



NELSON BAY GOLF CLUB

NELSON BAY, NSW AUSTRALIA

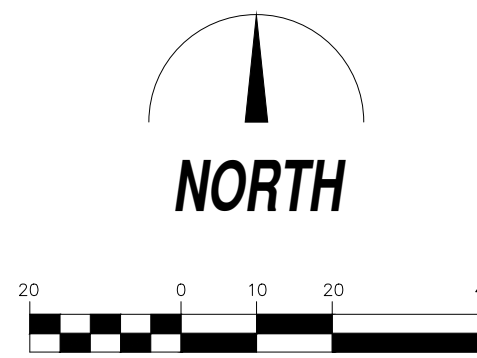
IRRIGATION DESIGN DOCUMENTS

NOVEMBER 2020

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DESIGN NOTES

1. UTILITIES ARE NOT LOCATED ON THE IRRIGATION PLANS. THE IRRIGATION INSTALLER SHALL REPAIR ALL UTILITIES DAMAGED DUE TO HIS WORK AT NO ADDITIONAL COST TO THE OWNER.
2. LOCATIONS OF ELEMENTS ON THE DRAWINGS ARE SCHEMATIC. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE INSTALLER. PIPE LINES DRAWN SIDE BY SIDE MAY BE Laid IN THE SAME TRENCH. SOME PIPE LOCATIONS ARE DRAWN OFFSET TO CLEARLY SHOW THE INTENDED PIPE ROUTING. IT SHALL BE THE RESPONSIBILITY OF THE IRRIGATION INSTALLER TO LOCATE AND INSTALL THE SYSTEM IN A LOGICAL MANNER.
3. THE CONTRACTOR SHALL ADJUST THE IRRIGATION CONTROL SYSTEM, SPRINKLER ARC, AND NOZZLE ADJUSTMENTS TO PROVIDE THE MOST BALANCED AND EFFICIENT WATER DISTRIBUTION.
4. INSTALL WIRES BESIDE IRRIGATION PIPE LINES WITH 1 METER LOOP EVERY 100 METERS FOR EXPANSION.
5. CONTRACTOR SHALL PROVIDE 3 YEAR OF MANUFACTURER SUPPORT (JSP OR NEN) AS PART OF THIS CONTRACT.
6. 3M DBYR SPIRE KITS AT HEADS.
7. PROVIDE 60 CM EXPANSION COIL AT EACH CONTROL WIRE SPIRE.
8. NO VALVE BOXES ARE TO BE INSTALLED IN ANY FAIRWAYS. CONTRACTOR IS TO VERIFY THE LOCATION OF VALVE BOXES PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL GREENS, BUNKERS, TEES, MAINLINE AND ANY OTHER RELEVANT ITEMS IN RELATION TO THE IRRIGATION SYSTEM AND SHALL NOTIFY THE IRRIGATION CONSULTANT IF THERE ARE ANY ITEMS THAT DIFFER IN THE FIELD FROM WHAT IS SHOWN ON THE PLAN.
10. AT ALL BRIDGE AND STREAM CROSSINGS, CONTRACTOR SHALL INSTALL MAINLINE PIPE UNDERGROUND AND BENEATH THE WATER BODY BEING CROSSED.
11. ALL VALVES SHALL BE LOCATED OUT OF FAIRWAYS. CONFIRM LOCATIONS WITH PROJECT MANAGER PRIOR TO INSTALLATION.
12. ALL LATERAL BLOCK ZONES (LANDSCAPE ROTORS AND LANDSCAPE SPRAY ZONES IF UTILIZED) SHALL BE SIZED SO WATER VELOCITIES WITHIN THE PIPE DOES NOT EXCEED 5 M/S.
13. CONTRACTOR SHALL PROVIDE 2 REPAIR COUPLINGS FOR EACH SIZE PIPE INSTALLED ON THE PROJECT AND HAND THEM OVER TO THE OWNER PRIOR TO ISSUANCE OF PRACTICAL COMPLETION.
14. IF ANY POWER IS INSTALLED IN SAME TRENCH AS MAINLINE AND COMMUNICATION CABLE, KEEP 500MM DISTANCE MINIMUM BETWEEN THE POWER CABLE FROM OTHER CABLES.
15. CONTRACTOR SHALL SUBMIT PIPE TYPE TO BE INSTALLED. IF ALTERNATE STANDARD IS PROPOSED, CONTRACTOR SHALL PROVIDE ALTERNATE PRICING AND SHALL SUBMIT STANDARD AND MANUFACTURER DURING TENDER PROCESS FOR APPROVAL.
16. ALL MAINLINE LOCATIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO TRENCHING. VALVE LOCATIONS SHALL BE CONFIRMED PRIOR TO EXCAVATING.
17. FIELD ADJUSTMENTS WILL BE MADE IN THE FIELD TO ACCOMMODATE THE DESIGNER SITE ADJUSTMENTS. THE CONTRACTOR SHALL MAKE ADJUSTMENTS BASED ON THE DESIGN STANDARDS SHOWN AS PART OF THESE DOCUMENTS. ANY ADDITIONAL OR SUBTRACTIONS DUE TO SITE ADJUSTMENTS SHALL BE ADDRESSED BASED ON THE UNIT PRICES IN THE TENDER DOCUMENTS PROVIDED AS PART OF THE BID PROCESS.
18. REFER TO SPECIFICATIONS FOR PRE-APPROVED ALTERNATE MATERIALS IN LIEU OF THOSE SPECIFIED ON THE PLANS
19. SHIELDING WIRE SHALL BE AN ADD ALTERNATE AND NOT A PART OF BASE BID. IF SHIELDING WIRE IS UTILIZED, IT SHALL BE INSTALLED IN THE SAME TRENCH ONLY ALONG THE MAINLINES.
20. THE HYDRAULIC SYSTEM IS DESIGNED FOR NO MORE THEN 5,200LPM TO BE OPERATED AT ONE TIME THROUGHOUT THE 27 HOLES AND PRACTICE AREAS. NO MORE THEN 1200LPM SHALL OPERATE ON ANY 3 ADJACENT HOLES AT ONE TIME. AT NO TIME SHOULD MORE HEADS BE OPERATED THEN THE PUMP STATION IS CAPABLE OF PROVIDING.
21. THE DESIGN IS BASED ON A 9 HOUR WATERING WINDOW.
22. THE CONTRACTOR SHALL VERIFY THAT THE PUMP STATION IS CAPABLE OF PROVIDED A FULL RANGE OF FLOWS FROM 0.5,200 LPM WHILE MAINTAINING CONSTANT DISCHARGE PRESSURE OF 35 METER HEAD AT ALL TIMES. PUMP STATION SHALL FUNCTION AS PRESSURE DEMAND TO SENSE WHEN MAINLINE PRESSURE DROPS FOR PUMP STATION TO OPERATE.
23. PRESSURE REGULATORS IN THE SOLENOID VALVES SHALL BE SET TO 60 PSI. USE FLOW CONTROL TO CREATE HYDRAULIC PRESSURE REDUCER IN ADDITION TO PRESSURE REGULATOR.
24. CONTRACTOR SHALL MAINTAIN THE EXISTING IRRIGATION SYSTEM SO IT REMAINS FULLY OPERATIONAL FOR ALL AREAS OUTSIDE OF CONSTRUCTION DURING THE PHASING OF THE PROJECT. TEMPORARY REROUTING OF PIPES OR ADDITION OF ISOLATION VALVES AND CAPPING OF MAINLINES MAY BE REQUIRED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO TENDERING TO CONFIRM PHASING REQUIREMENTS. THE CONTRACTOR SHALL GET APPROVAL FROM THE CLUB ON ANY SHUTDOWN, RE-ROUTING OR ISOLATION OF THE EXISTING MAINLINE SYSTEM PRIOR TO COMMENCING ANY WORK.
25. DURING PUMP STATION CHANGEOVER, THE IRRIGATION SYSTEM SHALL NOT BE WITHOUT WATER FOR MORE THEN TWO DAYS FOR REMOVING THE OLD PUMP STATION AND INSTALLING THE NEW ONE WITHOUT APPROVAL OF THE CLUB. TEMPORARY PUMPS MAY BE REQUIRED AND THEY BE DEMED INCLUDED AS PART OF THE TENDER PRICE IF NOT EXPLICITLY IDENTIFIED AS OMITTED.
26. CONTRACTOR SHALL VERIFY BORES DO NOT PROVIDE PRESSURE EXCEEDING 50 METERS HEAD. IF BORES PROVIDE PRESSURE GREATER THEN THIS, THE BORE TRANSFER PIPE WILL NEED TO BE UPGRADED TO A HIGHER PRESSURE RATING. IMMEDIATELY NOTIFY THE PROJECT MANAGER IF BORE OUTPUT PRESSURE EXCEEDS 50 METER HEAD.
27. THE CONTRACTOR SHALL PLAN ON INSTALLING THE NEW PUMP STATION AND CONNECT TO EXISTING IRRIGATION TANKS FIRST. A NEW PUMP HOUSE SHALL BE PROVIDED AND THE CONSTRUCTION SHALL BE INCLUDED AS PART OF THE CONTRACTORS TENDER. THE CONTRACTOR SHALL PROVIDE A CONNECTION BETWEEN THE NEW PUMP STATION AND THE EXISTING IRRIGATION MAINLINE AS SHOWN ON THE PLANS. THE MAINLINE SHALL THEN BE INSTALLED OUT FROM THE IRRIGATION PUMP STATION TAKING INTO ACCOUNT LOGICAL SECTIONS WHERE THE EXISTING SYSTEM CAN BE ISOLATED OFF. ALL FAIRWAYS, GREENS AND THE WORK SHALL OCCUR ON A HOLE BY HOLE BASIS TO ALLOW THE COURSE TO MAINTAIN FULL GOLF OPERATIONS WITH 1 TEMPORARY HOLE THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL ALLOW TIME PRIOR TO SUBMITTING THEIR TENDER TO MAKE THEMSELVES FULLY AWARE OF THE SITE CONDITIONS AND SHALL ALLOW FOR ALL COSTS ASSOCIATED WITH MAINTAINING THE EXISTING SYSTEM AS NECESSARY SO ALL AREAS HAVE ACCESS TO WATER WITHOUT A DOWN PERIOD OF MORE THEN 7 DAYS. THESE COSTS SHALL ALL BE INCLUDED AS PART OF BASE TENDER.
28. THE CONTRACTOR SHALL PROVIDE TEMPORARY COMMUNICATION CABLE ROUTINGS AT NO ADDITIONAL COST DURING CONSTRUCTION TO ALLOW FOR FULL AUTOMATION OF NEW INSTALLATION AS EACH HOLE IS COMPLETED.
29. CONTRACTOR SHALL PROVIDE BORE MAINLINE DISCHARGE TO THE SECONDARY IRRIGATION TANK AND ALSO TO THE IRRIGATION POND. THE DIRECTION OF FLOW SHALL BE CONTROLLED VIA MANUAL GATE VALVE AS SHOWN ON THE PLAN. INCLUDE ALL FITTINGS AND SUPPORT FOR PROVIDING DISCHARGE TO IRRIGATION TANK PER TANK MANUFACTURERS REQUIREMENTS.

IRRIGATION LEGEND

- ⑦ FULL CIRCLE VHS SPRINKLER ROTOR WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER. REFER TO DETAIL. (REFER TO CHART FOR NOZZLE)
- ⑧ PART CIRCLE VHS SPRINKLER ROTOR WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER. REFER TO DETAIL. (REFER TO CHART FOR NOZZLE)
- 25 MM BSP THREADED QUICK COUPLER VALVE (RAINBIRD SRC OR TORO TORO-474-00) WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER (TSJ-15-A-10-12-4-10-B FOR TORO OR J-B-0-1-3-2 FOR RAINBIRD WITH 40MM MALE ACME X 25MM FEMALE ACME REDUCING ADAPTOR ON INLET). PROVIDE ONE KEY ASSEMBLY (RAINBIRD 55K-1 OR TORO 464-01 AND 477-02) W/ HOSE SWIVEL PER 10 QUICK COUPLERS INSTALLED.
- ✕ ISOLATION VALVE. FOR MAINLINE ISOLATION VALVES, UTILIZE LEECMCO DLMV-BIH055-13.0 SERIES. SIZE PER MAINLINE SIZE. FOR SUBMAINLINE VALVES, UTILIZE LEECMCO LV-263H055-13.6 WITH RSLS SADDLE SIZED TO MAINLINE SIZE.
- 15" INSTALL CRISPIN UL20 DUAL AIR RELEASE VALVES (OR EQUAL) AT HIGH POINTS IN VALVE BOX LOCATIONS SHOWN ON PLAN ARE SCHEMATIC. FINAL LOCATIONS TO BE APPROVED BY PROJECT SUPERINTENDENT.
- ⑨ RISER STUBOUT FOR SPARE PIPE. PROVIDE 50CM OF PIPE ATTACHED TO 50CM SQUARE POST AND CAP FOR FUTURE CLUB USE.
- SPARE PIPE. 40MM UNLESS INDICATED OTHERWISE. PNB AS/NZS 4130 PE 100, SDR21 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM
- 200MM BORE TRANSFER PIPE. PNB 3 AS/NZS 4130 PE 100, SDR26 PE PIPE. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM
- PE PNB 1.5 AS/NZS 4130 PE 100, SDR13.6 MAINLINE PIPE WITH WITH SDR 11 BUTTWELD FITTINGS. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM. SIZE AS SHOWN.
- 63MM PNB 1.5 AS/NZS 4130 PE 100, SDR13.6 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM
- 15" FLOODED SUCTION VERTICAL MULTISTAGE IRRIGATION PUMP STATION. PUMP STATION SHALL BE CAPABLE OF PRODUCING 5,200 LPM AT 95 METER HEAD AT THE POINT OF DISCHARGE. PUMP STATION SHALL CONNECT TO EXISTING TANK DISCHARGE VIA FLANGE CONNECTION. PROVIDE NEW MANIFOLD BUTTERFLY ISOLATION VALVE ON INTAKE SIDE. PROVIDE CONNECTIONS TO ONE PRESSURE MAINTENANCE PUMP CAPABLE OF PROVIDING 200LPM AND THREE MAIN PUMPS, EACH CAPABLE OF FLOWS OF 0.1,733 LPM. ALL PUMPS SHALL HAVE BUTTERFLY VALVES ON INTAKE AND GROOVED ISOLATION BUTTERFLY VALVE ON DISCHARGE SIDE. DISCHARGE MANIFOLD SHALL CONTAIN A PRESSURE RELIEF VALVE AND AIR RELIEF VALVE. PROVIDE AUTOMATIC WYE FILTER WITH 300 MICRON SCREEN AND DISCHARGE TO LAKE. DISCHARGE MANIFOLD SHALL CONNECT TO 355MM PE PIPE WITH FLANGED CONNECTION. PUMP STATION SHALL BE CONTROLLED BY NEW PLC WITH VFD WHICH SHALL FUNCTION ACROSS THE LINE. PUMP STATION SHALL BE CAPABLE OF HANDLING FLOWS FROM 0.5,200 LPM WHILE MAINTAINING CONSTANT PRESSURE OF 95 METER AT THE POINT OF DISCHARGE. PROVIDE ALL POWER AND ELECTRICAL CONNECTIONS PER LOCAL CODE WITH QUALIFIED ELECTRICAL CONTRACTOR. CONTRACTOR SHALL VERIFY THAT THE POWER IS ACCEPTABLE ON SITE PRIOR TO COMMENCING WORK.
- 14AWG COMMUNICATION CABLE - INSTALL ALONGSIDE MAINLINE FOR PROTECTION OR IN CONDUIT IF AWAY FROM MAINLINE. FOR RAINBIRD SYSTEM, UTILIZE P7872D CABLE AND CONNECT WIREPATHS TO NEW IC-1500 WITH TWO MOTHER BOARDS ADJACENT TO CENTRAL COMPUTER. FOR TORO SYSTEM, UTILIZE PAGE P7355D CABLE AND CONNECT WIREPATHS TO TWO DEC-45-1000-M LOCATED NEXT TO FIU AND CENTRAL COMPUTER. CONNECT TO CENTRAL GROUNDING PER DETAIL.
- RAINBIRD ICM WITH ICM-A VALVE ADAPTOR CONNECTED TO 100-PEB-PRSD SOLENOID VALVE. FOR TORO, UTILIZE TORO LSM-1 WITH P220-27-94 VALVE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- RAINBIRD ICD OR TORO DEC-5G-LINE SURGE DEVICE WITH GROUNDING ROD IN 200MM ROUND VALVE BOX - REFER TO DETAIL. PROVIDE GROUND PLATE AS AN ADD ALTERNATE PRICE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- FOR RAINBIRD, UPGRADE THE EXISTING CENTRAL COMPUTER TO CURRENT RAINBIRD STRATUS 2 CONTROL SYSTEM WITH MAXI SURGE PROTECTOR (MSP-1) AND MAXI GROUND PLATE (MGP-1) AT CENTRAL CONTROLLER. INCLUDE 1 LG-3502 WITH TWO BRIVER BANDS. INCLUDE KEYCODES FOR EXTRA WIREPATHS. FOR TORO SYSTEM, PROVIDE NEW LYNX CENTRAL COMPUTER (LX-1-1-8) WITH FIU-200X AND TWO WALL MOUNTED DEC-85-1000-M. FOR BOTH SYSTEMS, PROVIDE GROUNDING PER MANUFACTURER RECOMMENDATIONS AND AN UNINTERRUPTED POWER SUPPLY (UPS) WITH "PURE SINE WAVE" SIGNAL FOR THE COMPUTER AND INTERFACE (APC MODEL SMART-UPS 1500 OR EQUAL).

GOLF ROTORS

INCLUDE ONE LEECMCO RSST-6315A PER HEAD AND SWING JOINT MODEL INDICATED.

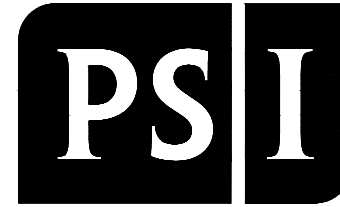
- ③ TORO FLX35-308-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-22 WITH J-E-0-1-R-3
- ④ TORO FLX35-318-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-28 WITH J-E-0-1-R-3
- ⑤ TORO FLX35-328-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-32 WITH J-E-0-1-R-3
- ⑥ TORO FLX35-338-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-36 WITH J-E-0-1-R-3
- ⑦ TORO FLX35-358-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-40 WITH J-E-0-1-R-3
- ⑧ TORO FLX34-318-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-28 WITH J-E-0-1-R-3
- ⑨ TORO FLX34-328-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-28 WITH J-E-0-1-R-3
- ⑩ TORO FLX34-338-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-40 WITH J-E-0-1-R-3
- ⑪ TORO FLX34-348-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-48 WITH J-E-0-1-R-3
- TORO T7P-SS-42L, #3 NOZZLE WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-551-B-80-52 WITH J-B-0-1-3-3 AND 40MM MALE ACME X 25MM FEMALE ACME REDUCING ADAPTOR ON INLET

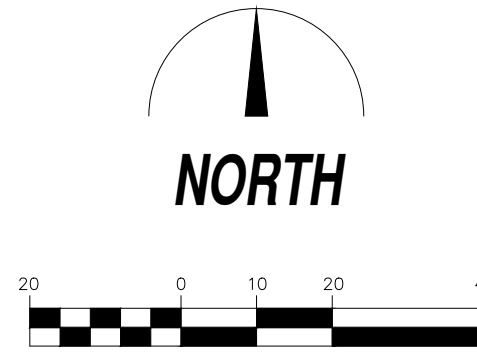
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REV.	DATE	DESCRIPTION

PROJECT
NELSON BAY GOLF COURSE RENOVATION
NELSON BAY, NSW, AUSTRALIA

TITLE
IRRIGATION HYDRAULIC PLAN
(SHEET 1 OF 2)

Designed By JRS	Job No.
Checked By JRS	Scale 1:1000
Drawn By JRS	Drawing No. IR-101
Date of Issue 11/20	Rev.





DESIGN NOTES

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2. LOCATIONS OF ELEMENTS ON THE DRAWINGS ARE SCHEMATIC. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE INSTALLER. PIPE LINES DRAWN SIDE BY SIDE MAY BE Laid IN THE SAME TRENCH. SOME PIPE LOCATIONS ARE DRAWN OFFSET TO CLEARLY SHOW THE INTENDED PIPE ROUTING. IT SHALL BE THE RESPONSIBILITY OF THE IRRIGATION INSTALLER TO LOCATE AND INSTALL THE SYSTEM IN A LOGICAL MANNER.
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4. INSTALL WIRES BESIDE IRRIGATION PIPE LINES WITH 1 METER LOOP EVERY 100 METERS FOR EXPANSION.
5. CONTRACTOR SHALL PROVIDE 1 YEAR OF MANUFACTURER SUPPORT (JSP OR NEN) AS PART OF THIS CONTRACT.
6. USE 3M DBYR SPICE KITS AT HEADS.
7. PROVIDE 60 CM EXPANSION COIL AT EACH CONTROL WIRE SPICE.
8. NO VALVE BOXES ARE TO BE INSTALLED IN ANY FAIRWAYS. CONTRACTOR IS TO VERIFY THE LOCATION OF VALVE BOXES PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL GREENS, BUNKERS, TEES, MAINLINE AND ANY OTHER RELEVANT ITEMS IN RELATION TO THE IRRIGATION SYSTEM AND SHALL NOTIFY THE IRRIGATION CONSULTANT IF THERE ARE ANY ITEMS THAT DIFFER IN THE FIELD FROM WHAT IS SHOWN ON THE PLAN.
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19. SHELING WIRE SHALL BE AN ADD ALTERNATE AND NOT A PART OF BASE BID. IF SHELING WIRES IS UTILIZED, IT SHALL BE INSTALLED IN THE SAME TRENCH ONLY ALONG THE MAINLINES.
20. THE HYDRAULIC SYSTEM IS DESIGNED FOR NO MORE THEN 5,200LPM TO BE OPERATED AT ONE TIME THROUGHOUT THE 27 HOLES AND PRACTICE AREAS. NO MORE THEN 1200LPM SHALL OPERATE ON ANY 3 ADJACENT HOLES AT ONE TIME. AT NO TIME SHOULD MORE HEADS BE OPERATED THEN THE PUMP STATION IS CAPABLE OF PROVIDING.
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IRRIGATION LEGEND

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- 200MM BORE TRANSFER PIPE. PNB.3 AS/NZS 4130 PE 100, SDR26 PE PIPE. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM
- PE PNB1.5 AS/NZS 4130 PE 100, SDR13.6 MAINLINE PIPE WITH WITH SDR 11 BUTTWELD FITTINGS. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM. SIZE AS SHOWN.
- 63MM PNB1.5 AS/NZS 4130 PE 100, SDR13.6 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM
- 15A FLOODED SUCTION VERTICAL MULTISTAGE IRRIGATION PUMP STATION. PUMP STATION SHALL BE CAPABLE OF PRODUCING 5,200 LPM AT 95 METER HEAD AT THE POINT OF DISCHARGE. PUMP STATION SHALL CONNECT TO EXISTING TANK DISCHARGE VIA FLANGE CONNECTION. PROVIDE NEW MANFOLD BUTTERFLY ISOLATION VALVE ON INTAKE SIDE. PROVIDE CONNECTIONS TO ONE PRESSURE MAINTENANCE PUMP CAPABLE OF PROVIDING 200LPM AND THREE MAIN PUMPS, EACH CAPABLE OF FLOWS OF 0.1-733 LPM. ALL PUMPS SHALL HAVE BUTTERFLY VALVES ON INTAKE AND GROOVED ISOLATION BUTTERFLY VALVE ON DISCHARGE SIDE. DISCHARGE MANFOLD SHALL CONTAIN A PRESSURE RELIEF VALVE AND AIR RELIEF VALVE. PROVIDE AUTOMATIC WYE FILTER WITH 300 MICRON SCREEN AND DISCHARGE TO LAKE. DISCHARGE MANFOLD SHALL CONNECT TO 250MM PE PIPE WITH FLANGED CONNECTION. PUMP STATION SHALL BE CONTROLLED BY NEW PLC WITH VFD WHICH SHALL FUNCTION ACROSS THE LINE. PUMP STATION SHALL BE CAPABLE OF HANDLING FLOWS FROM 0.5-200 LPM WHILE MAINTAINING CONSTANT PRESSURE OF 95 METER AT THE POINT OF DISCHARGE. PROVIDE ALL POWER AND ELECTRICAL CONNECTIONS PER LOCAL CODE WITH QUALIFIED ELECTRICAL CONTRACTOR. CONTRACTOR SHALL VERIFY THAT THE POWER IS ACCEPTABLE ON SITE PRIOR TO COMMENCING WORK.
- 14AWG COMMUNICATION CABLE - INSTALL ALONGSIDE MAINLINE FOR PROTECTION OR IN CONDUIT IF AWAY FROM MAINLINE. FOR RAINBIRD SYSTEM, UTILIZE P7822D CABLE AND CONNECT WIREPATHS TO NEW IC-1500 WITH TWO MOTHER BOARDS ADJACENT TO CENTRAL COMPUTER. FOR TORO SYSTEM, UTILIZE PAGE P7350D CABLE AND CONNECT WIREPATHS TO TWO DEC-65-1000-M LOCATED NEXT TO FIU AND CENTRAL COMPUTER. CONNECT TO CENTRAL GROUNDING PER DETAIL.
- 2 RAINBIRD ICM WITH ICMA VALVE ADAPTOR CONNECTED TO 100-PB-P8SD SOLENOID VALVE. FOR TORO, UTILIZE TORO LSM-1 WITH P220-27-94 VALVE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- ⑥ RAINBIRD ICSD OR TORO DEC-5G-LINE SURGE DEVICE WITH GROUNDING ROD IN 200MM ROUND VALVE BOX - REFER TO DETAIL. PROVIDE GROUND PLATE AS AN ADD ALTERNATE PRICE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- 15B FOR RAINBIRD, UPGRADE THE EXISTING CENTRAL COMPUTER TO CURRENT RAINBIRD STRATUS 2 CONTROL SYSTEM WITH MAXI SURGE PROTECTOR (MSP-1) AND MAXI GROUND PLATE (MGP-1) AT CENTRAL CONTROLLER. INCLUDE 1 IC-1500 WITH TWO DRIVER BOARDS. INCLUDE KEYCODES FOR EXTRA WIREPATHS. FOR TORO SYSTEM, PROVIDE NEW LYNX CENTRAL COMPUTER (LX-1-1-8) WITH FIU-200K AND TWO WALL MOUNTED DEC-85-1000-M. FOR BOTH SYSTEMS, PROVIDE GROUNDING PER MANUFACTURER RECOMMENDATIONS AND AN UNINTERRUPTED POWER SUPPLY (UPS) WITH "PURE SINE WAVE" SIGNAL FOR THE COMPUTER AND INTERFACE (APC MODEL SMART-UPS 1500 OR EQUAL).

GOLF ROTORS

INCLUDE ONE LEECMO RSST-6315A PER HEAD AND SWING JOINT MODEL INDICATED.

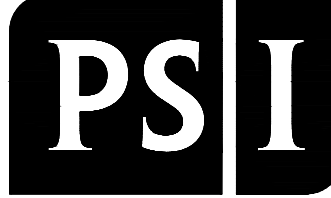
- ④ TORO FLX35-308-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-22 WITH J-E-0-1-R-3
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0	11/20	FOR TENDER
REV.	DATE	DESCRIPTION

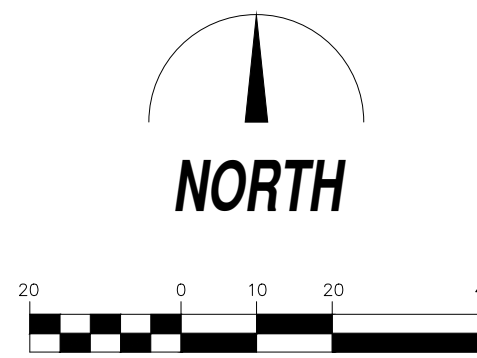
PROJECT
NELSON BAY GOLF COURSE RENOVATION
NELSON BAY, NSW, AUSTRALIA

TITLE
IRRIGATION HYDRAULIC PLAN
(SHEET 2 OF 2)

Designed By JRS	Job No.
Checked By JRS	Scale 1:1000
Drawn By JRS	Drawing No. IR-102
Date of Issue 11/20	Rev. 11/20



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An Irrigation Design Company
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DESIGN NOTES

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2. LOCATIONS OF ELEMENTS ON THE DRAWINGS ARE SCHEMATIC. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE INSTALLER. PIPE LINES DRAWN SIDE BY SIDE MAY BE Laid IN THE SAME TRENCH. SOME PIPE LOCATIONS ARE DRAWN OFFSET TO CLEARLY SHOW THE INTENDED PIPE ROUTING. IT SHALL BE THE RESPONSIBILITY OF THE IRRIGATION INSTALLER TO LOCATE AND INSTALL THE SYSTEM IN A LOGICAL MANNER.
3. THE CONTRACTOR SHALL ADJUST THE IRRIGATION CONTROL SYSTEM, SPRINKLER ARC, AND NOZZLE ADJUSTMENTS TO PROVIDE THE MOST BALANCED AND EFFICIENT WATER DISTRIBUTION.
4. INSTALL WIRES BESIDE IRRIGATION PIPE LINES WITH 1 METER LOOP EVERY 100 METERS FOR EXPANSION.
5. CONTRACTOR SHALL PROVIDE 1 YEAR OF MANUFACTURER SUPPORT (JSP OR NEN) AS PART OF THIS CONTRACT.
6. USE 3M DRYER SPIKE KITS AT HEADS.
7. PROVIDE 60 CM EXPANSION COIL AT EACH CONTROL WIRE SPIRCE.
8. NO VALVE BOXES ARE TO BE INSTALLED IN ANY FAIRWAYS. CONTRACTOR IS TO VERIFY THE LOCATION OF VALVE BOXES PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL GREENS, BUNKERS, TEES, MAINLINE AND ANY OTHER RELEVANT ITEMS IN RELATION TO THE IRRIGATION SYSTEM AND SHALL NOTIFY THE IRRIGATION CONSULTANT IF THERE ARE ANY ITEMS THAT DIFFER IN THE FIELD FROM WHAT IS SHOWN ON THE PLAN.
10. AT ALL BRIDGE AND STREAM CROSSINGS, CONTRACTOR SHALL INSTALL MAINLINE PIPE UNDERGROUND AND BENEATH THE WATER BODY BEING CROSSED.
11. ALL VALVES SHALL BE LOCATED OUT OF FAIRWAYS. CONFIRM LOCATIONS WITH PROJECT MANAGER PRIOR TO INSTALLATION.
12. ALL LATERAL BLOCK ZONES (LANDSCAPE ROTORS AND LANDSCAPE SPRAY ZONES IF UTILIZED) SHALL BE SIZED SO WATER VELOCITIES WITHIN THE PIPE DOES NOT EXCEED 1.5 M/S.
13. CONTRACTOR SHALL PROVIDE 2 REPAIR COUPLINGS FOR EACH SIZE PIPE INSTALLED ON THE PROJECT AND HAND THEM OVER TO THE OWNER PRIOR TO ISSUANCE OF PRACTICAL COMPLETION.
14. IF ANY POWER IS INSTALLED IN SAME TRENCH AS MAINLINE AND COMMUNICATION CABLE, KEEP 500MM DISTANCE MINIMUM BETWEEN THE POWER CABLE FROM OTHER CABLES.
15. CONTRACTOR SHALL SUBMIT PIPE TYPE TO BE INSTALLED. IF ALTERNATE STANDARD IS PROPOSED, CONTRACTOR SHALL PROVIDE ALTERNATE PRICING AND SHALL SUBMIT STANDARD AND MANUFACTURER DURING TENDER PROCESS FOR APPROVAL.
16. ALL MAINLINE LOCATIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO TRENCHING. VALVE LOCATIONS SHALL BE CONFIRMED PRIOR TO EXCAVATING.
17. FIELD ADJUSTMENTS WILL BE MADE IN THE FIELD TO ACCOMMODATE THE DESIGNER SITE ADJUSTMENTS. THE CONTRACTOR SHALL MAKE ADJUSTMENTS BASED ON THE DESIGN STANDARDS SHOWN AS PART OF THESE DOCUMENTS. ANY ADJUSTMENTS OR SUBSTITUTIONS DUE TO SITE ADJUSTMENTS SHALL BE ADDRESSED BASED ON THE UNIT PRICES IN THE TENDER DOCUMENTS PROVIDED AS PART OF THE BID PROCESS.
18. REFER TO SPECIFICATIONS FOR PRE-APPROVED ALTERNATE MATERIALS IN LIEU OF THOSE SPECIFIED ON THE PLANS
19. SHIELDING WIRE SHALL BE AN ADD ALTERNATE AND NOT A PART OF BASE BID. IF SHIELDING WIRE IS UTILIZED, IT SHALL BE INSTALLED IN THE SAME TRENCH ONLY ALONG THE MAINLINES.
20. THE HYDRAULIC SYSTEM IS DESIGNED FOR NO MORE THEN 5,200LPM TO BE OPERATED AT ONE TIME THROUGHOUT THE 27 HOLES AND PRACTICE AREAS. NO MORE THEN 1200LPM SHALL OPERATE ON ANY 3 ADJACENT HOLES AT ONE TIME. AT NO TIME SHOULD MORE HEADS BE OPERATED THEN THE PUMP STATION IS CAPABLE OF PROVIDING.
21. THE DESIGN IS BASED ON A 9 HOUR WATERING WINDOW.
22. THE CONTRACTOR SHALL VERIFY THAT THE PUMP STATION IS CAPABLE OF PROVIDED A FULL RANGE OF FLOWS FROM 0.5,200 LPM WHILE MAINTAINING CONSTANT DISCHARGE PRESSURE OF 35 METER HEAD AT ALL TIMES. PUMP STATION SHALL FUNCTION AS PRESSURE DEMAND TO SENSE WHEN MAINLINE PRESSURE DROPS FOR PUMP STATION TO OPERATE.
23. PRESSURE REGULATORS IN THE SOLENOID VALVES SHALL BE SET TO 60 PSI. USE FLOW CONTROL TO CREATE HYDRAULIC PRESSURE REDUCER IN ADDITION TO PRESSURE REGULATOR.
24. CONTRACTOR SHALL MAINTAIN THE EXISTING IRRIGATION SYSTEM SO IT REMAINS FULLY OPERATIONAL FOR ALL AREAS OUTSIDE OF CONSTRUCTION DURING THE PHASING OF THE PROJECT. TEMPORARY REROUTING OF PIPES OR ADDITION OF ISOLATION VALVES AND CAPPING OF MAINLINES MAY BE REQUIRED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO TENDERING TO CONFIRM PHASING REQUIREMENTS. THE CONTRACTOR SHALL GET APPROVAL FROM THE CLUB ON ANY SHUTDOWN, RE-ROUTING OR ISOLATION OF THE EXISTING MAINLINE SYSTEM PRIOR TO COMMENCING ANY WORK.
25. DURING PUMP STATION CHANGEOVER, THE IRRIGATION SYSTEM SHALL NOT BE WITHOUT WATER FOR MORE THEN TWO DAYS FOR REMOVING THE OLD PUMP STATION AND INSTALLING THE NEW ONE WITHOUT APPROVAL OF THE CLUB. TEMPORARY PUMPS MAY BE REQUIRED AND SHALL BE DEMOED INCLUDED AS PART OF THE TENDER PRICE IF NOT EXPLICITLY IDENTIFIED AS OMITTED.
26. CONTRACTOR SHALL VERIFY BORES DO NOT PROVIDE PRESSURE EXCEEDING 50 METERS HEAD. IF BORES PROVIDE PRESSURE GREATER THEN THIS, THE BORE TRANSFER PIPE WILL NEED TO BE UPGRADED TO A HIGHER PRESSURE RATING. IMMEDIATELY NOTIFY THE PROJECT MANAGER IF BORE OUTPUT PRESSURE EXCEEDS 50 METER HEAD.
27. THE CONTRACTOR SHALL PLAN ON INSTALLING THE NEW PUMP STATION AND CONNECT TO EXISTING IRRIGATION TANKS FIRST. A NEW PUMP HOUSE SHALL BE PROVIDED AND THE CONSTRUCTION STYLE SHALL BE INCLUDED AS PART OF THE CONTRACTORS TENDER. THE CONTRACTOR SHALL PROVIDE A CONNECTION BETWEEN THE NEW PUMP STATION AND THE EXISTING IRRIGATION MAINLINE AS SHOWN ON THE PLANS. THE MAINLINE SHALL THEN BE INSTALLED OUT FROM THE IRRIGATION PUMP STATION TAKING INTO ACCOUNT LOGICAL SECTIONS WHERE THE EXISTING SYSTEM CAN BE ISOLATED OFF. ALL FAIRWAYS, GREENS AND THE WORK SHALL OCCUR ON A HOLE BY HOLE BASIS TO ALLOW THE COURSE TO MAINTAIN FULL GOLF OPERATIONS WITH 1 TEMPORARY HOLE THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL ALLOW TIME PRIOR TO SUBMITTING THEIR TENDER TO MAKE THEMSELVES FULLY AWARE OF THE SITE CONDITIONS AND SHALL ALLOW FOR ALL COSTS ASSOCIATED WITH MAINTAINING THE EXISTING SYSTEM AS NECESSARY SO ALL AREAS HAVE ACCESS TO WATER WITHOUT A DOWN PERIOD OF MORE THEN 7 DAYS. THESE COSTS SHALL ALL BE INCLUDED AS PART OF BASE TENDER.
28. THE CONTRACTOR SHALL PROVIDE TEMPORARY COMMUNICATION CABLE ROUTINGS AT NO ADDITIONAL COST DURING CONSTRUCTION TO ALLOW FOR FULL AUTOMATION OF NEW INSTALLATION AS EACH HOLE IS COMPLETED.
29. CONTRACTOR SHALL PROVIDE BORE MAINLINE DISCHARGE TO THE SECONDARY IRRIGATION TANK AND ALSO TO THE IRRIGATION POND. THE DIRECTION OF FLOW SHALL BE CONTROLLED VIA MANUAL GATE VALVE AS SHOWN ON THE PLAN. INCLUDE ALL FITTINGS AND SUPPORT FOR PROVIDING DISCHARGE TO IRRIGATION TANK PER TANK MANUFACTURERS REQUIREMENTS.

IRRIGATION LEGEND

- ⑦ FULL CIRCLE VHS SPRINKLER ROTOR WITH LEEMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER. REFER TO DETAIL. (REFER TO CHART FOR NOZZLE)
- ⑧ PART CIRCLE VHS SPRINKLER ROTOR WITH LEEMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER. REFER TO DETAIL. (REFER TO CHART FOR NOZZLE)
- 25 MM BSP THREADED QUICK COUPLER VALVE (RAINBIRD SRC OR TORO TORO-474-00) WITH LEEMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER (TSJ-15-A-10-12-4-10-B FOR TORO OR J-B-0-1-3-2 FOR RAINBIRD WITH 40MM MALE ACME X 25MM FEMALE ACME REDUCING ADAPTOR ON INLET). PROVIDE ONE KEY ASSEMBLY (RAINBIRD 55K-1 OR TORO 464-01 AND 477-02) W/ HOSE SWIVEL PER 10 QUICK COUPLERS INSTALLED.
- ✂ ISOLATION VALVE. FOR MAINLINE ISOLATION VALVES, UTILIZE LEEMCO DLMV-BIH055-13.6 SERIES. SIZE PER MAINLINE SIZE. FOR SUBMAINLINE VALVES, UTILIZE LEEMCO LV-26H055-13.6 WITH RSLS SADDLE SIZED TO MAINLINE SIZE.
- 15 INSTALL CRISPIN UL20 DUAL AIR RELEASE VALVES (OR EQUAL) AT HIGH POINTS IN VALVE BOX. LOCATIONS SHOWN ON PLAN ARE SCHEMATIC. FINAL LOCATIONS TO BE APPROVED BY PROJECT SUPERINTENDENT.
- ⑨ RISER STUBOUT FOR SPARE PIPE. PROVIDE 50CM OF PIPE ATTACHED TO 50CM SQUARE POST AND CAP FOR FUTURE CLUB USE.
- SPARE PIPE. 40MM UNLESS INDICATED OTHERWISE. PNB AS/NZS 4130 PE 100, SDR21 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM.
- 200MM BORE TRANSFER PIPE. PNB.3 AS/NZS 4130 PE 100, SDR26 PE PIPE. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM.
- PE PN12.5 AS/NZS 4130 PE 100, SDR13.6 MAINLINE PIPE WITH WITH SDR 11 BUTTWELD FITTINGS. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM. SIZE AS SHOWN.
- 63MM PN12.5 AS/NZS 4130 PE 100, SDR13.6 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM.
- 15A FLOODED SUCTION VERTICAL MULTISTAGE IRRIGATION PUMP STATION. PUMP STATION SHALL BE CAPABLE OF PRODUCING 5,200 LPM AT 95 METER HEAD AT THE POINT OF DISCHARGE. PUMP STATION SHALL CONNECT TO EXISTING TANK DISCHARGE VIA FLANGE CONNECTION. PROVIDE NEW MANIFOLD BUTTERFLY ISOLATION VALVE ON INTAKE SIDE. PROVIDE CONNECTIONS TO ONE PRESSURE MAINTENANCE PUMP CAPABLE OF PROVIDING 200LPM AND THREE MAIN PUMPS, EACH CAPABLE OF FLOWS OF 0.1,733 LPM. ALL PUMPS SHALL HAVE BUTTERFLY VALVES ON INTAKE AND GROOVED ISOLATION BUTTERFLY VALVE ON DISCHARGE SIDE. DISCHARGE MANIFOLD SHALL CONTAIN A PRESSURE RELIEF VALVE AND AIR RELIEF VALVE. PROVIDE AUTOMATIC WYE FILTER WITH 300 MICRON SCREEN AND DISCHARGE TO LAKE. DISCHARGE MANIFOLD SHALL BE CONNECTED TO 335MM PE PIPE WITH FLANGED CONNECTION. PUMP STATION SHALL BE CONTROLLED BY NEW PLC WITH VFD WHICH SHALL FUNCTION ACROSS THE LINE. PUMP STATION SHALL BE CAPABLE OF HANDLING FLOWS FROM 0.5,200 LPM WHILE MAINTAINING CONSTANT PRESSURE OF 95 METER AT THE POINT OF DISCHARGE. PROVIDE ALL POWER AND ELECTRICAL CONNECTIONS PER LOCAL CODE WITH QUALIFIED ELECTRICAL CONTRACTOR. CONTRACTOR SHALL VERIFY THAT THE POWER IS ACCEPTABLE ON SITE PRIOR TO COMMENCING WORK.
- 14AWG COMMUNICATION CABLE - INSTALL ALONGSIDE MAINLINE FOR PROTECTION OR IN CONDUIT IF AWAY FROM MAINLINE. FOR RAINBIRD SYSTEM, UTILIZE P7872D CABLE AND CONNECT WIREPATHS TO NEW IC-1500 WITH TWO MOTHER BOARDS ADJACENT TO CENTRAL COMPUTER. FOR TORO SYSTEM, UTILIZE PAGE P7355D CABLE AND CONNECT WIREPATHS TO TWO DEC-65-1000-M LOCATED NEXT TO FIU AND CENTRAL COMPUTER. CONNECT TO CENTRAL GROUNDING PER DETAIL.
- 2 RAINBIRD ICM WITH ICMA VALVE ADAPTOR CONNECTED TO 100-PEB-PRSD SOLENOID VALVE. FOR TORO, UTILIZE TORO LSM-1 WITH P220-27-94 VALVE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- ⑩ RAINBIRD ICSD OR TORO DEC-5G-LINE SURGE DEVICE WITH GROUNDING ROD IN 200MM ROUND VALVE BOX - REFER TO DETAIL. PROVIDE GROUND PLATE AS AN ADD ALTERNATE PRICE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- 15B FOR RAINBIRD, UPGRADE THE EXISTING CENTRAL COMPUTER TO CURRENT RAINBIRD STRATUS 2 CONTROL SYSTEM WITH MAXI SURGE PROTECTOR (MSP-1) AND MAXI GROUND PLATE (MGP-1) AT CENTRAL CONTROLLER. INCLUDE 1 LG-1500 WITH TWO DRIVER BOARDS. INCLUDE KEYCODES FOR EXTRA WIREPATHS. FOR TORO SYSTEM, PROVIDE NEW LYNX CENTRAL COMPUTER (LX-1-1-8) WITH FIU-200X AND TWO WALL MOUNTED DEC-85-1000-M. FOR BOTH SYSTEMS, PROVIDE GROUNDING PER MANUFACTURER RECOMMENDATIONS AND AN UNINTERRUPTED POWER SUPPLY (UPS) WITH "PURE SINE WAVE" SIGNAL FOR THE COMPUTER AND INTERFACE (APC MODEL SMART-UPS 1500 OR EQUAL).

GOLF ROTORS

INCLUDE ONE LEEMCO RSST-6315A PER HEAD AND SWING JOINT MODEL INDICATED.

- ④ TORO FLX35-308-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-22 WITH J-E-0-1-R-3
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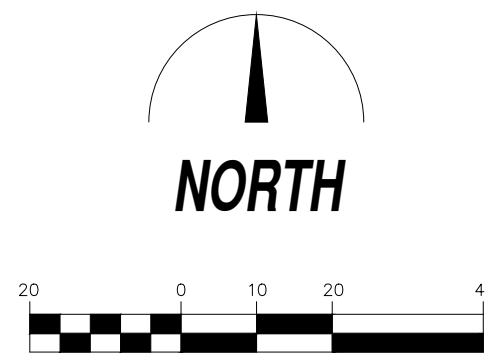
0	11/20	FOR TENDER
REV.	DATE	DESCRIPTION

PROJECT
NELSON BAY GOLF COURSE RENOVATION
NELSON BAY, NSW, AUSTRALIA

TITLE
RAINBIRD ELECTRICAL PLAN
(SHEET 1 OF 2)

Designed By JRS	Job No.
Checked By JRS	Scale 1:1000
Drawn By JRS	Drawing No. IR-201
Date of Issue 11/20	Rev.





DESIGN NOTES

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4. INSTALL WIRES BESIDE IRRIGATION PIPE LINES WITH 1 METER LOOP EVERY 100 METERS FOR EXPANSION.
5. CONTRACTOR SHALL PROVIDE 1 YEAR OF MANUFACTURER SUPPORT (JSP OR NEN) AS PART OF THIS CONTRACT.
6. 3M DBVR PIPE KITS AT HEADS.
7. PROVIDE 60 CM EXPANSION COIL AT EACH CONTROL WIRE SPIKE.
8. NO VALVE BOXES ARE TO BE INSTALLED IN ANY FAIRWAYS. CONTRACTOR IS TO VERIFY THE LOCATION OF VALVE BOXES PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL GREENS, BUNKERS, TEES, MAINLINE AND ANY OTHER RELEVANT ITEMS IN RELATION TO THE IRRIGATION SYSTEM AND SHALL NOTIFY THE IRRIGATION CONSULTANT IF THERE ARE ANY ITEMS THAT DIFFER IN THE FIELD FROM WHAT IS SHOWN ON THE PLAN.
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22. THE CONTRACTOR SHALL VERIFY THAT THE PUMP STATION IS CAPABLE OF PROVIDED A FULL RANGE OF FLOWS FROM 0.5, 200 LPM WHILE MAINTAINING CONSTANT DISCHARGE PRESSURE OF 35 METER HEAD AT ALL TIMES. PUMP STATION SHALL FUNCTION AS PRESSURE DEMAND TO SENSE WHEN MAINLINE PRESSURE DROPS FOR PUMP STATION TO OPERATE.
23. PRESSURE REGULATORS IN THE SOLENOID VALVES SHALL BE SET TO 60 PSI. USE FLOW CONTROL TO CREATE HYDRAULIC PRESSURE REDUCER IN ADDITION TO PRESSURE REGULATOR.
24. CONTRACTOR SHALL MAINTAIN THE EXISTING IRRIGATION SYSTEM SO IT REMAINS FULLY OPERATIONAL FOR ALL AREAS OUTSIDE OF CONSTRUCTION DURING THE PHASING OF THE PROJECT. TEMPORARY REROUTING OF PIPES OR ADDITION OF ISOLATION VALVES AND CAPPING OF MAINLINES MAY BE REQUIRED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO TENDERING TO CONFIRM PHASING REQUIREMENTS. THE CONTRACTOR SHALL GET APPROVAL FROM THE CLUB ON ANY SHUTDOWN, RE-ROUTING OR ISOLATION OF THE EXISTING MAINLINE SYSTEM PRIOR TO COMMENCING ANY WORK.
25. DURING PUMP STATION CHANGEOVER, THE IRRIGATION SYSTEM SHALL NOT BE WITHOUT WATER FOR MORE THEN TWO DAYS FOR REMOVING THE OLD PUMP STATION AND INSTALLING THE NEW ONE WITHOUT APPROVAL OF THE CLUB. TEMPORARY PUMPS MAY BE REQUIRED AND SHALL BE DEMO/INCLUDED AS PART OF THE TENDER PRICE IF NOT EXPLICITLY IDENTIFIED AS OMITTED.
26. CONTRACTOR SHALL VERIFY BORES DO NOT PROVIDE PRESSURE EXCEEDING 50 METERS HEAD. IF BORES PROVIDE PRESSURE GREATER THEN THIS, THE BORE TRANSFER PIPE WILL NEED TO BE UPGRADED TO A HIGHER PRESSURE RATING. IMMEDIATELY NOTIFY THE PROJECT MANAGER IF BORE OUTPUT PRESSURE EXCEEDS 50 METER HEAD.
27. THE CONTRACTOR SHALL PLAN ON INSTALLING THE NEW PUMP STATION AND CONNECT TO EXISTING IRRIGATION TANKS FIRST. A NEW PUMP HOUSE SHALL BE PROVIDED AND THE CONSTRUCTION STYLE SHALL BE INCLUDED AS PART OF THE CONTRACTORS TENDER. THE CONTRACTOR SHALL PROVIDE A CONNECTION BETWEEN THE NEW PUMP STATION AND THE EXISTING IRRIGATION MAINLINE AS SHOWN ON THE PLANS. THE MAINLINE SHALL THEN BE INSTALLED OUT FROM THE IRRIGATION PUMP STATION TAKING INTO ACCOUNT LOGICAL SECTIONS WHERE THE EXISTING SYSTEM CAN BE ISOLATED OFF. ALL FAIRWAYS, GREENS AND TEES WORK SHALL OCCUR ON A HOLE BY HOLE BASIS TO ALLOW THE COURSE TO MAINTAIN FULL GOLF OPERATIONS WITH 1 TEMPORARY HOLE THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL ALLOW TIME PRIOR TO SUBMITTING THEIR TENDER TO MAKE THEMSELVES FULLY AWARE OF THE SITE CONDITIONS AND SHALL ALLOW FOR ALL COSTS ASSOCIATED WITH MAINTAINING THE EXISTING SYSTEM AS NECESSARY SO ALL AREAS HAVE ACCESS TO WATER WITHOUT A DOWN PERIOD OF MORE THEN 7 DAYS. THESE COSTS SHALL ALL BE INCLUDED AS PART OF BASE TENDER.
28. THE CONTRACTOR SHALL PROVIDE TEMPORARY COMMUNICATION CABLE ROUTINGS AT NO ADDITIONAL COST DURING CONSTRUCTION TO ALLOW FOR FULL AUTOMATION OF NEW INSTALLATION AS EACH HOLE IS COMPLETED.
29. CONTRACTOR SHALL PROVIDE BORE MAINLINE DISCHARGE TO THE SECONDARY IRRIGATION TANK AND ALSO TO THE IRRIGATION POND. THE DIRECTION OF FLOW SHALL BE CONTROLLED VIA MANUAL GATE VALVE AS SHOWN ON THE PLAN. INCLUDE ALL FITTINGS AND SUPPORT FOR PROVIDING DISCHARGE TO IRRIGATION TANK PER TANK MANUFACTURERS REQUIREMENTS.

IRRIGATION LEGEND

- ⑦ FULL CIRCLE VHS SPRINKLER ROTOR WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER. REFER TO DETAIL. (REFER TO CHART FOR NOZZLE)
- ⑧ PART CIRCLE VHS SPRINKLER ROTOR WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER. REFER TO DETAIL. (REFER TO CHART FOR NOZZLE)
- 25 MM BSP THREADED QUICK COUPLER VALVE (RAINBIRD SRC OR TORO TORO-474-00) WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER (TSJ-15-A-10-12-4-10-B FOR TORO OR J-B-O-1-3-2 FOR RAINBIRD WITH 40MM MALE ACME X 25MM FEMALE ACME REDUCING ADAPTOR ON INLET). PROVIDE ONE KEY ASSEMBLY (RAINBIRD 55K-1 OR TORO 464-01 AND 477-02) W/ HOSE SWIVEL PER 10 QUICK COUPLERS INSTALLED.
- ✂ ISOLATION VALVE. FOR MAINLINE ISOLATION VALVES, UTILIZE LEECMCO DLMV-BIH055-13.6 SERIES. SIZE PER MAINLINE SIZE. FOR SUBMAINLINE VALVES, UTILIZE LEECMCO LV-263H055-13.6 WITH RSLS SADDLE SIZED TO MAINLINE SIZE.
- 15 INSTALL CRISPIN UL20 DUAL AIR RELEASE VALVES (OR EQUAL) AT HIGH POINTS IN VALVE BOX LOCATIONS SHOWN ON PLAN ARE SCHEMATIC. FINAL LOCATIONS TO BE APPROVED BY PROJECT SUPERINTENDENT.
- ⑨ RISER STUBOUT FOR SPARE PIPE. PROVIDE 50CM OF PIPE ATTACHED TO 50CM SQUARE POST AND CAP FOR FUTURE CLUB USE.
- SPARE PIPE. 40MM UNLESS INDICATED OTHERWISE. PNB AS/NZS 4130 PE 100, SDR21 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM
- 200MM BORE TRANSFER PIPE. PNB.3 AS/NZS 4130 PE 100, SDR26 PE PIPE. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM
- PE PN12.5 AS/NZS 4130 PE 100, SDR13.6 MAINLINE PIPE WITH WITH SDR 11 BUTTWELD FITTINGS. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM. SIZE AS SHOWN.
- 63MM PN12.5 AS/NZS 4130 PE 100, SDR13.6 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM
- 15A FLOODED SUCTION VERTICAL MULTISTAGE IRRIGATION PUMP STATION. PUMP STATION SHALL BE CAPABLE OF PRODUCING 5,200 LPM AT 95 METER HEAD AT THE POINT OF DISCHARGE. PUMP STATION SHALL CONNECT TO EXISTING TANK DISCHARGE VIA FLANGE CONNECTION. PROVIDE NEW MANFOLD BUTTERFLY ISOLATION VALVE ON INTAKE SIDE. PROVIDE CONNECTIONS TO ONE PRESSURE MAINTENANCE PUMP CAPABLE OF PROVIDING 200LPM AND THREE MAIN PUMPS, EACH CAPABLE OF FLOWS OF 0.1, 733 LPM. ALL PUMPS SHALL HAVE BUTTERFLY VALVES ON INTAKE AND GROOVED ISOLATION BUTTERFLY VALVE ON DISCHARGE SIDE. DISCHARGE MANFOLD SHALL CONTAIN A PRESSURE RELIEF VALVE AND AIR RELIEF VALVE. PROVIDE AUTOMATIC WYE FILTER WITH 300 MICRON SCREEN AND DISCHARGE TO LAKE. DISCHARGE MANFOLD SHALL CONNECT TO 250MM PE PIPE WITH FLANGED CONNECTION. PUMP STATION SHALL BE CONTROLLED BY NEW PLC WITH VFD WHICH SHALL FUNCTION ACROSS THE LINE. PUMP STATION SHALL BE CAPABLE OF HANDLING FLOWS FROM 0.5-200 LPM WHILE MAINTAINING CONSTANT PRESSURE OF 95 METER AT THE POINT OF DISCHARGE. PROVIDE ALL POWER AND ELECTRICAL CONNECTIONS PER LOCAL CODE WITH QUALIFIED ELECTRICAL CONTRACTOR. CONTRACTOR SHALL VERIFY THAT THE POWER IS ACCEPTABLE ON SITE PRIOR TO COMMENCING WORK.
- 14AWG COMMUNICATION CABLE - INSTALL ALONGSIDE MAINLINE FOR PROTECTION OR IN CONDUIT IF AWAY FROM MAINLINE. FOR RAINBIRD SYSTEM, UTILIZE P7822D CABLE AND CONNECT WIREPATHS TO NEW IC-1500 WITH TWO MOTHER BOARDS ADJACENT TO CENTRAL COMPUTER. FOR TORO SYSTEM, UTILIZE PAGE P7355D CABLE AND CONNECT WIREPATHS TO TWO DEC-65-100M LOCATED NEXT TO FIU AND CENTRAL COMPUTER. CONNECT TO CENTRAL GROUNDING PER DETAIL.
- 2 RAINBIRD ICM WITH ICM-A VALVE ADAPTOR CONNECTED TO 100-PB-PRSD SOLENOID VALVE. FOR TORO, UTILIZE TORO LSM-1 WITH P220-27-94 VALVE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- 15B RAINBIRD ICSD OR TORO DEC-5G-LINE SURGE DEVICE WITH GROUNDING ROD IN 200MM ROUND VALVE BOX - REFER TO DETAIL. PROVIDE GROUND PLATE AS AN ADD ALTERNATE PRICE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- 15C FOR RAINBIRD, UPGRADE THE EXISTING CENTRAL COMPUTER TO CURRENT RAINBIRD STRATUS 2 CONTROL SYSTEM WITH MAXI SURGE PROTECTOR (MSP-1) AND MAXI GROUND PLATE (MGP-1) AT CENTRAL CONTROLLER. INCLUDE 1 LG-3502 WITH TWO DRIVER BOARDS. INCLUDE KEYCODES FOR EXTRA WIREPATHS. FOR TORO SYSTEM, PROVIDE NEW LYNX CENTRAL COMPUTER (LX-1-1-8) WITH FIU-200K AND TWO WALL MOUNTED DEC-85-100M. FOR BOTH SYSTEMS, PROVIDE GROUNDING PER MANUFACTURER RECOMMENDATIONS AND AN UNINTERRUPTED POWER SUPPLY (UPS) WITH "PURE SINE WAVE" SIGNAL FOR THE COMPUTER AND INTERFACE (APC MODEL SMART UPS 1500 OR EQUAL).

GOLF ROTORS

INCLUDE ONE LEECMCO RSST-6315A PER HEAD AND SWING JOINT MODEL INDICATED.

- ④ TORO FLX35-308-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-22 WITH J-E-0-1-R-3
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- ⑦ TORO FLX35-338-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-36 WITH J-E-0-1-R-3
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- ④ TORO FLX34-348-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-48 WITH J-E-0-1-R-3
- TORO T7P-SS-42L, #3 NOZZLE WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-551-B-80-52 WITH J-B-0-1-3-3 AND 40MM MALE ACME X 25MM FEMALE ACME REDUCING ADAPTOR ON INLET

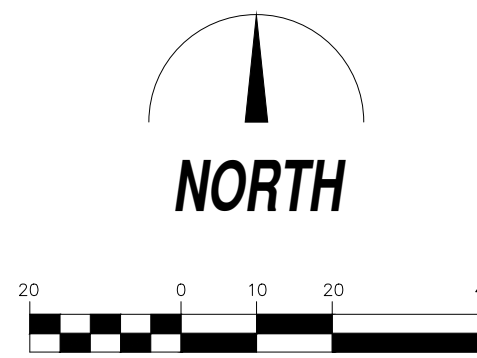
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REV.	DATE	DESCRIPTION

PROJECT
NELSON BAY GOLF COURSE RENOVATION
NELSON BAY, NSW, AUSTRALIA

TITLE
RAINBIRD ELECTRICAL PLAN
(SHEET 2 OF 2)

Designed By JRS	Job No.
Checked By JRS	Scale 1:1000
Drawn By JRS	Drawing No. IR-202
Date of Issue 11/20	Rev.





DESIGN NOTES

1. UTILITIES ARE NOT LOCATED ON THE IRRIGATION PLANS. THE IRRIGATION INSTALLER SHALL REPAIR ALL UTILITIES DAMAGED DUE TO HIS WORK AT NO ADDITIONAL COST TO THE OWNER.
2. LOCATIONS OF ELEMENTS ON THE DRAWINGS ARE SCHEMATIC. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE INSTALLER. PIPE LINES DRAWN SIDE BY SIDE MAY BE Laid IN THE SAME TRENCH. SOME PIPE LOCATIONS ARE DRAWN OFFSET TO CLEARLY SHOW THE INTENDED PIPE ROUTING. IT SHALL BE THE RESPONSIBILITY OF THE IRRIGATION INSTALLER TO LOCATE AND INSTALL THE SYSTEM IN A LOGICAL MANNER.
3. THE CONTRACTOR SHALL ADJUST THE IRRIGATION CONTROL SYSTEM, SPRINKLER ARC, AND NOZZLE ADJUSTMENTS TO PROVIDE THE MOST BALANCED AND EFFICIENT WATER DISTRIBUTION.
4. INSTALL WIRES BESIDE IRRIGATION PIPE LINES WITH 1 METER LOOP EVERY 100 METERS FOR EXPANSION.
5. CONTRACTOR SHALL PROVIDE 1 YEAR OF MANUFACTURER SUPPORT (JSP OR NEN) AS PART OF THIS CONTRACT.
6. USE 3M DRYER SPIKE KITS AT HEADS.
7. PROVIDE 60 CM EXPANSION COIL AT EACH CONTROL WIRE SPIRCE.
8. NO VALVE BOXES ARE TO BE INSTALLED IN ANY FAIRWAYS. CONTRACTOR IS TO VERIFY THE LOCATION OF VALVE BOXES PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL GREENS, BUNKERS, TEES, MAINLINE AND ANY OTHER RELEVANT ITEMS IN RELATION TO THE IRRIGATION SYSTEM AND SHALL NOTIFY THE IRRIGATION CONSULTANT IF THERE ARE ANY ITEMS THAT DIFFER IN THE FIELD FROM WHAT IS SHOWN ON THE PLAN.
10. AT ALL BRIDGE AND STREAM CROSSINGS, CONTRACTOR SHALL INSTALL MAINLINE PIPE UNDERGROUND AND BENEATH THE WATER BODY BEING CROSSED.
11. ALL VALVES SHALL BE LOCATED OUT OF FAIRWAYS. CONFIRM LOCATIONS WITH PROJECT MANAGER PRIOR TO INSTALLATION.
12. ALL LATERAL BLOCK ZONES (LANDSCAPE ROTORS AND LANDSCAPE SPRAY ZONES IF UTILIZED) SHALL BE SIZED SO WATER VELOCITIES WITHIN THE PIPE DOES NOT EXCEED 1.5 M/S.
13. CONTRACTOR SHALL PROVIDE 2 REPAIR COUPLINGS FOR EACH SIZE PIPE INSTALLED ON THE PROJECT AND HAND THEM OVER TO THE OWNER PRIOR TO ISSUANCE OF PRACTICAL COMPLETION.
14. IF ANY POWER IS INSTALLED IN SAME TRENCH AS MAINLINE AND COMMUNICATION CABLE, KEEP 500MM DISTANCE MINIMUM BETWEEN THE POWER CABLE FROM OTHER CABLES.
15. CONTRACTOR SHALL SUBMIT PIPE TYPE TO BE INSTALLED. IF ALTERNATE STANDARD IS PROPOSED, CONTRACTOR SHALL PROVIDE ALTERNATE PRICING AND SHALL SUBMIT STANDARD AND MANUFACTURER DURING TENDER PROCESS FOR APPROVAL.
16. ALL MAINLINE LOCATIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO TRENCHING. VALVE LOCATIONS SHALL BE CONFIRMED PRIOR TO EXCAVATING.
17. FIELD ADJUSTMENTS WILL BE MADE IN THE FIELD TO ACCOMMODATE THE DESIGNER'S SITE ADJUSTMENTS. THE CONTRACTOR SHALL MAKE ADJUSTMENTS BASED ON THE DESIGN STANDARDS SHOWN AS PART OF THESE DOCUMENTS. ANY ADDITIONS OR SUBTRACTIONS DUE TO SITE ADJUSTMENTS SHALL BE ADDRESSED BASED ON THE UNIT PRICES IN THE TENDER DOCUMENTS PROVIDED AS PART OF THE BID PROCESS.
18. REFER TO SPECIFICATIONS FOR PRE-APPROVED ALTERNATE MATERIALS IN LIEU OF THOSE SPECIFIED ON THE PLANS
19. SHIELDING WIRE SHALL BE AN ADD ALTERNATE AND NOT A PART OF BASE BID. IF SHIELDING WIRE IS UTILIZED, IT SHALL BE INSTALLED IN THE SAME TRENCH ONLY ALONG THE MAINLINES.
20. THE HYDRAULIC SYSTEM IS DESIGNED FOR NO MORE THEN 5,200LPM TO BE OPERATED AT ONE TIME THROUGHOUT THE 27 HOLES AND PRACTICE AREAS. NO MORE THEN 1200LPM SHALL OPERATE ON ANY 3 ADJACENT HOLES AT ONE TIME. AT NO TIME SHOULD MORE HEADS BE OPERATED THEN THE PUMP STATION IS CAPABLE OF PROVIDING.
21. THE DESIGN IS BASED ON A 9 HOUR WATERING WINDOW.
22. THE CONTRACTOR SHALL VERIFY THAT THE PUMP STATION IS CAPABLE OF PROVIDED A FULL RANGE OF FLOWS FROM 0.5,200 LPM WHILE MAINTAINING CONSTANT DISCHARGE PRESSURE OF 95 METER HEAD AT ALL TIMES. PUMP STATION SHALL FUNCTION AS PRESSURE DEMAND TO SENSE WHEN MAINLINE PRESSURE DROPS FOR PUMP STATION TO OPERATE.
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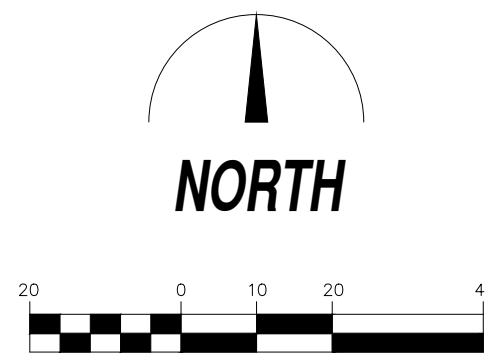
PROJECT
NELSON BAY GOLF COURSE RENOVATION
NELSON BAY, NSW, AUSTRALIA

TITLE
TORO ELECTRICAL PLAN
(SHEET 1 OF 2)

Designed By JRS	Job No.
Checked By JRS	Scale 1:1000
Drawn By JRS	Drawing No. IR-301
Date of Issue 11/20	Rev.



PREVOST STAMPER IRRIGATION
An Irrigation Design Company
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DESIGN NOTES

1. UTILITIES ARE NOT LOCATED ON THE IRRIGATION PLANS. THE IRRIGATION INSTALLER SHALL REPAIR ALL UTILITIES DAMAGED DUE TO HIS WORK AT NO ADDITIONAL COST TO THE OWNER.
2. LOCATIONS OF ELEMENTS ON THE DRAWINGS ARE SCHEMATIC. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE INSTALLER. PIPE LINES DRAWN SIDE BY SIDE MAY BE Laid IN THE SAME TRENCH. SOME PIPE LOCATIONS ARE DRAWN OFFSET TO CLEARLY SHOW THE INTENDED PIPE ROUTING. IT SHALL BE THE RESPONSIBILITY OF THE IRRIGATION INSTALLER TO LOCATE AND INSTALL THE SYSTEM IN A LOGICAL MANNER.
3. THE CONTRACTOR SHALL ADJUST THE IRRIGATION CONTROL SYSTEM, SPRINKLER ARC, AND NOZZLE ADJUSTMENTS TO PROVIDE THE MOST BALANCED AND EFFICIENT WATER DISTRIBUTION.
4. INSTALL WIRES BESIDE IRRIGATION PIPE LINES WITH 1 METER LOOP EVERY 100 METERS FOR EXPANSION.
5. CONTRACTOR SHALL PROVIDE 1 YEAR OF MANUFACTURER SUPPORT (JSP OR NEN) AS PART OF THIS CONTRACT.
6. 3M DBVR SPICE KITS AT HEADS.
7. PROVIDE 60 CM EXPANSION COIL AT EACH CONTROL WIRE SPICE.
8. NO VALVE BOXES ARE TO BE INSTALLED IN ANY FAIRWAYS. CONTRACTOR IS TO VERIFY THE LOCATION OF VALVE BOXES PRIOR TO INSTALLATION.
9. CONTRACTOR SHALL VERIFY THE LOCATION OF ALL GREENS, BUNKERS, TEES, MAINLINE AND ANY OTHER RELEVANT ITEMS IN RELATION TO THE IRRIGATION SYSTEM AND SHALL NOTIFY THE IRRIGATION CONSULTANT IF THERE ARE ANY ITEMS THAT DIFFER IN THE FIELD FROM WHAT IS SHOWN ON THE PLAN.
10. AT ALL BRIDGE AND STREAM CROSSINGS, CONTRACTOR SHALL INSTALL MAINLINE PIPE UNDERGROUND AND BENEATH THE WATER BODY BEING CROSSED.
11. ALL VALVES SHALL BE LOCATED OUT OF FAIRWAYS. CONFIRM LOCATIONS WITH PROJECT MANAGER PRIOR TO INSTALLATION.
12. ALL LATERAL BLOCK ZONES (LANDSCAPE ROTORS AND LANDSCAPE SPRAY ZONES IF UTILIZED) SHALL BE SIZED SO WATER VELOCITIES WITHIN THE PIPE DOES NOT EXCEED 1.5 M/S.
13. CONTRACTOR SHALL PROVIDE 2 REPAIR COUPLINGS FOR EACH SIZE PIPE INSTALLED ON THE PROJECT AND HAND THEM OVER TO THE OWNER PRIOR TO ISSUANCE OF PRACTICAL COMPLETION.
14. IF ANY POWER IS INSTALLED IN SAME TRENCH AS MAINLINE AND COMMUNICATION CABLE, KEEP 500MM DISTANCE MINIMUM BETWEEN THE POWER CABLE FROM OTHER CABLES.
15. CONTRACTOR SHALL SUBMIT PIPE TYPE TO BE INSTALLED. IF ALTERNATE STANDARD IS PROPOSED, CONTRACTOR SHALL PROVIDE ALTERNATE PRICING AND SHALL SUBMIT STANDARD AND MANUFACTURER DURING TENDER PROCESS FOR APPROVAL.
16. ALL MAINLINE LOCATIONS SHALL BE VERIFIED IN THE FIELD PRIOR TO TRENCHING. VALVE LOCATIONS SHALL BE CONFIRMED PRIOR TO EXCAVATING.
17. FIELD ADJUSTMENTS WILL BE MADE IN THE FIELD TO ACCOMMODATE THE DESIGNER'S SITE ADJUSTMENTS. THE CONTRACTOR SHALL MAKE ADJUSTMENTS BASED ON THE DESIGN STANDARDS SHOWN AS PART OF THESE DOCUMENTS. ANY ADDITIONS OR SUBTRACTIONS DUE TO SITE ADJUSTMENTS SHALL BE ADDRESSED BASED ON THE UNIT PRICES IN THE TENDER DOCUMENTS PROVIDED AS PART OF THE BID PROCESS.
18. REFER TO SPECIFICATIONS FOR PRE-APPROVED ALTERNATE MATERIALS IN LIEU OF THOSE SPECIFIED ON THE PLANS
19. SHIELDING WIRE SHALL BE AN ADD ALTERNATE AND NOT A PART OF BASE BID. IF SHIELDING WIRE IS UTILIZED, IT SHALL BE INSTALLED IN THE SAME TRENCH ONLY ALONG THE MAINLINES.
20. THE HYDRAULIC SYSTEM IS DESIGNED FOR NO MORE THEN 5,200LPM TO BE OPERATED AT ONE TIME THROUGHOUT THE 27 HOLES AND PRACTICE AREAS. NO MORE THEN 1200LPM SHALL OPERATE ON ANY 3 ADJACENT HOLES AT ONE TIME. AT NO TIME SHOULD MORE HEADS BE OPERATED THEN THE PUMP STATION IS CAPABLE OF PROVIDING.
21. THE DESIGN IS BASED ON A 9 HOUR WATERING WINDOW.
22. THE CONTRACTOR SHALL VERIFY THAT THE PUMP STATION IS CAPABLE OF PROVIDED A FULL RANGE OF FLOWS FROM 0.5,200 LPM WHILE MAINTAINING CONSTANT DISCHARGE PRESSURE OF 35 METER HEAD AT ALL TIMES. PUMP STATION SHALL FUNCTION AS PRESSURE DEMAND TO SENSE WHEN MAINLINE PRESSURE DROPS FOR PUMP STATION TO OPERATE.
23. PRESSURE REGULATORS IN THE SOLENOID VALVES SHALL BE SET TO 60 PSI. USE FLOW CONTROL TO CREATE HYDRAULIC PRESSURE REDUCER IN ADDITION TO PRESSURE REGULATOR.
24. CONTRACTOR SHALL MAINTAIN THE EXISTING IRRIGATION SYSTEM SO IT REMAINS FULLY OPERATIONAL FOR ALL AREAS OUTSIDE OF CONSTRUCTION DURING THE PHASING OF THE PROJECT. TEMPORARY REROUTING OF PIPES OR ADDITION OF ISOLATION VALVES AND CAPPING OF MAINLINES MAY BE REQUIRED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO TENDERING TO CONFIRM PHASING REQUIREMENTS. THE CONTRACTOR SHALL GET APPROVAL FROM THE CLUB ON ANY SHUTDOWN, RE-ROUTING OR ISOLATION OF THE EXISTING MAINLINE SYSTEM PRIOR TO COMMENCING ANY WORK.
25. DURING PUMP STATION CHANGEOVER, THE IRRIGATION SYSTEM SHALL NOT BE WITHOUT WATER FOR MORE THEN TWO DAYS FOR REMOVING THE OLD PUMP STATION AND INSTALLING THE NEW ONE WITHOUT APPROVAL OF THE CLUB. TEMPORARY PUMPS MAY BE REQUIRED AND SHALL BE DEMO/INCLUDED AS PART OF THE TENDER PRICE IF NOT EXPLICITLY IDENTIFIED AS OMITTED.
26. CONTRACTOR SHALL VERIFY BORES DO NOT PROVIDE PRESSURE EXCEEDING 50 METERS HEAD. IF BORES PROVIDE PRESSURE GREATER THEN THIS, THE BORE TRANSFER PIPE WILL NEED TO BE UPGRADED TO A HIGHER PRESSURE RATING. IMMEDIATELY NOTIFY THE PROJECT MANAGER IF BORE OUTPUT PRESSURE EXCEEDS 50 METER HEAD.
27. THE CONTRACTOR SHALL PLAN ON INSTALLING THE NEW PUMP STATION AND CONNECT TO EXISTING IRRIGATION TANKS FIRST. A NEW PUMP HOUSE SHALL BE PROVIDED AND THE CONSTRUCTION STYLE SHALL BE INCLUDED AS PART OF THE CONTRACTORS TENDER. THE CONTRACTOR SHALL PROVIDE A CONNECTION BETWEEN THE NEW PUMP STATION AND THE EXISTING IRRIGATION MAINLINE AS SHOWN ON THE PLANS. THE MAINLINE SHALL THEN BE INSTALLED OUT FROM THE IRRIGATION PUMP STATION TAKING INTO ACCOUNT LOGICAL SECTIONS WHERE THE EXISTING SYSTEM CAN BE ISOLATED OFF. ALL FAIRWAYS, GREENS AND TEES WORK SHALL OCCUR ON A HOLE BY HOLE BASIS TO ALLOW THE COURSE TO MAINTAIN FULL GOLF OPERATIONS WITH 1 TEMPORARY HOLE THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL ALLOW TIME PRIOR TO SUBMITTING THEIR TENDER TO MAKE THEMSELVES FULLY AWARE OF THE SITE CONDITIONS AND SHALL ALLOW FOR ALL COSTS ASSOCIATED WITH MAINTAINING THE EXISTING SYSTEM AS NECESSARY SO ALL AREAS HAVE ACCESS TO WATER WITHOUT A DOWN PERIOD OF MORE THEN 7 DAYS. THESE COSTS SHALL ALL BE INCLUDED AS PART OF BASE TENDER.
28. THE CONTRACTOR SHALL PROVIDE TEMPORARY COMMUNICATION CABLE ROUTINGS AT NO ADDITIONAL COST DURING CONSTRUCTION TO ALLOW FOR FULL AUTOMATION OF NEW INSTALLATION AS EACH HOLE IS COMPLETED.
29. CONTRACTOR SHALL PROVIDE BORE MAINLINE DISCHARGE TO THE SECONDARY IRRIGATION TANK AND ALSO TO THE IRRIGATION POND. THE DIRECTION OF FLOW SHALL BE CONTROLLED VIA MANUAL GATE VALVE AS SHOWN ON THE PLAN. INCLUDE ALL FITTINGS AND SUPPORT FOR PROVIDING DISCHARGE TO IRRIGATION TANK PER TANK MANUFACTURERS REQUIREMENTS.

IRRIGATION LEGEND

- ① FULL CIRCLE VHS SPRINKLER ROTOR WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER. REFER TO DETAIL. (REFER TO CHART FOR NOZZLE)
- ② PART CIRCLE VHS SPRINKLER ROTOR WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER. REFER TO DETAIL. (REFER TO CHART FOR NOZZLE)
- 25 MM BSP THREADED QUICK COUPLER VALVE (RAINBIRD SRC OR TORO TORO-474-00) WITH LEECMCO RSST-6315A SADDLE AND 30CM STANDARD O-RING SWING JOINT BY IRRIGATION HEAD MANUFACTURER (TSJ-15-A-10-12-4-10-B FOR TORO OR J-B-O-1-3-2 FOR RAINBIRD WITH 40MM MALE ACME X 25MM FEMALE ACME REDUCING ADAPTOR ON INLET). PROVIDE ONE KEY ASSEMBLY (RAINBIRD 55K-1 OR TORO 464-01 AND 477-02) W/ HOSE SWIVEL PER 10 QUICK COUPLERS INSTALLED.
- ✂ ISOLATION VALVE. FOR MAINLINE ISOLATION VALVES, UTILIZE LEECMCO DLMV-BIH055-13.6 SERIES. SIZE PER MAINLINE SIZE. FOR SUBMAINLINE VALVES, UTILIZE LEECMCO LV-263H055-13.6 WITH RSLS SADDLE SIZED TO MAINLINE SIZE.
- 15 INSTALL CRISPIN UL20 DUAL AIR RELEASE VALVES (OR EQUAL) AT HIGH POINTS IN VALVE BOX LOCATIONS SHOWN ON PLAN ARE SCHEMATIC. FINAL LOCATIONS TO BE APPROVED BY PROJECT SUPERINTENDENT.
- ③ RISER STUBOUT FOR SPARE PIPE. PROVIDE 50CM OF PIPE ATTACHED TO 50CM SQUARE POST AND CAP FOR FUTURE CLUB USE.
- SPARE PIPE. 40MM UNLESS INDICATED OTHERWISE. PNB AS/NZS 4130 PE 100, SDR21 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM
- 200MM BORE TRANSFER PIPE. PNB.3 AS/NZS 4130 PE 100, SDR26 PE PIPE. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM
- PE PNB1.5 AS/NZS 4130 PE 100, SDR13.6 MAINLINE PIPE WITH WITH SDR 11 BUTTWELD FITTINGS. IPLEX OR EQUAL. INSTALL 75 CM DEPTH MINIMUM. SIZE AS SHOWN.
- 63MM PNB1.2.5 AS/NZS 4130 PE 100, SDR13.6 PE PIPE. IPLEX OR EQUAL. INSTALL 45 CM DEPTH MINIMUM
- 16 FLOODED SUCTION VERTICAL MULTISTAGE IRRIGATION PUMP STATION. PUMP STATION SHALL BE CAPABLE OF PRODUCING 5,200 LPM AT 95 METER HEAD AT THE POINT OF DISCHARGE. PUMP STATION SHALL CONNECT TO EXISTING TANK DISCHARGE VIA FLANGE CONNECTION. PROVIDE NEW MANIFOLD BUTTERFLY ISOLATION VALVE ON INTAKE SIDE. PROVIDE CONNECTIONS TO ONE PRESSURE MAINTENANCE PUMP CAPABLE OF PROVIDING 200LPM AND THREE MAIN PUMPS, EACH CAPABLE OF FLOWS OF 0.1,733 LPM. ALL PUMPS SHALL HAVE BUTTERFLY VALVES ON INTAKE AND GROOVED ISOLATION BUTTERFLY VALVE ON DISCHARGE SIDE. DISCHARGE MANIFOLD SHALL CONTAIN A PRESSURE RELIEF VALVE AND AIR RELIEF VALVE. PROVIDE AUTOMATIC WYE FILTER WITH 300 MICRON SCREEN AND DISCHARGE TO LAKE. DISCHARGE MANIFOLD SHALL CONNECT TO 250MM PE PIPE WITH FLANGED CONNECTION. PUMP STATION SHALL BE CONTROLLED BY NEW PLC WITH VFD WHICH SHALL FUNCTION ACROSS THE LINE. PUMP STATION SHALL BE CAPABLE OF HANDLING FLOWS FROM 0.5,200 LPM WHILE MAINTAINING CONSTANT PRESSURE OF 95 METER AT THE POINT OF DISCHARGE. PROVIDE ALL POWER AND ELECTRICAL CONNECTIONS PER LOCAL CODE WITH QUALIFIED ELECTRICAL CONTRACTOR. CONTRACTOR SHALL VERIFY THAT THE POWER IS ACCEPTABLE ON SITE PRIOR TO COMMENCING WORK.
- 14AWG COMMUNICATION CABLE - INSTALL ALONGSIDE MAINLINE FOR PROTECTION OR IN CONDUIT IF AWAY FROM MAINLINE. FOR RAINBIRD SYSTEM, UTILIZE P7822D CABLE AND CONNECT WIREPATHS TO NEW IC-1500 WITH TWO MOTHER BOARDS ADJACENT TO CENTRAL COMPUTER. FOR TORO SYSTEM, UTILIZE PAGE P7355D CABLE AND CONNECT WIREPATHS TO TWO DEC-65-1000-M LOCATED NEXT TO FIU AND CENTRAL COMPUTER. CONNECT TO CENTRAL GROUNDING PER DETAIL.
- 2 RAINBIRD ICM WITH ICMA VALVE ADAPTOR CONNECTED TO 100-PB-PRSD SOLENOID VALVE. FOR TORO, UTILIZE TORO LSM-1 WITH P220-27-94 VALVE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- ④ RAINBIRD ICSD OR TORO DEC-5G-LINE SURGE DEVICE WITH GROUNDING ROD IN 200MM ROUND VALVE BOX - REFER TO DETAIL. PROVIDE GROUND PLATE AS AN ADD ALTERNATE PRICE. INSTALL WITHIN 200MM ROUND VALVE BOX.
- 16 FOR RAINBIRD, UPGRADE THE EXISTING CENTRAL COMPUTER TO CURRENT RAINBIRD STRATUS 2 CONTROL SYSTEM WITH MAXI SURGE PROTECTOR (MSP-1) AND MAXI GROUND PLATE (MGP-1) AT CENTRAL CONTROLLER. INCLUDE 1 IC-1500 WITH TWO DRIVER BOARDS. INCLUDE KEYCODES FOR EXTRA WIREPATHS. FOR TORO SYSTEM, PROVIDE NEW LYNX CENTRAL COMPUTER (LX-1-1-8) WITH FIU-200K AND TWO WALL MOUNTED DEC-85-1000-M. FOR BOTH SYSTEMS, PROVIDE GROUNDING PER MANUFACTURER RECOMMENDATIONS AND AN UNINTERRUPTED POWER SUPPLY (UPS) WITH "PURE SINE WAVE" SIGNAL FOR THE COMPUTER AND INTERFACE (APC MODEL SMART-UPS 1500 OR EQUAL).

GOLF ROTORS

INCLUDE ONE LEECMCO RSST-6315A PER HEAD AND SWING JOINT MODEL INDICATED.

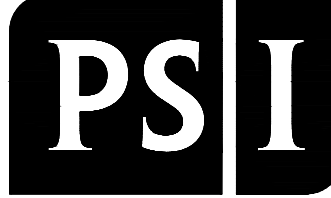
- ④ TORO FLX35-308-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-22 WITH J-E-0-1-R-3
- ⑤ TORO FLX35-318-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-28 WITH J-E-0-1-R-3
- ⑥ TORO FLX35-328-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-32 WITH J-E-0-1-R-3
- ⑦ TORO FLX35-338-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-36 WITH J-E-0-1-R-3
- ⑧ TORO FLX35-358-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-752-IC-80-40 WITH J-E-0-1-R-3
- ① TORO FLX34-318-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-28 WITH J-E-0-1-R-3
- ② TORO FLX34-328-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-28 WITH J-E-0-1-R-3
- ③ TORO FLX34-338-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-40 WITH J-E-0-1-R-3
- ④ TORO FLX34-348-6 WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-702-IC-80-48 WITH J-E-0-1-R-3
- TORO T7P-SS-42L, #3 NOZZLE WITH TSJ-15-A-10-12-4-10-A OR RAINBIRD A-551-B-80-52 WITH J-B-0-1-3-3 AND 40MM MALE ACME X 25MM FEMALE ACME REDUCING ADAPTOR ON INLET

0	11/20	FOR TENDER
REV.	DATE	DESCRIPTION

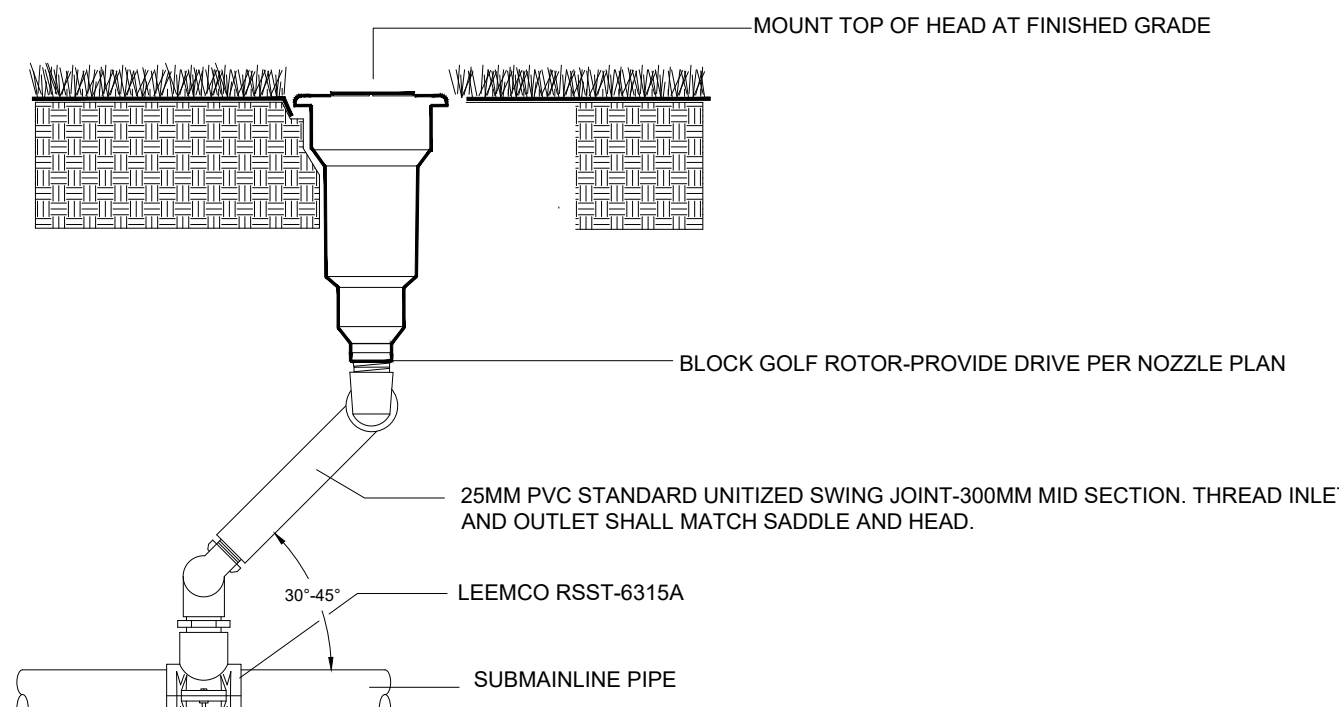
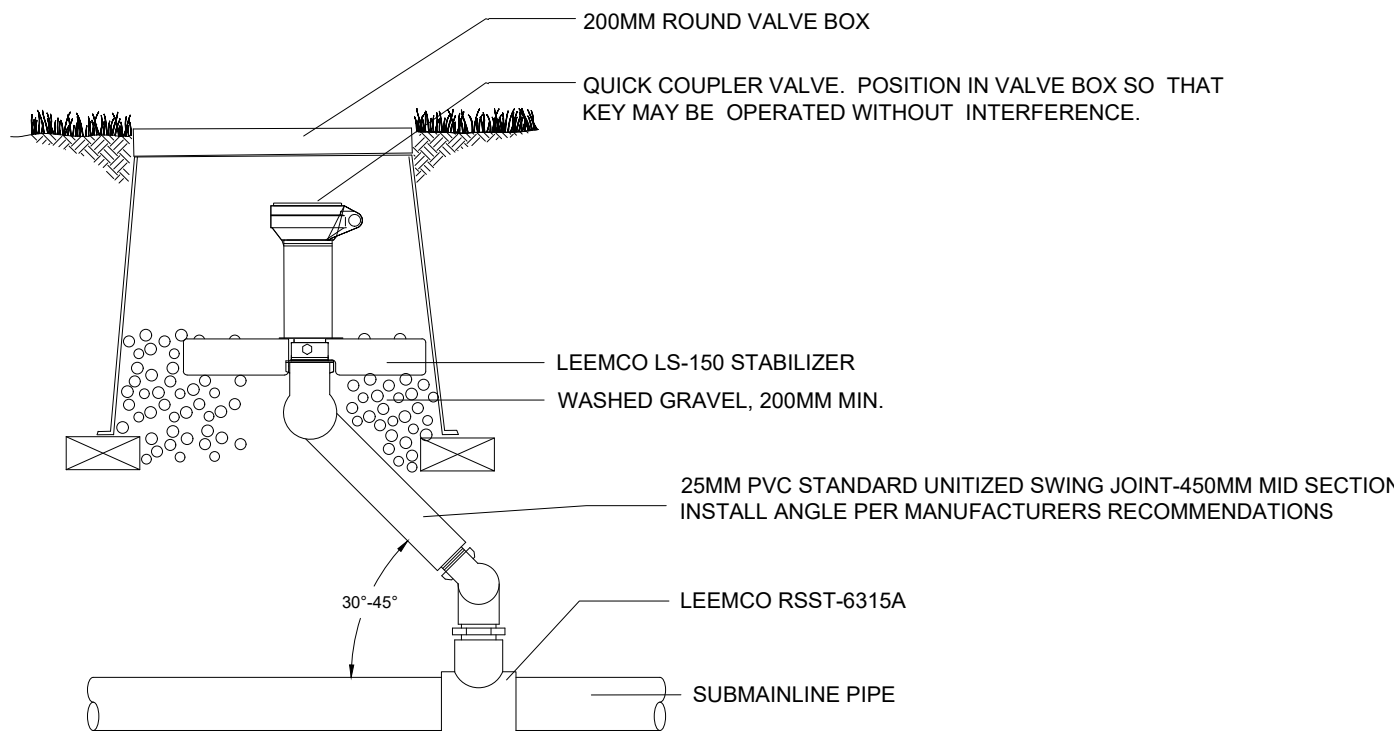
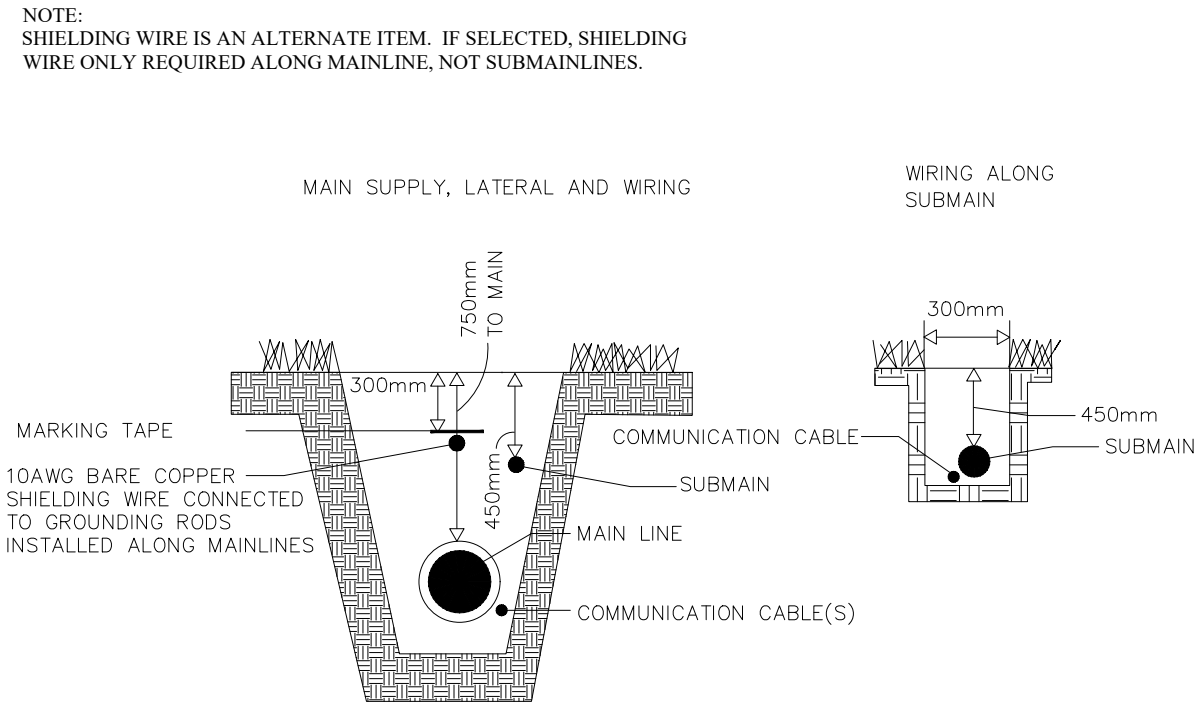
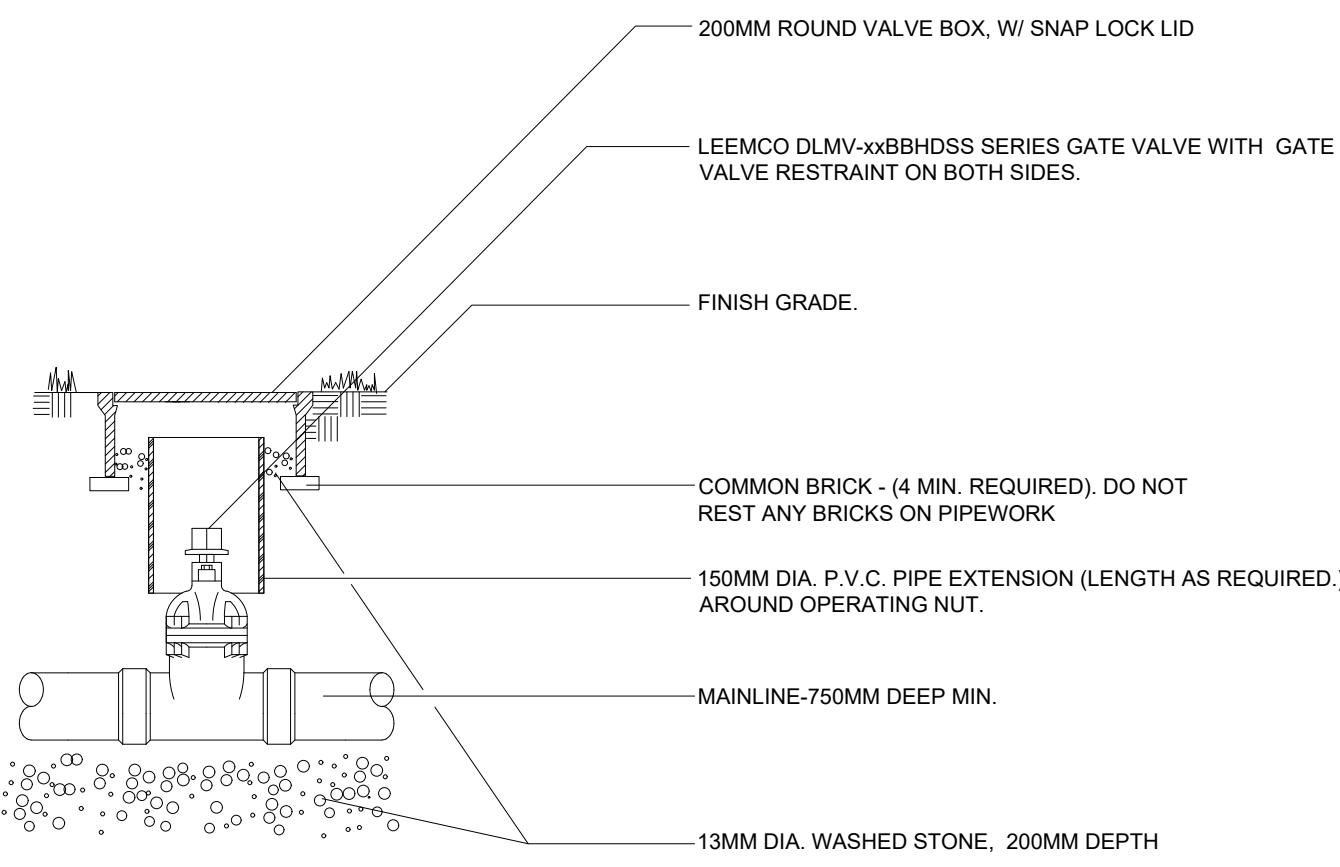
PROJECT
NELSON BAY GOLF COURSE RENOVATION
NELSON BAY, NSW, AUSTRALIA

TITLE
TORO ELECTRICAL PLAN
(SHEET 2 OF 2)

Designed By JRS	Job No.
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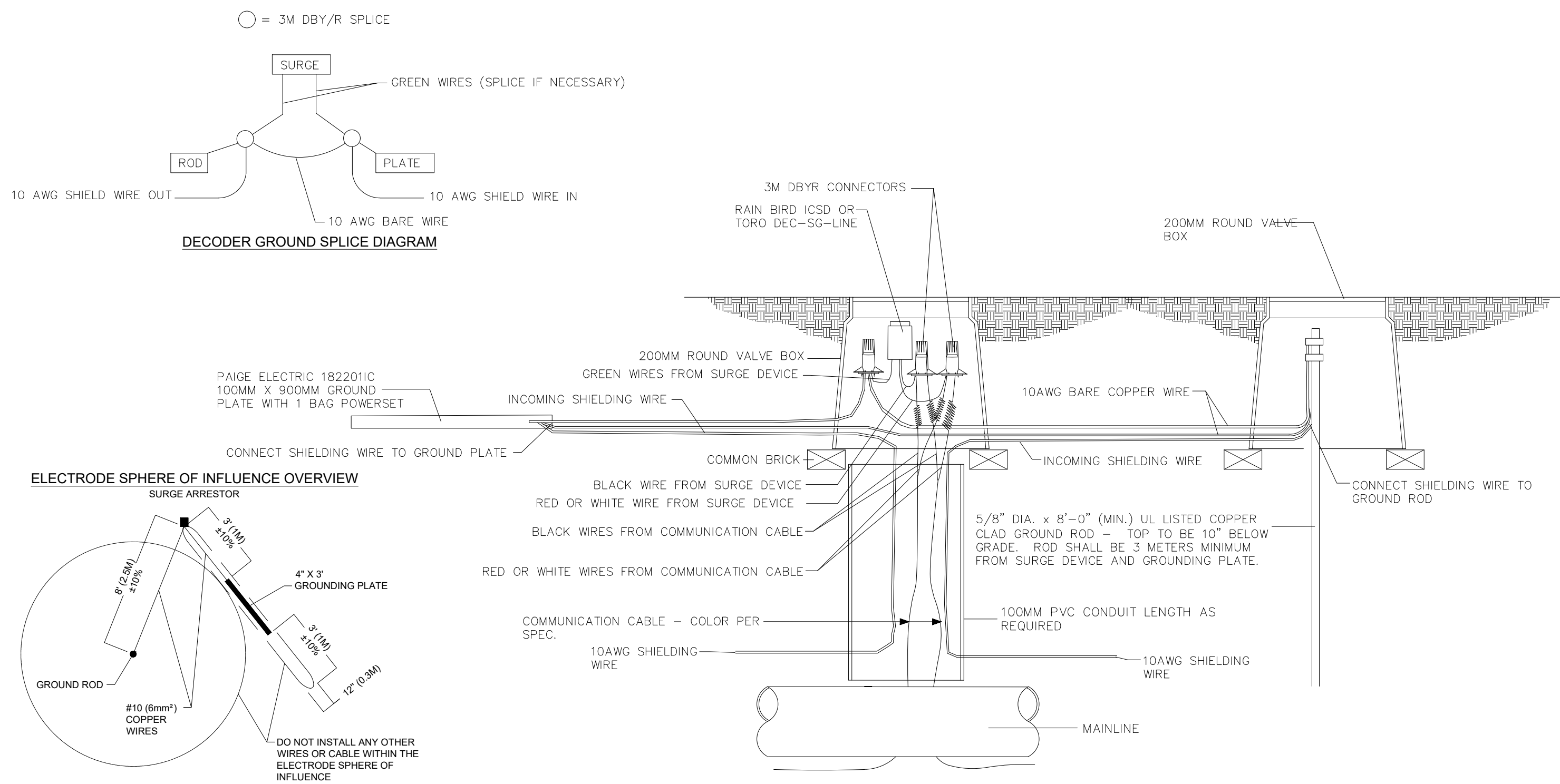


1 MAINLINE ISOLATION VALVE DETAIL NOT TO SCALE

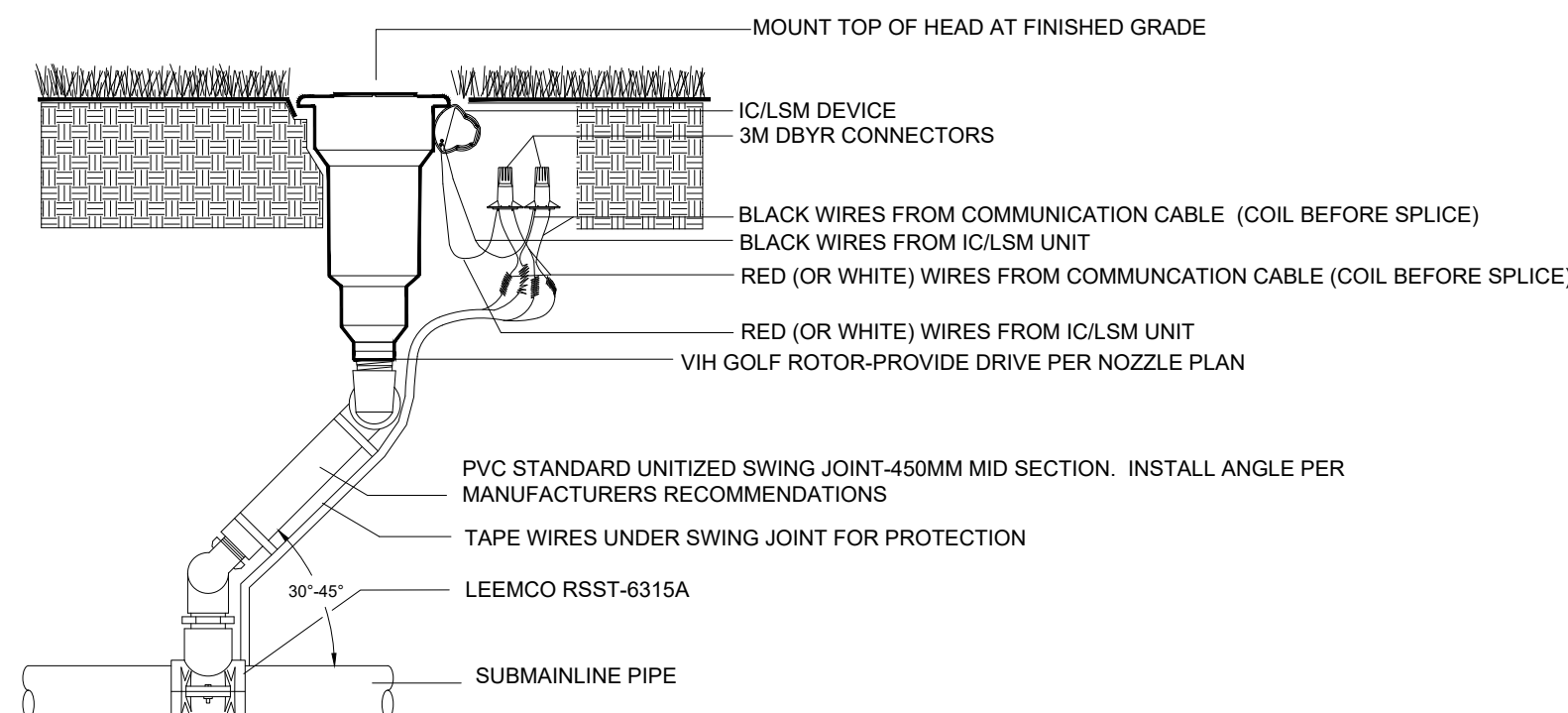
2 TYPICAL TRENCHING DETAILS NOT TO SCALE

3 STANDARD QUICK COUPLER VALVE NOT TO SCALE

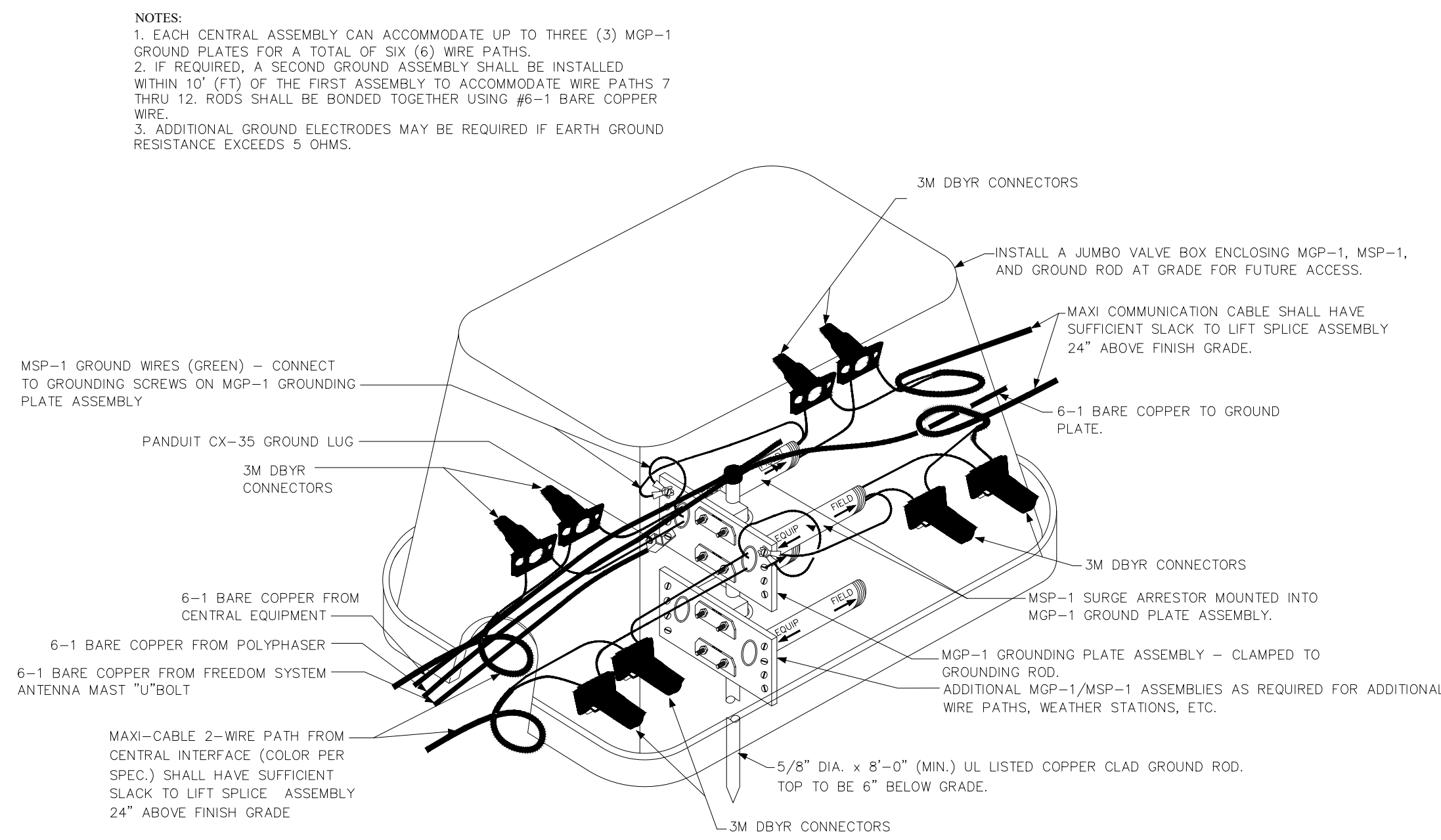
4 BLOCK STYLE TURF ROTOR NOT TO SCALE



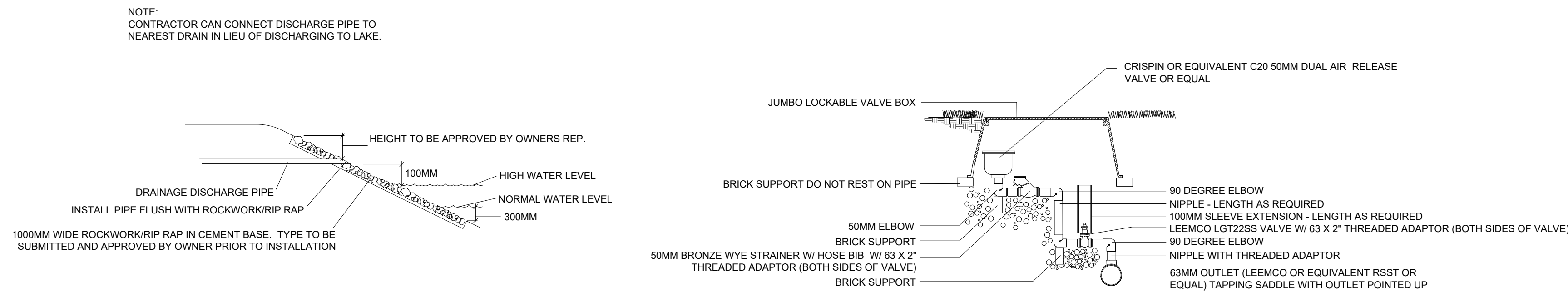
5 GROUNDING POINTS WITH OPTIONAL SHIELDING WIRE AND GROUND PLATE NOT TO SCALE



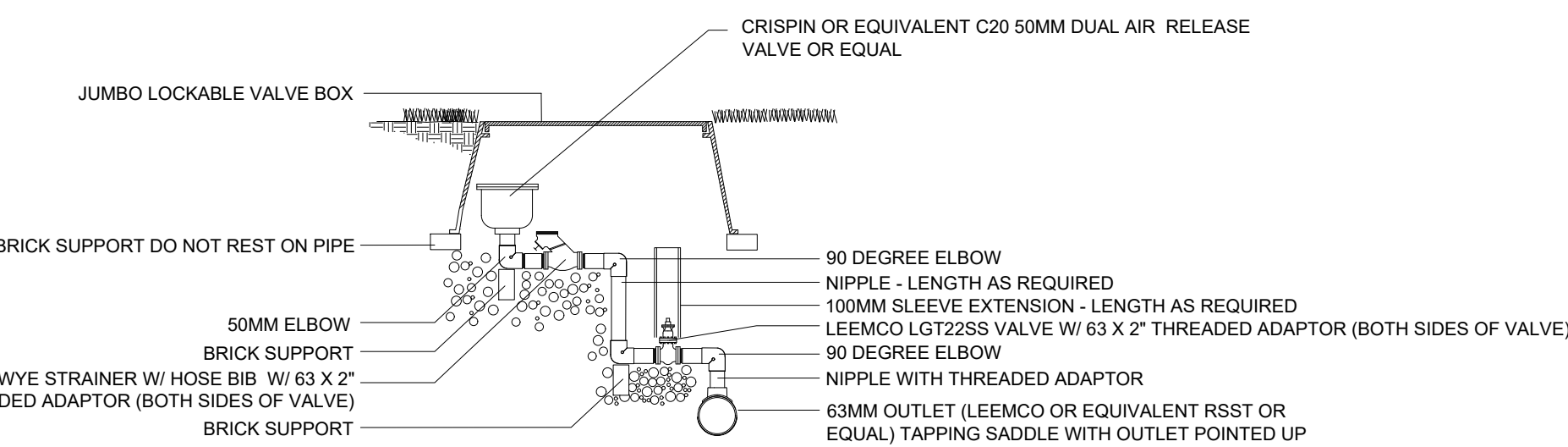
6 VALVE IN HEAD TURF ROTOR NOT TO SCALE



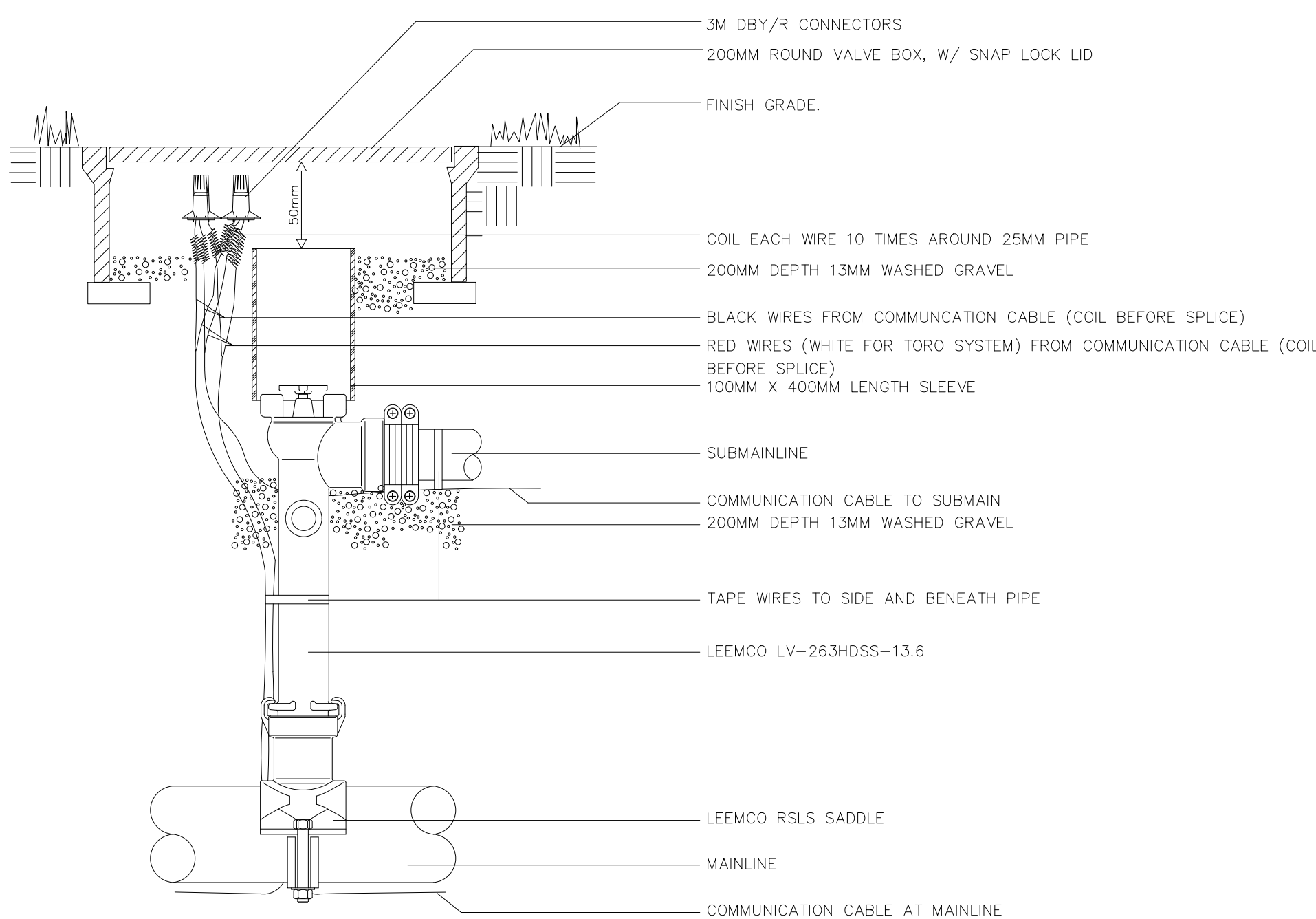
7 CENTRAL GROUNDING ASSEMBLY - RAINBIRD SYSTEM NOT TO SCALE



8 DISCHARGE TO LAKE NOT TO SCALE



9 AIR RELEASE VALVE DETAIL NOT TO SCALE



10 SUBMAINLINE CONNECTION DETAIL NOT TO SCALE

0	11/20	FOR TENDER
REV.	DATE	DESCRIPTION

PROJECT
NELSON BAY GOLF COURSE RENOVATION
NELSON BAY, NSW, AUSTRALIA

TITLE
IRRIGATION DETAILS

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Nelson Bay Golf Club Irrigation Material List

November 2020

**Contractor is responsible for performing own takeoffs for tender and construction purposes. For reference only.*

Item	Total	Unit	Unit Price	Total
Demolition/Phasing				
Removal of existing irrigation head and swing joint and return to owner (price on per head basis)		Each		
Removal of existing quick coupler and swing joint and return to owner (price on per qcv basis)		Each		
Decommission and removal of existing pump station including panel and motors and return to owner		LS		
Connection of new pump station to existing irrigation mainline to provide water to existing hydraulic network. Include all fittings and labour.		LS		
Maintain existing irrigation system during construction of new irrigation including temprary pipe re-routing, capping, valve installation electrical re-routing and mainline addition. Contractor shall make sure that no part of the existing system does not go without water supply for more then 7 days at any time.		LS		
Make amendments to existing irrigation system during new system installation. This shall include the repair of any pipe. electrical cables, existing pipes damaged, splices for damaged cables including all connections and repair fittings necessary or other components damaged as part of new irrigation system installation. This shall also include any temporary routing of pipe or electrical components to maintain operation of the system throughout construciton. Additional fees will not be allowed for post tender unless prior approval is granted by the project manager. Identify in proposal the full scope of work expected and that is included or specifiically excluded as part of this line item on seperate page.		LS		
Include all cutting and capping of all existing submainline pipe at connection point to existing mainline on a hole by hole phasing basis during changeover from old system to new system.		LS		
Disconnect existing 4 bores from current hydraulic connections and reconnect to new bore transfer pump mainline.		LS		

Full Circle Golf Heads

1	RAINBIRD A-702-IC-80-28 or Toro FLX34-318-6		Each	
3	RAINBIRD A-702-IC-80-40 or Toro FLX34-338-6		Each	
	LEEMCO RSST-6315A		Each	
	Rainbird J-E-0-1-R-3 or Toro TSJ-15-A-10-12-4-10-A Swing Joint		Each	

Part Circle Golf Heads

A	RAINBIRD A-752-IC-80-22 or Toro FLX35-308-6		Each	
B	RAINBIRD A-752-IC-80-28 or Toro FLX35-318-6		Each	
C	RAINBIRD A-752-IC-80-32 or Toro FLX35-328-6		Each	
D	RAINBIRD A-752-IC-80-36 or Toro FLX35-338-6		Each	
E	RAINBIRD A-752-IC-80-40 or Toro FLX35-358-6		Each	
	RAINBIRD A-551-B-80-52 or Toro T7P-SS-42L		Each	
	LEEMCO RSST-6315A		Each	
	Rainbird J-E-0-1-R-3 or Toro TSJ-15-A-10-12-4-10-A Swing Joint		Each	
	Rainbird J-B-0-1-3-3 or Toro TSJ-15-A-10-12-4-10-A Swing Joint		Each	
	For Rainbird option, provide additional 1.5" male ACME x 1" female ACME bushing for block heads		Each	

Piping

Mainline Pipe - IPLEX PE100, SDR 13.6 PN12.5 including trenching				
	315mm		LM	
	250mm		LM	
	200mm		LM	
	160mm		LM	
	110mm		LM	
Spare Pipe - IPLEX PE100, SDR 26 PN6.3 (including trenching)				
	90mm, including all fittings		LM	
	40mm, including all fittings		LM	
	40mm riser including tees/elbows, end cap, post and support		Each	
Bore Transfer Mainline Pipe - IPLEX PE100, SDR 26 PN6.3 (including trenching)				
	200mm		LM	
Sub-Mainline Pipe - IPLEX PE100, SDR 13.6 PN12.5				
	63mm pipe (including trenching or ploughing)		LM	
	63mm Tee		Each	
	63mm 90 degree elbow		Each	
	63mm 45 degree elbow		Each	
	63mm end cap		Each	
Mainline Fittings - IPLEX PE100, SDR 11				
	315mm - butt weld - molded fittings			
	tee		Each	
	315 x 250 reducer		Each	
	flange adaptor for connection to irrigation pump station		Each	
	250mm - HDPE butt weld - molded fittings			
	tee		Each	
	250 x 200 reducer		Each	
	250 x 160 reducer		Each	
	45 degree elbow		Each	
	Repair coupling for connection to existing mainline		Each	
	200mm - HDPE butt weld - molded fittings			
	tee		Each	
	200 x 160 reducer		Each	
	200 x 110 reducer		Each	
	90 degree elbow		Each	
	45 degree elbow		Each	
	160mm - HDPE butt weld - molded fittings			
	tee		Each	
	160 x 110 reducer		Each	
	90 degree elbow		Each	
	45 degree elbow		Each	
	110mm - HDPE butt weld - molded fittings			
	tee		Each	
	90 degree elbow		Each	
	45 degree elbow		Each	
	End Cap		Each	

Pump Station

Flooded suction vertical multistage irrigation pump station. Pump station shall be capable of producing 5,200 LPM at 95 meter head <u>at the point of discharge</u> . Pump station shall connect to existing tank discharge via flange connection. Provide new manifold butterfly isolation valve on intake side. Provide connections to one pressure maintenance pump capable of providing 200lpm and three main pumps, each capable of flows of 0-1,733 LPM. All pumps shall have butterfly valves on intake and grooved isolation butterfly valve on discharge side. Discharge manifold shall contain a pressure relief valve and air relief valve. Provide automatic filter with 300 micron screen and discharge to lake. Discharge manifold shall connect to 315mm PE pipe with flanged connection. Pump station shall be controlled by new PLC with VFD which shall function across the line. Pump station shall be capable of handling flows from 0-5,200 LPM while maintaining constant pressure of 95 meter <u>at the point of discharge</u> . Provide all power and electrical connections per local code with qualified electrical contractor, contractor shall verify that the power is acceptable on-site prior to commencing work.		LS		
Provide new pump house for new pump station including all architectural and structural requirements, slabs and lighting. Provide schematic layout along with building construction materials as part of tender proposal for owner review.		LS		

**Nelson Bay Golf Club Irrigation Material List
November 2020**

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Item	Total	Unit	Unit Price	Total
Control System - Rainbird Option				
Upgrade existing STRATUS 2 central computer including new 24" monitor. Install grounding at central including MSP-1 and MGP-1 as per detail. Include 1 ICI-1500 with two driver boards and grounding per manufacturer recommendations. Include keycode for extra wirepaths. Provide 1 year GSP support.		LS		
Grounding				
5/8" x 8' ground rod and welded connections with 15' 10 AWG green wire (Paige182000IC10)		Each		
ICSD Unit		Each		
MSP-1 Surge Arrestor		Each		
MGP-1 Grounding Plate Assembly		Each		
3M DBYR connectors		Each		
14AWG Paige P7072D "Maxi Cable" - Communication Cable from Central Computer to heads and ICM units				
WirePath 1 - Red		LM		
WirePath 2 - Yellow		LM		
WirePath 3 - Blue		LM		
APC UPS - MODEL SMART-UPS 1500		Each		
Rainbird ICM valve kit (#213831)		Each		
Control System - Toro Option				
LYNX-PE (LX-1-1-4-8) central computer with 24" monitor. Install grounding at central as per detail. Include 1 FIU (FIU-20XX) and 2 DEC-RS-1000-M panels and grounding per manufacturer recommendations. Provide 1 year NSN support.		Each		
Grounding				
5/8" x 8' ground rod and welded connections with 15' 10 AWG green wire (Paige182000IC10)		Each		
TORO DEC-SG-LINE Unit		Each		
3M DBYR connectors		Each		
14AWG Paige P7350D - Communication Cable from Central Computer to heads and LSM units				
WirePath 1 - Red		LM		
WirePath 2 - Yellow		LM		
WirePath 3 - Blue		LM		
WirePath 4 - Green		LM		
WirePath 5 - Gray		LM		
WirePath 6 - Orange		LM		
APC UPS - MODEL SMART-UPS 1500		Each		
Toro LSM-1 for solenoid valves		Each		
Valves				
Push-on Isolation Valves for Mainline Pipe – LEEMCO DLMV-BBHDSS-13.6 Series with valve restraint on either side				
315mm		Each		
250mm		Each		
200mm		Each		
160mm		Each		
110mm		Each		
Submain Connections				
Isolation Valve for Submain Pipe – LEEMCO LV-263-HDSS-13.6		Each		
LEEMCO RSLs-400		Each		
LEEMCO RSLs-600		Each		
LEEMCO RSLs-800		Each		
LEEMCO RSLs-1000		Each		
Solenoid Valves				
Rainbird 100-PEB-PRSD or Toro P220-27-94 valve		Each		
63mm butt weld x 2" male BSP threaded adaptor		Each		
Air Relief Valve - Crispin UL20 or equal		Each		
50mm LEEMCO LGT22SS Threaded Gate Valve		Each		
50mm BSP thread Bronze Wye Strainer with hose bib		Each		
63mm 90 degree elbow		Each		
63mm butt weld x 2" male BSP threaded adaptor		Each		
LEEMCO RSST-404 tapping saddle with BSP thread		Each		
LEEMCO RSST-604 tapping saddle with BSP thread		Each		
LEEMCO RSST-804 tapping saddle with BSP thread		Each		
Quick Couplers				
RAINBIRD 5RC or Toro 474-00 with BSP thread		Each		
LEEMCO RSST-6315A		Each		
LEEMCO LS-150 Stabilizer		Each		
Rainbird J-B-0-1-3-2 or Toro TSJ-15-A-10-12-4-10-B Swing Joint		Each		
For Rainbird option, provide additional 1.5" male ACME x 1" female ACME bushing for block heads		Each		
Valve Boxes				
200mm round lockable valve box for Quick Couplers and Grounding Rods and isolation valves (Rainbird Option)		Each		
200mm round lockable valve box for Quick Couplers and Grounding Rods and isolation valves (Toro Option)		Each		
375mm rectangular lockable valve box for solenoid valves		Each		
Jumbo rectangular lockable valve box for air relief valves		Each		
Additional Pricing				
Sprinkler Tool Set per type of sprinkler body		Each		
Spare Nozzle (10 of each type installed)		LS		
Quick Coupler Key Assembly with swivel elbows		Each		
Two repair couplings for each size pipe installed		LS		
Plastic Non-detectable Marking Tape		LM		
100mm x 400mm sleeve extension for isolation and air relief valves		Each		
15mm diameter Gravel for valve boxes (depth per details)		LS		
Conduits, teflon tape, glue and miscellaneous items for installation per manufacturers requirements and/or best practice installation		LS		
			GST	
			Grand Total	
Alternate Pricing				
4" x 36" ground plate with 10' green wire (Paige 182201IC) (Rainbird Option)		Each		
Paige Powerset earth grounding material (50 pound bag) (Rainbird Option)		Each		
4" x 36" ground plate with 10' green wire (Paige 182201IC) (Toro Option)		Each		
Paige Powerset earth grounding material (50 pound bag) (Toro Option)		Each		
10AWG Bare copper shielding wire connected to ground rod served by same power source		Each		

* Note: The owner retains the right to utilize this pricing for any material adjustments during the tender phase as part of any value engineering or upgrading components.

PART 1.00 – GENERAL

1.01 BACKGROUND

- A. Provide all labor, materials, equipment, services, and facilities required to perform all work in connection with the irrigation system renovation for Nelson Bay Golf Club located in Nelson Bay, NSW, Australia, complete, as indicated on Drawings and specified including (but not limited to) the following:
1. Supply and install the primary irrigation pump station with automatic filtration. Pump station shall meet the performance requirements outlined in the design documents. Contractor shall also supply a new pump house which shall be design build to satisfy the clubs spatial requirements and other requirements indicated within the design documents. Submit the pump house proposal as part of tender.
 2. Supply and install all Mainlines and all associated valves
 3. Supply and install all Submainlines and all associated valves and fittings
 4. Supply and install all rotor heads and all associated fittings and wiring
 5. Supply and install the control system and wiring including central computer and communication cables
 6. Supply and install all Power (installed by licensed electrician) including uninterrupted power supply at the central control
 7. Supply and install new bore transfer mainlines including disconnecting from old mainlines.
 8. Supply and install new bore spare pipe alongside mainline
 9. Commissioning of entire system
 10. 1 year warranty on material and labor from date of practical completion
 11. The contractor shall allow for the phasing of the irrigation system according to the clubs schedule which shall be identified at the time of tendering. The Contractor shall make repairs and reroute any existing hydraulic and electrical connections as necessary to accommodate the phasing of the irrigation system. Contractor shall make sure the existing system has water maintained to it at all times during construction without a period of greater than 7 days with an area without water or shall provide alternate temporary supplies. Contractor shall submit their proposal for maintaining the existing system as the transition occurs as part of the tender proposal.
 12. Verify that power requirement is acceptable at pump house location for new pump station capacity.
- B. The Design intent for the project is based on a hydraulically independent irrigation system for the redevelopment of 27 holes and practice facilities controlled by a central computer located at the maintenance facility. The project will have a primary flooded suction (from existing tanks) VFD pump station which supplies water to the corresponding golf irrigation system. The primary pump station will provide pressurized water for the entire system. The water will be distributed through valve in head (VIH) grade gear driven rotors located throughout the courses, each with individual head control with the exception of some tee areas which will be on block zones. All heads will be controlled automatically via the central computer. This communication between the computer and the heads will occur via a hardwire connection with control units at each solenoid valve and selects heads. The central computer shall calculate the daily watering requirements for all irrigation heads based on individual head requirements. The central controller shall also maximize the scheduling based upon the nightly watering window requirements to maximize the efficiency of the pump station and pipe network. The nightly watering window for hydraulic design purposes has been calculated as 9 hours each night. The system is designed based on a peak application rate of 6.02 mm applied per day for all irrigated turf. The total irrigated area is calculated as 45.99 hectares. Any future landscape or additional turf areas will be operated outside of the golf course operating window.
- C. Coordinate work of this Section with other underground utilities and with trades responsible for their installation. Refer to respective Drawings pertaining to other work.

1.02 TENDERING

- A. **As part of tendering, the contractor shall provide a complete Bill of Quantities (BOQ) as the basis of the tender for unit pricing. This BOQ shall not be the basis for material supplied, but shall be used as a reference for cost control for additions and subtractions to the irrigation system. The irrigation system shall be installed according to plans, details and specifications and acceptance of a BOQ does not constitute acceptance of an alternate material. Any alternates or substitutions must be approved in writing by the irrigation consultant as part of the material submission process indicated in item 1.04.B after being awarded the contract.**
- B. The Owner will have the right to add or delete items from the contract as necessary at any time. The tender shall be submitted so that in the event line items are deleted, increased or decreased, they will not affect other pricing elements of the contract.
- C. SUBSTITUTIONS / ALTERNATES
1. The system is designed based on the hydraulic and specific characteristics of each component and arbitrary substitution could render the system useless. The Contractor may submit items for substitution and associated cost savings at the same time as the tender is issued in addition to the base prices which must be tendered. Supply technical data sheets for any items to be considered. Submittal of substitutes will not constitute approval. Approval shall only be granted by the Owner in writing for alternates after acceptance.
 2. Upon being awarded the project, the Bill of Quantities provided by the Contractor during tendering shall not serve as the basis of the total material to be supplied. The contract documents (plans, details and specifications) shall serve as the basis for installation materials and techniques unless approved in writing by the Owner or Owner's representative for alternate materials to be substituted. The contractor shall supply enough material to complete the irrigation system as per the design documents (plans, details and specifications). Final approval of the acceptable materials shall be granted through the material submittal process described in section 1.04.B.
 3. Contractor shall submit their tender utilizing the same manufacturer for rotors, swing joints, solenoid valves, control system and quick coupler valves.
- D. Upon submitting their tender, the Contractor shall be deemed to have examined all the information supplied by the Owner including drawings, specifications, contract conditions and any other materials included by the Owner.
- E. The Contractor shall have visited the site and shall be aware of any site conditions that are readily apparent or would have been accessible by reasonable inquiries. This includes any allowances for rockwork/rock breaking or demucking or dewatering as part of the contract responsibilities. This shall also include understanding the needs for maintaining the existing irrigation system as the new system is installed to allow for all materials necessary for repair, rerouting, capping etc that may be necessary.
- F. The Contractor shall have allowed within their tender to provide all labour, based upon local labour conditions and accommodation that is present at the time of construction and allowed for all transport of materials to the site and access and storage methods.
- G. The Contractor shall allow for all taxes, duties, insurance and any other jurisdictional requirements required as part of the tender, unless informed otherwise in writing by the Owner.
- H. Qualification of irrigation personnel:
1. Contractor and on-site field superintendent shall each have not less than 5 years of continuous experience in installation of irrigation systems.
 2. Supply a list of 5 successfully completed central satellite control irrigation system installations, along with location, and name, address, and telephone number of the person to contact for information regarding the completed work as part of the tender document.

1.03 QUALITY ASSURANCE

A. Pressure Tests.

1. Hydrostatic tests:

- a. Perform hydrostatic tests on all mainlines in the presence of Project Manager. Do not backfill over pipe joints. Center load pipe with joints exposed until the installation has been inspected, tested, and approved in writing by Project Manager.
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- b. Furnish force pump and all other equipment required to adequately perform hydrostatic tests.
- c. Valves upstream of electric control valves and at submain isolation locations shall be installed prior to the hydrostatic test.
- d. Maintain 150 psi pressure (or pressure rating of pipe, whichever is lower) in the irrigation mainlines for not less than 4 hours. If the pressure drops more than 5 psi due to leaks, remake joints and repeat tests until the entire length tested is proven watertight.
- e. Perform all tests prior to backfilling over pipe joints.

B. Coverage Tests

1. Preliminary Coverage test: When the sprinkler system has been completed and prior to the grow-in of grass, perform a coverage test in presence of Project Manager to determine if the water coverage for all grassed areas is complete and adequate. Furnish materials and perform work required to correct inadequacies of coverage due to deviations from Drawings or where the system has been willfully installed when it is obviously inadequate or inappropriate without bringing it to the attention of the Project Manager. Perform this coverage test before grow-in of grass is commenced.
2. Final Coverage Test: When all sprinkler system punch list (defect list) items have been completed and the sprinkler system is operating automatically, perform a final coverage test in the presences of the Project manager to determine if the water coverage for all planting areas is complete and final. Furnish materials and perform work required to correct inadequacies of coverage. This shall be performed after the leveling of all heads has occurred.

C. Electrical tests indicated in 3.03.

D. Notification of inspections:

1. Be responsible for notifying Project Manager in advance for the following inspections, according to the time indicated:
 - a. Pre-job conference: 7 days.
 - b. Pressure supply line installation and hydrostatic testing: 24 hours.
 - c. Mainline layout: 24 hours.
 - d. Installation of sleeving and conduits: 24 hours
 - e. Control wire and communication/sensor cable installation and testing: 24 hours
 - f. Staking: 72 hours
 - g. Coverage tests: 24 hours.
 - h. Final inspection: 72 hours.
 - i. Irrigation consultant on-site visit: 7 days
2. When inspections have been conducted, keep adequate records and show evidence of when and by whom inspections were made. Submit a copy of these records to the Project Manager after inspections have been completed.
3. During final inspection, be responsible for having two-way radio communication and sufficient personnel to provide instantaneous communication between the inspection area and the controller for the system.
4. Prior to walking the irrigation system with the Project manager for inspections, the Contractor shall pre-walk the irrigation system with its own crew to ensure compliance with plans and specifications.

5. In the event the system does not pass an inspection and additional site visits by the irrigation consultant are required, the contractor shall be responsible for paying all expenses including airfare and accommodation and timecard fees for the irrigation consultant to visit and retest the system, should the owner deem it necessary.

1.04 SUBMITTALS

- A. Procedure: In accord with specifications.
- B. Materials List: Submit list of all materials for irrigation system prior to ordering and delivering material on-site.
 1. Furnish the articles, equipment, materials, or processes specified by name on Drawings and in Specifications. Substitutions will not be allowed without prior written approval of Project Manager.
 2. Submit a complete list of materials for approval prior to ordering materials and commencing work. List of materials shall include the name of manufacturer, model number, and description of each item of materials and equipment intended to be used.
 3. Irrigation submittal shall be specific and complete. All items shall be listed and include cleaner/primer/glue, wire, wire connectors, valve boxes, and other items needed to complete work.
 4. Equipment or materials installed or furnished without prior approval of Project Manager may be rejected and Contractor may be required to remove such materials from the site at the Contractor's expense.
 5. Approval of any item, alternative, or substitute indicates only that the product or products apparently meet the requirements of Drawings and Specifications on the basis of information or samples submitted.
 6. Manufacturer's warranties shall not relieve Contractor of its liabilities under the guarantee. Such warranties shall only supplement the guarantee.
 7. Submit 2 samples of each type of irrigation wire and cable that has been specified for approval by the Project manager.
 - a. One sample shall be loose
 - b. A second sample shall be laminated between two pieces of clear plastic. This shall be used by the Project manager in the field to verify that the wire/cable being installed is the approved type.
 8. Submit two samples of each type of pipe to be used, 1 meter in length which clearly identifies brand markings, class, extrusion date etc on the pipe.
- C. Operating and maintenance data:
 1. Prepare and deliver to the Project Manager within ten calendar days prior to completion of construction, two hard-cover, three-ring binders as well as digitally containing the following information:
 - a. Index sheet which states Contractor's name, address and contact telephone numbers and lists each type of equipment installed and material, including names and addresses of manufacturers' local representative.
 - b. Catalog and parts sheets on every material and equipment item installed under this contract and complete operations and maintenance instructions on all major equipment.
 - c. Maintenance of equipment Schedule
 - d. Servicing of equipment manual
 - e. Control Diagrams.
 - f. Diagrams of the system.
 - g. Logic of Operation of the Systems.
 - h. Performance Characteristics: Curves and charts for equipment (Data shall refer to, and identify specific model in service and shall not be general advertising data)
 - i. Spare parts list
 - j. Names, Contact numbers & Addresses of Spare part suppliers.
 - k. Signed test and inspection reports.
 - l. Certificates

m. Bill of Quantities of Material used in the Contract.

n. Guarantees.

D. Project record documents:

1. Provide and keep up-to-date a complete redlined record set of drawings which shall be corrected daily, showing every change from the original Drawings and Specifications and the exact installed locations, sizes, and kinds of equipment. Prints for this purpose may be obtained from Project Manager's authorized representative at cost. This redlined record set of drawings shall be kept at job site and shall be used only as a record set.
2. Keep two (2) sets of CAD file drawings during the installation. The first shall be an "As-staked" CAD indicating the surveyed or GPS'd locations of all irrigation components staked by the irrigation consultant in the field. The second CAD file shall indicate the as-built locations of all irrigation components.
3. This redlined record set of drawings shall also serve as work progress sheets and shall be the basis for measurement and payment for work completed. This record set of drawings shall be available at all times for observation and shall be kept in a location designated by Project Manager's authorized representative. Should this record set of drawings not be available for review or not be up-to-date at the time of observation, it will be assumed no work has been completed. Provide copies of the redlined record set of drawings for Project Manager's review on a monthly basis.
4. Make neat and legible notations on this record set of drawings daily as the work proceeds, showing the work as actually installed. For example, should a piece of equipment be installed in a location that does not match the plan, indicate that equipment in a graphic manner in the location of installation and so as to match the original symbols as indicated in the irrigation legend. Should the equipment be different from that specified, indicate with a new graphic symbol both on the drawings and the irrigation legend. The relocated equipment, dimensions and northing and easting coordinates should then be transferred to the appropriate drawing in this record set of drawings at the proper time.
5. The contractor shall keep an accurate account of the material that has been delivered to site, is scheduled to be delivered to the site, and the material that has been installed. This shall be kept on an area by area basis. The purpose of this is to be able to monitor the exact status of material and foresee if any material shortcomings are expected for the last few areas. This set of documents shall be provided to the project manager on a monthly basis for their review. The owner shall not be liable for paying for additional air freight to have material delivered if the contractor does not provide ample notice of material shortfall.
6. Final As-builts shall be provided to the owner 2 weeks prior to practical completion. The Contractor shall survey all irrigation components including items that are not directly visible on the surface and shall supply this survey data to the Owner when requested. A list (though not all inclusive) is indicated below as item 1.04.D.6 below for the components the Contractor is required to keep survey data for. The Contractor may use above ground markers that indicate underground components for future identification during the as-built survey.
7. Although descriptions and other information may be different, the following is a guide to proper table format:

Description	Number Description	Northing	Easting
Mainline Tee	MT1	XXX.xx	YYY.yy
	MT2	XXX.xx	YYY.yy
Communication	CC1	XXX.xx	YYY.yy
	CC2	XXX.xx	YYY.yy
Etc.	Etc.	Etc.	Etc.

8. The following items shall be located using northing and easting coordinates within 30cm accuracy from the Project survey benchmarks:
 - a. Mainlines and submains routing. Include all fittings and change in direction. Note locations of mainline at a maximum of 30 meter intervals. Record vertical dimensions of depth below finished grade.
 - b. Electrical control valve wiring.
 - c. Communication cable conduit routing including pull box locations.
 - d. Connection to electrical power service and electrical routing.
 - e. Irrigation electrical pull box locations and wire splice locations.
 - f. Each end of irrigation conduits and sleeves.
 - g. Power cable routing and sizes
 - h. All valves and valve box locations
 - i. Heads
 - j. Grounding and switch locations
 - k. Quick Couplers
 - l. Other related equipment as directed by Project Manager's Representative.

E. For new turf areas, the contractor shall submit a schedule during each areas grow-in on the operation schedule for each head. This shall indicate each station, head type, nozzle, length of time to run, water applied and precipitation rate. The schedule shall also reflect the impact on the pump station including total demand for the system on an area by area basis (areas that are being grown in as well as established areas).

F. Checklist:

1. Complete the following checklist at the end of each segment of the project.
 - a. Permits: Itemize by type with date received
 - b. Material approvals: By who approved and date
 - c. Pressure line tests: By whom approved and date.
 - d. Wire testing including all splices and grounding tests: By whom approved and date
 - e. Materials furnished: Recipient and date.
 - f. Manufacturer's warranties: Recipient and date.
 - g. Written guarantee: Recipient and date.
 - h. Head and component staking: By who approved and date
 - i. Leveling of heads in grass areas: By whom approved and date
 - j. Preliminary and Final coverage tests: By who approved and date
2. The signed and dated checklist(s) shall be forwarded to Project Manager before final acceptance of the project.

1.05 PRODUCT HANDLING

- A. Procedures: In accord with Specifications.
- B. All materials to be supplied by the Contractor shall be new, and the best procurable without defects, and as required by the plans, specifications and special provisions. All materials shall be suitable for the site conditions to be encountered. Any materials or equipment found to be defective or not as specified shall be removed from the site by the Contractor, and proper materials shall be brought in and installed by the Contractor at no additional expense to the Owner.

1.06 PROJECT CONDITIONS

- A. Project Manager reserves the right to make temporary repairs as necessary to keep the irrigation system equipment in operating condition. This does not, in any way, alter the requirements of Contract Documents.
- B. Coordinate with other trades the underground improvements, location and planting of specimen trees, and other planting as applicable. Verify location of all planting requiring excavations 600mm (24 in.) in diameter and larger with Project Manager prior to installation of main lines.

1.07 WARRANTY

- A. Warrant the entire permanent irrigation system (materials and labour) to give satisfactory service for a period of 1 year from the date practical completion is granted by Project Manager.
- B. Should any problems develop within the warranty period because of inferior or faulty materials or workmanship, they shall be corrected to the satisfaction of Project Manager at no additional expense for parts or labour to Owner.
- C. A written warranty showing date of completion and period of warranty shall be supplied upon completion of each segment of the project.
- D. Contractor shall pass on any warranties that extend beyond the defects liability period to the Owner so that that Owner can maintain the warranty directly from the manufacturers.

1.08 STATUTORY ORDINANCES

- A. Equipment supplied under this contract shall comply with the latest version of the relevant statutory regulations.
- B. Where the design or choice of equipment is affected by Ordinance, in particular the Electricity Supply Ordinance, the equipment supplied under contract shall comply with all relevant sections of those ordinances even though no particular reference may be made in this Specification. The entire irrigation system shall be installed in complete compliance with all applicable local and federal laws, ordinances and established codes. The Contractor shall at his sole cost and expense and without increase in the contract price, comply with all laws, rules, ordinances, and regulations of all governing bodies having jurisdiction over the work; obtain all necessary permits, taxes and licenses at no additional expense to the Owner.
- C. If the Contractor observes that the drawings and specifications are in conflict with existing ordinances, regulations, or codes, he shall promptly notify the Owner in writing prior to proceeding.

1.9 SILENCE OF SPECIFICATION

- A. The apparent silence of the specification, drawings or other contract documents as to any detail or the apparent omission from them of a detailed description concerning any point, shall be regarded as meaning that only the best general practice is to be used. All interpretations of the specifications will be made by the Contractor on this basis.

PART 2.00 – PRODUCTS

2.01 MATERIALS

- A. Pipe and fittings:
 - 1. uPVC: uPVC piping shall be fabricated from unplasticized polyvinyl chloride according to metric standard or owner approved equivalent. Rating and size shall be as shown on the drawings but not less than PN12.5.
 - a. All pipe shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.
 - b. All PVC pipes 75mm (3") and larger shall use o-ring gasket socket. The socket to be integral part of the pipe and it should incorporate a triple compression rubber seal and when jointed offers three-fold hydraulic security under both positive and negative pressure heads. The socket should have the same wall thickness as the pipe with an extra sleeve to maintain the correct pressure rating at the joint. The insertion mark shall be visible to show proper depth into spigot.

- c. For o-ring socket connections, thrust blocks shall be installed in accordance with current AS/NZ standard. Joint restraints may be used in lieu of thrust blocks and installed per manufacturers recommendations.
- d. For PVC pipe 75mm (3") and larger, cast iron fittings shall be used with o-ring gasket sockets. Contractor shall use IPLEX cast iron fittings or approved equal.
- e. When PVC is utilized for mainlines, tapping saddles with stainless steel bolts, nuts and washers shall be used for connections for submainline, block valves connected to mainline pipe. IPLEX or approved equal.
- f. PVC Pipe 63mm and less shall be made by solvent welding using adhesive solvent and primer as recommended, in writing, by the manufacturer and approved by the irrigation consultant. All cans of solvent and primer shall have labels intact and shall be stamped with date of manufacture. No cans dated over two years old will be permitted. No thinning of solvent or primer will be permitted. Lubricant and solvent cement used to make joints shall be approved in writing by the pipes manufacturer or his designated representative and the Engineer. Weld-on brand or approved equal.
- g. For PVC pipe, use IPLEX or equal solvent weld uPVC fittings rated to PN16 for all fittings 63mm and smaller.

2. HDPE

- a. All HDPE pipe shall be manufactured by IPLEX or approved equal.
- b. All pipe unless stated otherwise, shall be manufactured from a PE 100 resin. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, have nominal burst values of three times the Working Pressure Rating (WPR) of the pipe. Peak flow water velocity of 1.5 m/sec has been used in the hydraulics engineering design.
- c. For HDPE mainline connections electrofusion or butt weld fittings shall be utilized, pressure rated as per plans. Side fusion shall not be permitted. Fittings shall be installed by personnel with experience with EF and/or butt weld fittings and shall use approved equipment for proper installation as approved by the manufacturer.
- d. Electrofusion fittings - Fittings shall be PE100 HDPE. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half times the Working Pressure Rating (WPR) of the fitting.
- e. Butt weld Fittings - Fittings shall be PE100 HDPE. Fittings shall be compatible with pipe it is connecting and shall be from the same manufacturer unless approved by owner.

3. Ductile Iron:

- a. Ductile iron pipes shall be supplied by an internationally known and approved manufacturer. Ductile iron pipes and fittings shall be supplied, stored, laid, back-filled and tested in accordance with current AN/NZ standard. The pipes shall not exceed 6 meters in length and push-in or flexible mechanical joints shall be used unless otherwise stated.

Internal and external surfaces of all ductile iron pipes and fittings shall be coated according to one of the following methods:

- i) Fusion Bonded Plastic Powder Coating (average 500 microns)
- ii) Fusion Bonded Epoxy Coating (minimum 300 microns)

4. Sleeves

- a. All sleeves shall be PN12 or equal with solvent weld joints. Sleeves shall be a minimum of twice the nominal size of the pipe within the sleeve.
- b. All pipe shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.

5. Fittings:

- a. Where flanged joints are used, the flanges shall be faced and drilled to match the corresponding flanges they are connecting to. Flanged joints shall be made with inside bolt circle gaskets and gaskets from plain rubber. Bolts shall be stainless steel Grade A4-70, complete with nuts and washers. The threaded portion of bolts shall be of such length that at least two threads shall protrude beyond the nut when tightened.
- b. Fittings shall bear manufacturer's name or trademark, material designation and size.
- c. **Contractor to verify that correct threading tools are used. At no time shall BSP threaded pipe be connected to NPT or ACME inlets or vice versa. Only like threads shall be joined. Excessive tape shall not be allowed to match non-similar thread types.**

6. Joints: Socket type with primer, cleaner, and solvent cement; threaded type with Teflon tape with the exception of ACME threads which do not require Teflon tape.

7. Solvent welding:

- a. All solvent weld joints shall be welded using cleaner, primer and cement. Expiration date of material shall be clearly visible on all containers.
 - 1) Primer shall meet ASTM F-656, NSF approved as manufactured by IPS Corporation, or Project Manager approved equal.
 - 2) Cement shall meet ASTM 2564, NSF approved. Cement shall be labeled for use on PVC and flex pipe as manufactured by IPS Corporation (Weld-On 737) or Project Manager approved equal. Cements labeled for Wet or Dry use shall not be used.

B. Isolation and Check valves:

1. Gate valves 75mm (3") and larger shall be push-on, cast iron waterworks valves, with solid wedge type gate and non-rising stem. Valves installed below ground shall be provided with stem cap for key operation. Provide heavy duty steel keys with head configuration to fit operating nut and handle length as required for proper above ground operation shall be provided. Valves above ground shall be provided with hand wheel. Nominal pressure for the valves shall be 13.8 bar or more. All bolts and nuts to be stainless steel grade A4-70. LEEMCO or equal.
2. Isolation valves located on submainlines are to be 50mm integral valves with an operating nut handle. LEEMCO or equal. Valves must be accessible and operable from finished grade by a key.
3. Check valves shall be Class 125 and 200 PSI CWP and in accordance with FM, bronze trim, with body and bonnet conforming to ASTM A 48 cast iron, stainless steel springloaded center-guided globe-style lift-type. Valve ends shall be flanged type. NIBCO F-918-B or equal.

C. Control System:

1. Central Computer
 - a. The irrigation computer shall be the latest version of TORO LYNX-CE or updated Rainbird Stratus 2 with motherboard expansion and wirepath keycode for capacity for up to 3 wire paths for Rainbird or 6 wire paths for Toro. Include ICI-1500 with two motherboards for Rainbird. For Toro, provide FIU and two DEC-RS-1000-M panels. Include keycodes as necessary for number of wirepaths.
 - b. The irrigation central controller shall be a Windows compatible computer based package with hardware equal to the manufacturers latest recommendation as specified by the irrigation software manufacturer and shall include the CPU, software, printer, 24" LCD monitor, modem, cables, irrigation interface units, surge suppression, uninterrupted power supply (UPS), programming and training manuals as specified herein and any other items necessary to insure complete operation of the irrigation system. Provide all grounding at central computer per manufacturers requirements.
 - c. The Contractor shall be responsible for coordinating the installation of all central computer components with the manufacturers' distributor and shall certify communication to all field components. Price for installation shall be included in the Contractors cost to at no additional expense to the Owner. Location of the central controller shall be in the maintenance building and installed per the following specifications and any manufacturer's recommendations
 - d. The Contractor shall provide an uninterrupted power supply (UPS) to the central computer and interface units. This unit shall be capable of providing a minimum of 1 hour power supply in the event of site power failure.

D. Remote control valves: Type and size in accord with Drawings.

E. Sprinkler heads:

1. Head placement: Locate where indicated on drawings.
2. Install heads in accord with details on Drawings.
3. Valve in Head rotors: Of size and type indicated on Drawings.

G. Control wire:

1. Wire requirements shall be as follows:
 - a. Unless noted otherwise, connections between the central computer unit and irrigation solenoid valves and VIH heads shall be made with "Maxi-cable", Paige 7072D. If TORO system is utilized, then Paige P7350 cable shall be utilized.
 - b. Install in accord with valve manufacturer's specifications and wire chart. In no case shall wire size be less than #14 awg.
2. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply lines wherever possible.
 - a. **Where wire will not be run in same trench as mainline, install all wire in Class C PVC (or equal) conduit a minimum of 450mm (18") below finished grade.**
3. When more than one wire is placed in a trench, tape the wiring together at intervals of 2 meters.
4. An expansion curl shall be provided at each wire splice connection. Control wires shall be laid loosely in trench without stress or stretching wire conductors. Wrap wires around 25mm pipe ten times for acceptable curl. This additional wrapping is important for maintenance as well as adding additional surge protection for electric valves.
5. Make wire splices using 3M DBYR connectors, UL-listed.
6. Make an expansion loop of 600mm at each directional turn.
7. Use a continuous wire between controller and remote control valves and heads. Do not use wire splices without prior approval by Project Manager except at valve box locations. Install each approved splice in valve box.
8. **Provide a separate colored cable for each wire path so it is identifiable in the trenches.**
9. Provide a single #14AWG black trace wire alongside any pipe that does not have control wire installed alongside it.

H. Valve and pull/splice boxes:

1. Valve and pull/splice boxes shall be provided as follows, Toro/Rainbird brand or equal:
 - a. Air relief valves shall be Jumbo lockable box.
 - b. Quick coupling valve, isolation valves, grounding and drain valves shall be 200mm (8") round lockable box.
 - c. Electric control valves shall be standard 375mm (15") lockable box.
 - d. Control wire, communication cable, and flow sensor cable pull box/splice box shall be standard 200mm (8") lockable box.
2. Valve box extensions shall be provided as required and shall be by the same manufacturer as the valve box.
3. Gravel all boxes after valve installation in accord with details as indicated on Drawings.

I. Identification tag: Provide identification tags for all block zone valves. ID tags or equal indicating station number of block zone.

J. Quick coupler valves:

1. Permanent quick coupling valves shall be connected to permanent irrigation mainline or submainline and shall be of size, type, and location indicated on Drawings.

K. Communication Cable and Conduit

1. The communication cable between the central control computer and the heads shall be single pair cable meeting Paige Electric specification P7072D for Rainbird system or P7350D for Toro system.

L. Conduit for wires:

1. Control wires under paving shall be in PVC Class C conduit.
2. Control wires not installed alongside pipework shall be in PVC Class C conduit.
3. Use separate conduit for each type of wire or cable.

M. Copper pipe and fittings:

1. Copper pipe: Type K, hard tempered.
2. Fittings: Wrought copper, solder joint type
3. Solder: Make up solder joints with appropriate paste flux and solder with 95/5 solder, unless specified otherwise.

M. Brass pipe and fittings:

1. Brass pipe: 125 lb., cast bronze, ground joint pattern, threaded
2. Fittings: Cast bronze, screwed, 125 lb. Class.

N. Air Valves:

1. Provide CRISPIN UL20 or approved equal dual air release valves with threaded inlet at all high points. Location on the plans are approximate.

O. Pressure Reducing and Pressure Relief Valves (not utilized)

1. Pressure reducing valve shall be manufactured by Cla-Val and shall be model #90-01. The pressure reducing valve shall be set to a downstream pressure setting as indicated on the plans.
2. A pressure relief valve shall be installed immediately downstream of the pressure reducing valve and shall be set at a pressure 1 bar above the pressure reducing valve setting. Pressure relief valve shall be manufactured by Cla-Val model #50-01.
2. Contractor shall supply and install all pipework and fittings associated with the installation of the pressure reducing and pressure relief valves as per the manufacturers recommendations. This includes the connection of the pressure relief discharge to the nearest drain.

P. Drain Valves: (not utilized)

1. All drain valve assemblies shall be made with a IPLEX ELGEF Plus (or equal) ball valves. Assembly shall be installed in a 8" round valve box with a 4" PVC sleeve around valve skirt. Drain valve assemblies shall be installed on any low points in mainline isolation sections to allow for water to be quickly removed from the system for maintenance. The relative locations are indicated on the irrigation plans, but should be field adjusted to the lowest point.

Q. Thrust blocks: In the event that PVC pipe is used for main line piping, it shall have thrust blocks sized and placed in accord with pipe manufacturer's recommendations and as indicated on Drawings. Thrust blocks shall be standard concrete mix in accord with ASTM C-150, ASTM C-33, and ASTM C- stability of all thrust blocks. Joint restraints can be used in lieu of thrust blocks and must be installed according to manufacturers recommendations and at recommended locations for proper functioning.

R. Swing Joints:

1. All swing joints for VIH sprinklers shall be manufactured by Rainbird or Toro and shall be standard top unitized o-ring swing joints with 300mm mid-section. Swing joint shall be 25mm unless noted otherwise. **Verify that threads match the manufacturers inlet and outlet.**
2. Quick couplers shall be installed with standard top Unitized swing joints with 300mm mid-section and shall be manufactured by Rainbird or Toro. Horizontal Stabilizer shall be installed. **Verify that threads match the manufacturers inlet and outlet.**

S. Irrigation Pump Station:

1. The existing pump station shall be dismantled and returned to the owner. Gain approval of the Project Manager for the method and schedule for dismantling the existing pump station and the location that the pump station should be relocated to for future use.
2. The pump station shall utilize the existing flooded suction flume from the existing tank. The contractor shall verify that the flume is sized appropriately for the new pump station flow rates and that the intake screen is clean without blockage.
3. The new pump station shall be capable of producing 5,200 LPM at 95 meter head at the point of discharge. The design of the pump station is based on the use of three vertical multistage pumps operating via VFD for one pump with other pumps switching across the line. A single vertical multistage pressure maintenance pump capable of providing 200 LPM at same discharge as the main pumps shall be provided. This pump shall operate with a DOL starter and shall be used to maintain pressure within the station for small flows. Verify that there is no gap between the pressure maintenance pump maximum flow and minimum flow of one main pump in order to enable total flow capability of 0-5,200 LPM and to ensure proper operation at a constant pressure of 95 meter at the point of discharge.
4. The contractor shall provide and install a butterfly valve at the connection point to the intake line for isolating the pump station from the tank for maintenance purposes.
5. The pump station intake manifold shall be composed of schedule 40 carbon steel. Provide tees for connection to each main pump and the pressure maintenance pump. Provide and install one butterfly valve upstream of each pump for isolation from the intake manifold.
6. The discharge manifold shall connect to the pumps with a grooved isolation butterfly valve. In addition, each pump connection shall have a cast iron stainless steel disc duo flap check valve installed upstream of the butterfly valve.
7. Provide and install a 50mm air relief valve on the discharge manifold.
8. Provide a 25mm hose cock on the discharge manifold along with three, 25mm threaded inlets for future fertigation connection(s).
9. Provide and install a pressure relief valve sized for peak flow on the discharge manifold. Include discharge pipe plumbed to the nearest drain or lake.
10. Provide and install an automatic filter on the discharge manifold sized for peak flow on the discharge manifold. Filter shall have 300 micron screen. Include discharge pipe plumbed to the nearest drain or lake.
11. The contractor shall provide and install a butterfly valve at the connection point to the intake line for isolating the pump station from the lake for maintenance purposes.
12. The contractor shall provide a PLC (programmable logic controller) along with a pressure transducer within the discharge manifold so that the system is capable of monitoring pressure within the system and operating the VFD to maintain the design pressure. The PLC shall be capable of monitoring both high and low pressures within the system to operate between the pressure maintenance pump and the main pumps, turning them on in sequence with the VFD altering the flow on the pumps to meet the pressure requirements. The PLC shall be capable of rotating the starting pumps to balance the operational hours amongst the pumps so they achieve an equal duty over the lifespan of the station. The PLC shall be housed in a NEMA 4 rated enclosure. Provide a quick trip air circuit breaker within the panel to protect each pump motor along with all switches and fuses as required by regulation. The PLC shall be grounded per manufacturer and regulatory requirements. All electrical connections shall be made by a licensed electrician.
13. The PLC shall include indicator lights, reset switches and reporting capabilities to the PLC for low and high flow, voltage fault and phase failure. There shall be a meter connected to the panel which will show the flow and pressure output being provided in real time.

14. All wiring for the irrigation pump station, PLC and panel shall be based on best international standards and practices and shall fully comply with all relevant codes.

15. In the event of a VFD or PLC failure, the system must be able to be switched to be operated manually.

16. Additional Contractor requirements–

- Verify that adequately sized power supply cables between the supply main and the pump station control panel are provided and installed by workers qualified by local authority for electrical work. All electrical work must meet the requirements of the relevant local authority.
- Contractor shall provide and install all piping for the filter flush discharge.
- The Contractor shall provide an exhaust fan if natural ventilation is insufficient for the pump room as required by the pump station manufacturer. The fan should be in operation in tandem with the main pumps of the pump station.
- The Contractor shall provide and install a flanged Z - pipe or down-pipe which connects the pump station discharge to the main line.
- The Contractor shall obtain a sample of the source water and submit to testing laboratory to ascertain the organic and chemical composition and forward the test results to the Owner and pump manufacturer. Should the pump manufacturer recommend a change in pump materials due to water source, the Contractor shall immediately notify the Owner and provide cost implication for review prior to ordering station.
- The contractor shall provide a connection at the discharge of the pump station to the existing irrigation mainline so the existing system can continue to operate as the new mainline is constructed.

17. The contractor shall provide full drawings and details of the proposed pump station layout including all components and operation of the system for approval by the owner. This should include both mechanical as well as electrical information and full warranty data.

2.02 TOOLS TO BE SUPPLIED TO OWNER

- A. As part of work of this Section, provide the following tools and equipment to Project Manager before final inspection:
1. Two sets of special tools required for disassembling and adjusting each type of sprinkler and valve provided. **(deliver at commencement of installation)**
 2. One quick coupler key assembly for every ten or fraction thereof of each type of quick coupling valve provided.
 3. Two keys for gate valve operation. **(deliver at commencement of installation)**
 4. **Two repair couplings for each size and type of pipe installed. (deliver at commencement of installation)**
- B. Before final inspection can occur, written evidence that Project Manager has received the tools and equipment must be shown to Project Manager.

PART 3.00 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. Before work is commenced, hold a conference with Project Manager to discuss general details of the work. **Submit all material submittals for approval by the Consultant prior to ordering any material.**
- B. Verify dimensions and grades at job site before work is commenced.
- C. During progress of work, a competent superintendent and all assistants necessary shall be on site. All shall be satisfactory to Project Manager. The superintendent shall not be changed, except with consent of Project Manager, unless that person proves unsatisfactory or ceases to be employed. The superintendent shall represent Contractor in its absence and all directions given to the superintendent shall be as binding as if given to Contractor.
- D. Obtain and pay for all permits and all inspections required by governing authorities.
- E. All work indicated on Drawings shall be provided whether or not specifically mentioned in the Specifications.

- F. If there are ambiguities between Drawings and Specifications, and specific interpretation or clarification or request for information is not asked for prior to bidding, the interpretation or clarification will be made only by Project Manager, and Contractor shall comply with the decisions. In the event the installation contradicts the directions given, the installation shall be corrected by Contractor at no additional cost to Project Manager.
- G. Layout of sprinkler lines indicated on Drawings is diagrammatic only. Location of sprinkler equipment is contingent upon and subject to integration with all other underground utilities. Contractor shall employ all data contained in the Contract Documents and shall verify this information at the construction site to confirm the manner by which it relates to the installation.
- H. Coordinate installation of all sprinkler materials, including pipe, to avoid conflict with the trees, shrubs, or other planting.
- I. Do not proceed with installation of the irrigation system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, legend, or specific notes are discovered. All such obstructions, conflicts, or discrepancies shall be brought to attention of Project Manager.
- J. Replace, or repair to the satisfaction of Project Manager, all existing paving disturbed during course of work. New paving shall be the same type, strength, texture, finish, and be equal in every way to removed paving.
- K. Project Manager reserves the right to make temporary repairs as necessary to keep equipment in operating condition without voiding Contractor's guarantee or relieving Contractor of its responsibilities during the guarantee period.
- L. Change-out of sprinkler heads shall be included as needed without additional cost to Project Manager.

3.02 EXCAVATING AND BACKFILLING MAINLINES

A. Trenching - General:

- 1. Dig sides of trenches straight (vertical). Provide continuous support for pipe on bottom of trenches. Lay pipe to uniform grade. Trenching excavation shall follow layout indicated on Drawings.
 - a. Where irrigation lines occur under paved areas, coverage shall be measured from bottom of paving.
- 2. Mainlines under constant pressure shall have minimum cover over the top of the pipe as indicated in the details. Pipes should be laid in such a way as it should have minimum clear space as per local municipality standards & requirements from other services and trees. Lateral pipe not under constant pressure and submainline pipe shall have minimum cover over pipework as indicated in the details. Contractor shall verify that all mainline pipework under constant pressure is installed below the freeze line.
- 3. Provide minimum cover of over control wires as indicated in the details when installed away from mainline.
- 4. Prior to trenching all services crossing or running close to the line of the trench shall be identified and exposed. In addition the line of the trench shall be swept using an approved detection device, capable of detecting both live and 'dead' cables.
- 5. Trenches shall be made as narrow as practicable, but not less than the pipe diameter plus 300 mm, and shall provide sufficient room for laying jointing and testing. The width of the trench at the crown of the pipe shall not exceed the pipe diameter plus 600 mm. Sheet piling, bracing and shoring shall be used to provide for the safety of all personnel for all trenches.
- 6. The trench bottom shall be composed of stable uniform sand with no protuberances that might cause point loading of the pipe. The trench formation shall be trimmed to an even finish which will provide continuous support for the pipe. Additional excavation shall be carried out at the position of the pipe socket to ensure proper joint assembly and pipe support.
- 7. If the existing formation is unsuitable for direct laying, the pipes shall be laid on a bed of imported sand 100 mm thick (minimum). This sand may be sourced from sieved excavated material, but should not contain any particles larger than 5 mm, and should have good self compacting properties.
- 8. De-watering shall be provided to remove any surface or ground water entering the excavations. Ground water level shall be maintained at least 100 mm below the bottom of each excavation.

9. The trench should not be excavated more than 3 days production rate in front of pipe laying.
10. In the event that rock breaking may be required to suitably lay pipework within trenches, a 100 mm layer of imported clean sand bedding free of debris larger than 5 mm shall be applied around the pipework. The Contractor shall familiarize themselves with the site conditions to make an allowance within their tender for rock breaking as indicated on a per meter basis. No additional compensation will be provided for additional rock breaking unless agreed upon in writing with the Owner.

B. Backfilling:

1. Main line pressure supply lines shall have minimum of 300mm (12") of fill placed over pipe. The shielding wire and marking tape as specified shall then be placed directly over the main line, followed by remainder of backfill.
2. Initial backfill on all lines shall be of fine granular material with no foreign matter larger than 13mm (1/2") in.
3. Compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken areas, humps, or other irregularities.
4. Flooding may not be used in lieu of tamping.
5. Do not use motorized vehicle for compacting soil.
6. Restore grades and repair damage where settling occurs.
7. Pipes shall be center loaded leaving joints exposed within three days of laying. Initial back-fill shall be by hand in 300 mm lifts, and carried out in such a manner as to ensure adequate support under the pipe and distributed evenly to ensure there are no voids under or to the side of the pipe.
8. Back-fill material shall be debris-less and shall be compacted by water tamping until the level of back-fill reaches the crown of the pipe.
9. Back-fill material shall be deposited in 300 mm lifts in general areas and compacted to relative degree of compaction of 95% (by approved method)and tested by large pouring method. In paved areas layers shall be 150 mm and back-fill shall be compacted layer by layer to reach relative degree of compaction to roads department approval. Mechanical compactors shall not be used until there is a minimum of 300 mm above the crown of the pipe.
10. Back-fill material shall be sand and shall not contain any particles larger than 13 mm for the first 100 mm above the pipe; thereafter back-fill material shall contain no particles larger than 50 mm.

C. Routing of piping:

1. Routing of pressure and non-pressure piping lines are indicated diagrammatically on Drawings.
2. Coordinate specimen trees and shrubs with routing of piping lines.
 - a. Planting locations shall take precedence over sprinkler and piping locations.
 - b. Report to Project Manager any major deviation from routings indicated.
3. Lay out sprinkler heads and make all minor adjustments required due to differences between site and Drawings. All such deviations in layout shall be within the intent of the original Drawings, and without additional cost to Project Manager. Project Manager shall be responsible for approving head layout.
4. Layout all systems using an approved staking method, and maintain the staking of approved layout. If GPS is utilized, it shall have an accuracy of 30cm or better.
5. The Contractor shall stake out the irrigation system in accordance with the scaled plans. Staking shall be erected in such a manner as to insure permanency of the staked locations until such time as the irrigation system is installed. Stakes shall be placed to show location of valves, pipelines and sprinkler heads. Stakes shall be flagged with bright flagging for ease of location. All staking by the Contractor shall be subject to approval of the Project Manager.

6. Utilize the following colored flags for staking purposes:

- a. White = Heads
- b. Blue = Quick Couplers
- c. Orange= Isolation Valves

3.03 INSTALLATION

A. Water supply: Connections to water sources shall be at approximate locations indicated on Drawings. Make minor changes caused by actual site conditions without additional cost to Project Manager.

B. Assemblies:

1. Routing of pressure supply lines as indicated on Drawings is diagrammatic only. Install lines and required assemblies in accord with Drawings.
2. Do not install multiple assemblies on individual service tees. Provide each assembly with its own inlet.
3. Install assemblies in accord with the respective detail Drawings and Specifications.
4. Brass pipe and fittings, and plastic pipe with threaded fittings shall be assembled using Teflon tape, applied to the male threads only with the exception of ACME threads which do not require Teflon tape.
6. Valve locations such as electric control valves, gate valves, quick coupler as well as any other equipment installed within a valve box shown on Drawings are approximate:
 - a. Contractor shall stake out locations of each electric control valves, gate valves, quick coupler as well as any other equipment installed within a valve box for review and approval by Project manager prior to installation of this irrigation equipment.
 - b. Final location and exact positioning of electric control valves, gate valves, quick coupler as well as any other equipment installed within a valve box shall be determined by the Project Manager.
 1. Minor modifications as to location of said irrigation equipment as requested by Project manager shall be provided by Contractor at no additional cost to Project Manager. Failure to obtain Project Manager's approval prior to installation shall cause Contractor to make Project manager directed revisions at no additional cost to Owner.
7. Equipment locations such field satellites and other above grade irrigation equipment shown on Drawings are approximate:
 - a. Contractor shall stake out locations field satellites and other above grade irrigation equipment for review and approval by Project manager prior to installation of this irrigation equipment.
 - b. Final location and exact positioning field satellites and other above grade irrigation equipment shall be determined by the Project Manager.
 1. Minor modifications as to location of said irrigation equipment as requested by Project manager shall be provided by Contractor at no additional cost to Project Manager. Failure to obtain Project Manager's approval prior to installation shall cause Contractor to make Project manager directed revisions at no additional cost to Owner.
8. All irrigation heads shall be staked in the field by the owners rep. Once staking has occurred, the contractor shall immediately survey or GPS the locations of all components staked in the field. A final "as-stake plan shall then be generated which will include pipe routings for the staked locations. During installation and trenching, the contractor will need to refer to this as-stake plan prior to the final location of the heads. **Before backfilling of trenches shall occur, the contractor shall re-survey or GPS the head locations from the as-stake plan and locate the heads at the same location when originally staked.** Failure to do so will require the contractor to reinstall the heads including any replacement wires for the correct head locations as splices will not be permitted.

C. Pipe:

1. Install all pipes in accordance with manufacturer's recommendations.
2. Electrofusion:
 - a. An electrofusion (EF) joint is heated internally, either by a wire coil at the interface of the joint, or by a conductive polymer. Heat is created as an electric current is applied to the conductive material in the fitting.

- b. Prepare the pipe: Prior to connecting the EF fitting to the pipe, the pipe surface must be thoroughly cleaned. Cut the end of the pipe square. Mark on the pipe surface the proper positioning of the fitting to be installed. Scrape the surface of the pipe area to be joined, removing all surface degradation and contamination. Exercise caution to avoid contamination of the scraped pipe surfaces. Use tools available from the pipe manufacturer to assist with this procedure.
- c. Clamp the fittings and Pipes: Place the pipes and fitting in the clamping fixture to prevent movement of the pipes or fitting. Give special attention to the proper positioning of the fitting on the prepared pipe surfaces.
- d. Apply Electric Current: Connect the electrofusion control box (provided by pipe manufacturer) to the fitting and to the power source. Apply electric current to the fitting as per the manufacturers' recommendations. If the control does not do so automatically, turn off the current when the proper time has elapsed to heat the joint properly.
- e. Cool joint and remove clamps: Allow the joint to cool for the recommended time and remove the clamping fixtures. Premature removal from the clamps and any strain on a joint that has not fully cooled can be detrimental to joint performance.

3. Buttweld:

- a. Heating tool surfaces must be to temperature before you begin. The heater surface temperature should be as follows: Minimum 400°F – Maximum 450°F (204 – 232°C). All points on both heating tool surfaces where the heating tool surfaces will contact the pipe or fitting ends must be within the prescribed minimum and maximum temperatures and the maximum temperature difference between any two points on the heating tool fusion surfaces must not exceed 20°F (11°C) for equipment for pipe smaller than 18" diameter, or 35°F (19°C) for larger equipment. Heating tool surfaces must be clean.
- b. Interface pressure : Minimum 60 psi – Maximum 90 psi (414 – 621 kPa; 4.16 – 6.21 bar) Interface pressure is used to calculate a fusion joining pressure value for hydraulic butt fusion machines or manual machines equipped with force reading capability. The interface pressure is constant for all pipe sizes and all butt fusion machines. However, fusion joining pressure settings are calculated for each butt fusion machine, which are dependent upon the OD (Outside Diameter) and DR (Dimension Ratio).
- c. Procedure:
 - 1. Secure: Clean the inside and outside of the component, pipe or fitting ends by wiping with a clean, dry, lint-free cloth or paper towel. Remove all foreign matter. Align the components of the machine, place them in the clamps, and then close the clamps. Do not force pipes into alignment against open fusion clamps. Component ends should protrude past the clamps enough so that facing will be complete. Bring the ends together and check high-low alignment. Adjust alignment as necessary by tightening the high side down.
 - 2. Face: Place the facing tool between the component ends, and face them to establish smooth, clean, parallel mating surfaces. Complete facing produces continuous circumferential shavings from both ends. Face until there is minimal distance between the fixed and moveable clamps. If the machine is equipped with facing stops, face down to the stops. Stop the facer before moving the pipe ends away from the facer. Remove the facing tool, and clear all shavings and pipe chips from the component ends. Do not touch the component ends with your hands after facing : Minimum 60 psi – Maximum 90 psi (414 – 621 kPa; 4.16 – 6.21 bar)
 - 3. Align: Bring the component ends together, check alignment and check for slippage against fusion pressure. Look for complete contact all around both ends with no detectable gaps, and outside diameters in high-low alignment. If necessary, adjust the high side by tightening the high side clamp. Do not loosen the low side clamp because components may slip during fusion. Re-face if high-low alignment is adjusted.

4. Melt: Verify that the contact surface of the heating tool is maintaining the correct temperature. Place the heating tool between the component ends, and move the ends against the heating tool. Bring the component ends together under pressure to ensure full contact. The initial contact pressure should be held very briefly and released without breaking contact. Pressure should be reduced when evidence of melt appears on the circumference of the pipe. Hold the ends against the heating tool without force (drag force may be necessary to ensure contact). Beads of melted polyethylene will form against the heating tool at the component ends. When the proper melt bead size is formed, quickly separate the ends, and remove the heating tool. The proper bead size is dependent upon the size of the component. Approximate values are shown in Table 1 below:

Table 1
Approximate Melt Bead Size

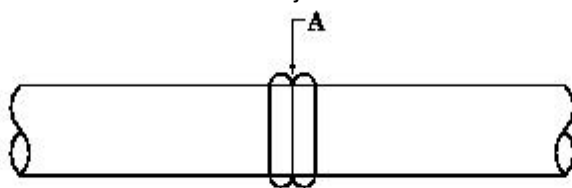
Approximate Wall Thickness, inches		Melt Bead Size* (Approximate)	
≤ 0.15	3.8 mm and smaller	1/32" – 1/16"	1 – 2 mm
0.15 – 0.30	3.8 mm – 7.6 mm	1/16"	2 mm
Above 0.30 – 0.75	Above 7.6 mm – 19 mm	1/8" – 3/16"	3 – 5 mm
Above 0.75 – 1.15	Above 19 mm – 29.2 mm	3/16" – 1/4"	5 – 6 mm
Above 1.15 – 1.60	Above 29.2 mm – 40.6 mm	1/4" – 5/16"	6 – 8 mm
Above 1.60 – 2.20	Above 40.6 mm – 55.9 mm	5/16" – 7/16"	8 – 11 mm
Above 2.20 – 3.00	Above 55.9 mm – 76.2 mm	7/16" – 9/16"	11 mm

**The appearance of the melt swell zone may vary depending on the pipe material. The melt bead width is to be determined by measuring the distance from the heater plate to the melt swell origin.*

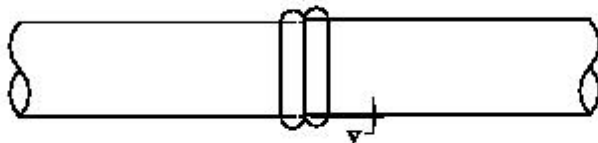
During heating, the melt bead will expand out flush to the heating tool surface, or may curl slightly away from the surface. If the melt bead curls significantly away from the heating tool surface, unacceptable pressure during heating may have occurred.

5. Join: Immediately after the heating tool is removed, quickly inspect the melted ends, which should be flat, smooth and completely melted. If the melt surfaces are acceptable, immediately and in a continuous motion, bring the ends together and apply the correct joining force (or fusion pressure). The correct fusion pressure will form a double bead that is rolled over to the surface on both ends. A concave melt surface is unacceptable; it indicates pressure during heating. Do not continue. Allow the component ends to cool and start over with Step 1.
6. Hold: Hold joining force against the ends until the joint is cool. The joint is cool enough for gentle handling when the double bead is cool to the touch. **Cool for about 35 – 90 seconds per inch of pipe outside diameter.** Do not try to decrease the cooling time by applying water, wet clothes or the like. Avoid pulling, installation, pressure testing and rough handling for at least an additional 30 minutes. Heavier wall thickness pipes require longer cooling times.
7. Inspect: On both sides, the double bead should be rolled over to the surface, and be uniformly rounded and consistent in size all around the joint.

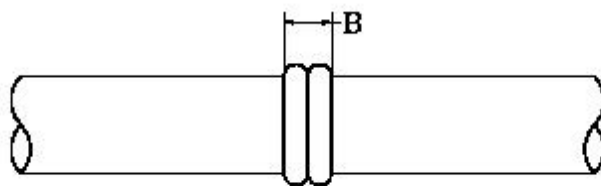
The gap (A) between the two single beads must not be below the fusion surface throughout the entire circumference of the butt joint.



The displacement (V) between the fused ends must not exceed 10% of the pipe/fitting minimum wall thickness.



- a. Refer to Table II for general guidelines for bead width, B, for each respective wall thickness.



- b. The size differential (Smax – Smin) between two single beads shall not exceed X% of the actual bead width (B).

Table II
Bead Widths per Wall Thickness

Minimum Wall Thickness, in.	Approximate Bead Width (B), in.		Minimum Wall Thickness, in.	Approximate Bead Width (B), in.	
	Minimum	Maximum		Minimum	Maximum
.118	5/32	1/4	1.06	19/32	25/32
.157	5/32	9/32	1.18	5/8	13/16
.197	3/16	5/16	1.34	21/32	7/8
.246	1/4	11/32	1.57	11/16	29/32
.315	9/32	3/8	1.77	25/32	1
.354	5/16	7/16	1.97	7/8	1-1/16
.433	11/32	1/2	2.16	15/16	1-3/16
.512	3/8	9/16	2.36	1	1-1/4
.630	7/16	19/32	2.56	1-1/8	1-7/16
.710	1/2	5/8	2.76	1-3/16	1-1/2
.750	1/2	11/16	2.95	1-1/4	1-9/16
.870	1/2	11/16	3.15	1-5/16	1-11/16
.940	9/16	3/4	3.35	1-3/8	1-3/4
			3.54	1-1/2	1-13/16

Instructions:
Determine the wall thickness of the pipe/fitting. Find the wall thickness above. If the exact wall thickness is not shown, use the next lowest wall thickness for determination of bead width.

$$X = S/B \times 100$$

Where

X = Percent difference of bead width, %

Pipe to pipe, maximum X = 10%

Pipe to fitting, maximum X = 20%

Fitting to fitting, maximum X = 20%

S = Smax - Smin, inches

B = Width of bead, inches

4. HDPE pipes installed using mechanical compression fittings shall be installed according to manufacturers' recommendations. Contractor may use lubricant for inserting pipework into compression fitting which shall be silicone based.
 5. Pipes shall be stored on site in a covered pipe store. Pipe stacks shall not be greater than seven layers or two meters high (whichever is less). Pipes shall be shielded from the sun at all times and shall be placed on a sand bed, or on supports at least 75 mm wide and placed not greater than 1.50 m apart; side supports shall be similarly constructed and placed not greater than 3.00 m apart. The pipe store shall allow for circulation of air. Rubber sealing rings (if used) shall be stored inside closed boxes in a shaded place, and shall on no account be exposed to sunlight for more than a few hours.
 6. Pipes shall be transported on the site on a flatbed trailer, and should never be dropped or dragged along the ground.
 7. Spigot ends of PVC pipes shall be chamfered to a depth of half the wall thickness at an angle of 15 degree. Pipes cut on site should be cut square to the pipe axis with a fine toothed saw. All burrs should be removed from the pipe prior to assembly of joints. Spigot insertion depth shall be measured and marked on all PVC pipe 75mm (3") and larger using indelible ink to allow checking at a later date.
 8. O-Ring gasketed joints shall be made using an approved non ionic lubricant compatible with the sealing ring. Pipes sized up to 200mm (8") may be jointed using a crowbar and a timber protection piece, joints larger than 200mm (8") shall be assembled using a clamped lever device.
 9. Maintain 150mm (6") minimum clearance between sprinkler lines and between lines of other trades.
 - a. Do not install sprinkler lines directly above another line of any kind.
 10. Maintain 25mm (1") minimum between lines that cross at angles of 45 degrees to 90 degrees
 11. Exercise care when excavating, trenching and working near existing utilities.
 12. Flushing the system:
 - a. After all permanent sprinkler pipe lines are in place and connected, and prior to installation of sprinkler heads, open the control valves and flush out the system with a full head of water.
 - c. Sprinkler heads shall be installed only after flushing of the system has been accomplished to the complete satisfaction of Project Manager.
 - d. Contractor shall be responsible for flushing the entire system after installation is complete and will be responsible for any clogged nozzles for 30 days after substantial completion of this portion of the irrigation system.
 13. Installing piping under existing pavement:
 - a. Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. Hydraulic driving will not be permitted under asphalt paving.
 - b. Secure permission from Project Manager before cutting or breaking existing pavement. Repairs and replacement shall be approved by Project Manager and shall be accomplished at no additional cost to Project Manager.
- D. Field satellite assembly (not utilized): Install in accord with manufacturer's instructions and construction details indicated on Drawings.
- a. Electric control valves shall be connected to field satellites in numerical sequence as indicated on Drawings.
- E. Grounding equipment:
1. Grounding rods to be 5/8 inch x 8 foot copper clad, UL Listed.
 2. Grounding plates to be 4 inch x 36 inch x .06 inch copper alloy with integral connection of 25 feet of #6 AWG bare, solid copper wire, UL Listed conforming to the minimum requirements of Section

250 of the National Electric Code. Connection of the wire to plate shall be performed by the plate manufacturer.

3. Use only Cadweld Plus One-shot welded electrical connections or approved equal to attach wire to grounding rod(s). Methods other than clamping are not acceptable. Use a separate clamp to attach each wire to a ground rod.
4. Shielding wire shall be #10 AWG, solid, bare copper wire and shall be connected to all grounding points along the mainline (submainline does not require shielding wire).

F. Grounding installation:

1. Each grounding rod shall be driven into the ground its full length and connected via a Cadweld connection to the #10 solid, bare copper shielding wire.
2. Grounding plates shall be installed 750mm below grade with 50 lbs of ground enhancement material spread evenly around the plate in accordance with manufacturer's requirements. Provide two 50 pound bag of Paige Powerset earth grounding material per grounding plate. Plates shall be covered with a 4 inch grated cover as specified, set a minimum of 1 inch below grade, to facilitate drainage onto the plate. Cover shall be installed on a minimum of 36 inches of 4 inch ADS corrugated polyethylene, perforated drainage pipe.
3. Contractor shall connect all grounding rods from the **same power source** together through the use of a single bare #10AWG copper wire which shall act as a shield for the control wires in the field. The shielding wire shall be installed over the mainline 300mm below grade. Use Cadweld Plus One-shot weld or equal for electrical connections to rods.
4. After installation of all grounding equipment an earth ground test shall be performed with the shielding wire disconnected. Testing of this grounding locations shall not include the ground wire from the controller power source. Readings over manufacturers requirements will require additional ground rods and/or ground plates, installed per all applicable specifications, details and municipality requirements.

G. High voltage wiring for field satellite (Not utilized)

1. Power connection to field satellites shall be provided by a certified electrician.
2. All electrical work shall conform to local codes, ordinances, and union authorities having jurisdiction.

H. Wiring Tests:

1. Contractor shall cause the following tests to be performed by the Owners authorized and approved representative on all electrical circuits, and shall submit a written approval from the equipment supplier to Project Manager prior to start of maintenance period. All tests shall be made to satisfaction of Project Manager.
 - a. Wire loop resistance (continuity): Test each circuit for wire loop resistance. Maximum loop resistance is 200 ohms. A looped resistance greater than 200 ohms will not be accepted. This test is performed by connecting the common wires on the satellite together above ground (do not allow wires to come into contact with ground) to create a single common wire for circuit closure. Each station wire shall then be connected to common at the valve location (or VIH location) to create a closed circuit and the ohms resistance tested back at the satellite using an ohmmeter. The test shall be carried out in the presence of the irrigation consultant or Owners rep. only after the contractor has performed the test on his own and remedied all failures.
 - b. Ground fault: Test each wire for leaks to ground with an ohmmeter after each wire circuit has been installed. No circuit checking lower than 700,000 ohms will be acceptable. Any approved splices on each circuit shall be buried in the soil and be water settled prior to test. After test has been completed, remove splices from soil and leave them exposed in pull box for future access. This test is performed by having the end of the wire to be tested above grade (do not allow wires to come into contact with ground as this will lead to test failure). At the satellite, using an ohmmeter, connect one lead to wet ground with second lead connected to the wire to be tested. Resistance less than 700,000 ohms indicates a break in the wire path and will need to be replaced or rectified. The test shall be carried out in the presence of the irrigation consultant or Owners rep. only after the contractor has performed the test on his own and remedied all failures.
 - c. Grounding: Test each grounding point for proper grounding to meet manufacturers specifications and Local municipality standards, whichever is more stringent.

- d. Faults: Replace or correct materials revealed by tests to be faulty in part of the installation in a manner permitted by Project Manager and at no additional cost to Project Manager. Repeat same type test until no fault is evident.
- e. Record results of circuitry tests and submit to Project Manager prior to acceptance of work.
2. Submit a copy of equipment supplier's written approval to Project Manager prior to final acceptance.
3. Contractor shall make sure that like colored wires are always connected to maintain polarity of the system.
- I. Remote control valves:
 1. Install at sufficient depth to provide not more than 150mm (6"), nor less than 100mm (4") cover from top of valve to finish grade.
 2. Install valves in a plumb position with 600mm (24") minimum maintenance clearance from other equipment.
- J. Wire:
 1. Make underground wire connections to electric remote control valves with 3M DBYR Connectors, based on the number and size of wires.
 2. Run wire for heads with main line and show on "as-built" project record Drawings if deviations occur.
 3. Install communication cable from central controller to each head location as detailed and indicated on the plans.
- K. Isolation valves:
 1. Install where indicated on Drawings and with sufficient clearance from other materials for proper maintenance.
 2. Check and tighten valve bonnet packing before backfill.
- L. Sprinkler heads:
 1. Install in a plumb position at intervals not to exceed maximum spacing indicated.
 2. Install heads 25mm above finish grade to be later leveled to finish grade once grassing has been completed.
 3. For VIH rotors, o-ring swing joints shall be installed to allow for 3-dimensional adjustment. For landscape heads, flexi-pipe is acceptable so long as pressure reducing solenoid valves are utilized.
 4. If not already included as part of base scope, the contractor shall provide alternate pricing for upgrading the swing joints on VIH sprinklers to triple-top unitized. Pricing shall be on a per head basis.
 5. Contractor shall provide marking flags that will remain in place throughout installation and during turf installation to allow for easy location and as-built creation.
 6. Contractor shall supply sufficient labour during the staking with irrigation consultant or Owner's rep. A minimum of 3 workers, with proficient English skills for communication with consultant are required.
- M. Quick coupler valves: Install in accord with Drawings.
- N. Thrust blocks:
 1. Where bell-end ductile iron fittings are installed, provide concrete thrust blocks on PVC mainline piping. Thrust blocks shall be required at all changes in size - - bends, reducers, plugs, and all sides and angles of "T" intersections.
 2. Size of thrust block shall be determined by working pressure, size and type of fitting, and soil conditions. Calculate area required for concrete thrust block in contact with soil. Refer to BS standard to determine size of thrust block for each condition.
 3. Ensure stability of thrust blocks.
 4. All thrust blocks shall be cast in place.
 5. A heavy duty polyethylene sheet shall be used to wrap the cast-iron fittings at the point of contact between pipeline fittings and the thrust block.

6. In lieu of thrust blocks, Contractor may submit joint restraint system (LEEMCO or approved equal) as an alternate.

O. Conduit and sleeves:

1. All differences between actual field conditions and conditions indicated on Drawings shall be immediately brought to the attention of Project Manager. Contractor shall assume full responsibility for installing required sleeving and it shall be assumed that it is proceeding at its own risk for failure to provide field investigation and for failure to notify Project Manager. For other installations, provide materials and coordinate conduit and sleeve installation with other trades as required to facilitate smooth construction sequence.
2. Conduit: Furnish and install conduit where control wires pass under or through walls, walks and paving. Conduits shall be of adequate size to accommodate retrieval for repair of wiring and shall extend 450mm beyond edges of walls and pavement.
3. Sleeving: Install sleeves for pipes passing through or under walks and paving as indicated on Drawings. Sleeving shall be 2x the nominal size of the pipe up to and including 100mm or two sizes larger for pipes 150mm and larger and shall extend a minimum of 450mm beyond edges of paving or other construction.

3.04 ELECTRICAL

- A. Connect to the 230VAC power source where approved by owners rep. As a minimum requirement, install and connect electrical work in accord with requirements of applicable codes.

3.05 LOWERING OF HEADS AND FINAL ADJUSTMENTS

- A. Lower sprinklers installed in turf areas to finish grade within 10 days following notification by Project Manager.
- B. At time of lowering heads, completely check and adjust entire system and make all repairs that are necessary to complete the work.
- C. When nozzle changes will provide improved coverage, make such changes, or make arrangements with manufacturer to have adjustments made, as approved by Project Manager. Make changes prior to planting.
- D. Make changes or adjustments in systems without additional cost to Project Manager.
- E. The system shall be operating properly before turf planting operations commence.
- F. Check out correct operation of systems and adjust as required for proper operation.
- G. Make such adjustments and repairs as requested or necessary for acceptance, including refreshing of system.

3.06 FINAL ACCEPTANCE OF INSTALLATION

- A. All punch list items shall be completed and all irrigation operational prior to Project Manager's acceptance of project installation.
- B. Prior to final approval of work, do the following:
 1. Adjust, move or add sprinkler heads, where necessary, to obtain full and even coverage caused by obstructions.
 2. Remove all debris resulting from work of this Section.
 3. Regrade, lightly compact, and replant around sprinkler heads where necessary to maintain proper vertical positioning in relation to established grade.
 4. Fill all depressions and eroded channels with sufficient soil mix to adjust grade to ensure proper drainage. Compact lightly, and replant filled areas in accord with Drawings requirements.
 5. Complete final coverage test in the presence of Project Manager.
- C. Conditions for acceptability of work for start of maintenance by Project Manager issued by Project Manager shall include, but shall not be limited to:

1. Punch list items complete and approved by Project Manager.
 2. Irrigation system complete and in place including all valves and programming of system.
 3. As-built drawings complete and handed over to Owner prior to final inspection for review.
 4. Maintain installation and watering schedules until all conditions noted above have been completed.
 5. All tools, spare parts and equipment as specified in this section shall be provided to Project Manager.
 6. All training has been provided to Owners maintenance team.
 7. All testing and commissioning has been completed and noted by manufacturers.
- D. At final completion of all work and final acceptance, Project Manager will issue a letter of acceptance.

3.07 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform the startup service and commissioning.
- B. Complete installation and startup checks according to manufacturer's written instructions.
- C. Verify that controllers and central control are installed, connected and operational to manufacturers' requirements.
- D. Verify that electrical wiring and grounding installation complies with manufacturer's submittal.
- E. Commissioning of the system shall be performed by the manufacturers authorized representative or alternate approved by the project manager in writing. Costs for these services shall be borne by the Contractor.
- F. The Contractor shall provide 8 hours of manufacturer training to the Owners personnel upon successful commissioning of the project. This training shall coincide with the handing over (after approval) of the operations and maintenance manuals. The Contractor shall train the personnel in all components included within the system including proper maintenance and limitations (i.e. watering window and flow limitations of hydraulic network). A list of weekly, monthly and annual maintenance procedures shall be developed and provided to the owners personnel for proper operation of the system (to be included as part of operations and maintenance manuals).

END OF SECTION



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IRRIGATED TURF

NELSON BAY GOLF CLUB RENOVATION
IRRIGATED AREAS
JUNE 2019

Nelson Bay GC (Lat 32 ° 40 ' 43 " S Long 151 ° 55 ' 34 " E)

	P50 (Mm/month)	Days with Rain (days/month)	Temp (mean) (deg. C)	(DTR) (deg. C)	Ref Humid (%)	Sunshine (% of Hrs)	Wind Run (m/s)	Penman ETo (mm/day)
Jan	94.37	11.80	22.90	9.60	65.00	52.00	3.80	5.39
Feb	93.52	12.00	22.70	9.40	68.00	53.00	3.60	4.81
Mar	109.16	13.00	21.30	9.90	68.00	56.00	3.40	4.08
Apr	86.73	11.20	18.60	10.20	67.00	60.00	3.50	3.25
May	95.65	11.50	15.20	10.20	70.00	58.00	3.50	2.29
Jun	116.24	11.10	12.80	9.70	70.00	58.00	3.70	1.94
Jul	62.09	8.80	11.70	10.90	64.00	66.00	4.00	2.31
Aug	58.61	10.30	12.70	11.80	61.00	67.00	4.00	2.93
Sep	50.16	9.80	15.20	12.00	58.00	63.00	4.00	3.88
Oct	71.22	10.80	17.80	11.40	59.00	57.00	3.90	4.63
Nov	66.14	11.60	19.80	10.90	61.00	56.00	3.90	5.18
Dec	70.56	10.20	22.00	10.70	62.00	54.00	3.90	5.61

IRRIGATION CONSUMPTIVE USE ESTIMATE
Nelson Bay Golf Club
June 2019

Nelson Bay Golf Club

27 Hole Course Turf Area based on twin row (hectares)	45.99
Rainfall catchment area (hectares)	74.73

Course Turf Requirements

	January	February	March	April	May	June	July	August	September	October	November	December
ET _o per day (mm)	5.39	4.81	4.08	3.25	2.29	1.94	2.31	2.93	3.88	4.63	5.18	5.61
Warm Season Turf Crop Coefficient	0.71	0.71	0.62	0.54	0.58	0.55	0.55	0.54	0.76	0.72	0.79	0.68
Efficiency of Irrigation System	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Scheduling Coefficient and Contingency	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adjusted Water Required for Turf (mm)	5.63	5.02	3.72	2.58	1.95	1.57	1.87	2.33	4.34	4.90	6.02	5.61
Total Daily Water Requirement for Turf (liters)	2,588,223	2,309,712	1,710,828	1,186,948	898,293	721,637	859,269	1,070,079	1,994,343	2,254,592	2,767,651	2,580,039
Total Daily Water Requirement for Turf (cubic meters)	2,588	2,310	1,711	1,187	898	722	859	1,070	1,994	2,255	2,768	2,580
Total Monthly Water Requirement for Turf w/o Rain (liters)	80,234,898	64,671,950	53,035,668	35,608,434	27,847,080	21,649,116	26,637,340	33,172,452	59,830,285	69,892,356	83,029,534	79,981,209
Total Monthly Water Requirement for Turf w/o Rain (cubic meters)	80,235	64,672	53,036	35,608	27,847	21,649	26,637	33,172	59,830	69,892	83,030	79,981

Rainfall

50% Probability Monthly Rainfall (mm)	94	93	109	86	95	116	62	58	50	71	66	70
Total Rainfall (liters)	70,246,200	69,498,900	81,455,700	64,267,800	70,993,500	86,686,800	46,332,600	43,343,400	37,365,000	53,058,300	49,321,800	52,311,000
Usable Monthly Rainfall (66%) (liters)	46,362,492	45,869,274	53,760,762	42,416,748	46,855,710	57,213,288	30,579,516	28,606,644	24,660,900	35,018,478	32,552,388	34,525,260
Total Monthly Water Requirement for all Turf including Rain (liters)	33,872,406	18,802,676	-725,094	-6,808,314	-19,008,630	-35,564,172	-3,942,176	4,565,808	35,169,385	34,873,878	50,477,146	45,455,949

Flow and Storage Requirements

Water Window (hours)	9	9	9	9	9	9	9	9	9	9	9	9
Flow Required (LPM)	4,793	4,277	3,168	2,198	1,664	1,336	1,591	1,982	3,693	4,175	5,125	4,778
Annual Water Requirement w/o rain (liters)	635,590,322											
Annual Water Requirement with rain (liters)	157,168,862											
Minimum Size Pump Required for normal peak demand (L/M)	5,125											
Minimum Size Pump Required for normal peak demand (L/S)	85											
One Month storage capacity for Peak Demand (liters)	83,029,534											



NELSON BAY GOLF CLUB IRRIGATION SYSTEM HYDRAULIC ANALYSIS

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
2	2	3	12	270
3	3	4	16	210
4	4	5	8	210
5	5	6	58	210
6	6	7	50	210
7	7	8	11	210
8	8	9	25	140
9	9	10	103	140
10	10	11	66	140
11	11	12	17	140
12	12	13	26	140
13	13	14	17	140
14	14	15	71	140
15	15	16	61	170
16	16	17	71	170
17	3	17	61	210
18	17	18	63	170
19	18	19	75	170
20	19	20	43	170
21	20	82	46	140
22	82	83	108	140
23	83	84	31	140
24	84	85	27	140
25	85	86	22	140
26	86	87	71	95
27	87	88	13	95
28	88	89	31	95
29	89	90	128	95
30	90	91	25	140
31	91	81	128	140
32	81	80	30	140
33	80	79	81	140
34	79	78	56	140
35	78	77	36	140
36	77	76	14	140
37	76	75	28	140
38	75	72	12	140

39	72	73	5	170
40	73	74	9	170
41	74	15	81	170
42	14	65	64	140
43	65	66	85	95
44	66	67	14	95
45	67	68	17	140
46	68	69	27	140
47	69	70	9	140
48	70	71	27	170
49	71	72	37	170
50	70	105	49	140
51	105	104	128	140
52	104	103	16	140
53	103	102	41	140
54	102	101	13	140
55	101	100	69	140
56	100	99	36	140
57	99	122	32	95
58	122	121	68	95
59	121	120	77	95
60	120	115	58	95
61	115	119	15	95
62	119	118	71	95
63	118	117	8	95
64	117	116	27	95
65	116	104	45	95
66	115	114	36	95
67	114	113	12	95
68	113	112	65	95
69	112	111	18	95
70	111	110	64	95
71	110	109	38	95
72	109	108	106	95
73	108	107	45	95
74	107	106	86	95
75	106	67	13	95
76	99	98	9	95
77	98	97	29	95
78	97	96	26	95
79	96	95	68	95
80	95	94	34	95
81	94	93	54	95
82	93	92	31	95
83	92	90	70	95
84	86	170	16	95
85	170	123	118	95

86	123	124	108	95
87	124	125	29	95
88	125	126	26	95
89	126	127	79	95
90	127	128	23	140
91	128	129	8	140
92	129	130	22	140
93	130	153	73	95
94	153	152	55	95
95	152	151	19	95
96	151	150	17	95
97	150	149	30	95
98	149	148	60	140
99	148	147	41	95
100	147	146	28	95
101	146	145	40	95
102	145	144	21	95
103	144	143	99	95
104	143	142	22	95
105	142	141	58	95
106	141	140	47	95
107	140	139	17	95
108	139	138	8	95
109	138	137	28	95
110	137	127	49	95
111	148	169	16	95
112	169	168	14	95
113	168	167	9	95
114	167	166	79	95
115	166	165	88	95
116	165	164	57	95
117	164	163	57	95
118	163	162	9	95
119	162	161	45	95
120	161	160	53	95
121	160	159	81	95
122	159	44	37	95
123	44	43	9	140
124	43	42	16	140
125	42	41	33	140
126	41	158	46	140
127	158	157	74	140
128	157	156	33	140
129	156	155	59	140
130	155	154	75	140
131	154	149	18	140
132	130	131	24	140

133	131	132	18	140
134	132	133	17	140
135	133	134	22	140
136	134	135	72	140
137	135	136	25	140
138	136	27	82	140
139	27	26	46	95
140	26	25	18	95
141	25	24	26	95
142	24	23	80	95
143	23	22	51	95
144	22	21	13	95
145	21	20	31	95
146	27	28	24	170
147	28	29	10	170
148	29	30	18	170
149	30	31	99	170
150	31	32	13	170
151	32	33	25	170
152	33	34	32	170
153	34	35	11	170
154	35	38	15	170
155	38	39	21	170
156	39	40	74	170
157	40	41	46	170
158	8	37	12	210
159	37	36	40	210
160	36	35	40	210
161	39	51	15	95
162	51	50	75	95
163	50	49	68	95
164	49	48	58	95
165	48	47	89	95
166	44	45	62	95
167	45	46	121	95
168	46	47	25	95
169	47	52	60	95
170	52	53	37	95
171	53	54	20	95
172	54	55	65	95
173	55	56	40	95
174	56	57	40	95
175	57	58	94	95
176	58	59	37	95
177	59	60	38	95
178	60	61	45	95
179	61	62	21	95

180	59	63	86	140
181	63	64	68	140
182	64	65	26	140
1	1	2	#N/A	#N/A Pump

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality
2	0.00	116.00	95.00	0.00
3	0.00	115.92	94.92	0.00
4	0.00	115.82	93.82	0.00
5	0.00	115.77	93.77	0.00
6	0.00	115.38	91.38	0.00
7	0.00	115.05	90.05	0.00
8	0.00	114.98	89.98	0.00
9	0.00	114.95	90.95	0.00
10	200.00	114.82	89.82	0.00
11	0.00	114.80	89.80	0.00
12	0.00	114.80	89.80	0.00
13	0.00	114.79	90.79	0.00
14	0.00	114.79	90.79	0.00
15	0.00	114.87	88.87	0.00
16	0.00	115.21	91.21	0.00
17	0.00	115.60	93.60	0.00
18	0.00	115.42	90.42	0.00
19	0.00	115.20	90.20	0.00
20	0.00	115.08	91.08	0.00
21	0.00	114.93	90.93	0.00
22	0.00	114.87	90.87	0.00
23	0.00	114.64	90.64	0.00
24	200.00	114.27	90.27	0.00
25	0.00	114.26	89.26	0.00
26	0.00	114.25	89.25	0.00
27	0.00	114.23	89.23	0.00
28	0.00	114.26	89.26	0.00

29	0.00	114.27	90.27	0.00
30	0.00	114.29	90.29	0.00
31	0.00	114.41	90.41	0.00
32	0.00	114.42	90.42	0.00
33	200.00	114.45	89.45	0.00
34	0.00	114.52	89.52	0.00
35	0.00	114.54	90.54	0.00
36	200.00	114.71	90.71	0.00
37	0.00	114.92	90.92	0.00
38	0.00	114.47	90.47	0.00
39	0.00	114.36	88.36	0.00
40	0.00	114.11	88.11	0.00
41	0.00	113.96	83.96	0.00
42	0.00	113.94	83.94	0.00
43	0.00	113.93	82.93	0.00
44	0.00	113.92	82.92	0.00
45	0.00	113.94	81.94	0.00
46	0.00	113.97	82.97	0.00
47	0.00	113.97	83.97	0.00
48	0.00	113.99	86.99	0.00
49	0.00	114.00	87.00	0.00
50	200.00	114.02	88.02	0.00
51	0.00	114.31	88.31	0.00
52	0.00	113.97	83.97	0.00
53	0.00	113.97	83.97	0.00
54	0.00	113.97	83.97	0.00
55	0.00	113.97	86.97	0.00
56	200.00	113.97	87.97	0.00
57	0.00	114.07	88.07	0.00
58	0.00	114.30	88.30	0.00
59	0.00	114.39	88.39	0.00
60	0.00	114.30	88.30	0.00
61	0.00	114.19	87.19	0.00
62	200.00	114.14	87.14	0.00
63	0.00	114.51	88.51	0.00
64	0.00	114.60	89.60	0.00
65	0.00	114.63	89.63	0.00
66	0.00	114.51	88.51	0.00
67	0.00	114.49	88.49	0.00
68	0.00	114.49	88.49	0.00
69	0.00	114.49	89.49	0.00
70	0.00	114.49	89.49	0.00
71	0.00	114.53	89.53	0.00
72	0.00	114.57	89.57	0.00
73	0.00	114.58	89.58	0.00
74	0.00	114.61	89.61	0.00
75	0.00	114.55	89.55	0.00

76	0.00	114.50	90.50	0.00
77	0.00	114.48	90.48	0.00
78	0.00	114.42	89.42	0.00
79	0.00	114.34	88.34	0.00
80	200.00	114.21	87.21	0.00
81	0.00	114.19	87.19	0.00
82	0.00	114.89	90.89	0.00
83	200.00	114.45	89.45	0.00
84	0.00	114.38	89.38	0.00
85	0.00	114.32	89.32	0.00
86	0.00	114.27	89.27	0.00
87	200.00	114.11	87.11	0.00
88	0.00	114.11	87.11	0.00
89	0.00	114.11	86.11	0.00
90	0.00	114.11	85.11	0.00
91	0.00	114.12	85.12	0.00
92	0.00	113.89	79.89	0.00
93	200.00	113.79	78.79	0.00
94	0.00	113.79	69.79	0.00
95	0.00	113.78	80.78	0.00
96	0.00	113.78	80.78	0.00
97	200.00	113.78	70.78	0.00
98	0.00	113.83	78.83	0.00
99	0.00	113.85	78.85	0.00
100	0.00	113.87	85.87	0.00
101	200.00	113.91	87.91	0.00
102	0.00	113.93	87.93	0.00
103	0.00	114.00	90.00	0.00
104	0.00	114.03	90.03	0.00
105	0.00	114.37	89.37	0.00
106	0.00	114.46	88.46	0.00
107	0.00	114.26	87.26	0.00
108	0.00	114.15	87.15	0.00
109	200.00	113.89	86.89	0.00
110	0.00	113.89	86.89	0.00
111	0.00	113.89	89.89	0.00
112	0.00	113.89	89.89	0.00
113	0.00	113.89	90.89	0.00
114	0.00	113.89	90.89	0.00
115	0.00	113.89	89.89	0.00
116	0.00	113.99	88.99	0.00
117	0.00	113.97	89.97	0.00
118	0.00	113.97	89.97	0.00
119	0.00	113.91	89.91	0.00
120	0.00	113.85	84.85	0.00
121	200.00	113.79	80.79	0.00
122	0.00	113.83	62.83	0.00

123	200.00	113.40	89.40	0.00
124	0.00	113.26	87.26	0.00
125	0.00	113.22	86.22	0.00
126	200.00	113.19	85.19	0.00
127	0.00	113.21	82.21	0.00
128	0.00	113.23	82.23	0.00
129	0.00	113.24	82.24	0.00
130	0.00	113.26	81.26	0.00
131	200.00	113.31	80.31	0.00
132	0.00	113.38	80.38	0.00
133	0.00	113.44	81.44	0.00
134	0.00	113.53	82.53	0.00
135	0.00	113.81	85.81	0.00
136	0.00	113.91	86.91	0.00
137	0.00	113.03	86.03	0.00
138	0.00	112.93	87.93	0.00
139	0.00	112.90	87.90	0.00
140	0.00	112.83	88.83	0.00
141	200.00	112.66	92.66	0.00
142	0.00	112.64	90.64	0.00
143	0.00	112.64	90.64	0.00
144	200.00	112.62	87.62	0.00
145	0.00	112.65	84.65	0.00
146	0.00	112.71	80.71	0.00
147	0.00	112.75	76.75	0.00
148	0.00	112.81	74.81	0.00
149	0.00	112.90	81.90	0.00
150	0.00	112.90	83.90	0.00
151	200.00	112.90	85.90	0.00
152	0.00	112.95	84.95	0.00
153	0.00	113.08	83.08	0.00
154	0.00	112.93	81.93	0.00
155	200.00	113.04	84.04	0.00
156	0.00	113.23	85.23	0.00
157	200.00	113.33	86.33	0.00
158	0.00	113.72	84.72	0.00
159	0.00	113.71	81.71	0.00
160	0.00	113.25	70.25	0.00
161	0.00	112.95	62.95	0.00
162	0.00	112.69	60.69	0.00
163	200.00	112.64	60.64	0.00
164	0.00	112.59	64.59	0.00
165	200.00	112.54	68.54	0.00
166	0.00	112.58	70.58	0.00
167	200.00	112.62	72.62	0.00
168	0.00	112.66	73.66	0.00
169	0.00	112.73	74.73	0.00

170	0.00	114.16	89.16	0.00
1	-5200.00	21.00	0.00	0.00 Reservoir

Link Results:

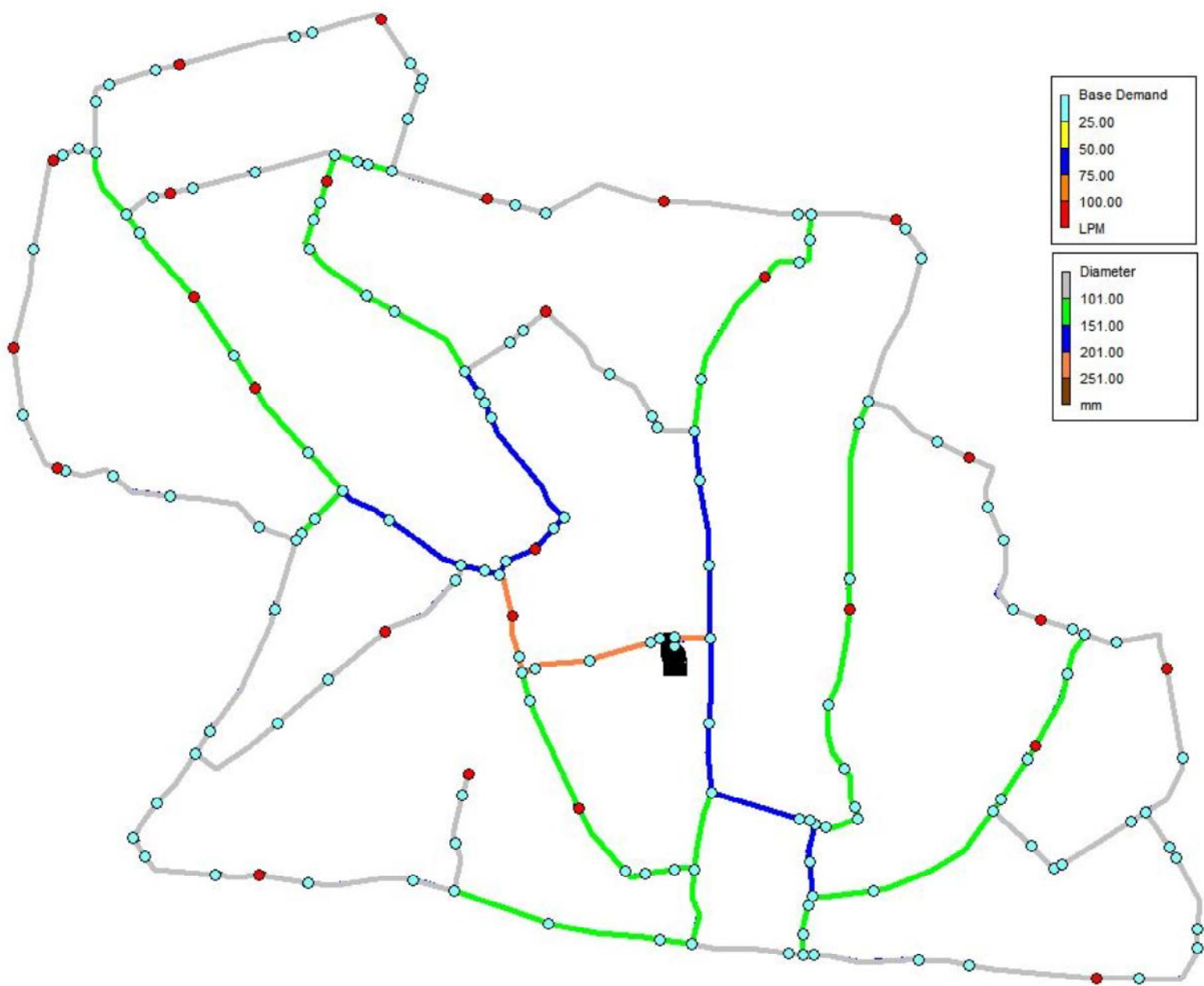
Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
2	5200.00	1.51	6.32	Open
3	2755.63	1.33	6.63	Open
4	2755.63	1.33	6.63	Open
5	2755.63	1.33	6.63	Open
6	2755.63	1.33	6.63	Open
7	2755.63	1.33	6.63	Open
8	376.00	0.41	1.19	Open
9	376.00	0.41	1.19	Open
10	176.00	0.19	0.29	Open
11	176.00	0.19	0.29	Open
12	176.00	0.19	0.29	Open
13	176.00	0.19	0.29	Open
14	-372.77	0.40	1.18	Open
15	-1433.79	1.05	5.53	Open
16	-1433.79	1.05	5.53	Open
17	2444.37	1.18	5.31	Open
18	1010.58	0.74	2.90	Open
19	1010.58	0.74	2.90	Open
20	1010.58	0.74	2.90	Open
21	729.28	0.79	4.07	Open
22	729.28	0.79	4.07	Open
23	529.28	0.57	2.25	Open
24	529.28	0.57	2.25	Open
25	529.28	0.57	2.25	Open
26	190.31	0.45	2.24	Open
27	-9.69	0.02	0.01	Open
28	-9.69	0.02	0.01	Open
29	-9.69	0.02	0.01	Open
30	-239.70	0.26	0.52	Open
31	-239.70	0.26	0.52	Open
32	-239.70	0.26	0.52	Open
33	-439.70	0.48	1.60	Open
34	-439.70	0.48	1.60	Open
35	-439.70	0.48	1.60	Open
36	-439.70	0.48	1.60	Open
37	-439.70	0.48	1.60	Open
38	-439.70	0.48	1.60	Open
39	-1061.01	0.78	3.17	Open
40	-1061.01	0.78	3.17	Open

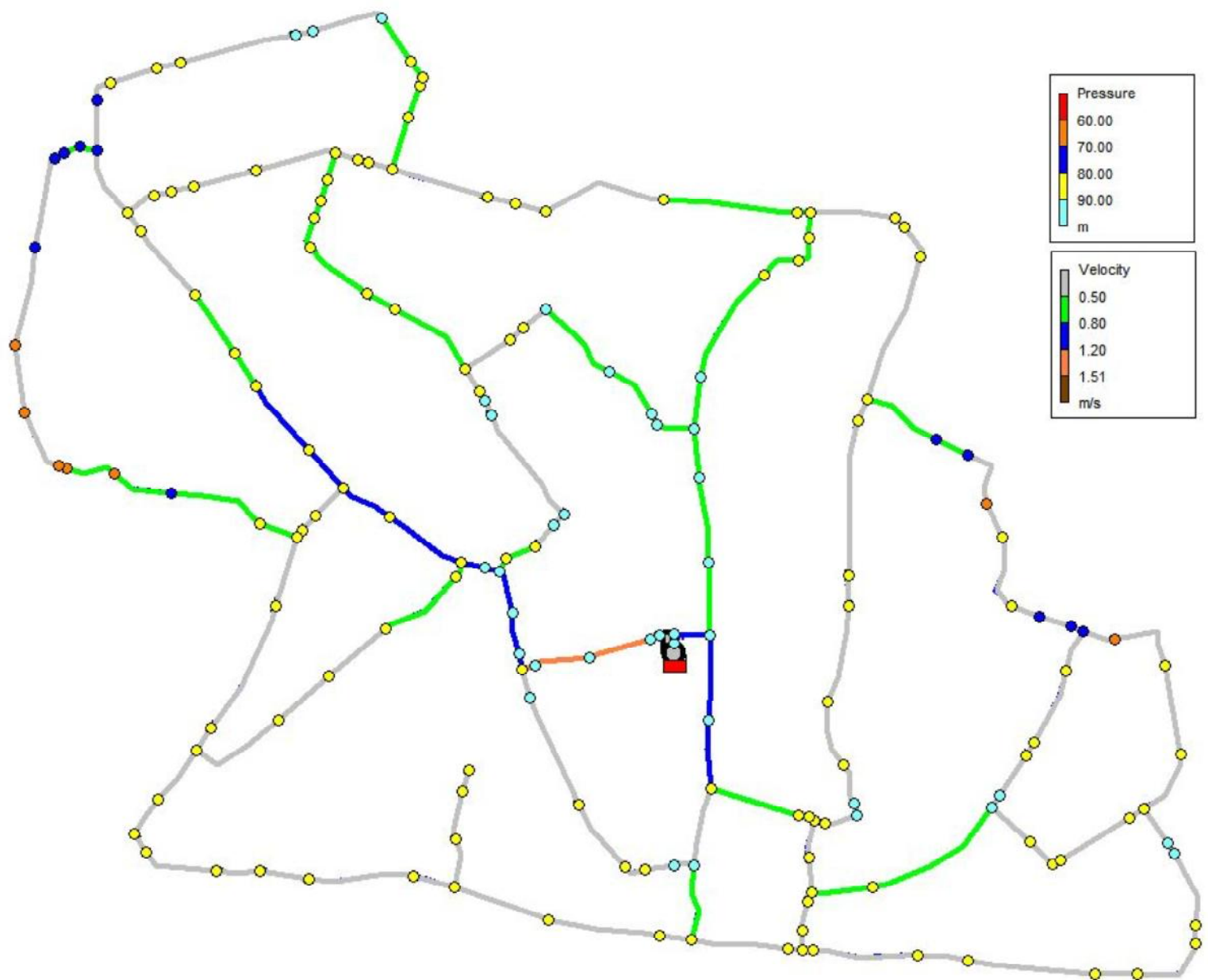
41	-1061.01	0.78	3.17	Open
42	548.78	0.59	2.41	Open
43	148.68	0.35	1.42	Open
44	148.68	0.35	1.42	Open
45	-48.49	0.05	0.03	Open
46	-48.49	0.05	0.03	Open
47	-48.49	0.05	0.03	Open
48	-621.31	0.46	1.18	Open
49	-621.31	0.46	1.18	Open
50	572.82	0.62	2.61	Open
51	572.82	0.62	2.61	Open
52	461.57	0.50	1.75	Open
53	461.57	0.50	1.75	Open
54	461.57	0.50	1.75	Open
55	261.57	0.28	0.61	Open
56	261.57	0.28	0.61	Open
57	91.58	0.22	0.58	Open
58	91.58	0.22	0.58	Open
59	-108.42	0.25	0.79	Open
60	-108.42	0.25	0.79	Open
61	-111.26	0.26	0.83	Open
62	-111.26	0.26	0.83	Open
63	-111.26	0.26	0.83	Open
64	-111.26	0.26	0.83	Open
65	-111.26	0.26	0.83	Open
66	2.83	0.01	0.00	Open
67	2.83	0.01	0.00	Open
68	2.83	0.01	0.00	Open
69	2.83	0.01	0.00	Open
70	2.83	0.01	0.00	Open
71	2.83	0.01	0.00	Open
72	-197.17	0.46	2.39	Open
73	-197.17	0.46	2.39	Open
74	-197.17	0.46	2.39	Open
75	-197.17	0.46	2.39	Open
76	169.99	0.40	1.82	Open
77	169.99	0.40	1.82	Open
78	-30.01	0.07	0.07	Open
79	-30.01	0.07	0.07	Open
80	-30.01	0.07	0.07	Open
81	-30.01	0.07	0.07	Open
82	-230.01	0.54	3.18	Open
83	-230.01	0.54	3.18	Open
84	338.97	0.80	6.52	Open
85	338.97	0.80	6.52	Open
86	138.97	0.33	1.25	Open
87	138.97	0.33	1.25	Open

88	138.97	0.33	1.25	Open
89	-61.03	0.14	0.27	Open
90	-312.05	0.34	0.85	Open
91	-312.05	0.34	0.85	Open
92	-312.05	0.34	0.85	Open
93	199.37	0.47	2.44	Open
94	199.37	0.47	2.44	Open
95	199.37	0.47	2.44	Open
96	-0.63	0.00	0.00	Open
97	-0.63	0.00	0.00	Open
98	433.42	0.47	1.55	Open
99	148.97	0.35	1.42	Open
100	148.97	0.35	1.42	Open
101	148.97	0.35	1.42	Open
102	148.97	0.35	1.42	Open
103	-51.03	0.12	0.20	Open
104	-51.03	0.12	0.20	Open
105	-51.03	0.12	0.20	Open
106	-251.03	0.59	3.74	Open
107	-251.03	0.59	3.74	Open
108	-251.03	0.59	3.74	Open
109	-251.03	0.59	3.74	Open
110	-251.03	0.59	3.74	Open
111	284.44	0.67	4.71	Open
112	284.44	0.67	4.71	Open
113	284.44	0.67	4.71	Open
114	84.44	0.20	0.50	Open
115	84.44	0.20	0.50	Open
116	-115.56	0.27	0.89	Open
117	-115.56	0.27	0.89	Open
118	-315.56	0.74	5.71	Open
119	-315.56	0.74	5.71	Open
120	-315.56	0.74	5.71	Open
121	-315.56	0.74	5.71	Open
122	-315.56	0.74	5.71	Open
123	-261.00	0.28	0.61	Open
124	-261.00	0.28	0.61	Open
125	-261.00	0.28	0.61	Open
126	834.04	0.90	5.22	Open
127	834.04	0.90	5.22	Open
128	634.04	0.69	3.14	Open
129	634.04	0.69	3.14	Open
130	434.04	0.47	1.56	Open
131	434.04	0.47	1.56	Open
132	-511.43	0.55	2.11	Open
133	-711.43	0.77	3.89	Open
134	-711.43	0.77	3.89	Open

135	-711.43	0.77	3.89	Open
136	-711.43	0.77	3.89	Open
137	-711.43	0.77	3.89	Open
138	-711.43	0.77	3.89	Open
139	-81.31	0.19	0.46	Open
140	-81.31	0.19	0.46	Open
141	-81.31	0.19	0.46	Open
142	-281.31	0.66	4.61	Open
143	-281.31	0.66	4.62	Open
144	-281.31	0.66	4.62	Open
145	-281.31	0.66	4.61	Open
146	-630.12	0.46	1.21	Open
147	-630.12	0.46	1.21	Open
148	-630.12	0.46	1.21	Open
149	-630.12	0.46	1.21	Open
150	-630.12	0.46	1.21	Open
151	-630.12	0.46	1.21	Open
152	-830.12	0.61	2.01	Open
153	-830.12	0.61	2.01	Open
154	1349.50	0.99	4.95	Open
155	1349.50	0.99	4.95	Open
156	1095.04	0.80	3.36	Open
157	1095.04	0.80	3.36	Open
158	2379.63	1.15	5.05	Open
159	2379.63	1.15	5.05	Open
160	2179.63	1.05	4.29	Open
161	254.46	0.60	3.83	Open
162	254.46	0.60	3.83	Open
163	54.46	0.13	0.22	Open
164	54.46	0.13	0.22	Open
165	54.46	0.13	0.22	Open
166	-54.56	0.13	0.22	Open
167	-54.56	0.13	0.22	Open
168	-54.56	0.13	0.22	Open
169	-0.09	0.00	0.00	Open
170	-0.09	0.00	0.00	Open
171	-0.09	0.00	0.00	Open
172	-0.09	0.00	0.00	Open
173	-0.09	0.00	0.00	Open
174	-200.09	0.47	2.46	Open
175	-200.09	0.47	2.46	Open
176	-200.09	0.47	2.46	Open
177	200.00	0.47	2.45	Open
178	200.00	0.47	2.45	Open
179	200.00	0.47	2.45	Open
180	-400.10	0.43	1.34	Open
181	-400.10	0.43	1.34	Open

182	-400.10	0.43	1.34	Open
1	5200.00	0.00	-95.00	Open Pump









A CENTURY OF INNOVATION



The strength of any institution rests solely in the good will of the people with whom they deal. You can replace anything except the good will of your customers.

~John Samuel Clapper, Co-Founder and First President

The success of this company is no secret. It has been due to two simple things: building a good product, and treating customers honestly and fairly. The only way to success is by the fair and honest treatment of customers.

~Kenneth E. Goit, Toro's Third President



Since July 10, 1914, a long line of ingenious Toro inventors have developed dramatic breakthroughs that helped establish and strengthen the Company's leadership role and revolutionize the industries in which we compete.

As we enter our second century, the people of Toro will continue to lead with our relentless drive to innovate. At Toro, innovation is more than a slogan; it is our lifeblood, our legacy, our commitment to all the customers we are honored to serve.

By celebrating our past, we reveal our future. Yesterday, today and tomorrow, The Toro Company's fundamental commitment to building long-term customer relationships based on integrity and trust, transcends time.

Our high-quality products and legacy of trusting relationships has combined to make Toro the leading global supplier of innovative turf maintenance equipment and precision irrigation solutions to the golf market. Our products are used to maintain a vast number of public, private, municipal, and resort golf courses-including many of the world's top golf venues.

Our purpose is to help our customers enrich the beauty, productivity and sustainability of the land. This is our legacy, our purpose, our commitment to both the customers we serve and the generations to come.

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More information & demo video on

www.toro.com/lynx

BETTER INFORMATION FOR **BETTER DECISIONS**

The Toro® Lync® Central Control System was developed specifically to help you address the unique challenges and changing priorities you face every day. With Lync, you can now have all of your essential irrigation information readily available in one place, conveniently combined into a single, intuitive interface.



Easy to Set Up

Lync® was developed for quick setup – it gives you a fast, accurate way to setup your system to put water exactly where you want it, and then allows you to make edits as your course conditions change.



Easy to Use

Lync® has a distinct user interface that combines all essential data and intuitively presents the information you need (alerts, scheduled watering and more) at a glance. It's easy to access all the information you need with one click through your Favorites Menu.



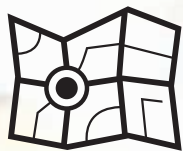
Easy to Access

Lync® empowers you to take quick, accurate action.



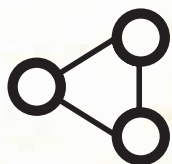
National Support Network (NSN®)

Toro's exclusive National Support Network provides software and network assistance from experienced service professionals who understand what you need. NSN Connect™ allows easy remote access to your irrigation system from anywhere. NSN Connect provides full remote access to your entire system. Lync mobile provides comprehensive remote control and system status.



Superior course map editing, creation and interaction

The advanced functionality of the Lynx® Central Control System enables you to **edit your course map easily, or create your own fully interactive map** using a digital image of your course. Setting up your map is simple, and Lynx® lets you **program and control your irrigation activities right from the map**, with instant access to operation feedback from the rest of your irrigation system.



Integration with other system components

Lynx® offers integration with other turf management components, giving you access to all of the information needed to support your irrigation management. Lynx can be seamlessly integrated with field hardware, weather stations, electrical systems, smartphones and much more, including the Toro® Turf Guard® Wireless Soil Monitoring System.



Comprehensive reporting increases your productivity

Armed with the thorough reports provided by Lynx, you'll be able to **immediately address any irrigation concerns and avoid potential course damage** . . . or just move on to other tasks when Lynx lets you know that things are running as planned.

Lynx® Mobile Apps Provide Remote Control

Lynx Mobile Apps enable you to control your irrigation system from your smart phone or tablet. Available for both iPhone®* and Android™* devices, Lynx Mobile Apps offer map and numeric based interfaces for manual irrigation, as well as an easy way to enter or edit GDC module addresses.

* iPhone and the Apple logo are registered trademarks of Apple, Inc. in the U.S. and other countries.

* Android and the Android logo are trademarks or registered trademarks of Google Inc.



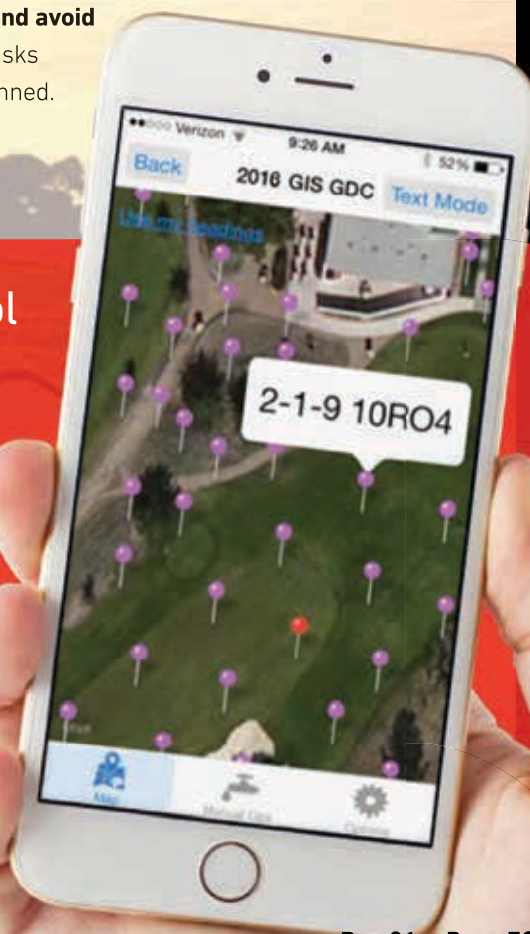
Lynx Map



Lynx Handheld



Lynx Barcode



TORO Field Controls

Innovative, Flexible and Best-in-Class Field Control Options

LYNX Network VP Satellite Control

Provides distributed control and added security via intelligent field controllers with an intuitive user interface

- ✓ Station Based Flow Management helps reduce water window and optimize pump operation
- ✓ Current Sensing provides protection by monitoring each station output for proper amperage draw
- ✓ Stores and runs a fully flow-managed irrigation schedule in the event the central computer is offline
- ✓ Stand-alone capabilities enable you to conduct manual irrigation directly from the satellite faceplate
- ✓ Station runtimes are executed to the second to provide precise irrigation
- ✓ 2-way wired or wireless communication options enable flexible system design and installation

LYNX GDC 2-Wire Control

Provides direct control via intelligent modules installed inside or near each sprinkler

- ✓ All system components are below ground, which helps maintain course aesthetics
- ✓ Lowest cost system option due to reduced amount of wire
- ✓ Continuous 2-way communication and automated diagnostics ensure system integrity
- ✓ Best-in-class broadband lightning protection
- ✓ System can be expanded easily by adding modules to the wire path
- ✓ Optional Lynx Smart Hub provides additional features and benefits



Toro INFINITY® and FLEX800™ Series sprinklers can be ordered with integrated GDC modules

LYNX Smart Hub

Optional Lynx Smart Hub combines the simplicity of a 2-wire system with the added security of a traditional satellite system

- ✓ Irrigation system can be segmented into manageable areas for simplified maintenance
- ✓ Provides for in-field manual operation or troubleshooting
- ✓ Stores and runs a fully flow-managed irrigation schedule in the event the central computer is offline
- ✓ Creates a convenient point of connection for soil, flow and status sensors

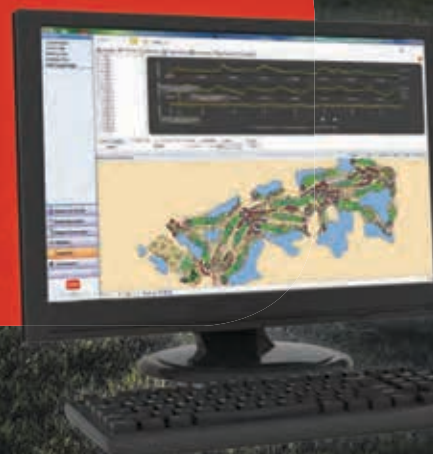




More information on

www.toro.com/golf

The Lynx® Central Control System integrates seamlessly with Toro's Field Control options, enabling you to have the complete information needed to support your irrigation decisions.



Lynx®
Central Control



More information & demo video on
www.toroinfinity.com

INFINITY® SERIES GOLF SPRINKLERS

Engineered for Today's Challenges.
Designed for Tomorrow's Technologies.

The new INFINITY® Series improves your course quality with less workload and most important, it keeps golfers playing. Calculate the money you'll save by cutting sprinkler maintenance from hours to minutes.



Smart Access®

Provides top accessibility to all critical components.

- ✓ No digging or unsightly turf repair scars
- ✓ Pilot valve removable with water "ON"
- ✓ GDC 2-wire module accessible from the top
- ✓ Customizable marker
- ✓ No buried wire splices or ground faults
- ✓ Replaceable cover if damaged
- ✓ Increased labor efficiency
- ✓ Lower long term cost of ownership



Future Proof

The SMART ACCESS® compartment provides room to grow. Whatever the future holds, this sprinkler will be ready.



Protective Enclosure

The protective enclosure isolates wire splices from the soil and potential shorts to ground. Provides access for system troubleshooting and repairs without digging!



FLEX800™ SERIES GOLF SPRINKLERS

Golf sprinklers with all the efficiency and proven performance features and benefits of the 800S and DT Series

FEATURES AVAILABLE IN INFINITY AND FLEX800 SERIES

TRAJECTORY ADJUSTMENT



24-position TruJectory™ or Dual trajectory to help fight the wind, avoid obstacles or reduce the radius.

NOZZLE BASE CLUTCHING



Hot spot watering has never been easier, simply turn, hold and shoot to put down as much water as needed.

LARGE NOZZLE SELECTION



From 20' to 100' we've got you covered! Toro provides the flexibility to optimize your system for maximum uniformity.

PART AND FULL CIRCLE MODELS



Align part circle sprinklers quickly and easily or adjust watering locations to suit seasonal needs.





Toro Technical Support

Our technical support team is highly skilled at what they do. From helping superintendents program controllers, to troubleshooting complex system issues with consultants, the support team provides years of irrigation experience that you can count on. For exceptional technical support, call **1-877-345-TORO (8676)**.



Toro Controller Repair

Did you know that with Toro's Board Exchange Program you can get the replacement controller boards you need immediately? Through your distributor, Controller Repair provides controller boards ready for immediate board exchange to assure that controller downtime is minimal and your golf course and reputation stays protected. For immediate assistance call: **1-877-345-TORO (8676)**.

Visit Controller Repair website at www.toro.com/controller-repair



Toro Distributor Support

Our distributors have been our partners for an average of 40 years (10 to 88 years) and we consider them an extension of us.



Toro Field Service

With some of the most knowledgeable and helpful field service staff in the industry, and our extensive training and support programs; Toro field service personnel are always there to assist—before, during, and well after a sale.



Toro Genuine Parts

From the smallest sprinkler part to complete control systems, Toro Service Parts support can deliver most replacement parts to our distributors within hours. In fact, Toro offers its customers the highest parts order completion rate in the industry: 98%!



Toro Financing

By offering a variety of customized, competitive financing plans, Toro gives you "one-stop shopping" eliminating the need for third-party funding. You can improve your course without draining your budget.



Toro National Support Network (NSN®)

A team of A+ certified technicians and licensed irrigators dedicated to the daily operations and maintenance of computerized central control systems for customers worldwide. (See page 17 for more information.)

CONTROL SYSTEM AND FIELD CONTROLLERS



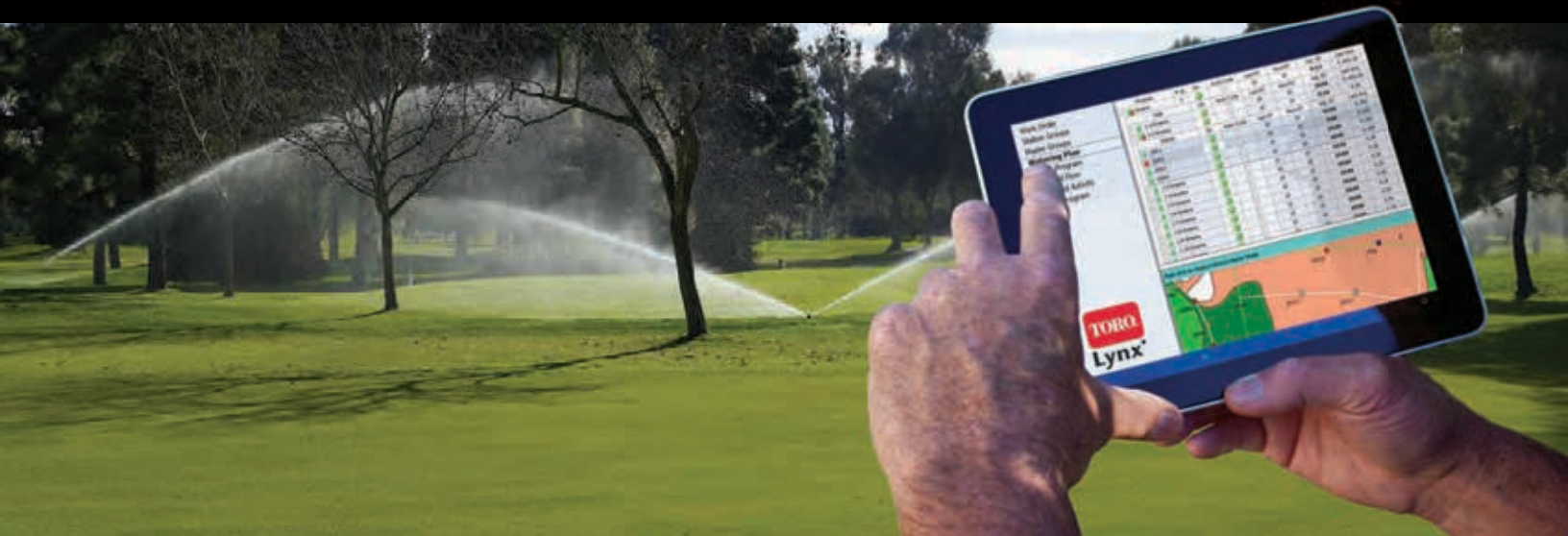
Field Controller Comparison Charts

Feature/Capability	Network VP®	GDC
Catalog Pages	18-19	22-23
Maximum Stations Per Controller	64	1600
Maximum Simultaneously Operating Stations Per Controller	32	200
Stand-alone Programs	64	10**
Wireline Field Communication	Yes	Yes
Wireless Field Communication	Yes	Yes***
Upload Field Changes	Yes	No
Field Controller Alerts	Yes	Yes
Downloaded Programs	Yes	Yes***
Station Based Flow Management	Yes	Yes
Station Current Sensing	Yes	No
Station Runtimes In Seconds	Yes	No

* Requires Smart OSMAC
 ** GDC 200 Stand-alone Gateway
 *** GDC Remote



LYNX® CENTRAL CONTROL SYSTEM



The Toro® LYNX® Control System was developed specifically to help you address the unique challenges and changing priorities you face every day. With the Lynx System, you can now have all of your essential irrigation information readily available in one place, conveniently combined into a single, intuitive interface.

FEATURES & BENEFITS

Lynx 4.0 Adds More Flexibility and More Control

Station Percent Adjust for duration allows you to set temporary adjustments that automatically returns to normal after a set number of days. The new Sequential Instant Program allows you to pick the order stations water automatically. GDC system diagnostics can now be displayed on the map to make pin pointing a problem even easier, and you can now chose to have Lynx automatically upload VP satellite station changes into the Watering Plan.

Simplified Decision Making with Dynamic Drilldown

Guides you to where you need to go. Follow the water drop in the Watering Plan to find stations, holes or entire areas that are disabled, on hold or otherwise not programmed to irrigate. Quickly find any stations in Course Report that did not operate as intended.

Flexible and Editable Map with Enhanced Interaction

Easily add, drag, drop and assign sprinklers, satellites, sensors and switches to their exact locations. You can effortlessly make edits as your field hardware changes. Fully supports CAD-generated maps.

Power Guard Helps Prevent Wasted Energy

Integration with a Flowtronex® pump station with PACE™ enables the exclusive Lynx Power Guard feature to track and control electricity usage of the system.



Integrated Turf Guard® Soil Sensor Information
Helps you determine when and how much to irrigate which helps you save water.



Lynx Mobile
Enables remote access and control from any mobile device connected to the Internet. Screens are specifically designed and optimized for smaller devices.



Lynx Map



Lynx Handheld



Lynx Barcode

Lynx® Mobile Apps

SPECIFICATIONS – Lynx® Levels Comparison

SYSTEM CAPACITY	Lynx CE	Lynx PE	Lynx SE
Satellites	500	500	500
Satellite Stations	32,000	1344	512
GDC Stations	6400	1000	500
Weather Stations	10	10	10
Pump Stations	10	3	2
Courses	3	2	1
Holes	84	56	28
Hydraulic Branches	1024	300	100

HARDWARE SUPPORTED

OSMAC®	Yes	Yes	Yes
GDC	Yes	Yes	Yes
Network VP*	Yes	No	No

PROGRAMMING

VP Current Sensing	Yes	No	No
VP Station Adjust Upload	Yes	No	No
Site Code Categories	7	3	No
Precip. Mgmt. Groups (PMG)	Yes	Yes	No
Max. Stations/Hole Control	Yes	Yes	No
Instant Program Creation	Yes	Yes	Yes
Program Priority	Yes	Yes	No
Pump Profiling	Yes	No	No
Station Group Multi-Manual	Yes	No	No
Master Group Multi-Manual	Yes	No	No
Pump Integration	Yes	Yes	Optional
Weather Station Alarms	Yes	Yes	Optional
ET Auto Calc. RT Method	Yes	Yes	Optional



NSN® Connect
Remote access so
that you can control
irrigation anytime,
anywhere from any
web enabled device.

ADDITIONAL FEATURES

Runtimes:

- Runtimes are executed to the second rather than rounding to the whole minute, resulting in more precise irrigation and water savings (Network VP* & OSMAC® only)
- Control your irrigation by setting runtime minutes or application inches and let the system calculate the other. See exactly how much water you will apply and how long you will irrigate each area
- Runtime synchronization with Network VP satellites prevents irrigation outages if the central goes offline
- Integrated runtime display shows past and planned irrigation activity so you can easily determine what action to take

Quick Start:

- With Quick Start, you create station, hardware and area associations, and control the definition of greens, tees, fairways and sprinklers based on their locations
- A basic hydraulic tree is auto-generated for you during Quick Start

Views and Reports:

- Course Report provides both real time and daily summaries of both scheduled and manual watering events
- Area and Hole orientation allows you to control your irrigation system the same way you think about the course
- Instant Program has simple check-box selection and Dynamic Drilldown to you can instantly create and personalize new irrigation programs
- Projected Flow View shows you areas that will be watered and how much will be applied

Communication:

- Current-sensing capabilities notify you of wire cuts and sprinklers unintentionally turned off (Network VP Only)
- Constant communication with Network VP satellites lets you take action if a power outage threatens irrigation
- Toro GDC communication and solenoid diagnostics help identify shorts, low voltage and other issues
- Weather station integration and Hand-held Remote Interface support are included as standard features

Operating System:

- Windows® 7/Windows® 10*
- Lynx mobile applications
 - Lynx Handheld
 - Lynx Map
 - Lynx Barcode Reader

* Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.

Specifying Information—Lynx Central

LX-0X-X-XX				
Model	Computer Hardware	Service	Levels	Field Hardware
LX	0X	X	X	X
LX-LYNX Central Control	1—Standard Computer 4—Premium Computer	1—1-year NSN 5—5-years NSN	0—CE 1—SE 2—PE	1—For OSMAC 7—For Network VP 8—For 2-wire
Example: When ordering a LYNX Central standard computer with one year of NSN and CE Level with Network VP field hardware, you would order: LX-01-1-07				

Specifying Information—Lynx CE Central Upgrade for SitePro®

Model	Description
LYNX-NSN-STAN	Lynx Upgrade - NSN - Standard Toro Computer
LYNX-NSN-PREM	Lynx Upgrade - NSN - Premium Toro Computer
LYNX-NONNSN-STAN	Lynx Upgrade-NSN-Standard Computer and 1-year NSN Support
LYNX-NONNSN-PREM	Lynx Upgrade-NSN-Premium Computer and 1-year NSN Support
LX-SW	Software, Lynx, Client/Server



Get the essential soil information you need, when you need it. Stay up to date on your current soil conditions no matter where you are. Get the information you need to make important decisions in real time. Turf Guard sensors instantly track soil moisture, salinity, and temperature, saving you time. Repeaters mount easily inside all Toro Network VP®, Network LTC® Plus and E-OSMAC® satellite pedestals.

FEATURES & BENEFITS

Reduce Water Usage and Improve Playability

Monitor moisture levels and adjust irrigation without risking turf quality. Promote root growth by avoiding over watering. Detect dry areas before they impact the turf's health.

100% Wireless Network

No wires between the repeaters and the sensors, or the sensor and the probes means that sensors can be installed anywhere on the course without disrupting play. Install sensors without having to trench or pull wires.

Take the Guesswork out of Managing Salinity

Track salt build-up and schedule flushing as needed. Get positive confirmation that you're flushing reduced soil salts. Know when and how much water to flush with.



Web-based or Stand-alone Interface

Graphical course overview displays sensor data at-a-glance. Plus with Toro Lynx® Control System integration you can check course moisture, salinity and temperature readings right from your irrigation control software.

HOW IT WORKS...



- ✓ Three to five sensors buried in each green at critical root zone levels
- ✓ Additional sensors buried in fairways, tee boxes and planters
- ✓ Above-ground radio repeaters installed on or in existing irrigation pedestals
- ✓ Wireless MESH networking links all sensors to central control system
- ✓ Moisture, Temperature and Salinity readings displayed in your office



ADDITIONAL FEATURES

Operational

- Two distinct depths in the soil profile – critical root zone level and a second 5" lower. Independent measurements from each depth.
- MESH routing technology offers complete coverage even in remote canyon courses.
- Repeater mounts in most Toro irrigation satellite pedestals. An external repeater is available for other models including non-Toro pedestals.
- Supports up to 500 sensors per course
- Expected sensor battery life of 3 years, field replaceable.
- Sensor reading sent every 5 minutes.
- Automatic network configuration and failure recovery.
- Plots trends and compares historical and current readings.
- Lynx® Control System integration

Electrical

Input Power:

- Repeater: <.02A @ 6 VDC
- Base Station: <.1A @ 120 VAC, 50/60 Hz
- UL and CE approved

Dimensions:

- Body: 2" x 3" x 5"
- Spikes: 2.5" x 3/16"
- Installation Hole Diameter: 4.25"

Temperature:

- Operating: 32° F to 140° F
- Storage: -22° F to 180° F

Sensing:

- 0.1°F temperature resolution
- 0.1 % volumetric soil moisture content resolution
- 0.1 dS/m soil conductivity resolution (salinity)

Communication:

- Repeater Range: 2,000' line-of-sight
- Buried Sensor Range: 500' line-of-sight
- 900 MHz ISM Band FHSS communication
- Additional licensing not required

Specifying Information—Turf Guard

Model	Description
TG-S2-R	Turf Guard Sensor With Replaceable Battery
TG-R-INT	Repeater-Internal Mount
TG-R-EXT	Repeater-External Mount
TG-B	Base Station
TG-S2-BAT	Sensor Replacement Battery



NETWORK RADIO-LINK AND FIU WITH RADIO



Network Radio-Link offers you the flexibility to design your irrigation system unconfined by the limitations of distance or terrain. Oversized acreage and natural barriers are not a problem for Network Radio-Link. Communicating where wires can't run, it's the bridge between non-contiguous wire line systems and much more.

FEATURES & BENEFITS

- ✓ Wireless communication to Network satellites
- ✓ Network Radio-Link kits for upgrades
- ✓ True 2-way communication
- ✓ Multi-port field interface allows one radio to be shared among many satellites
- ✓ Easy satellite installation
- ✓ Compatible with Network LTC® Plus and Network VP®



Specifying Information—Field Interface Unit (FIU)

Model	Description
FIU-2011	Field Interface Unit with 1 Wire Line & 1 Radio Line, Radio Not Included
FIU-2011R	Field Interface Unit with 1 Wire Line & 1 Radio Line, Radio Included
FIU-2011DR	Field Interface Unit with 1 Wire Line & 1 Digital Radio Line, Radio Included
FIU-2021	Field Interface Unit with 2 Wire Lines & 1 Radio Line, Radio Not Included
FIU-2021R	Field Interface Unit with 2 Wire Lines & 1 Radio Line, Radio Included

Note: FCC license required.



Before, during and after the purchase of your Toro central control system, we pledge to support all of your needs with our National Support Network, Toro NSN[®] has been taking care of customers since 1991. From small system upgrades to large-scale golf applications, our knowledgeable staff, including bilingual representatives, is available to assist you over the phone 24/7, every day of the year. Our technicians are licensed irrigation specialists and can link directly to your system's computer to perform remote diagnostic checks and offer expert advice. If necessary, we can send you a replacement computer within 24 hours. Support subscriptions to Toro NSN are included with the purchase of a Toro central control system and can be renewed for extended periods after the subscription. NSN Connect provides remote access and our latest offering, NSN Connect Plus allows remote monitoring of your system. The NSN Customer Portal is your one-stop-shop for anything and everything dealing with your NSN relationship.

NSN[®] Connect for Lynx[®] and SitePro[®]

Features

- Remote access so that you can control irrigation anytime, anywhere
- Easy access from your desktop, laptop or mobile device
- Ability to easily transfer files
- Ability to print remote documents from a remote location

Minimum Requirements for Remote Control Devices

- Desktop or Laptop
 - Windows[®] 7 (or later) or Mac OS[®] X 10.7 (or later)*
 - Modern web browser (Internet Explorer[®] 9+, Chrome[™], Safari[®], Firefox[®])
- Tablet or Smart Phone
 - Apple (iOS), Android[™], or Windows[®] 8.x
 - Any modern mobile web browser (Internet Explorer 10+, Chrome, Safari, Firefox)

NSN[®] Customer Portal*

Features

- Access your irrigation computer via your NSN Connect account
- View the status of your recent orders and shipments
- Chat with an NSN Technician
- View the status of your NSN service(s)
- See what service renewal options are available to you
- Watch training videos and view other training resources
- Access the NSN Technical Knowledge Base
- Tell us what kind of emails you would, and would not, like to receive from NSN

*Coming in 2015

NSN[®] Connect Plus for Lynx

Features

- Adds remote hardware and software monitoring to NSN Connect
- Automatic notifications via Email and Txt
- Proactive support and computer hardware replacement from NSN

Specifications

- Platform – Toro[®] Lynx control system
- Operating System – Windows 7 (64-bit)
- User Configuration
 - Ability to have multiple email/txt recipients for alert notifications
 - Ability to set a schedule (days and times) of when to receive alert notifications
 - Ability to enable/disable specific monitors
 - Ability to have alerts sent to different recipients for different monitors
- Monitors
 - Toro Lynx Control System Software
 - Computer Hardware
- High speed Internet access required at the irrigation computer

*Windows and Internet Explorer are registered trademarks of Microsoft Corporation. Mac OS and Safari are registered trademarks of Apple Inc. Android and Chrome are trademarks of Google. Firefox is a trademark of Mozilla Corporation.



The Network VP® satellite from Toro® combines modular flexibility, ease of use and increased control in a single controller. With individual station runtimes programmed to the second and station-based flow management, the Network VP provides the most water efficient capabilities for irrigating.

FEATURES & BENEFITS

Station Based Flow Management

Reduces nighttime water window and optimizes pump capacity. Central irrigation programs (greens, tees, etc.) are available from the satellite faceplate for manual watering and field adjustments.

Quick Sync

Variable Length (VL) protocol synchronizes scheduled irrigation between Lynx and Network VP satellites in minutes.

Current Sensing Provides Protection

Monitors each station output for proper amperage draw with user defined thresholds. Under and over current alarm notification protects against electrical shorts, wire cuts, etc.

Runtime In Seconds For More Precise Watering

Station runtimes are executed to the second. This prevents individual stations from over or under watering by up to 25% compared to systems that operate only in whole minutes.



Intuitive User Interface

With backlit display for better low-light viewing. Station range entry makes establishing irrigation routines easier. DVD type controls for Start, Pause/Resume and Stop.





SPECIFICATIONS

Operational

- Operates as a stand-alone controller, or under the management of a central computer
 - Supports wireline or radio communications
 - Supports hybrid communication (wireline & radio)
- 64 irrigation programs
- Basic, Advanced and Grow-in programs
- Percent adjust from 1% to 900%
- Each output can be defined as an irrigation station or general application switch
- Non-volatile memory retains program information and satellite settings during power-off conditions. Battery back-up retains the date and time.
- 16-64 stations in 8-station increments – individual station control and the ability to run up to 32 stations simultaneously
- Backwards compatible with Toro Network 8000 satellites

Electrical

Input Power:

- 108 V ac to 132 V ac, 60 Hz
 - 0.20 amps (no load) 115 V ac
 - 1.20 amps (max load) 115 V ac
- 216 V ac to 264 V ac, 50 Hz
 - 0.10 amps (no load) 230 V ac
 - 0.60 amps (max load) 230 V ac

Output Power:

- 24 V ac - 3.0 amps (max total load)
- UL Listed

Dimensions

- Plastic Cabinet: 17" W x 40" H x 16" D

Temperature/Humidity

- Operating temperature: -15° F to 140° F
- Storage temperature: -22° F to 149° F
- Humidity: 0% to 95% RH (non-condensing)

Options

- Surge Protection

Specifying Information—Network VP Satellites

201-XXX6XX						
Description	Configuration		Cabinet	Output	Comm.	Options
201	XX		X	6	X	X
201—Network VP Satellite	16—16 Stations 32—32 Stations 48—48 Stations 64—64 Stations	24—24 Stations 40—40 Stations 56—56 Stations	P—Plastic, Green T—Desert Sand B—Tree Bark	6—24 VAC Electric	A—Stand-alone M—2-Way Wire Modem R—UHF Radio	3—Large-capacity Terminal Block & Switches 4—Large-capacity Terminal Block w/Add'l Surge & Switches
Example: When ordering a 24-station, Stand-alone VP Satellite in a plastic cabinet with large-capacity terminal block, additional surge and switches, you would specify: 201-24P6A4						



The Toro GDC System uses innovative technology to provide an irrigation solution to customers who want a safe, reliable and energy efficient system. Using a two-wire path to communicate to buried control units, the system eliminates the costs associated with traditional valve wire bundles and provides a solution that is vandal resistant, easy to install and easy to expand.

FEATURES & BENEFITS

Lower Costs with Flexible Configurations

GDC Systems can be configured with the modules located in valve boxes outside of the playing area for easy access and lower cost, or with the modules integrated with the sprinkler to reduce wire and splices.

Less System Downtime with Integrated Surge Protection (ISP)

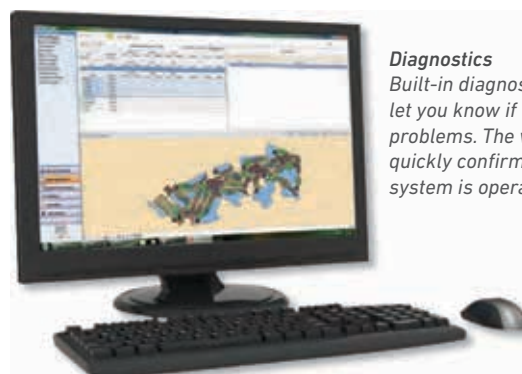
ISP 2-wire modules are rated at 20 KV surge protection—the highest in the industry. In some of the most active lightning areas of the world, the GDC provides rock-solid performance.

Easily Expandable Up To 9000 Stations

Whether you have 100, 800 or 9000 stations, the GDC system will meet your needs and can be expanded by simply adding modules.

Lynx Smart Hub

Optional Lynx Smart Hub combines the simplicity of a 2-wire system with the added security of a traditional satellite system.



Diagnostics

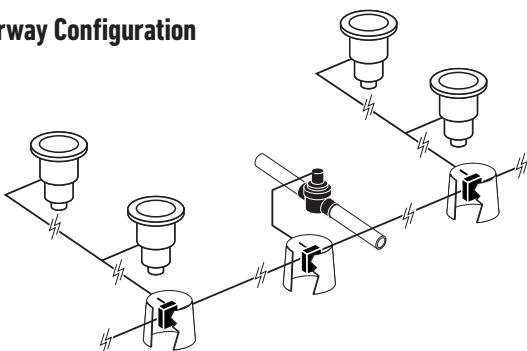
Built-in diagnostics automatically let you know if there are any problems. The wire path check quickly confirms that the whole system is operational.



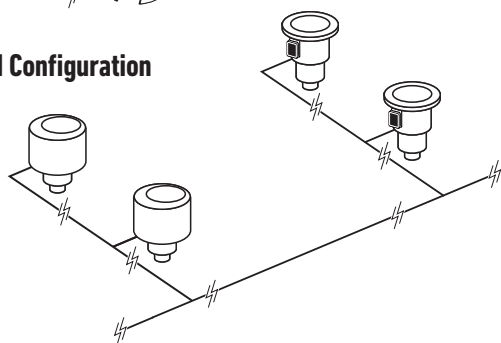
Integrated Sprinkler

Toro INFINITY® and FLEX800™ Series sprinkler models have an integrated 2-wire module option.

Off Fairway Configuration



Integrated Configuration



DEC-ISP-4

DEC-ISP-2

DEC-ISP-1

Standard



Lynx*



DEC-PCS-1600

Lynx Smart Hub



Lynx*



FIU-2011DR



DEC-RS-1000M

or



DEC-RS-1000-DR

Specifying Information—2-Wire Modules DEC-RSP-1000M or DEC-RSP-1000-DR

DEC-ISP-X	
Type	Configuration
DEC-ISP	X
DEC-ISP—Module*	1—1-station 2—2-station 4—4-station

Example: A 2-station GDC Module would be specified as: DEC-ISP-2

*Refer to sprinkler pages for specifying information on Sprinkler 2-wire Modules

Specifying Information—Gateway or Lynx Smart Hub

DEC-XXX-XXXX			
Type	Communication	Cabinet	Station Count
DEC	XXX	X	XXXX
DEC	SA—Stand-alone PCS—Central RS—Lynx Smart Hub	P B T	WM Metal 200—200 Stations Green Plastic Pedestal 1600—1600 Stations, Standard Brown Plastic Pedestal 1000-M—1000 Stations, Lynx Smart Hub, Wired Tan Plastic Pedestal 1000-DR—1000 Stations, Lynx Smart Hub, Radio

SPECIFICATIONS

Operational

Lynx® Central:

- Mapping capabilities
- Remote hand-held operation
- Weather station integration
- Pump station integration
- Enhanced diagnostics:
 - Communication
 - Electrical shorts/opens
 - Solenoid check

- No holding power required to operate stations
- Decoder identification is a unique 5-character address
- Standalone option (GDC200)

Installation

- Maximum number of wire paths:
 - 4 per gateway
- Maximum number of gateways:
 - 4 per system (Standard)
 - 9 per system Lynx Smart Hub
- Maximum number of decoders per wire path:
 - 250
- Maximum stations per gateway:
 - 1000 integrated (Standard)
 - 1600 off fairway (Standard)
 - 1000 Lynx Smart Hub
- Maximum stations per system:
 - 4000 integrated (Standard)
 - 6400 off fairway (Standard)
 - 9000 Lynx Smart Hub

- Simultaneous stations per output board:
 - 100
- Maximum distance from central to module (using 14 gauge wire): 2.6 miles
- Maximum distance from module to sprinkler (using 14 gauge wire): 400 ft.
- Solenoids per output: 2 DCLS-P
- Stations per module: 1, 2 or 4

Electrical

- Input power:
 - 88-264 V ac, 50/60 Hz
- Output Power:
 - Output voltage: 40 V ac max
 - Output power: 75 VA max
 - Class 2, SELV
- ISP 2-wire modules are rated at 20 KV surge protection
- 2-Wire modules wiring: 14 awg

Temperature

- Operating Temperature: 32° F to 140° F
- Storage temperature: -22° F to 212° F



CONTROL SYSTEM UPGRADES

OSMAC® G3

The OSMAC G3 satellite is easy to install, troubleshoot and maintain. Economical because you buy only what you need and can expand as your site conditions change. They utilize paging technology to create one of the most convenient, dependable, and flexible satellites on the market. Employing wireless communication, these satellites are great for retrofit projects. Available as complete satellites or upgrade kit for existing E-OSMAC satellites. Upgrade kit includes OSMAC G3 faceplate, interface cable and hardware

FEATURES & BENEFITS

Low Cost Wireless Communication

Ideal choice for upgrading existing systems. No communication wires are needed. Mounts to many existing pedestal bolt patterns.

Easily Expandable

OSMAC G3 offers up to 64 stations in eight-station increments.

Lower Operating Costs

The enhanced surge protection on OSMAC G3 provides lower operating costs. Ideal for high lightning areas.

Enhanced Diagnostics

Page log and radio signal strength readings provide local troubleshooting capabilities.





Additional Features:

- ✓ Stand-alone capabilities include scheduled irrigation programs, manual program start and station multi-manual
- ✓ Received Signal Strength Indication (RSSI) at the satellite faceplate aids in system installation and troubleshooting
- ✓ Page Log records the last 100 commands received by each satellite
- ✓ Improved radio performance helps overcome difficult environmental conditions
- ✓ Available as complete satellites and an upgrade kit for existing E-OSMAC units

SATELLITE SPECIFICATIONS

Operational

OSMAC G3:

- Colored LED indicators to confirm 24-, 9-, and 5-volt power to various boards within the cabinet
- LED's for each station output
- Internal antenna allows for smaller profile cabinet
- Patented Hot Post for each eight-station module

Electrical

- Input power: 120/240 V ac, 50/60 Hz

OSMAC G3:

- 0.20 amps, 110-120 V ac, 60 Hz (no load)
- 0.96 amps, 110-120 V ac, 60 Hz (max load)
- 0.10 amps, 220-240 V ac, 50/60 Hz (no load)
- 0.47 amps, 220-240 V ac, 50/60 Hz (max load)

Dimensions

- Plastic Cabinet: 17" W x 40" H x 16" D

Options

- Surge protection

Specifying Information – OSMAC G3 Upgrade Kit

118-4839
<i>Kit Contains</i>
OSMAC G3 Faceplate, Interface Cable and Hardware

Specifying Information—OSMAC G3 Satellites

G-XXX6ANMX					
Description	Configuration	Cabinet	Output	Communication	Options
E	XX	X	6A	X	MX
G – OSMAC G3	16 – 16 Stations 24 – 24 Stations 32 – 32 Stations 40 – 40 Stations 48 – 48 Stations 56 – 56 Stations 64 – 64 Stations	P – Plastic Green B – Plastic Tree Bark T – Plastic Desert Sand	6A – 24VAC	N – Narrowband Radio	3 – Large Terminal Blocks, Switches 4 – Large Terminal Block, Switches, Premium Surge
Example: When specifying a 40-station, satellite in a green plastic cabinet with large terminal block, switches and premium surge you would specify: G-40P6ANM4					



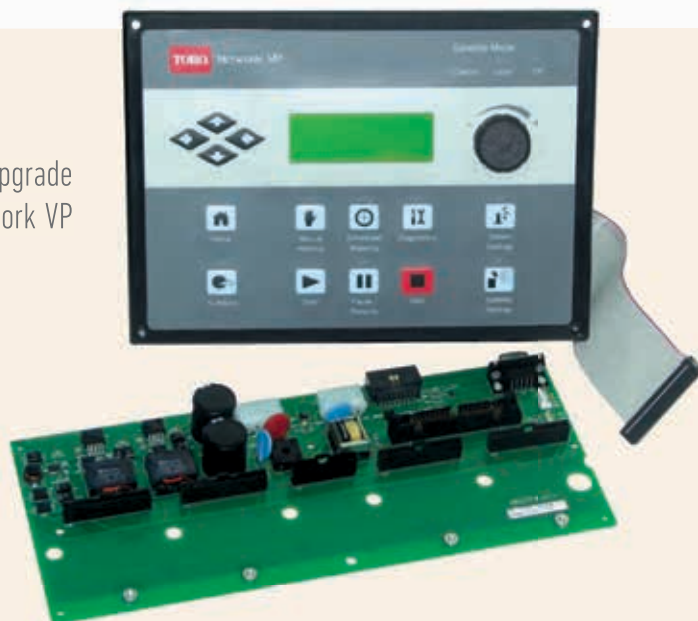
CONTROL SYSTEM UPGRADES

Network LTC Plus to Network VP

Available as an upgrade kit for existing LTC Plus satellites. Upgrade kit includes Network VP Faceplate, Network LTC Plus To Network VP Power Distribution Board, Cable and Hardware.

FEATURES & BENEFITS

- ✓ Station based flow management shortens watering window
- ✓ Intuitive user interface simplifies manual irrigation
- ✓ Station runtimes executed to the second helps save water
- ✓ Upgrade to Lynx for enhanced central capabilities



Specifying Information—Network LTC Plus Upgrade Kit

118-0038	
Kit Contains	
Network VP Faceplate, Network LTC Plus To Network VP Power Distribution Board, Cable and Hardware	

Network LTC Plus to LTC Pro

Available as complete satellites or upgrade kit for existing LTC Plus satellites. Upgrade kit includes LTC Pro Faceplate, Power Distribution Board, Cable and Hardware.

FEATURES & BENEFITS

- ✓ Intuitive user interface simplifies faceplate functions
- ✓ Enhanced manual operations
 - Runtimes to the second
 - Stackable multi-manuals
 - Start/Pause/Stop
- ✓ Backwards compatible with SitePro®



Specifying Information—LTC Pro Satellites

LTCRXXX6XX					
Description	Configuration	Cabinet	Output	Comm.	Options
LTCR	XX	X	6	X	X
LTCR - LTC Pro	16 – 16 Stations 40 – 40 Stations	P – Plastic Green	6 – 24VAC	M – Wire R – Radio	4 – Large Terminal Block, Switches, Premium Surge
Example: When specifying a 40-station, wire communication satellite, you would specify: LTCR40P6M4					

Specifying Information—LTC Pro Upgrade Kit

118-4838	
Kit Contains	
LTC Pro Faceplate, Power Distribution Board, Cable and Hardware	



Radio Interface Unit (RIU)

The Toro® Radio Interface Unit combines the functions of the OSMAC® Base Station and Hand-held Remote Interface (HHRI) in a single unit. Available in a dual radio configuration that performs both Base Station and HHRI functions, a single radio configuration that's programmable for either function, and a radio-less configuration that's programmable for either function and utilizes a user-supplied external radio for added flexibility.

FEATURES & BENEFITS

- ✓ Provides control of your system while you're on-the-go
- ✓ Provides both hand-held control and central-to-satellite communication
- ✓ Designed to operate continuously, 24/7
- ✓ Interfaces with your Lynx® or SitePro® central without the burden of recurring network costs
- ✓ Tailored to fit your application with programmable selections for: OSMAC Base Station and hand-held remote interface modes, independent transmit/receive UHF frequencies, independent transmit/receive private line settings (CTCSS) and transmit power.



Radio Interface Unit (RIU) Graphical User Interface.

Specifying Information—Radio Interface Unit (RIU)

Model	Description
RIU-00	Radio Interface Unit – External Radio
RIU-01	Radio Interface Unit – Single Radio
RIU-02	Radio Interface Unit – Dual Radio

Note: FCC license required.



CONTROL SYSTEM UPGRADES

Lynx® GAC

The Lynx upgrade system uses modern electronic technology to enable users of older decoder control systems to upgrade to a modern central with new field hardware. New features like remote control from your phone, moisture sensing and sophisticated diagnostics are now available without replacing your entire irrigation system.

FEATURES & BENEFITS

Upgrade your old control system

Works with your existing sprinklers and wiring – just replace your field decoders and the central control.

Modern Electronics

Higher surge protection, more precise run times and 2-way communication.

Works with Toro's Lynx Central Control

Easy to Install, easy to support, easy to use.

Benefits for Users of Older CDS, Rain Bird® and Hunter® Systems:

- ✓ Two-way communication
- ✓ More precise run times (+/- 1 second)
- ✓ Enhanced diagnostics – rapid communication check, voltage and amperage, cable length
- ✓ 20KV lightning protection
- ✓ Lynx Central Control (all the benefits, apps, NSN*)
- ✓ 1-station fits in Toro INFINITY® Series golf sprinklers with Smart Access®

* Rain Bird is a registered trademark of the Rain Bird Corporation.
** Hunter is a registered trademark of Hunter Industries



Lynx Central



Lynx GAC Modules



Feature	TORO GAC	CDS	Rain Bird FD	Hunter Pilot
Stations Per Wire Path	500	112	250	250
Devices Per Wire Path	125	112	250	250
Outputs	1,2,4	1,2,3,4	1,2,4,6	1,2,4,6
Maximum 14 AWG Wire Path Length	6800 ft	5400 ft	10,000 ft	8000 ft
Simultaneous Stations with 6800 ft of 14 AWG Cable	16	2	20	20
Distance from Decoder Module to Solenoid	575 ft	1200 ft	220 ft	240 ft
Solenoids Per Output	2	2	2	2
Surge Protection	20 KV	6-8 KV	6-8 KV	15 KV
Wire Paths Per Interface	2	4	2	4
Solenoid Characteristics 24VAC, 60 Hz	400mA inrush, 250mA holding	400mA inrush, 200mA holding	400mA inrush, 250mA holding	400mA inrush, 250mA holding
Holding Current	40mA	300mA	20mA	45mA
Two-Way Feedback from Decoder Module	VOLTS AMPS DISTANCE	NO	NO	VOLTS AMPS

SPECIFICATIONS

Operational

Enhanced diagnostics

- Communication
- Electrical shorts/opens
- Voltage
- Amperage

Module addresses are factory programmed

Low holding current

Installation

Maximum number of wire paths

- 2 per gateway

Maximum number of gateways

- 4 standard, 4 expansion

Electrical

- Input voltage: 100-240 VAC, 50/60 Hz

- Input current: 1.6A/1.0A (115/230)

- Output voltage: 40VAC max

- Output power: 75VA max

- Class 2, SELV

- Decoders and gateways have 20KV surge protection

Temperature

- Operating temperature: 32F to 140°F

- Storage temperature: -22F to 140°F

Specifying Information—GAC Module

DAC-ISP-X	
Type	Station Count
DAC-ISP	X
DAC-ISP-Module	1-1 Station, 2-2 Station, 4-4 Station

Specifying Information—Gateway

DAC-XXX-XXXX		
Type	Communication	Station Count
DAC	XXX	XXXX
DAC	PCS – Central RS – Remote	1000 1000-E



Model	INF35-6/ INF55-6	INF35/ INF55	INF34/ INF54	FLX35-6/ FLX55-6	FLX35/ FLX55	FLX34/ FLX54
Catalog Pages	30-33	34-37	38-41	42-45	46-49	50-53
Radius	42'-100'	43'-92'	52'-99'	42'-100'	43'-92'	52'-99'
Short Radius (mainless)	25'-51'	25'-50'		25'-51'	25'-50'	
Radius Reduction Screw		X	X		Optional	Optional
Back Nozzle Capable	X	X		X	X	
Inlet Size	1" & 1½" ACME	1" & 1½" ACME	1" & 1½" ACME	1" & 1½" ACME	1" & 1½" ACME	1" & 1½" ACME
Turf	X	X	X	X	X	X
High Wind	X	X	X	X	X	X
GDC 2-wire Systems	X	X	X	X	X	X
Normally Open Hydraulic System				X	X	X
Spike Guard™ Solenoid	X	X	X	X	X	X
Full Circle	X	X	X	X	X	X
Part-circle Adjustable	X	X		X	X	
Part/Full Circle In One	40°-330° & 360°	40°-330° & 360°		40°-330° & 360°	40°-330° & 360°	
Ratcheting Riser	X	X		X	X	
Check Valve				X	X	X
Effluent Water Option	X	X	X	X	X	X
Trajectory Adjustment	7°-30°	25° & 15°	25° & 15°	7°-30°	25° & 15°	25° & 15°
Nozzle Base Clutching	X	X		X	X	
SMART ACCESS® Compartment	X	X	X			
SMART ACCESS® Cover	X	X	X			
Removable Marker	X	X	X			
Pilot Valve Serviceable Under Pressure	X	X	X			
Warranty	3 Years/ 5 Years*	3 Years/ 5 Years*	3 Years/ 5 Years*	3 Years/ 5 Years*	3 Years/ 5 Years*	3 Years/ 5 Years*

*When purchased and installed with Toro Swing Joints.
X~Complete sprinkler requires the purchase and assembly of riserless bodies and conversions.
NPT and BSP models available as riserless bodies only.



Model	FLEX800 B SERIES	T7 Rotor	690	590GF
Catalog Pages	54-57	64-65	66-67	68-69
Radius	25'-95'	Low-flow: 38'-56' High-flow: 46'-75'	87'-108'	2'-26
Short Radius (mainless)	X	X		X
Radius Reduction Screw	Optional	X		X
Back Nozzle Capable	X			
Inlet Size	1" NPT, BSP, ACME	1" ACME	1½" NPT	1/2" NPT
Flow Range	7.1-56.3 gpm	Low-flow: 1.7-12.7 gpm High-flow: 6.8-30.5 gpm	51.0-82.2 gpm	.05-4.5 gpm
Recommended Operating Pressure	50-100 psi	40-100 psi	80-100 psi	20-50 psi
Turf	X	X	X	X
High Wind	X		X	
Low Pressure		X		X
Normally Open Hydraulic System			X	
Full Circle	X	X	1 and 2 Speed	X
Part-circle Adjustable	X	X		X
Part-circle Fixed			90° and 180°	X
Part/Full Circle In One	40°-330° & 360°	X		X
Ratcheting Riser	FLX35-6B/FLX35B			X
Check Valve	X	X	X	X
Effluent Water Option	X	X		X
Trajectory Adjustment	7°-30°/ 25° & 15°			
Warranty	3 Years/ 5 Years*	5 Years	3 Years/5 Years*	3 Years

*When purchased and installed with Toro Swing Joints.



With the industry's largest selection of high performance nozzles and TruJectory™ adjustment the INFINITY 35-6/55-6 Series with SMART ACCESS® allows you to put water precisely where you want it for maximum distribution uniformity. And the part/full circle drive and ratcheting riser allows you to simply and economically adjust the area of coverage to match your seasonal watering needs or meet water rationing mandates in seconds with no disassembly or additional parts required.

FEATURES & BENEFITS

Industry's Largest Nozzle Selection

Nozzles from 42' to 100' radius plus a wide assortment of back nozzles lets you put the precise amount of water exactly where you need it. All color coded and debris tolerant nozzles threaded in from the front.

Hot Spot Watering

Nozzle base can be turned in either direction and held to put down as much water as needed, precisely where you want it. Standard on all Toro part circle golf rotors!

Adjustment With No Disassembly

A Toro original, simply pull up the riser and ratchet it to the precise position you want to water.

True Part and Full-Circle in One (40° - 330° part circle)

These sprinklers can be full circle today and part circle tomorrow allowing you to simply and economically adjust the area of coverage to match your seasonal needs or meet water rationing mandates.



Smart Access®

Provides top accessibility to all critical components.

- ✓ No digging or unsightly turf repair scars
- ✓ No buried wire splices or ground faults
- ✓ Pilot valve removable with water "ON"
- ✓ Lower long term cost of ownership
- ✓ Customizable marker
- ✓ Replaceable cover if damaged
- ✓ Increased labor efficiency

INF35-6 CONVERSION UPGRADES

MODELS	DESCRIPTION
• INF35-6-3134	INF35-6 w/31-34 Nozzles (33 Nozzle Installed)
• INF35-6-3537	INF35-6 w/35-37 Nozzles (35 Nozzle Installed)
• INF35-6-3134E	INF35-6 w/31-34 Nozzles (33 Nozzle Installed), Effluent
• INF35-6-3537E	INF35-6 w/35-37 Nozzles (35 Nozzle Installed), Effluent



INF55-6 CONVERSION UPGRADES

MODELS	DESCRIPTION
• INF55-6-5154	INF55-6 w/51-54 Nozzles (53 Nozzle Installed)
• INF55-6-5558	INF55-6 w/55-58 Nozzles (55 Nozzle Installed)
• INF55-6-59	INF55-6 w/59 Nozzle Installed
• INF55-6-5154E	INF55-6 w/51-54 Nozzles (53 Nozzle Installed), Effluent
• INF55-6-5558E	INF55-6 w/55-58 Nozzles (55 Nozzle Installed), Effluent
• INF55-6-59E	INF55-6 w/59 Nozzle Installed Effluent



Trajectory – 24 Positions
From 7° - 30° in 1° increments put water where you want it. Adjust from the top of the sprinkler in seconds, wet or dry. This flexibility lets you tackle every obstacle on the course; wind, trees, bunkers, mounds and more.

SPECIFICATIONS

Operational

- Inlet:
 - INF35-6: 1" ACME
 - INF55-6: 1½" ACME
- Radius:
 - INF35-6: 42' – 92'
 - INF55-6: 52' – 100'
- Flow Rate:
 - INF35-6: 7.1 – 45.3 gpm
 - INF55-6: 13.9 – 61.1 gpm
- Precipitation Rates:
 - INF35-6: Minimum - .37"/hr; Maximum - .53"/hr
 - INF55-6: Minimum - .43"/hr; Maximum - .60"/hr
- Pilot Valve: Selectable at 50, 65, 80 and 100 psi
- Recommended Operating Pressure Range: 65-100 psi (maximum -150 psi and minimum - 40 psi)
- Activation types – Electric Valve-in-Head:
 - Standard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.30 A
 - Holding 0.20 A
 - Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - Nickel-Plated Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - DC Latching Solenoid (DCLS):
 - Momentary low voltage pulse
 - Integrated GDC Module w/DCLS:
 - Momentary low voltage pulse
- Trajectory: 24 positions from 7° - 30° in 1° increments

Additional Features

- INF35-6 has eight nozzle variations (30, 31, 32, 33, 34, 35, 36 and 37)
- INF55-6 has nine nozzle variations (51, 52, 53, 54, 55, 56, 57, 58 and 59)
- Four in-line nozzles, rotating stream pattern
- One back nozzle position
- Stator variations: INF35-6 – 3 and INF55-6 – 3
- Ratcheting riser
- Nozzle base clutching

Dimensions

- SMART ACCESS® Cover and Compartment Diameter:
 - INF35-6: 7 5/8"
 - INF55-6: 7 5/8"
- Body height:
 - INF35-6: 10"
 - INF55-6: 11 3/8"
- Weight:
 - INF35-6: 4.31 lbs.
 - INF55-6: 5.13 lbs.
- Pop-up height to nozzle: 3 1/4"

Warranty

- Three years
- Five years when installed with Toro Swing Joints

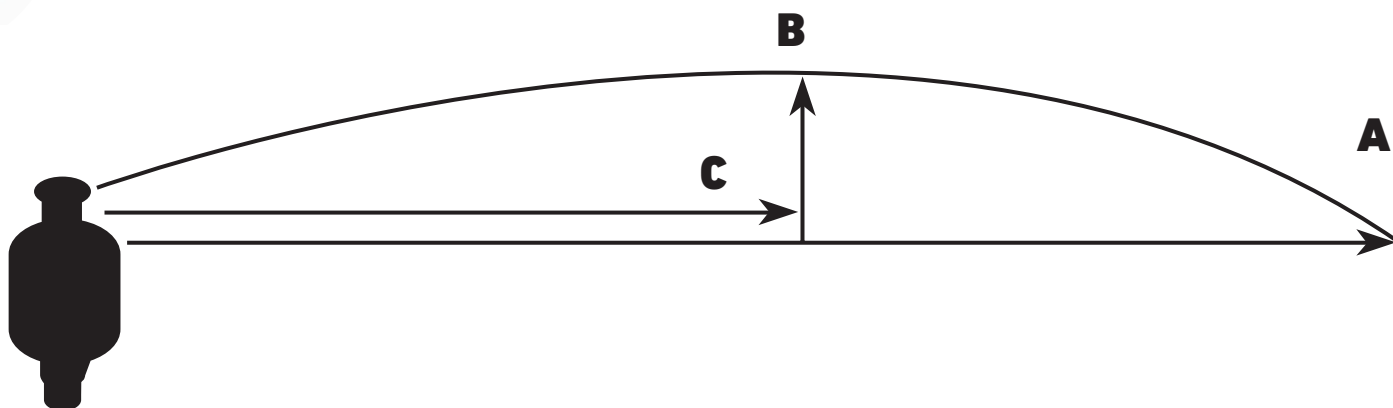
Specifying Information—INFINITY 35-6 & INFINITY 55-6

INF5-XXX-X6-7						
Body Inlet	Arc	Nozzle	Pressure Regulation*	Activation Type	Trajectory	Optional
INF5	5	XX	X	X	6	7
3—1" 5—1½"	5—Part-circle and Full-circle In One	INF35—30, 31, 32, 33, 34, 35, 36, 37 INF55—51, 52, 53, 54, 55, 56, 57, 58, 59	6—65 psi 8—80 psi 1—100 psi	1—Standard Solenoid 2—Spike Guard™ Solenoid 3—Nickel-plated Spike Guard Solenoid 4—DC Latching Solenoid (DCLS) 5—Integrated GDC Module w/DCLS	6—24-position TruJectory	7—Effluent

Example: When specifying an INF35-6 Series Sprinkler with #34 nozzle, pressure regulation at 65 psi and Spike Guard you would specify: **INF35-346-26**

Note: Not all models available.

* All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.



INFINITY 35-6 TRAJECTORY PERFORMANCE

Nozzle/psi/gpm	#31 Nozzle @ 65 psi, 15.5 gpm						#32 Nozzle @ 65 psi, 20.5 gpm						#33 Nozzle @ 65 psi, 22.9 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	46'	46'	50'	53'	54'	50'	46'	49'	51'	55'	63'	54'	54'	56'	59'	62'	66'	61'
"B" Spray Height	4'	4'	5'	8'	11'	13'	3'	4'	6'	9'	12'	15'	4'	5'	7'	9'	13'	15'
"C" Distance from Head	25'	25'	26'	33'	33'	33'	20'	24'	28'	34'	34'	34'	23'	28'	32'	34'	35'	35'

Nozzle/psi/gpm	#34 Nozzle @ 65 psi, 30.0 gpm						#35 Nozzle @ 65 psi, 32.4 gpm						#36 Nozzle @ 80 psi, 34.0 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	58'	60'	63'	67'	74'	70'	59'	61'	64'	70'	76'	74'	64'	68'	76'	80'	84'	82'
"B" Spray Height	4'	4'	6'	11'	14'	17'	4'	5'	7'	11'	15'	17'	5'	7'	9'	14'	17'	22'
"C" Distance from Head	24'	26'	35'	39'	39'	39'	30'	32'	36'	43'	43'	43'	25'	38'	40'	45'	49'	45'

Nozzle/psi/gpm	#37 Nozzle @ 80 psi, 39.8 gpm					
Trajectory	7°	10°	15°	20°	25°	30°
"A" Radius	65'	69'	78'	82'	86'	84'
"B" Spray Height	5'	7'	9'	14'	18'	22'
"C" Distance from Head	30'	39'	41'	46'	50'	46'

INFINITY 55-6 TRAJECTORY PERFORMANCE

Nozzle/psi/gpm	#51 Nozzle @ 65 psi, 15.7 gpm						#52 Nozzle @ 65 psi, 20.8 gpm						#53 Nozzle @ 65 psi, 23.4 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	46'	46'	51'	53'	54'	50'	49'	50'	51'	55'	64'	65'	54'	56'	59'	62'	68'	61'
"B" Spray Height	4'	4'	6'	10'	13'	15'	4'	4'	6'	9'	11'	13'	5'	6'	7'	9'	13'	15'
"C" Distance from Head	26'	27'	32'	38'	40'	41'	22'	26'	31'	35'	34'	30'	30'	33'	32'	35'	37'	37'

Nozzle/psi/gpm	#54 Nozzle @ 65 psi, 31.2 gpm						#55 Nozzle @ 65 psi, 33.8 gpm						#56 Nozzle @ 80 psi, 35.7 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	58'	60'	63'	67'	74'	70'	59'	62'	66'	70'	76'	77'	72'	73'	75'	82'	85'	82'
"B" Spray Height	5'	6'	8'	10'	15'	17'	6'	6'	9'	11'	15'	17'	5'	7'	9'	14'	17'	22'
"C" Distance from Head	31'	34'	40'	41'	41'	42'	34'	36'	43'	45'	45'	45'	25'	38'	40'	45'	49'	45'

Nozzle/psi/gpm	#57 Nozzle @ 80 psi, 41.9 gpm						#58 Nozzle @ 80 psi, 46.2 gpm						#59 Nozzle @ 80 psi, 53.3 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	72'	74'	77'	83'	89'	85'	75'	77'	83'	87'	92'	88'	77'	78'	84'	89'	96'	92'
"B" Spray Height	5'	7'	9'	14'	18'	22'	6'	7'	10'	15'	18'	22'	7'	8'	11'	16'	21'	25'
"C" Distance from Head	30'	39'	41'	46'	50'	46'	38'	40'	43'	47'	52'	48'	42'	44'	45'	47'	53'	49'

Information is for reference only. Actual results may vary.

INFINITY® 35-6/55-6 SERIES GOLF ROTORS

TORO®



INFINITY 35-6 SERIES PERFORMANCE CHART

Base Pressure	Nozzle Set 30  (White)		Nozzle Set 31  (Yellow)		Nozzle Set 32  (Blue)		Nozzle Set 33  (Brown)		Nozzle Set 34  (Orange)		Nozzle Set 35  (Green)		Nozzle Set 36  (Gray)		Nozzle Set 37  (Black)	
	102-2208		102-4587		102-4588		102-4589		102-0728		102-0729		102-0730		102-4261	
																
	Blue	Gray	Blue	Gray	Red	Gray	Orange	Gray	Orange	Gray	Blue	Gray	Blue	Gray	Orange	Gray
	102-2925	102-2910	102-2925	102-2910	102-2928	102-2910	102-2926	102-2910	102-2926	102-2910	102-2925	102-2910	102-2925	102-2910	102-2926	102-2910
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	42	7.1	52	13.7	61	17.1	64	20.2	69	27.4	—	—	—	—	—	—
65	45	8.7	54	15.5	63	20.5	66	22.9	74	30.0	76	32.4	80	34.0	—	—
80	46	9.6	57	17.0	67	22.6	70	25.3	77	33.2	79	35.8	84	37.5	86	40.8
100	48	11.2	59	18.9	72	25.2	74	28.2	80	37.0	84	39.9	88	42.5	92	45.3
Stator	102-6929 Blue		102-1939 Yellow								102-1940 White					
Conversions			INF35-6-3134								INF35-6-3537					

INFINITY 55-6 SERIES PERFORMANCE CHART

Base Pressure	Nozzle Set 51  (Yellow)		Nozzle Set 52  (Blue)		Nozzle Set 53  (Brown)		Nozzle Set 54  (Orange)		Nozzle Set 55  (Green)		Nozzle Set 56  (Gray)		Nozzle Set 57  (Black)		Nozzle Set 58  (Red)		Nozzle Set 59  (Beige)	
	102-4587		102-4588		102-4589		102-0728		102-0729		102-0730		102-4261		102-4260		102-4259	
																		
	Blue	Gray	Red	Gray	Orange	Gray	Orange	Gray	Blue	Gray	Blue	Gray	Orange	Gray	Blue	Gray	Blue	Gray
	102-2925	102-2910	102-2928	102-2910	102-2926	102-2910	102-2926	102-2910	102-2925	102-2910	102-2925	102-2910	102-2926	102-2910	102-2925	102-2910	102-2925	102-2910
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	52	13.9	62	17.4	66	20.7	69	28.6	—	—	—	—	—	—	—	—	—	—
65	54	15.7	64	20.8	68	23.4	74	31.2	76	33.8	81	35.7	—	—	—	—	—	—
80	57	17.2	68	22.9	72	25.8	77	34.4	79	37.2	85	39.4	89	43.6	92	47.5	96	57.0
100	59	19.1	73	25.5	76	28.7	80	38.2	84	41.3	89	43.7	94	48.5	95	51.1	100	61.1
Stator	102-1939 Yellow								102-1940 White								102-1941	
Conver.	INF55-6-5154								INF55-6-5558								INF55-6-59	

■ Not recommended at these pressures. Radius shown in feet.
 Toro recommends the use of a 1 1/4" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
 Actual site conditions must be considered when selecting the appropriate nozzle.
 All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.



Main Nozzle Adapter
 A wide assortment of intermediate and inner nozzles for use in the main nozzle adapter and back nozzle position provide unmatched nozzle flexibility.

**Note: Main Nozzle Adapter Data Located on Pages 58.
 Back Nozzle Data Located on Page 63.**



The New INFINITY 35/55 Series with SMART ACCESS® features a dual trajectory main nozzle that provides exceptional nozzle performance at the 25° standard angle position and great performance in windy applications at the 15° low angle position. And the part/full circle drive and ratcheting riser allows you to adjust the area of coverage to match your seasonal watering needs or meet water rationing mandates in seconds with no additional parts required.

FEATURES & BENEFITS

Industry's Largest Nozzle Selection

Nozzles from 43' to 92' radius plus a wide assortment of back nozzles lets you put the precise amount of water exactly where you need it. All nozzles threaded in from front.

Stainless Steel Valve Seat

Eliminates body damage from rocks and debris. This indestructible stainless steel seat is molded to the body and virtually eliminates body replacements due to seat damage. Standard on all Toro Golf rotors!

Radius Reduction Screw

Allows for fine tuning the radius to exactly the distance you need. In combination with main nozzle sizing and trajectory adjustment the radius reduction screw can effectively reduce the sprinkler throw down to 30'.

True Part and Full-Circle in One (40° - 330° part circle)

These sprinklers can be full circle today and part circle tomorrow allowing you to adjust the area of coverage to match your seasonal needs or meet water rationing mandates.



Smart Access®

Provides top accessibility to all critical components.

- ✓ No digging or unsightly turf repair scars
- ✓ No buried wire splices or ground faults
- ✓ Pilot valve removable with water "ON"
- ✓ Lower long term cost of ownership
- ✓ Customizable marker
- ✓ Replaceable cover if damaged
- ✓ Increased labor efficiency

INF35 CONVERSION UPGRADES

MODELS	DESCRIPTION
• INF35-3134	INF35 w/31–34 Nozzles (#3 Nozzle Installed)
• INF35-3537	INF35 w/35–37 Nozzles (#5 Nozzle Installed)
• INF35-3134E	INF35 w/31–34 Nozzles (#3 Nozzle Installed), Effluent
• INF35-3537E	INF35 w/35–37 Nozzles (#5 Nozzle Installed), Effluent



INF55 CONVERSION UPGRADES

MODELS	DESCRIPTION
• INF55-5154	INF55 w/51–54 Nozzles (#3 Nozzle Installed)
• INF55-5558	INF55 w/55–58 Nozzles (#5 Nozzle Installed)
• INF55-59	INF55 w/59 Nozzle
• INF55-5154E	INF55 w/51–54 Nozzles (#3 Nozzle Installed), Effluent
• INF55-5558E	INF55 w/55–58 Nozzles (#5 Nozzle Installed), Effluent
• INF55-59E	INF55 w/59 Nozzle, Effluent



25°

OR

15°

Dual Trajectory
The 25° setting provides maximum distance of throw and the 15° setting provides improved wind performance, radius reduction and obstacle avoidance.

SPECIFICATIONS

Operational

- Inlet:
 - INF35: 1" ACME
 - INF55: 1½" ACME
- Radius:
 - INF35: 43' – 83'
 - INF55: 55' – 92'
- Flow Rate:
 - INF35: 8.2 – 47.3 gpm
 - INF55: 14.1 – 61.3 gpm
- Precipitation Rates:
 - INF35: Minimum - .41"/hr; Maximum - .45"/hr
 - INF55: Minimum - .46"/hr; Maximum - .58"/hr
- Pilot Valve: Selectable at 50, 65, 80 and 100 psi
- Recommended Operating Pressure Range: 65-100 psi (maximum – 150 psi and minimum – 40 psi)
- Activation types – Electric Valve-in-Head:
 - Standard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.30 A
 - Holding 0.20 A
 - Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - Nickel-Plated Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - DC Latching Solenoid (DCLS):
 - Momentary low voltage pulse
 - Integrated GDC Module w/DCLS:
 - Momentary low voltage pulse

Additional Features

- INF35 has eight nozzle variations (30, 31, 32, 33, 34, 35, 36 & 37)
- INF55 has nine nozzle variations (51, 52, 53, 54, 55, 56, 57, 58 & 59)
- Three in-line nozzles, rotating stream pattern
- Two back nozzle positions
- Stator variations: 3
- Radius reduction screw 363-4839 for fine tuning
- Ratcheting riser
- Nozzle base clutching

Dimensions

- SMART ACCESS® Cover and Compartment Diameter:
 - INF35: 7 5/8"
 - INF55: 7 5/8"
- Body height:
 - INF35: 10"
 - INF55: 11 3/8"
- Weight:
 - INF35: 4.26 lbs.
 - INF55: 5.08 lbs.
- Pop-up height to nozzle: 3 1/4"

Warranty

- Three years
- Five years when installed with Toro Swing Joints

Specifying Information—INFINITY 35 & INFINITY 55

INF5-XXX-X7					
Body Inlet	Arc	Nozzle	Pressure Regulation*	Activation Type	Optional
INF5	5	XX	X	X	7
3—1" 5—1½"	5—Part-circle and Full-circle In One	INF35—30, 31, 32, 33, 34, 35, 36, 37 INF55—51, 52, 53, 54, 55, 56, 57, 58, 59	6—65 psi 8—80 psi 1—100 psi	1—Standard Solenoid 2—Spike Guard™ Solenoid 3—Nickel-plated Spike Guard Solenoid 4—DC Latching Solenoid (DCLS) 5—Integrated GDC Module w/DCLS	7—Effluent

Example: When specifying an INF35 Series Sprinkler with #34 nozzle, pressure regulation at 65 psi and Spike Guard you would specify: **INF35-346-2**

Note: Not all models available.

* All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

INFINITY 35 SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 30  (White Plug)		Nozzle Set 31  (Yellow)		Nozzle Set 32  (Blue)		Nozzle Set 33  (Brown)		Nozzle Set 34  (Orange)		Nozzle Set 35  (Green)		Nozzle Set 36  (Gray)		Nozzle Set 37  (Black)	
	102-2208		102-6906		102-0726		102-6907		102-0728		102-6955		102-6935		102-6936	
																
	102-5670	102-6942	102-5670	102-5671	102-5670	102-6884	102-5670	102-6884	102-5670	102-6884	102-5670	102-6885	102-6531	102-6885	102-6531	102-6885
Back Nozzle Positions																
	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	43	8.2	53	13.8	56	18.3	61	21.7	65	25.3	—	—	—	—	—	—
65	45	10.0	53	15.5	59	20.5	64	24.4	68	28.2	72	34.1	—	—	—	—
80	46	11.5	57	17.3	62	22.7	67	27.1	71	31.1	75	37.8	78	40.3	80	44.0
100	47	13.4	59	19.1	65	24.9	70	29.8	74	34.1	79	40.9	81	43.8	83	47.3

INFINITY 35 SERIES PERFORMANCE CHART—15°

psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	43	8.2	52	13.6	58	18.1	61	21.5	62	25.6	—	—	—	—	—	—
65	45	10.0	54	15.3	60	20.3	64	24.2	65	27.3	69	33.1	—	—	—	—
80	46	11.5	58	17.2	64	22.6	69	26.8	69	30.2	75	36.8	76	39.7	76	42.9
100	47	13.4	60	19.0	66	24.7	71	29.5	72	32.9	78	39.5	82	42.6	82	46.1
Stator	102-6929 Blue		102-1939 Yellow						102-1940 White							
Conversions			INF35-3134						INF35-3537							

Not recommended at these pressures. Radius shown in feet.
Toro recommends the use of a 1¼" swing joint at flows over 25-Gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
Actual site conditions must be considered when selecting the appropriate nozzle.
All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

INFINITY 35 NOZZLE APEX

Pressure	Nozzle	Apex at 15°	Apex at 25°
65 psi	31	6' @ 51'	13' @ 54'
	32	6' @ 51'	11' @ 64'
	33	7' @ 59'	13' @ 68'
	34	8' @ 63'	15' @ 74'
	35	9' @ 66'	15' @ 76'
80 psi	36	8' @ 75'	18' @ 83'
	37	9' @ 74'	19' @ 82'

INFINITY® 35/55 SERIES GOLF ROTORS

TORO®



INFINITY 55 SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 51  (Yellow)		Nozzle Set 52  (Blue)		Nozzle Set 53  (Brown)		Nozzle Set 54  (Orange)		Nozzle Set 55  (Green)		Nozzle Set 56  (Gray)		Nozzle Set 57  (Black)		Nozzle Set 58  (Red)		Nozzle Set 59  (Beige)	
	102-6906		102-0726		102-6907		102-0728		102-6955		102-6935		102-6936		102-6909		102-4259	
																		
	Yellow	Brown	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green
Back Nozzle Positions																		
	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug
	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335
	psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius
50	55	14.1	57	18.5	62	22.3	66	25.8	—	—	—	—	—	—	—	—	—	—
65	57	15.8	60	20.9	65	25.1	69	28.7	73	35.9	—	—	—	—	—	—	—	—
80	59	17.5	61	23.1	68	27.8	72	31.7	76	39.7	80	43.1	83	48.2	85	50.0	89	57.5
100	61	19.3	63	25.3	71	30.3	75	34.5	80	43.5	83	49.0	88	51.5	90	53.9	92	61.3

INFINITY 55 SERIES PERFORMANCE CHART—15°

psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	55	14.0	59	16.5	62	22.2	63	25.6	—	—	—	—	—	—	—	—	—	—
65	56	15.6	62	20.7	65	25.0	66	28.5	75	35.3	—	—	—	—	—	—	—	—
80	59	17.4	66	23.0	69	27.7	70	31.5	78	39.0	78	42.4	79	46.9	79	49.5	82	57.2
100	60	19.2	68	25.1	71	30.2	72	34.3	80	41.9	81	47.2	83	52.1	83	53.4	85	60.8
Stator	102-1939 Yellow								102-1940 White								102-1941 White	
Conversions	INF35-3134								INF35-3537								INF55-59	

Not recommended at these pressures. Radius shown in feet.
 Toro recommends the use of a 1¼" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
 Actual site conditions must be considered when selecting the appropriate nozzle.
 All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

INFINITY 55 NOZZLE APEX

Pressure	Nozzle	Apex at 15°	Apex at 25°
65 psi	51	6' @ 51'	13' @ 54'
	52	6' @ 51'	11' @ 64'
	53	7' @ 59'	13' @ 68'
	54	8' @ 63'	15' @ 74'
	55	9' @ 66'	15' @ 76'
80 psi	56	8' @ 75'	18' @ 83'
	57	9' @ 74'	19' @ 82'
	58	10' @ 82'	18' @ 87'
	59	11' @ 81'	21' @ 91'

Note: Main Nozzle Adapter Data Located on Pages 58.
Back Nozzle Data Located on Page 63.



The New INFINITY 34/54 is Toro's Premium full-circle golf sprinkler series with SMART ACCESS®. The dual trajectory main nozzle provides exceptional nozzle performance at the 25° standard angle position and great performance in windy applications at the 15° low angle position. And the consistency of the constant velocity full circle drive ensures even water application across the coverage area every time you water.

FEATURES & BENEFITS

Industry's Largest Nozzle Selection

Nozzles from 52' to 100'. Color coded for easy flow and radius identification and threaded from the front to simplify servicing.

Constant Velocity Full Circle Drive

Ensures consistent rotation speeds when matched with station run times for even water application across the coverage area every time you water.

Radius Reduction Screw for Fine Tuning

In combination with main nozzle sizing and trajectory adjustment the radius reduction screw can effectively reduce the sprinkler throw down to 30'.

Five Activation Types

- ✓ Standard solenoid
- ✓ Spike Guard™ solenoid
- ✓ Nickel plated Spike Guard solenoid
- ✓ DC Latching Solenoid (DCLS)
- ✓ Integrated GDC module with DCLS
- ✓ Available on all INFINITY models!



Smart Access®

Provides top accessibility to all critical components.

- ✓ No digging or unsightly turf repair scars
- ✓ No buried wire splices or ground faults
- ✓ Pilot valve removable with water "ON"
- ✓ Lower long term cost of ownership
- ✓ Customizable marker
- ✓ Replaceable cover if damaged
- ✓ Increased labor efficiency

INF34 CONVERSION UPGRADES

MODELS	DESCRIPTION
• INF34-3134	INF34 w/31-34 Nozzles (33 Nozzle Installed)
• INF34-3537	INF34 w/35-37 Nozzles (35 Nozzle Installed)
• INF34-3134E	INF34 w/31-34 Nozzles (33 Nozzle Installed), Effluent
• INF34-3537	INF34 w/35-37 Nozzles (35 Nozzle Installed), Effluent



INF54 CONVERSION UPGRADES

MODELS	DESCRIPTION
• INF54-5154	INF54 w/51-54 Nozzles (53 Nozzle Installed)
• INF54-5558	INF54 w/55-58 Nozzles (55 Nozzle Installed)
• INF54-59	INF54 w/59 Nozzle Installed
• INF54-5154E	INF54 w/51-54 Nozzles (53 Nozzle Installed), Effluent
• INF54-5558E	INF54 w/55-58 Nozzles (55 Nozzle Installed), Effluent
• INF54-59E	INF54 w/59 Nozzle Installed Effluent
• 102-5011	690 Adapter allows you to upgrade any 690 with FLX54 conversions
• 102-0950	Required to upgrade all 1.5" Series Sprinklers (650, 670, 680, 750, and 780)



Dual Trajectory - 25° or 15°
Provides two selections for the main nozzle trajectory; the 25 degree setting provides maximum distance of throw and the 15 degree setting provides improved wind performance, radius reduction and obstacle avoidance.

SPECIFICATIONS

Features

- Dual Trajectory adjustment on main nozzle - 25° or 15°
- Constant velocity full circle drive
- Radius reduction screw can effectively reduce the sprinkler throw down to 30'

Operational

- Inlet:
 - INF34: 1" ACME
 - INF54: 1½" ACME
- Radius:
 - INF34: 52' - 91'
 - INF54: 52' - 99'
- Flow Rate:
 - INF34: 13.0 - 46.9 gpm
 - INF54: 13.2 - 61.8 gpm
- Precipitation Rates:
 - INF34: Minimum - .33"/hr; Maximum - .55"/hr
 - INF54: Minimum - .33"/hr; Maximum - .61"/hr
- Pilot Valve: Selectable at 50, 65, 80 and 100 psi
- Recommended Operating Pressure Range: 65-100 psi (maximum-150 psi and minimum-40 psi)
- Activation types - Electric Valve-in-Head:
 - Standard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.30 A
 - Holding 0.20 A
 - Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - Nickel-Plated Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - DC Latching Solenoid (DCLS):
 - Momentary low voltage pulse
 - Integrated GDC Module w/DCLS:
 - Momentary low voltage pulse
- Trajectory: 25° or 15°

Dimensions

- SMART ACCESS® Cover and Compartment Diameter:
 - INF34: 7 5/8"
 - INF54: 7 5/8"
- Body height:
 - INF34: 10"
 - INF54: 11 3/8"
- Weight:
 - INF34: 4.22 lbs.
 - INF54: 5.04 lbs.
- Pop-up height to nozzle: 3 1/4"

Warranty

- Three years
- Five years when installed with Toro Swing Joints

Specifying Information—INFINITY 34 & INFINITY 54

INF34-XXX-X-7					
Body Inlet	Arc	Nozzle	Pressure Regulation*	Activation Type	Optional
INF34	5	XX	X	X	7
3—1" 5—1½"	4—Full Circle	INF34—31, 32, 33, 34, 35, 36, 37 INF54—51, 52, 53, 54, 55, 56, 57, 58, 59	6—65 psi 8—80 psi 1—100 psi	1—Standard Solenoid 2—Spike Guard™ Solenoid 3—Nickel-plated Spike Guard Solenoid 4—DC Latching Solenoid (DCLS) 5—Integrated GDC Module w/DCLS	7—Effluent

Example: When specifying an INF34 Series Sprinkler with #34 nozzle, pressure regulation at 65 psi and Spike Guard you would specify: **INF34-346-2**

Note: Not all models available.

* All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

INFINITY 34 SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 31  (Yellow)		Nozzle Set 32  (Blue)		Nozzle Set 33  (Brown)		Nozzle Set 34  (Orange)		Nozzle Set 35  (Green)		Nozzle Set 36  (Gray)		Nozzle Set 37  (Black)		
	102-0725		102-7001		102-0727		102-7002		102-6908		102-0730		102-4261		
															
	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Brown
	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-6883
Back Nozzle Positions															
	Yellow	Blue	Yellow	Orange	Yellow	Red	Yellow	Beige	Yellow	Beige	Yellow	Red	Yellow	Gray	
	102-6937	102-2925	102-6937	102-2926	102-6937	102-2928	102-6937	102-2929	102-6937	102-2929	102-6937	102-6944	102-6937	102-6945	
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	
50	57	13.0	58	15.5	64	21.9	68	24.4	—	—	—	—	—	—	
65	58	14.6	60	18.0	68	24.4	72	28.1	76	32.2	—	—	—	—	
80	60	16.2	63	20.5	72	26.9	76	31.1	80	35.6	83	38.2	85	41.5	
100	62	17.9	66	23.4	75	29.8	79	34.9	84	49.3	88	43.4	91	46.9	

INFINITY 34 SERIES PERFORMANCE CHART—15°

psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	52	12.9	53	15.6	60	21.7	62	25.5	—	—	—	—	—	—
65	53	14.4	54	17.1	61	24.2	64	28.0	67	32.1	—	—	—	—
80	56	16.0	57	19.0	65	26.6	69	31.0	73	35.5	76	38.0	77	41.3
100	57	17.5	59	20.5	67	29.5	71	33.9	75	38.4	80	43.1	81	46.8
Stator	102-6929 Blue								102-1940 White					
Conversions	INF34-3134								INF34-3537					

 Not recommended at these pressures. Radius shown in feet.
 Toro recommends the use of a 1 1/4" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
 Actual site conditions must be considered when selecting the appropriate nozzle.
 All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

INFINITY 34 NOZZLE APEX

Pressure	Nozzle	Apex at 15°	Apex at 25°
65 psi	31	6' @ 51'	13' @ 54'
	32	6' @ 51'	11' @ 64'
	33	7' @ 59'	13' @ 68'
	34	8' @ 63'	15' @ 74'
	35	9' @ 66'	15' @ 76'
80 psi	36	8' @ 75'	18' @ 83'
	37	9' @ 74'	19' @ 82'

INFINITY® 34/54 SERIES GOLF ROTORS

TORO®



INFINITY 54 SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 51		Nozzle Set 52		Nozzle Set 53		Nozzle Set 54		Nozzle Set 55		Nozzle Set 56		Nozzle Set 57		Nozzle Set 58		Nozzle Set 59	
	(Yellow)		(Blue)		(Brown)		(Orange)		(Green)		(Gray)		(Black)		(Red)		(Beige)	
	102-0725		102-7001		102-0727		102-7002		102-6908		102-0730		102-4261		102-4260		102-4259	
Back Nozzle Positions	102-4335		102-4335		102-4335		102-4335		102-4335		102-4335		102-4335		102-6883		102-4335	
	102-6937		102-2925		102-6937		102-2926		102-6937		102-2928		102-6937		102-2929		102-6937	
	Yellow		Blue		Yellow		Orange		Yellow		Beige		Yellow		Gray		Yellow	
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	58	13.2	59	15.7	64	22.0	70	26.2	—	—	—	—	—	—	—	—	—	—
65	60	14.8	61	17.5	68	24.8	74	29.3	79	34.2	—	—	—	—	—	—	—	—
80	61	16.4	64	20.0	72	27.6	78	32.6	83	38.0	85	40.7	87	44.9	91	50.2	96	55.6
100	63	18.1	67	23.6	75	30.4	81	36.7	87	42.5	90	45.8	93	50.2	95	55.4	99	61.8

INFINITY 54 SERIES PERFORMANCE CHART—15°

psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	52	13.2	53	15.6	61	22.0	65	26.0	—	—	—	—	—	—	—	—	—	—
65	53	14.8	54	17.1	63	24.8	67	29.2	69	34.1	—	—	—	—	—	—	—	—
80	56	16.4	58	19.0	68	27.6	72	32.5	75	37.8	79	40.4	81	44.6	85	49.9	87	55.3
100	58	18.1	60	20.5	71	30.4	75	36.4	79	42.3	84	45.5	87	49.9	89	55.1	94	61.5
Stator	102-6929 Blue								102-1940 White								102-1941 White	
Conversions	INF54-5154								INF54-5558								INF54-59	

■ Not recommended at these pressures. Radius shown in feet.
Toro recommends the use of a 1¼" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
Actual site conditions must be considered when selecting the appropriate nozzle.
All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

INFINITY 54 NOZZLE APEX

Pressure	Nozzle	Apex at 15°	Apex at 25°
65 psi	51	6' @ 51'	13' @ 54'
	52	6' @ 51'	11' @ 64'
	53	7' @ 59'	13' @ 68'
	54	8' @ 63'	15' @ 74'
	55	9' @ 66'	15' @ 76'
80 psi	56	8' @ 75'	18' @ 83'
	57	9' @ 74'	19' @ 82'
	58	10' @ 82'	18' @ 87'
	59	11' @ 81'	21' @ 91'



Main Nozzle Adapter
A wide assortment of intermediate and inner nozzles for use in the main nozzle adapter and back nozzle position provide unmatched nozzle flexibility.

**Note: Main Nozzle Adapter Data Located on Pages 58.
Back Nozzle Data Located on Page 63.**

TORO.

FLEX800™ 35-6/55-6 SERIES GOLF ROTORS

NEW!

With the industry's largest selection of high performance nozzles and TruJectory™ adjustment the New FLEX800 35-6/55-6 Series allows you to put water precisely where you want it for maximum distribution uniformity. And the part/full circle drive allows you to simply and economically adjust the area of coverage to match your seasonal watering needs or meet water rationing mandates in seconds with no disassembly or additional parts required.

FEATURES & BENEFITS

Industry's Largest Nozzle Selection

Nozzles from 42' to 100' radius plus a wide assortment of back nozzles lets you put the precise amount of water exactly where you need it. All nozzles threaded in from the front.

20,000 Volt Lightning Rating

Spike-Guard™ solenoid virtually eliminates the need for replacements in high lightning areas. Draws half the amperage of traditional solenoids so you can run twice as many sprinklers simultaneously, reduce the cost of wire during initial installation or increase the distance from controller to sprinkler.

Adjustment With No Disassembly

Toro exclusive, simply pull up the riser and ratchet it to the precise position you want to water.

True Part and Full-Circle in One (40° - 330° part circle)

These sprinklers can be full circle today and part circle tomorrow allowing you to simply and economically adjust the area of coverage to match your seasonal needs or meet water rationing mandates.



FLX35-6



FLX55-6



Trajectory – 24 Positions
From 7° - 30° in 1° increments put water where you want it. Adjust from the top of the sprinkler in seconds, wet or dry. This flexibility lets you tackle every obstacle on the course; wind, trees, bunkers, mounds and more.

FLX35-6 CONVERSION UPGRADES

MODELS	DESCRIPTION
• FLX35-6-3134	FLX35-6 w/31-34 Nozzles (33 Nozzle Installed)
• FLX35-6-3537	FLX35-6 w/35-37 Nozzles (35 Nozzle Installed)
• FLX35-6-3134E	FLX35-6 w/31-34 Nozzles (33 Nozzle Installed), Effluent
• FLX35-6-3537E	FLX35-6 w/35-37 Nozzles (35 Nozzle Installed), Effluent



FLX55-6 CONVERSION UPGRADES — RIBBED BODY

MODELS	DESCRIPTION
• FLX55-6-5154	FLX55-6 w/51-54 Nozzles (53 Nozzle Installed)
• FLX55-6-5558	FLX55-6 w/55-58 Nozzles (55 Nozzle Installed)
• FLX55-6-59	FLX55-6 w/59 Nozzle Installed
• FLX55-6-5154E	FLX55-6 w/51-54 Nozzles (53 Nozzle Installed), Effluent
• FLX55-6-5558E	FLX55-6 w/55-58 Nozzles (55 Nozzle Installed), Effluent
• FLX55-6-59E	FLX55-6 w/59 Nozzle Installed, Effluent
• 102-5011	690 Adapter allows you to upgrade any 690 with FLX55-6 conversions
• 102-0950	Required to upgrade all 650, 670, 680, 750, and 780 Series Sprinklers



FLX55-6 CONVERSION UPGRADES — RIBBLESS BODY

MODELS	DESCRIPTION
• FLX55-6-5154R	FLX55-6 w/51-54 Nozzles (53 Nozzle Installed)
• FLX55-6-5558R	FLX55-6 w/55-58 Nozzles (55 Nozzle Installed)
• FLX55-6-59R	FLX55-6 w/59 Nozzle Installed
• FLX55-6-5154RE	FLX55-6 w/51-54 Nozzles (53 Nozzle Installed), Effluent
• FLX55-6-5558RE	FLX55-6 w/55-58 Nozzles (55 Nozzle Installed), Effluent
• FLX55-6-59RE	FLX55-6 w/59 Nozzle Installed, Effluent



SPECIFICATIONS

Operational

- Inlet:
 - FLX35-6: 1" ACME
 - FLX55-6: 1½" ACME
- Radius:
 - FLX35-6: 42' – 92'
 - FLX55-6: 52' – 100'
- Flow Rate:
 - FLX35-6: 7.1 – 45.3 gpm
 - FLX55-6: 13.9 – 61.1 gpm
- Precipitation Rates:
 - FLX35-6: Minimum - .37"/hr; Maximum - .53"/hr
 - FLX55-6: Minimum - .43"/hr; Maximum - .60"/hr
- Pilot Valve: Selectable at 50, 65, 80 and 100 psi
- Recommended Operating Pressure Range: 65-100 psi (maximum -150 psi and minimum - 40 psi)
- Activation types – Electric Valve-in-Head:
 - Standard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.30 A
 - Holding 0.20 A
 - Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - Nickel-Plated Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - DC Latching Solenoid (DCLS):
 - Momentary low voltage pulse
 - Integrated GDC Module w/DCLS:
 - Momentary low voltage pulse
- Trajectory: 24 positions from 7° – 30° in 1° increments

Additional Features

- FLX35-6 has eight nozzle variations (30, 31, 32, 33, 34, 35, 36 and 37)
- FLX55-6 has nine nozzle variations (51, 52, 53, 54, 55, 56, 57, 58 and 59)
- Four in-line nozzles, rotating stream pattern
- One back nozzle position
- Stator variations: FLX35-6 – 3 and FLX55-6 – 3
- Ratcheting riser
- Nozzle base clutching

Dimensions

- Body Flange Diameter:
 - FLX35-6: 6 1/2"
 - FLX55-6: 7 1/2"
- Body height:
 - FLX35-6: 10"
 - FLX55-6: 11 3/8"
- Weight:
 - FLX35-6: 2.94 lbs.
 - FLX55-6: 3.61 lbs.
- Weight-Integrated GDC
 - FLX35-6: 3.63 lbs.
 - FLX55-6: 4.30 lbs.
- Pop-up height to nozzle: 3 1/4"

Warranty

- Three years
- Five years when installed with Toro Swing Joints

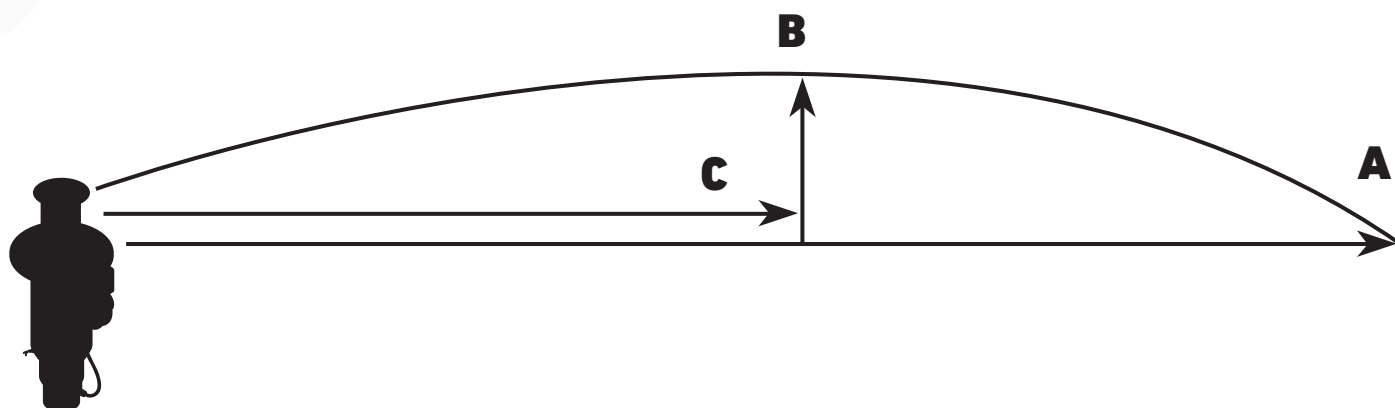
Specifying Information—FLEX800 35-6 & FLEX800 55-6

FLXX5-XXX-X6-7						
Body Inlet	Arc	Nozzle	Pressure Regulation*	Activation Type	Trajectory	Optional
FLXX	5	XX	X	X	6	7
3—1" 5—1½"	5—Part-circle and Full-circle In One	FLX35—30, 31, 32, 33, 34, 35, 36, 37 FLX55—51, 52, 53, 54, 55, 56, 57, 58, 59	6—65 psi 8—80 psi 1—100 psi	1—Standard Solenoid 2—Spike Guard™ Solenoid 3—Nickel-plated Spike Guard Solenoid 4—DC Latching Solenoid (DCLS) 5—Integrated GDC Module w/DCLS	6—24-position TruJectory	7—Effluent

Example: When specifying an FLX35-6 Series Sprinkler with #34 nozzle, pressure regulation at 65 psi and Spike Guard you would specify: **FLX35-346-26**

Note: Not all models available.

* All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.



FLEX800 35-6 TRAJECTORY PERFORMANCE

Nozzle/psi/gpm	#31 Nozzle @ 65 psi, 15.5 gpm						#32 Nozzle @ 65 psi, 20.5 gpm						#33 Nozzle @ 65 psi, 22.9 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	46'	46'	50'	53'	54'	50'	46'	49'	51'	55'	63'	54'	54'	56'	59'	62'	66'	61'
"B" Spray Height	4'	4'	5'	8'	11'	13'	3'	4'	6'	9'	12'	15'	4'	5'	7'	9'	13'	15'
"C" Distance from Head	25'	25'	26'	33'	33'	33'	20'	24'	28'	34'	34'	34'	23'	28'	32'	34'	35'	35'

Nozzle/psi/gpm	#34 Nozzle @ 65 psi, 30.0 gpm						#35 Nozzle @ 65 psi, 32.4 gpm						#36 Nozzle @ 80 psi, 34.0 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	58'	60'	63'	67'	74'	70'	59'	61'	64'	70'	76'	74'	64'	68'	76'	80'	84'	82'
"B" Spray Height	4'	4'	6'	11'	14'	17'	4'	5'	7'	11'	15'	17'	5'	7'	9'	14'	17'	22'
"C" Distance from Head	24'	26'	35'	39'	39'	39'	30'	32'	36'	43'	43'	43'	25'	38'	40'	45'	49'	45'

Nozzle/psi/gpm	#37 Nozzle @ 80 psi, 39.8 gpm					
Trajectory	7°	10°	15°	20°	25°	30°
"A" Radius	65'	69'	78'	82'	86'	84'
"B" Spray Height	5'	7'	9'	14'	18'	22'
"C" Distance from Head	30'	39'	41'	46'	50'	46'

FLEX800 55-6 TRAJECTORY PERFORMANCE

Nozzle/psi/gpm	#51 Nozzle @ 65 psi, 15.7 gpm						#52 Nozzle @ 65 psi, 20.8 gpm						#53 Nozzle @ 65 psi, 23.4 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	46'	46'	51'	53'	54'	50'	49'	50'	51'	55'	64'	65'	54'	56'	59'	62'	68'	61'
"B" Spray Height	4'	4'	6'	10'	13'	15'	4'	4'	6'	9'	11'	13'	5'	6'	7'	9'	13'	15'
"C" Distance from Head	26'	27'	32'	38'	40'	41'	22'	26'	31'	35'	34'	30'	30'	33'	32'	35'	37'	37'

Nozzle/psi/gpm	#54 Nozzle @ 65 psi, 31.2 gpm						#55 Nozzle @ 65 psi, 33.8 gpm						#56 Nozzle @ 80 psi, 35.7 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	58'	60'	63'	67'	74'	70'	59'	62'	66'	70'	76'	77'	72'	73'	75'	82'	85'	82'
"B" Spray Height	5'	6'	8'	10'	15'	17'	6'	6'	9'	11'	15'	17'	5'	7'	9'	14'	17'	22'
"C" Distance from Head	31'	34'	40'	41'	41'	42'	34'	36'	43'	45'	45'	45'	25'	38'	40'	45'	49'	45'

Nozzle/psi/gpm	#57 Nozzle @ 80 psi, 41.9 gpm						#58 Nozzle @ 80 psi, 46.2 gpm						#59 Nozzle @ 80 psi, 53.3 gpm					
Trajectory	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°	7°	10°	15°	20°	25°	30°
"A" Radius	72'	74'	77'	83'	89'	85'	75'	77'	83'	87'	92'	88'	77'	78'	84'	89'	96'	92'
"B" Spray Height	5'	7'	9'	14'	18'	22'	6'	7'	10'	15'	18'	22'	7'	8'	11'	16'	21'	25'
"C" Distance from Head	30'	39'	41'	46'	50'	46'	38'	40'	43'	47'	52'	48'	42'	44'	45'	47'	53'	49'

Information is for reference only. Actual results may vary.

FLEX800™ 35-6/55-6 SERIES GOLF ROTORS

TORO



FLEX800 35-6 SERIES PERFORMANCE CHART

Base Pressure	Nozzle Set 30		Nozzle Set 31		Nozzle Set 32		Nozzle Set 33		Nozzle Set 34		Nozzle Set 35		Nozzle Set 36		Nozzle Set 37	
																
	(White)		(Yellow)		(Blue)		(Brown)		(Orange)		(Green)		(Gray)		(Black)	
	102-2208		102-4587		102-4588		102-4589		102-0728		102-0729		102-0730		102-4261	
																
	Blue	Gray	Blue	Gray	Red	Gray	Orange	Gray	Orange	Gray	Blue	Gray	Blue	Gray	Orange	Gray
	102-2925	102-2910	102-2925	102-2910	102-2928	102-2910	102-2926	102-2910	102-2926	102-2910	102-2925	102-2910	102-2925	102-2910	102-2926	102-2910
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	42	7.1	52	13.7	61	17.1	64	20.2	69	27.4	—	—	—	—	—	—
65	45	8.7	54	15.5	63	20.5	66	22.9	74	30.0	76	32.4	80	34.0	—	—
80	46	9.6	57	17.0	67	22.6	70	25.3	77	33.2	79	35.8	84	37.5	86	40.8
100	48	11.2	59	18.9	72	25.2	74	28.2	80	37.0	84	39.9	88	42.5	92	45.3
Stator	102-6929 Blue		102-1939 Yellow								102-1940 White					
Conversions			FLX35-6-3134								FLX35-6-3537					

FLEX800 55-6 SERIES PERFORMANCE CHART

Base Pressure	Nozzle Set 51		Nozzle Set 52		Nozzle Set 53		Nozzle Set 54		Nozzle Set 55		Nozzle Set 56		Nozzle Set 57		Nozzle Set 58		Nozzle Set 59	
																		
	(Yellow)		(Blue)		(Brown)		(Orange)		(Green)		(Gray)		(Black)		(Red)		(Beige)	
	102-4587		102-4588		102-4589		102-0728		102-0729		102-0730		102-4261		102-4260		102-4259	
																		
	Blue	Gray	Red	Gray	Orange	Gray	Orange	Gray	Blue	Gray	Blue	Gray	Orange	Gray	Blue	Gray	Blue	Gray
	102-2925	102-2910	102-2928	102-2910	102-2926	102-2910	102-2926	102-2910	102-2925	102-2910	102-2925	102-2910	102-2926	102-2910	102-2925	102-2910	102-2925	102-2910
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	52	13.9	62	17.4	66	20.7	69	28.6	—	—	—	—	—	—	—	—	—	—
65	54	15.7	64	20.8	68	23.4	74	31.2	76	33.8	81	35.7	—	—	—	—	—	—
80	57	17.2	68	22.9	72	25.8	77	34.4	79	37.2	85	39.4	89	43.6	92	47.5	96	57.0
100	59	19.1	73	25.5	76	28.7	80	38.2	84	41.3	89	43.7	94	48.5	95	51.1	100	61.1
Stator	102-1939 Yellow								102-1940 White								102-1941	
Conver.	FLX55-6-5154								FLX55-6-5558								FLX55-6-59	

Not recommended at these pressures. Radius shown in feet.
Toro recommends the use of a 1¼" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
Actual site conditions must be considered when selecting the appropriate nozzle.
All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.



Main Nozzle Adapter
A wide assortment of intermediate and inner nozzles for use in the main nozzle adapter and back nozzle position provide unmatched nozzle flexibility.

**Note: Main Nozzle Adapter Data Located on Page 58.
Back Nozzle Data Located on Page 63.**

TORO.

FLEX800™ 35/55 SERIES GOLF ROTORS

NEW!

The New FLEX800 35/55 Series features a dual trajectory main nozzle that provides exceptional nozzle performance at the 25° standard angle position and great performance in windy applications at the 15° low angle position. And the part/full circle drive allows you to adjust the area of coverage to match your seasonal watering needs or meet water rationing mandates in seconds with no additional parts required.

FEATURES & BENEFITS

Industry's Largest Nozzle Selection

Nozzles from 43' to 92' radius plus a wide assortment of back nozzles lets you put the precise amount of water exactly where you need it. All nozzles threaded in from front.

Stainless Steel Valve Seat

Eliminates body damage from rocks and debris. This indestructible stainless steel seat is molded to the body and virtually eliminates body replacements due to seat damage.

Optional Radius Reduction Screw

Allows for fine tuning the radius to exactly the distance you need. In combination with main nozzle sizing and trajectory adjustment the radius reduction screw can effectively reduce the sprinkler throw down to 30'.

True Part and Full-Circle in One (40° - 330° part circle)

These sprinklers can be full circle today and part circle tomorrow allowing you to adjust the area of coverage to match your seasonal needs or meet water rationing mandates.



FLX35



FLX55



Dual Trajectory

The 25° setting provides maximum distance of throw and the 15° setting provides improved wind performance, radius reduction and obstacle avoidance.

FLX35 CONVERSION UPGRADES

MODELS	DESCRIPTION
• FLX35-3134	FLX35 w/31–34 Nozzles (#3 Nozzle Installed)
• FLX35-3537	FLX35 w/35–37 Nozzles (#5 Nozzle Installed)
• FLX35-3134E	FLX35 w/31–34 Nozzles (#3 Nozzle Installed), Effluent
• FLX35-3537E	FLX35 w/35–37 Nozzles (#5 Nozzle Installed), Effluent



FLX55 CONVERSION UPGRADES — RIBBED BODY

MODELS	DESCRIPTION
• FLX55-5154	FLX55 w/51–54 Nozzles (#3 Nozzle Installed)
• FLX55-5558	FLX55 w/55–58 Nozzles (#5 Nozzle Installed)
• FLX55-59	FLX55 w/59 Nozzle
• FLX55-5154E	FLX55 w/51–54 Nozzles (#3 Nozzle Installed), Effluent
• FLX55-5558E	FLX55 w/55–58 Nozzles (#5 Nozzle Installed), Effluent
• FLX55-59E	FLX55 w/59 Nozzle, Effluent
• 102-5011	690 Adapter allows you to upgrade any 690 with FLX55 conversions
• 102-0950	Required to upgrade all 650, 670, 680, 750, and 780 Series Sprinklers



FLX55 CONVERSION UPGRADES — RIBLESS BODY

MODELS	DESCRIPTION
• FLX55-5154R	FLX55 w/51–54 Nozzles (#3 Nozzle Installed)
• FLX55-5558R	FLX55 w/55–58 Nozzles (#5 Nozzle Installed)
• FLX55-59R	FLX55 w/59 Nozzle
• FLX55-5154RE	FLX55 w/51–54 Nozzles (#3 Nozzle Installed), Effluent
• FLX55-5558RE	FLX55 w/55–58 Nozzles (#5 Nozzle Installed), Effluent
• FLX55-59RE	FLX55 w/59 Nozzle, Effluent



SPECIFICATIONS

Operational

- Inlet:
 - FLX35: 1" ACME
 - FLX55: 1½" ACME
- Radius:
 - FLX35: 43' – 83'
 - FLX55: 55' – 92'
- Flow Rate:
 - FLX35: 8.2 – 47.3 gpm
 - FLX55: 14.1 – 61.3 gpm
- Precipitation Rates:
 - FLX35: Minimum - .41"/hr; Maximum - .45"/hr
 - FLX55: Minimum - .46"/hr; Maximum - .58"/hr
- Pilot Valve: Selectable at 50, 65, 80 and 100 psi
- Recommended Operating Pressure Range: 65-100 psi (maximum – 150 psi and minimum – 40 psi)
- Activation types – Electric Valve-in-Head:
 - Standard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.30 A
 - Holding 0.20 A
 - Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - Nickel-Plated Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - DC Latching Solenoid (DCLS):
 - Momentary low voltage pulse
 - Integrated GDC Module w/DCLS:
 - Momentary low voltage pulse

Additional Features

- FLX35 has eight nozzle variations (30, 31, 32, 33, 34, 35, 36 & 37)
- FLX55 has nine nozzle variations (51, 52, 53, 54, 55, 56, 57, 58 & 59)
- Three in-line nozzles, rotating stream pattern
- Two back nozzle positions
- Stator variations: 3
- Radius reduction screw 363-4839 for fine tuning
- Ratcheting riser
- Nozzle base clutching

Dimensions

- Body Flange Diameter:
 - FLX35: 6 1/2"
 - FLX55: 7 1/2"
- Body height:
 - FLX35: 10"
 - FLX55: 11 3/8"
- Weight:
 - FLX35: 2.89 lbs.
 - FLX55: 3.57 lbs.
- Weight—Integrated GDC
 - FLX35: 3.58 lbs.
 - FLX55: 4.26 lbs.
- Pop-up height to nozzle: 3¼"

Warranty

- Three years
- Five years when installed with Toro Swing Joints

Specifying Information—FLEX800 35 & FLEX800 55

FLXX5-XXX-X-7					
Body Inlet	Arc	Nozzle	Pressure Regulation*	Activation Type	Optional
FLXX	5	XX	X	X	7
3—1" 5—1½"	5—Part-circle and Full-circle In One	FLX35—30, 31, 32, 33, 34, 35, 36, 37 FLX55—51, 52, 53, 54, 55, 56, 57, 58, 59	6—65 psi 8—80 psi 1—100 psi	1—Standard Solenoid 2—Spike Guard™ Solenoid 3—Nickel-plated Spike Guard Solenoid 4—DC Latching Solenoid (DCLS) 5—Integrated GDC Module w/DCLS	7—Effluent

Example: When specifying an FLX35-6 Series Sprinkler with #34 nozzle, pressure regulation at 65 psi and Spike Guard you would specify: **FLX35-346-2**

Note: Not all models available.

* All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

FLEX800 35 SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 30  (White Plug)		Nozzle Set 31  (Yellow)		Nozzle Set 32  (Blue)		Nozzle Set 33  (Brown)		Nozzle Set 34  (Orange)		Nozzle Set 35  (Green)		Nozzle Set 36  (Gray)		Nozzle Set 37  (Black)	
	102-2208		102-6906		102-0726		102-6907		102-0728		102-6955		102-6935		102-6936	
																
	Yellow	Beige	Yellow	Brown	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Green	Green	Green
	102-5670	102-6942	102-5670	102-5671	102-5670	102-6884	102-5670	102-6884	102-5670	102-6884	102-5670	102-6885	102-6531	102-6885	102-6531	102-6885
Back Nozzle Positions																
	Red Plug		Red Plug		Red Plug		Red Plug		Red Plug		Red Plug		Red Plug		Red Plug	
	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	43	8.2	53	13.8	56	18.3	61	21.7	65	25.3	—	—	—	—	—	—
65	45	10.0	53	15.5	59	20.5	64	24.4	68	28.2	72	34.1	—	—	—	—
80	46	11.5	57	17.3	62	22.7	67	27.1	71	31.1	75	37.8	78	40.3	80	44.0
100	47	13.4	59	19.1	65	24.9	70	29.8	74	34.1	79	40.9	81	43.8	83	47.3

FLEX800 35 SERIES PERFORMANCE CHART—15°

psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	43	8.2	52	13.6	58	18.1	61	21.5	62	25.6	—	—	—	—	—	—
65	45	10.0	54	15.3	60	20.3	64	24.2	65	27.3	69	33.1	—	—	—	—
80	46	11.5	58	17.2	64	22.6	69	26.8	69	30.2	75	36.8	76	39.7	76	42.9
100	47	13.4	60	19.0	66	24.7	71	29.5	72	32.9	78	39.5	82	42.6	82	46.1
Stator	102-6929 Blue		102-1939 Yellow						102-1940 White							
Conversions			FLX35-3134						FLX35-3537							

Not recommended at these pressures. Radius shown in feet.
Toro recommends the use of a 1 1/4" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
Actual site conditions must be considered when selecting the appropriate nozzle.
All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

FLEX800 35 NOZZLE APEX

Pressure	Nozzle	Apex at 15°	Apex at 25°
65 psi	31	6' @ 51'	13' @ 54'
	32	6' @ 51'	11' @ 64'
	33	7' @ 59'	13' @ 68'
	34	8' @ 63'	15' @ 74'
	35	9' @ 66'	15' @ 76'
80 psi	36	8' @ 75'	18' @ 83'
	37	9' @ 74'	19' @ 82'

FLEX800™ 35/55 SERIES GOLF ROTORS

TORO



FLEX800 55 SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 51  (Yellow)		Nozzle Set 52  (Blue)		Nozzle Set 53  (Brown)		Nozzle Set 54  (Orange)		Nozzle Set 55  (Green)		Nozzle Set 56  (Gray)		Nozzle Set 57  (Black)		Nozzle Set 58  (Red)		Nozzle Set 59  (Beige)	
	102-6906		102-0726		102-6907		102-0728		102-6955		102-6935		102-6936		102-6909		102-4259	
																		
	Yellow	Brown	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green
Back Nozzle Positions																		
	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug
	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335
	psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius
50	55	14.1	57	18.5	62	22.3	66	25.8	—	—	—	—	—	—	—	—	—	—
65	57	15.8	60	20.9	65	25.1	69	28.7	73	35.9	—	—	—	—	—	—	—	—
80	59	17.5	61	23.1	68	27.8	72	31.7	76	39.7	80	43.1	83	48.2	85	50.0	89	57.5
100	61	19.3	63	25.3	71	30.3	75	34.5	80	43.5	83	49.0	88	51.5	90	53.9	92	61.3

FLEX800 55 SERIES PERFORMANCE CHART—15°

psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	55	14.0	59	16.5	62	22.2	63	25.6	—	—	—	—	—	—	—	—	—	—
65	56	15.6	62	20.7	65	25.0	66	28.5	75	35.3	—	—	—	—	—	—	—	—
80	59	17.4	66	23.0	69	27.7	70	31.5	78	39.0	78	42.4	79	46.9	79	49.5	82	57.2
100	60	19.2	68	25.1	71	30.2	72	34.3	80	41.9	81	47.2	83	52.1	83	53.4	85	60.8
Stator	102-1939 Yellow									102-1940 White								
Conversions	FLX55-5154									FLX55-5558								

Not recommended at these pressures. Radius shown in feet.
Toro recommends the use of a 1 1/4" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
Actual site conditions must be considered when selecting the appropriate nozzle.
All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

FLEX800 55 NOZZLE APEX

Pressure	Nozzle	Apex at 15°	Apex at 25°
65 psi	51	6' @ 51'	13' @ 54'
	52	6' @ 51'	11' @ 64'
	53	7' @ 59'	13' @ 68'
	54	8' @ 63'	15' @ 74'
	55	9' @ 66'	15' @ 76'
80 psi	56	8' @ 75'	18' @ 83'
	57	9' @ 74'	19' @ 82'
	58	10' @ 82'	18' @ 87'
	59	11' @ 81'	21' @ 91'

Note: Main Nozzle Adapter Data Located on Page 58.
Back Nozzle Data Located on Page 63.

NEW!



The New FLEX800 34/54 Series with dual trajectory main nozzle provides exceptional nozzle performance at the 25° standard angle position and great performance in windy applications at the 15° low angle position. And the consistency of the constant velocity full circle drive ensures even water application across the coverage area every time you water.

FEATURES & BENEFITS

Industry's Largest Nozzle Selection

Nozzles from 52' to 99' radius plus a wide assortment of back nozzles lets you put the precise amount of water exactly where you need it. All nozzles threaded in from front.

Stainless Steel Valve Seat

Eliminates body damage from rocks and debris. This indestructible stainless steel seat is molded to the body and virtually eliminates body replacements due to seat damage.

Optional Radius Reduction Screw

Allows for fine tuning the radius to exactly the distance you need. In combination with main nozzle sizing and trajectory adjustment the radius reduction screw can effectively reduce the sprinkler throw down to 30'.

Constant Velocity Full Circle Drive

Ensures consistent rotation speeds when matched with station run times for even water application across the coverage area every time you water.



Dual Trajectory
The 25° setting provides maximum distance of throw and the 15° setting provides improved wind performance, radius reduction and obstacle avoidance.

FLX34 CONVERSION UPGRADES

MODELS	DESCRIPTION
• FLX34-3134	FLX34 w/31–34 Nozzles (#3 Nozzle Installed)
• FLX34-3537	FLX34 w/35–37 Nozzles (#5 Nozzle Installed)
• FLX34-3134E	FLX34 w/31–34 Nozzles (#3 Nozzle Installed), Effluent
• FLX34-3537E	FLX34 w/35–37 Nozzles (#5 Nozzle Installed), Effluent



FLX54 CONVERSION UPGRADES

MODELS	DESCRIPTION
• FLX54-5154	FLX54 w/51–54 Nozzles (#3 Nozzle Installed)
• FLX54-5558	FLX54 w/55–58 Nozzles (#5 Nozzle Installed)
• FLX54-59	FLX54 w/59 Nozzle
• FLX54-5154E	FLX54 w/51–54 Nozzles (#3 Nozzle Installed), Effluent
• FLX54-5558E	FLX54 w/55–58 Nozzles (#5 Nozzle Installed), Effluent
• FLX54-59E	FLX54 w/59 Nozzle, Effluent
• 102-5011	690 Adapter allows you to upgrade any 690 with FLX54 conversions
• 102-0950	Required to upgrade all 1.5" Series Sprinklers (650, 670, 680, 750, and 780)



SPECIFICATIONS

Operational

- Inlet:
 - FLX34: 1" ACME
 - FLX54: 1½" ACME
- Radius:
 - FLX34: 52' – 91'
 - FLX54: 52' – 99'
- Flow Rate:
 - FLX34: 13.0 – 46.9 gpm
 - FLX54: 13.2 – 61.8 gpm
- Precipitation Rates:
 - FLX34: Minimum - .33"/hr; Maximum - .55"/hr
 - FLX54: Minimum - .33"/hr; Maximum - .61"/hr
- Pilot Valve: Selectable at 50, 65, 80 and 100 psi
- Recommended Operating Pressure Range: 65-100 psi (maximum-150 psi and minimum-40 psi)
- Activation types – Electric Valve-in-Head:
 - Standard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.30 A
 - Holding 0.20 A
 - Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - Nickel-Plated Spike Guard Solenoid:
 - 24 VAC, 50/60 Hz
 - Inrush: 0.12 A
 - Holding 0.10 A
 - DC Latching Solenoid (DCLS):
 - Momentary low voltage pulse
 - Integrated GDC Module w/DCLS:
 - Momentary low voltage pulse
- Trajectory: 25° or 15°

Dimensions

- Body Flange Diameter:
 - FLX34: 6½"
 - FLX54: 7½"
- Body height:
 - FLX34: 10"
 - FLX54: 11⅜"
- Weight:
 - FLX34: 2.87 lbs.
 - FLX54: 3.55 lbs.
- Weight-Integrated GDC
 - FLX34: 3.56 lbs.
 - FLX54: 4.24 lbs.
- Pop-up height to nozzle: 3¼"

Warranty

- Three years
- Five years when installed with Toro Swing Joints

Specifying Information—FLEX800 34 & FLEX800 54

FLXX4-XXX-X-7					
Body Inlet	Arc	Nozzle	Pressure Regulation*	Activation Type	Optional
FLXX	4	XX	X	X	7
3—1" 5—1½"	4—Part-circle and Full-circle In One	FLX34—30, 31, 32, 33, 34, 35, 36, 37 FLX54—51, 52, 53, 54, 55, 56, 57, 58, 59	6—65 psi 8—80 psi 1—100 psi	1—Standard Solenoid 2—Spike Guard™ Solenoid 3—Nickel-plated Spike Guard Solenoid 4—DC Latching Solenoid (DCLS) 5—Integrated GDC Module w/DCLS	7—Effluent

Example: When specifying an FLX34 Series Sprinkler with #34 nozzle, pressure regulation at 65 psi and Spike Guard you would specify: **FLX34-346-2**

Note: Not all models available.

* All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

FLEX800 34 SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 31  (Yellow)		Nozzle Set 32  (Blue)		Nozzle Set 33  (Brown)		Nozzle Set 34  (Orange)		Nozzle Set 35  (Green)		Nozzle Set 36  (Gray)		Nozzle Set 37  (Black)		
	102-0725		102-7001		102-0727		102-7002		102-6908		102-0730		102-4261		
															
	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug
	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335	102-4335
Back Nozzle Positions															
	Yellow	Blue	Yellow	Orange	Yellow	Red	Yellow	Beige	Yellow	Beige	Yellow	Red	Yellow	Gray	
	102-6937	102-2925	102-6937	102-2926	102-6937	102-2928	102-6937	102-2929	102-6937	102-2929	102-6937	102-6944	102-6937	102-6945	
	psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
	50	57	13.0	58	15.5	64	21.9	68	24.4	—	—	—	—	—	—
	65	58	14.6	60	18.0	68	24.4	72	28.1	76	32.2	—	—	—	—
	80	60	16.2	63	20.5	72	26.9	76	31.1	80	35.6	83	38.2	85	41.5
	100	62	17.9	66	23.4	75	29.8	79	34.9	84	39.3	88	43.4	91	46.9

FLEX800 34 SERIES PERFORMANCE CHART—15°

psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	52	12.9	53	15.6	60	21.7	62	25.5	—	—	—	—	—	—
65	53	14.4	54	17.1	61	24.2	64	28.0	67	32.1	—	—	—	—
80	56	16.0	57	19.0	65	26.6	69	31.0	73	35.5	76	38.0	77	41.3
100	57	17.5	59	20.5	67	29.5	71	33.9	75	38.4	80	43.1	81	46.8
Stator		102-6929 Blue								102-1940 White				
Conversions		FLX34-3134								FLX34-3537				

 Not recommended at these pressures. Radius shown in feet.
 Toro recommends the use of a 1 1/4" swing joint at flows over 25-gpm (95-LPM).
 Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
 Actual site conditions must be considered when selecting the appropriate nozzle.
 All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

FLEX800 34 NOZZLE APEX

Pressure	Nozzle	Apex at 15°	Apex at 25°
65 psi	31	6' @ 51'	13' @ 54'
	32	6' @ 51'	11' @ 64'
	33	7' @ 59'	13' @ 68'
	34	8' @ 63'	15' @ 74'
	35	9' @ 66'	15' @ 76'
80 psi	36	8' @ 75'	18' @ 83'
	37	9' @ 74'	19' @ 82'

FLEX800™ 34/54 SERIES GOLF ROTORS



FLEX800 54 SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 51 (Yellow)		Nozzle Set 52 (Blue)		Nozzle Set 53 (Brown)		Nozzle Set 54 (Orange)		Nozzle Set 55 (Green)		Nozzle Set 56 (Gray)		Nozzle Set 57 (Black)		Nozzle Set 58 (Red)		Nozzle Set 59 (Beige)	
	102-0725		102-7001		102-0727		102-7002		102-6908		102-0730		102-4261		102-4260		102-4259	
	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Red Plug 102-4335	Brown 102-6883	Red Plug 102-4335	Brown 102-6883	Red Plug 102-4335	Red Plug 102-4335
Back Nozzle Positions																		
	Yellow 102-6937	Blue 102-2925	Yellow 102-6937	Orange 102-2926	Yellow 102-6937	Red 102-2928	Yellow 102-6937	Beige 102-2929	Yellow 102-6937	Beige 102-2929	Yellow 102-6937	Red 102-6944	Yellow 102-6937	Gray 102-6945	Yellow 102-6937	Gray 102-6945	Yellow 102-6937	Gray 102-6945
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	58	13.2	59	15.7	64	22.0	70	26.2	—	—	—	—	—	—	—	—	—	—
65	60	14.8	61	17.5	68	24.8	74	29.3	79	34.2	—	—	—	—	—	—	—	—
80	61	16.4	64	20.0	72	27.6	78	32.6	83	38.0	85	40.7	87	44.9	91	50.2	96	55.6
100	63	18.1	67	23.6	75	30.4	81	36.7	87	42.5	90	45.8	93	50.2	95	55.4	99	61.8

FLEX800 54 SERIES PERFORMANCE CHART—15°

psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	52	13.2	53	15.8	61	22.0	65	26.0	—	—	—	—	—	—	—	—	—	—
65	53	14.8	54	17.4	63	24.8	67	29.2	69	34.1	—	—	—	—	—	—	—	—
80	56	16.4	58	19.4	68	27.6	72	32.5	75	37.8	79	40.4	81	44.6	85	49.9	87	55.3
100	58	18.1	60	21.1	71	30.4	75	36.4	79	42.3	84	45.5	87	49.9	89	55.1	94	61.5
Stator	102-6929 Blue								102-1940 White								102-1941 White	
Conversions	FLX54-5154								FLX54-5558								FLX54-59	

■ Not recommended at these pressures. Radius shown in feet.
 Toro recommends the use of a 1 1/4" swing joint at flows over 25-gpm (95-LPM).
 Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
 Actual site conditions must be considered when selecting the appropriate nozzle.
 All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

FLEX800 54 NOZZLE APEX

Pressure	Nozzle	Apex at 15°	Apex at 25°
65 psi	51	6' @ 51'	13' @ 54'
	52	6' @ 51'	11' @ 64'
	53	7' @ 59'	13' @ 68'
	54	8' @ 63'	15' @ 74'
	55	9' @ 66'	15' @ 76'
80 psi	56	8' @ 75'	18' @ 83'
	57	9' @ 74'	19' @ 82'
	58	10' @ 82'	18' @ 87'
	59	11' @ 81'	21' @ 91'



Main Nozzle Adapter
 A wide assortment of intermediate and inner nozzles for use in the main nozzle adapter and back nozzle position provide unmatched nozzle flexibility.

**Note: Main Nozzle Adapter Data Located on Page 58.
 Back Nozzle Data Located on Page 63.**

NEW!



The FLEX800™ B Series golf sprinkler family brings you all the great features and performance of the FLEX800 35-6, 34 and 35 Series sprinklers in a more economical body package specifically designed for block systems. With its rugged golf body design, small exposed surface diameter, flanged body for stability and check valve these sprinklers are perfect for every golf application.

FEATURES & BENEFITS

Industry's Largest Nozzle Selection

Nozzles from 25' to 95' radius, plus a wide assortment of intermediate and inner nozzles, provide unmatched flexibility allowing you to put the precise amount of water exactly where you need it. All nozzles are color-coded, debris tolerant, and thread in from front.

True Part and Full-Circle in One (40° - 330° part circle)

These sprinklers can be full circle or part circle allowing you to adjust the area of coverage to match your seasonal needs or meet water rationing mandates.

Flanged Cap Installs Below Grade

Stabilizes the body position and maintains optimum nozzle performance.

Small Exposed Diameter

Minimizes the appearance of the sprinkler to maximize the beauty of the course. Perfect for high traffic areas like tees, greens and surrounds.





FLX35-6B



FLX34B and FLX35B

Nozzle Trajectory Provides Unmatched Performance

FLX35-6B with TruJectory™ adjustment from 7°-30° in 1° increments and FLX35/FLX34 models with dual trajectory settings of 25° or 15° provide improved wind performance, obstacle avoidance and radius adjustment.



Main Nozzle Adapter

A wide assortment of intermediate and inner nozzles for use in the main nozzle adapter and back nozzle position provide unmatched nozzle flexibility.



SPECIFICATIONS

Operational

- Inlet: 1" NPT, BSP or ACME
- Radius:
 - FLX35-6B: 42' – 95'
 - FLX35B: 43' – 90'
 - FLX34B: 57' – 95'
- Flow Rate:
 - FLX35-6B : 7.1 – 52.5 gpm
 - FLX35B: 8.2 – 56.3 gpm
 - FLX34B : 13.0 – 55.4 gpm
- Precipitation Rates:
 - FLX35-6B : Minimum – .34"/hr; Maximum – .56"/hr
 - FLX35B: Minimum – .37"/hr; Maximum – .67"/hr
 - FLX34B : Minimum – .33"/hr; Maximum – .59"/hr
- Recommended Operating Pressure Range: 50-100 psi (maximum – 150 psi and minimum – 40 psi)
- Check-O-Matic models maintain up to 5' elevation change

Nozzle Selection

- Nozzle variations
 - FLX35-6B - Nine variations (30, 31, 32, 33, 34, 35, 36, 37 & 38)
 - FLX34B - Nine variations (30, 31, 32, 33, 34, 35, 36, 37 & 38)
 - FLX54B - Eight variations (31, 32, 33, 34, 35, 36, 37 & 38)
- Back nozzle capability on part circle models standard
 - FLX35-6B – one position available
 - FLX35B – two positions available
 - FLX34B – two additional front nozzle positions
- Main-less capability for short radius applications
- Stator variations - 2
- Radius reduction screw for fine tuning the radius (363-4839).
Optional on: FLX35B, FLX34B and not available on FLX35-6B models
- Ratcheting riser – Part circle models
- Nozzle base clutching – Part circle models

Dimensions

- Body diameter: 6"
- Body height: 8.5"
- Weight:
 - FLX34B – 1.98 lbs.
 - FLX35B – 2.00 lbs.
 - FLX35-6B – 2.05 lbs.
- Pop-up height to nozzle: 3¼"

Warranty

- Three years
- Five years when installed with Toro Swing Joints

Specifying Information—FLEX800 B Series

FLX3XB-X2-XXXXE						
Series	Arc	System	Thread Type	Valve Type	Nozzle	Optional
FLX3	X	B	X	2	XXXX	E
FLX3 – FLEX800 B Series	4—Full-Circle 5—Part-/Full-Circle 5-6—Part-/Full-Circle with TruJectory	B—Block	0—NPT 4—ACME 5—BSP	Check-O-Matic	3134— Includes nozzles #31, 32, 33 & 34 3538— Includes nozzles #35, 36, 37 & 38	E—Effluent Model
Example: When specifying a FLEX800 B Series Sprinkler with full circle – NPT threads #34 nozzles, you would specify: FLX34B-02-3134						



FLEX800™ 35-6B/34B/35B SERIES GOLF ROTORS

FLEX800 35-6B SERIES PERFORMANCE CHART—25°

Base Pressure	Nozzle Set 30		Nozzle Set 31		Nozzle Set 32		Nozzle Set 33		Nozzle Set 34		Nozzle Set 35		Nozzle Set 36		Nozzle Set 37		Nozzle Set 38	
	 (White) 102-2208		 (Yellow) 102-4587		 (Blue) 102-4588		 (Brown) 102-4589		 (Orange) 102-0728		 (Green) 102-0729		 (Gray) 102-0730		 (Black) 102-4261		 (Red) 102-6909	
																		
	102-2925	102-2910	102-2925	102-2910	102-2928	102-2910	102-2926	102-2910	102-2926	102-2910	102-2925	102-2910	102-2925	102-2910	102-2926	102-2910	102-2925	102-2910
Back Nozzle 102-4335  Red Plug																		
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	42	7.1	52	14.0	58	18.0	—	—	—	—	—	—	—	—	—	—	—	—
60	43	7.9	54	15.2	60	19.5	66	21.9	—	—	—	—	—	—	—	—	—	—
70	45	8.8	55	16.4	63	21.0	68	23.6	74	32.7	77	35.2	—	—	—	—	—	—
80	46	9.6	57	17.4	65	22.6	70	25.3	77	35.1	79	37.7	84	39.6	86	43.4	90	47.5
90	47	10.4	58	18.5	68	23.9	72	26.8	79	37.0	82	39.9	86	41.9	88	45.9	93	50.0
100	48	11.2	59	19.4	70	25.2	74	28.2	80	38.9	84	41.8	88	44.1	90	48.4	95	52.5
Stator	102-6929 Blue		102-1939 Yellow								102-1940 White							
Conversions			INF35-6-3134								INF35-6-3537							



FLEX800 B Series with mainless short radius nozzle configuration.

FLEX800™ 35-6B/34B/35B SERIES GOLF ROTORS

TORO



FLEX800 35B SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 30		Nozzle Set 31		Nozzle Set 32		Nozzle Set 33		Nozzle Set 34		Nozzle Set 35		Nozzle Set 36		Nozzle Set 37		Nozzle Set 38	
																		
	(White Plug) 102-2208		(Yellow) 102-6906		(Blue) 102-0726		(Brown) 102-6907		(Orange) 102-0728		(Green) 102-6955		(Gray) 102-6935		(Black) 102-6936		(Red) 102-6909	
																		
	102-5670	102-6942	102-5670	102-5671	102-5670	102-6884	102-5670	102-6884	102-5670	102-6884	102-5670	102-6885	102-6531	102-6885	102-6531	102-6885	102-6531	102-6885
Back Nozzles 102-4335  Red Plug																		
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	43	8.2	55	13.6	56	18.3	—	—	—	—	—	—	—	—	—	—	—	—
60	44	9.3	56	15.0	58	20.1	63	24.2	—	—	—	—	—	—	—	—	—	—
70	45	10.4	58	16.2	60	21.8	65	26.3	69	30.0	73	37.0	—	—	—	—	—	—
80	46	11.5	59	17.3	62	23.3	67	28.0	71	32.1	75	39.6	78	42.9	80	48.6	85	50.6
90	47	12.5	60	18.4	64	24.7	69	29.8	73	34.2	77	42.0	80	45.4	82	51.5	88	53.6
100	47	13.4	61	19.3	65	26.0	70	31.4	74	35.9	79	44.2	81	48.8	83	54.2	90	56.3
Serator	102-6929 Blue		102-1939 Yellow								102-1940 White							
Conversions			FLX35-3134								FLX35-3537							

FLEX800 34B SERIES PERFORMANCE CHART—25°

Front Nozzle Positions	Nozzle Set 31  (Yellow) 102-0725		Nozzle Set 32  (Blue) 102-7001		Nozzle Set 33  (Brown) 102-0727		Nozzle Set 34  (Orange) 102-7002		Nozzle Set 35  (Green) 102-6908		Nozzle Set 36  (Gray) 102-0730		Nozzle Set 37  (Black) 102-4261		Nozzle Set 38  (Red) 102-4260	
	Front Nozzles 102-4335  Red Plug															
	Back Nozzle Positions	 Yellow	 Blue	 Yellow	 Orange	 Yellow	 Red	 Yellow	 Beige	 Yellow	 Beige	 Yellow	 Red	 Yellow	 Gray	 Yellow
102-6937		102-2925	102-6937	102-2926	102-6937	102-2928	102-6937	102-2929	102-6937	102-2929	102-6937	102-6944	102-6937	102-6945	102-6937	102-6945
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
50	57	13.0	58	15.5	—	—	—	—	—	—	—	—	—	—	—	—
60	58	14.1	60	17.2	67	23.6	—	—	—	—	—	—	—	—	—	—
70	59	15.5	61	18.2	69	26.2	73	30.0	78	35.7	—	—	—	—	—	—
80	60	16.2	63	20.5	72	27.9	76	32.1	80	38.2	83	40.9	85	42.1	91	50.2
90	61	17.5	65	22.0	74	29.7	78	34.1	82	40.5	86	43.4	88	44.5	93	52.8
100	62	18.8	66	23.4	75	31.4	79	36.0	84	42.7	88	45.8	91	46.9	95	55.4
Stator	102-6929 Blue									102-1940 White						
Conversions	FLX34-3134									FLX34-3537						

Not recommended at these pressures. Radius shown in feet.
Toro recommends the use of a 1 1/4" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
Actual site conditions must be considered when selecting the appropriate nozzle.
All sprinklers are equipped with the selectable pilot valve that allows settings at 50, 65, 80 and 100 psi.

**Note: Main Nozzle Adapter Data Located on Page 58.
Back Nozzle Data Located on Page 63.**

Performance Charts

INTERMEDIATE NOZZLE PERFORMANCE CHARTS

102-2929 Beige		Trajectory		30°		25°		20°		15°		10°		7°	
Pressure		Flow		Radius		Radius		Radius		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	8.1	30.7	53	17.4	52	17.1	50	16.4	48	15.7	45	14.8	42	13.8
60	4.1	8.9	33.7	57	18.7	56	18.4	53	17.4	51	16.7	47	15.4	45	14.8
65	4.5	9.3	35.2	58	19.0	56	18.4	54	17.7	51	16.7	49	16.1	46	15.1
70	4.8	9.6	36.3	59	19.4	57	18.7	56	18.4	53	17.4	50	16.4	48	15.7
80	5.5	10.3	39.0	61	20.0	60	19.7	58	19.0	56	18.4	53	17.4	50	16.4
90	6.2	10.9	41.3	63	20.7	61	20.0	59	19.4	57	18.7	54	17.7	51	16.7
100	6.9	11.5	43.5	65	21.3	63	20.7	60	19.7	58	19.0	55	18.0	51	16.7

102-2928 Red		Trajectory		30°		25°		20°		15°		10°		7°	
Pressure		Flow		Radius		Radius		Radius		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	6.3	23.8	53	17.4	51	16.7	48	15.7	46	15.1	43	14.1	40	13.1
60	4.1	7.0	26.5	55	18.0	53	17.4	50	16.4	48	15.7	45	14.8	42	13.8
65	4.5	7.2	27.3	56	18.4	54	17.7	52	17.1	49	16.1	47	15.4	44	14.4
70	4.8	7.5	28.4	57	18.7	55	18.0	53	17.4	51	16.7	49	16.1	46	15.1
80	5.5	8.0	30.3	59	19.4	58	19.0	56	18.4	54	17.7	52	17.1	49	16.1
90	6.2	8.5	32.2	60	19.7	58	19.0	57	18.7	55	18.0	53	17.4	50	16.4
100	6.9	9.0	34.1	61	20.0	59	19.4	57	18.7	55	18.0	53	17.4	50	16.4

102-2927 Gray		Trajectory		30°		25°		20°		15°		10°		7°	
Pressure		Flow		Radius		Radius		Radius		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	5.0	18.9	50	16.4	48	15.7	46	15.1	44	14.4	41	13.5	38	12.5
60	4.1	5.5	20.8	52	17.1	50	16.4	48	15.7	46	15.1	43	14.1	40	13.1
65	4.5	5.7	21.6	53	17.4	51	16.7	49	16.1	46	15.1	44	14.4	41	13.5
70	4.8	5.9	22.3	53	17.4	51	16.7	49	16.1	47	15.4	45	14.8	42	13.8
80	5.5	6.3	23.8	54	17.7	52	17.1	50	16.4	48	15.7	46	15.1	43	14.1
90	6.2	6.7	25.4	55	18.0	53	17.4	52	17.1	50	16.4	48	15.7	45	14.8
100	6.9	7.1	26.9	55	18.0	54	17.7	53	17.4	52	17.1	50	16.4	46	15.1

102-2926 Orange		Trajectory		30°		25°		20°		15°		10°		7°	
Pressure		Flow		Radius		Radius		Radius		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	4.3	16.3	48	15.7	46	15.1	44	14.4	42	13.8	39	12.8	35	11.5
60	4.1	4.7	17.8	50	16.4	48	15.7	46	15.1	44	14.4	41	13.5	38	12.5
65	4.5	4.9	18.5	51	16.7	49	16.1	47	15.4	45	14.8	42	13.8	39	12.8
70	4.8	5.1	19.3	51	16.7	50	16.4	48	15.7	46	15.1	43	14.1	40	13.1
80	5.5	5.4	20.4	52	17.1	51	16.7	50	16.4	48	15.7	45	14.8	42	13.8
90	6.2	5.8	22.0	53	17.4	52	17.1	51	16.7	49	16.1	47	15.4	44	14.4
100	6.9	6.1	23.1	54	17.7	53	17.4	52	17.1	50	16.4	48	15.7	45	14.8

102-2925 Blue		Trajectory		30°		25°		20°		15°		10°		7°	
Pressure		Flow		Radius		Radius		Radius		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	2.7	10.2	42	13.8	41	13.5	39	12.8	38	12.5	36	11.8	34	11.2
60	4.1	3.0	11.4	43	14.1	42	13.8	40	13.1	39	12.8	37	12.1	35	11.5
65	4.5	3.2	12.1	43	14.1	42	13.8	40	13.1	39	12.8	37	12.1	35	11.5
70	4.8	3.3	12.5	44	14.4	42	13.8	41	13.5	39	12.8	38	12.5	36	11.8
80	5.5	3.5	13.2	44	14.4	43	14.1	41	13.5	40	13.1	38	12.5	36	11.8
90	6.2	3.7	14.0	45	14.8	44	14.4	42	13.8	41	13.5	39	12.8	37	12.1
100	6.9	3.9	14.8	45	14.8	44	14.4	43	14.1	42	13.8	40	13.1	38	12.5

Performance Charts

INTERMEDIATE NOZZLE PERFORMANCE CHARTS

102-6885 Green		Trajectory		30°		25°		20°		15°		10°		7°	
Pressure		Flow		Radius		Radius		Radius		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	5.4	20.4	51	16.7	50	16.4	48	15.7	45	14.8	42	13.8	39	12.8
60	4.1	5.9	22.3	52	17.1	51	16.7	49	16.1	46	15.1	43	14.1	41	13.5
65	4.5	6.1	23.1	52	17.1	51	16.7	50	16.4	47	15.4	44	14.4	42	13.8
70	4.8	6.3	23.8	53	17.4	52	17.1	50	16.4	47	15.4	44	14.4	42	13.8
80	5.5	6.7	25.4	53	17.4	52	17.1	51	16.7	48	15.7	45	14.8	43	14.1
90	6.2	7.1	26.9	54	17.7	53	17.4	52	17.1	50	16.4	47	15.4	45	14.8
100	6.9	7.4	28.0	55	18.0	55	18.0	54	17.7	52	17.1	49	16.1	47	15.4

102-6884 Yellow		Trajectory		30°		25°		20°		15°		10°		7°	
Pressure		Flow		Radius		Radius		Radius		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	4.1	15.5	48	15.7	47	15.4	45	14.8	41	13.5	38	12.5	35	11.5
60	4.1	4.5	17.0	49	16.1	48	15.7	47	15.4	44	14.4	41	13.5	38	12.5
65	4.5	4.7	17.8	50	16.4	49	16.1	48	15.7	45	14.8	42	13.8	39	12.8
70	4.8	4.8	18.2	50	16.4	49	16.1	48	15.7	45	14.8	43	14.1	40	13.1
80	5.5	5.1	19.3	51	16.7	50	16.4	49	16.1	47	15.4	44	14.4	41	13.5
90	6.2	5.4	20.4	53	17.4	52	17.1	50	16.4	48	15.7	45	14.8	42	13.8
100	6.9	5.8	22.0	54	17.7	53	17.4	51	16.7	49	16.1	46	15.1	43	14.1

102-6883 Brown		Trajectory		30°		25°		20°		15°		10°		7°	
Pressure		Flow		Radius		Radius		Radius		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	2.4	9.1	41	13.5	40	13.1	38	12.5	36	11.8	33	10.8	30	9.8
60	4.1	2.6	9.8	43	14.1	42	13.8	40	13.1	38	12.5	36	11.8	33	10.8
65	4.5	2.7	10.2	44	14.4	42	13.8	41	13.5	39	12.8	37	12.1	34	11.2
70	4.8	2.8	10.6	45	14.8	43	14.1	42	13.8	40	13.1	38	12.5	35	11.5
80	5.5	3.0	11.4	46	15.1	45	14.8	43	14.1	41	13.5	40	13.1	36	11.8
90	6.2	3.2	12.1	46	15.1	45	14.8	44	14.4	42	13.8	41	13.5	37	12.1
100	6.9	3.4	12.9	46	15.1	45	14.8	44	14.4	43	14.1	41	13.5	38	12.5

INNER NOZZLE PERFORMANCE CHARTS*

102-6937 Yellow		Trajectory		30°		25°		20°	
Pressure		Flow		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	3.7	14.0	26	8.5	24	7.9	20	6.6
60	4.1	4.0	15.1	28	9.2	25	8.2	22	7.2
65	4.5	4.2	15.9	28	9.2	25	8.2	22	7.2
70	4.8	4.4	16.7	28	9.2	26	8.5	23	7.5
80	5.5	4.7	17.8	28	9.2	26	8.5	24	7.9
90	6.2	5.0	18.9	29	9.5	27	8.9	25	8.2
100	6.9	5.2	19.7	30	9.8	29	9.5	27	8.9

102-6531 Green		Trajectory		30°		25°		20°	
Pressure		Flow		Radius		Radius		Radius	
psi	BAR	gpm	lpm	Feet	Meters	Feet	Meters	Feet	Meters
50	3.4	4.0	15.1	32	10.5	30	9.8	26	8.5
60	4.1	4.3	16.3	34	11.2	31	10.2	27	8.9
65	4.5	4.5	17.0	34	11.2	31	10.2	27	8.9
70	4.8	4.7	17.8	34	11.2	31	10.2	28	9.2
80	5.5	5.0	18.9	34	11.2	32	10.5	29	9.5
90	6.2	5.3	20.1	34	11.2	32	10.5	29	9.5
100	6.9	5.6	21.2	35	11.5	33	10.8	30	9.8

* Not recommended below 20°



TORO.

FLEX800™ R SERIES CONVERSION UPGRADES

NEW!

The Toro FLEX800™ R Series Conversion Upgrades enable customers with existing Rain Bird® Eagle™ 900 and 1100* Series sprinklers to upgrade to Toro's industry leading sprinkler technology. The benefits of upgrading include the patented TruJectory™ adjustment, full and part circle in the same sprinkler, the ability to ratchet the riser and clutch the nozzle base, and an extra 1½" pop-up height.

FEATURES & BENEFITS

Industry's Largest Nozzle Selection

Nozzles from 42' to 100' radius plus a wide assortment of back nozzles lets you put the precise amount of water exactly where you need it.

20,000 Volt Lightning Rating

Spike Guard™ solenoid virtually eliminates the need for replacements in high lightning areas. Draws half the amperage of traditional solenoids so you can run twice as many sprinklers simultaneously, reduce the cost of wire during installation or increase the distance from controller to sprinkler.

Dual TruJectory

The 25° setting provides maximum distance of throw and the 15° setting provides improved wind performance, radius reduction and obstacle avoidance (FLX54RB and FLX55RB).

True Full-Circle in One (40° - 330° part circle)

These sprinklers can be full circle today and part circle tomorrow allowing you to simply and economically adjust the area of coverage to match your seasonal needs or meet water rationing mandates (FLX55-6RB and FLX55RB).

*Rain Bird is a registered trademark of Rain Bird Corporation. Eagle is a trademark of Rain Bird Corporation.



FLX55-6RB

FLX55RB

FLX54RB



**Adds 1½" of
Pop-up Height**

**20,000 Volt
Lightning Rating**

Left: Rain Bird Eagle 900

*Right: Rain Bird Eagle
900 upgraded with Toro R
Series upgrade assembly
and optional Spike Guard
solenoid/adaptor*



SPECIFICATIONS

Operational

- Ratcheting riser allows riser positioning without riser removal.
- Recommended Operating Pressure Range: 60-100 psi (maximum – 150 psi and minimum – 40 psi)
- Radius reduction screw for radius refinement
- Riser pull-up feature simplifies servicing
- Effluent identifier included
- Yardage marker capable
- 3.25" pop-up clears tall grasses

Nozzles

- 4 main nozzle combinations included provides a wide range of radius and flow capabilities.
- Back nozzle capable (FLX55-6RB & FLX55RB)
- Two additional front nozzle positions (FLX54RB only)
- Nozzle base clutching (FLX55-6RB & FLX55RB) allows nozzle base movement by hand
- All nozzles threaded from the front with no other disassembly required.

Specifying Information—FLEX800 R Series Conversion Assemblies

Model Number	Description
FLX55-6RB-5154	R Series Conversion with FLX55-6 riser assembly and low flow nozzle set #51 - #54
FLX55-6RB-5558	R Series Conversion with FLX55-6 riser assembly and high flow nozzle set #55 - #58
FLX55RB-5154	R Series Conversion with FLX55 riser assembly and low flow nozzle set #51 - #54
FLX55RB-5558	R Series Conversion with FLX55 riser assembly and high flow nozzle set #55 - #58
FLX54RB-5154	R Series Conversion with FLX54 riser assembly and low flow nozzle set #51 - #54
FLX54RB-5558	R Series Conversion with FLX54 riser assembly and high flow nozzle set #55 - #58
SPIKEGUARD-RB	Toro solenoid adapter with Spike Guard™ solenoid for Rain Bird® Eagle 700, 900 or 1100 Series sprinklers

Toro® has designed and manufactured this product to fit within a sprinkler housing made by Rain Bird® Corporation, but Toro's product is not manufactured by or affiliated with Rain Bird®. Rain Bird® is a registered trademark of Rain Bird Corporation.

TORO®

TORO SPRINKLER CONVERSION ASSEMBLES

CROSS REFERENCE GUIDE					Models Being Replaced										
New Model	Arc	Trajectory	Radius - Ft	Flow - gpm	634	664	734	764	765	864S	865S	834S	835S	DT34	DT35
FLX34-3134	Full Circle	25° or 15°	52' - 79'	12.9 - 34.9	X	X	X	X	X	X	X	X	X	X	X
FLX34-3537	Full Circle	25° or 15°	67' - 91'	32.1 - 46.9	X	X	X	X	X	X	X	X	X	X	X
FLX35-3134	Part/Full Circle	25° or 15°	52' - 74'	13.6 - 34.1				1	X	X	X	X	X	X	X
FLX35-3537	Part/Full Circle	25° or 15°	69' - 83'	33.1 - 47.3				1	X	X	X	X	X	X	X
FLX35-6-3134	Part/Full Circle	30° - 7°	46' - 80'	15.5 - 37.0				1	X	X	X	X	X	X	X
FLX35-6-3537	Part/Full Circle	30° - 7°	59' - 92'	32.4 - 45.3				1	X	X	X	X	X	X	X

1. Must have ribbed bodies manufactured after 1992 to use Part/Full circles.

CROSS REFERENCE GUIDE					Models Being Replaced													
New Model	Arc	Trajectory	Radius - Ft	Flow - gpm	654	655	670	684	690	754	784	785	884S	885S	854S	855S	DT54	DT55
FLX54-5154	Full Circle	25° or 15°	58' - 81'	13.2 - 36.7	2	2	2	2	4	2	2	2	X	X	X	X	X	X
FLX54-5558	Full Circle	25° or 15°	79' - 95'	34.2 - 55.4	2	2	2	2	4	2	2	2	X	X	X	X	X	X
FLX54-59	Full Circle	25° or 15°	96' - 99'	55.6 - 61.8	2	2	2	2	4	2	2	2	X	X	X	X	X	X
FLX55-5154	Part/Full Circle	25° or 15°	55' - 75'	14.0 - 34.5					4	2	2	2	X	X	X	X	X	X
FLX55-5558	Part/Full Circle	25° or 15°	73' - 90'	35.3 - 53.9					4	2	2	2	X	X	X	X	X	X
FLX55-59	Part/Full Circle	25° or 15°	82' - 92'	57.2 - 61.3					4	2	2	2	X	X	X	X	X	X
FLX55-6-5154	Part/Full Circle	30° - 7°	46' - 80'	13.9 - 38.2					4	2	2	2	X	X	X	X	X	X
FLX55-6-5558	Part/Full Circle	30° - 7°	59' - 95'	33.8 - 51.1					4	2	2	2	X	X	X	X	X	X
FLX55-6-59	Part/Full Circle	30° - 7°	77' - 100'	57.0 - 61.1					4	2	2	2	X	X	X	X	X	X
FLX55-5154R	Part/Full Circle	25° or 15°	55' - 75'	14.0 - 34.5	3	3	3	3		3								
FLX55-5558R	Part/Full Circle	25° or 15°	73' - 90'	35.3 - 53.9	3	3	3	3		3								
FLX55-59R	Part/Full Circle	25° or 15°	82' - 92'	57.2 - 61.3	3	3	3	3		3								
FLX55-6-5154R	Part/Full Circle	30° - 7°	46' - 80'	13.9 - 38.2	3	3	3	3		3								
FLX55-6-5558R	Part/Full Circle	30° - 7°	59' - 95'	33.8 - 51.1	3	3	3	3		3								
FLX55-6-59R	Part/Full Circle	30° - 7°	77' - 100'	57.0 - 61.1	3	3	3	3		3								

2 - Requires the separate purchase and use of 102-0950 conversion adapter

3 - Use the "R" Series (Ribless body) conversion for bodies dated prior to 1992.

4 - Requires the separate purchase and use of 102-5011 690 conversion adapter

Main Nozzle Data

FLX55-6RB-5154 Performance Chart									FLX55-6RB-5558 Performance Chart								
Front Nozzle Positions	Nozzle Set 51		Nozzle Set 52		Nozzle Set 53		Nozzle Set 54		Nozzle Set 55		Nozzle Set 56		Nozzle Set 57		Nozzle Set 58		
																	
	(Yellow)		(Blue)		(Brown)		(Orange)		(Green)		(Gray)		(Black)		(Red)		
	102-4587		102-4588		102-4589		102-0728		102-0729		102-0730		102-4261		102-4260		
Back Nozzle Positions																	
	102-2925	102-2910	102-2928	102-2910	102-2926	102-2910	102-2926	102-2910	102-2925	102-2910	102-2925	102-2910	102-2926	102-2910	102-2925	102-2910	
	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	
																	
psi	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	
60	55	16.1	63	20.3	69	23.4	75	31.3	—	—	—	—	—	—	—	—	
70	56	17.4	66	21.8	70	25.3	76	33.8	—	—	—	—	—	—	—	—	
80	57	18.5	68	23.3	72	27.0	77	36.0	80	39.1	85	41.0	88	45.4	92	49.7	
90	58	19.4	70	24.5	75	28.5	79	38.1	83	41.5	87	43.5	91	48.2	94	52.8	
100	59	20.5	72	25.9	76	30.0	80	40.2	86	43.7	90	45.7	94	50.6	96	55.3	
Stator	102-1939 Yellow									102-1940 White							

FLX55RB-5154 Performance Chart									FLX55RB-5558 Performance Chart							
Front Nozzle Positions	Nozzle Set 51		Nozzle Set 52		Nozzle Set 53		Nozzle Set 54		Nozzle Set 55		Nozzle Set 56		Nozzle Set 57		Nozzle Set 58	
																
	(Yellow)		(Blue)		(Brown)		(Orange)		(Green)		(Gray)		(Black)		(Red)	
	102-6906		102-0726		102-6907		102-0728		102-6955		102-6935		102-6936		102-6909	
Back Nozzle Positions																
	102-5670	102-5671	102-5670	102-6884	102-5670	102-6884	102-5670	102-6884	102-5670	102-6885	102-6531	102-6885	102-6531	102-6885	102-6531	102-6885
	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug
																
psi	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm
60	56	15.2	57	20.1	66	24.3	68	28.0	—	—	—	—	—	—	—	—
70	58	16.5	60	21.7	67	26.2	71	30.4	—	—	—	—	—	—	—	—
80	59	17.5	62	23.1	68	27.8	72	31.7	76	39.7	80	43.1	83	48.2	85	53.0
90	60	18.4	64	24.5	71	28.8	74	34.5	78	43.1	81	45.1	86	51.2	87	56.0
100	61	19.3	66	25.3	72	30.3	75	36.5	80	45.5	82	49.0	90	54.5	89	59.0
Stator	102-1939 Yellow								102-1940 White							

FLX54RB-5154 Performance Chart									FLX54RB-5558 Performance Chart								
Front Nozzle Positions	 (Yellow)		 (Blue)		 (Brown)		 (Orange)		 (Green)		 (Gray)		 (Black)		 (Red)		
	102-0725		102-7001		102-0727		102-7002		102-6908		102-0730		102-4261		102-4260		
																	
	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Red Plug	Brown	Red Plug	Brown
Back Nozzle Positions																	
	Yellow	Blue	Yellow	Orange	Yellow	Red	Yellow	Beige	Yellow	Beige	Yellow	Red	Yellow	Gray	Yellow	Gray	
	102-6937	102-2925	102-6937	102-2926	102-6937	102-2928	102-6937	102-2929	102-6937	102-2929	102-6937	102-2928	102-6937	102-4965	102-6937	102-4965	
	psi	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm	Rad/Ft	gpm
	60	59	14.6	62	17.4	68	24.3	71	28.2	—	—	—	—	—	—	—	
	70	60	15.7	63	18.8	70	26.3	75	30.6	—	—	—	—	—	—	—	
	80	61	16.4	64	20.0	72	27.6	78	32.6	83	39.5	85	42.7	87	45.9	91	50.2
90	62	17.8	66	21.3	74	29.9	80	34.7	85	41.6	88	44.9	90	48.5	93	52.8	
100	63	18.1	67	23.6	75	30.4	81	36.7	87	43.7	90	46.8	93	51.2	95	55.4	
Stator	102-6929 Blue								102-1940 White								

Not recommended at these pressures. Radius shown in feet.
Toro recommends the use of a 1/4" swing joint at flows over 25-gpm (95-LPM). Sprinkler radius data collected in Toro's zero wind test facility per ASAE standard S398.1.
Actual site conditions must be considered when selecting the appropriate nozzle.



Mainless Data

FLX55-6RB SERIES MAINLESS NOZZLE PERFORMANCE DATA

										
	Blue Plug Gray 102-2925 102-2208 102-2910		Orange Plug Gray 102-2926 102-2208 102-2910		Red Plug Gray 102-2928 102-2208 102-2910		Gray Plug Gray 102-2910 102-2208 102-2910		Gray Plug Gray 102-2930 102-2208 102-2910	
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
65	46	8.7	46	10.4	50	12.4	42	10.2	47	13.9
SOR	5:02		4:16		3:36		4:19		4:06	
80	46	9.6	47	11.5	53	13.7	44	11.2	51	15.3
SOR	4:22		3:40		3:03		3:53		3:40	

Requires the low-flow stator 102-6929 for indicated rotation speeds.
SOR: Speed of rotation

FLX55RB MAINLESS NOZZLE PERFORMANCE DATA

								
	Green Plug Gray 102-6531 102-2208 102-2910		Green Plug Green 102-6531 102-2208 102-6885		Green Plug Red 102-6531 102-2208 102-2928		Green Plug Beige 102-6531 102-2208 102-2929	
psi	Radius	gpm	Radius	gpm	Radius	gpm	Radius	gpm
65	34	10.4	44	10.2	48	11.5	50	13.5
SOR	3:40		3:50		3:25		2:40	
80	37	11.6	44	11.4	48	12.9	50	15.0
SOR	3:15		3:25		3:00		2:30	

Requires the low-flow stator 102-6929 for indicated rotation speeds.
SOR: Speed of rotation

Back Nozzle Performance Data

Nozzles				65 psi		80 psi		Profile
Part #	Description	Color		Radius	gpm	Radius	gpm	
102-6937	Inner Nozzle w/ Yellow Restrictor		Yel/Yel	29	3.7	30	4.1	
102-6531	Inner Nozzle w/ White Restrictor		Grn/Wht	31	4.3	33	4.6	
102-6883	Intermediate Nozzle		Brown	38	2.8	38	2.8	
102-6884	Intermediate Nozzle		Yellow	41	4.1	43	4.5	
102-6885	Intermediate Nozzle		Green	42	5.4	45	6.0	
102-2925	Intermediate Nozzle		Blue	40	2.8	42	3.2	
102-2926	Intermediate Nozzle		Orange	44	4.3	45	4.8	
102-2927	Intermediate Nozzle		Gray	46	5.1	47	5.4	
102-2928	Intermediate Nozzle		Red	48	6.5	50	7.0	
102-2929	Intermediate Nozzle		Beige	51	8.1	53	9.1	



The T7 Series sprinkler is built rugged to withstand harsh golf course conditions. The low-flow version is perfect for shorter-radius golf course applications like tee boxes, surrounds and perimeters. The T7 has been designed and tested to ensure the high reliability demanded by the market.

FEATURES & BENEFITS

Water is Evenly Distributed

High efficiency nozzles with single port design ensure water is evenly distributed across the pattern.

Versatility

Available in standard and low-flow models to meet your application needs.

Vandal and Abuse Resistant

The Smart Arc memory safely returns the sprinkler to previously set arc even when turned beyond arc borders.

Clears Tall Grasses

The 5.75 inch pop-up ensures proper spray pattern and nozzle distribution uniformity even in taller grasses.

Additional Features

- ✓ Standard check valve
- ✓ Radius reduction screw – up to 25%
- ✓ Threaded cap-retained riser assembly
- ✓ Variable reversing stator
- ✓ Slip clutch
- ✓ Riser pull-up feature – adjustment/pull-up tool supplied
- ✓ Locking cap screw



Model Choices

- ✓ Plastic or stainless steel models
- ✓ Low-Flow or High-Flow models
- ✓ Effluent water indicator models



Top Arc Indication
Arc setting indicator on top of the rotor allows for easy wet or dry adjustments. Part or full-circle from 45° to 360°.

NOZZLE PERFORMANCE DATA-HIGH FLOW MODELS

Nozzle	psi	Radius (ft)	gpm	Precip. Rate (in/hr) ▲	Precip. Rate (in/hr) ■
7.0	40	46	6.6	0.72	0.62
	50	47	7.4	0.75	0.65
	60	48	8.1	0.78	0.68
	70	49	8.8	0.82	0.71
	80	51	9.4	0.83	0.72
	90	52	10.3	0.85	0.73
	100	54	10.7	0.83	0.72
9.0	40	47	7.4	0.76	0.66
	50	50	8.3	0.73	0.64
	60	51	8.7	0.76	0.66
	70	52	9.4	0.81	0.70
	80	54	9.9	0.80	0.69
	90	55	10.9	0.82	0.71
	100	56	11.5	0.84	0.73
12.0*	40	50	9.5	0.89	0.77
	50	51	11.6	0.90	0.78
	60	53	12.7	0.91	0.79
	70	54	13.8	0.96	0.83
	80	55	14.7	0.99	0.86
	90	56	15.6	1.02	0.88
	100	57	16.5	1.04	0.90
16.0	40	53	13.0	1.06	0.92
	50	56	15.1	1.06	0.92
	60	58	16.2	1.04	0.90
	70	59	17.5	1.09	0.95
	80	61	18.8	1.10	0.95
	90	62	20.0	1.14	0.98
	100	63	21.1	1.17	1.01
20.0	40	53	16.0	1.28	1.10
	50	58	17.5	1.22	1.05
	60	60	19.5	1.21	1.05
	70	61	20.6	1.26	1.09
	80	65	22.2	1.19	1.03
	90	66	23.6	1.23	1.06
	100	67	24.8	1.25	1.09
24.0	40	52	15.8	1.27	1.10
	50	60	17.5	1.09	0.95
	60	63	19.3	1.11	0.96
	70	65	20.7	1.14	0.99
	80	67	22.3	1.15	1.00
	90	68	23.8	1.20	1.04
	100	71	25.3	1.16	1.01
27.0	40	55	18.7	1.42	1.23
	50	65	23.4	1.16	1.00
	60	71	23.6	1.05	0.91
	70	72	25.8	1.10	0.95
	80	73	27.4	1.14	0.99
	90	74	29.1	1.18	1.02
	100	75	30.6	1.21	1.05

SPECIFICATIONS

Operational

- Inlet size: 1" threaded ACME
- Radius:
 - Low-flow models: 38' – 56'
 - High-flow models: 46' – 75'
- Flow rate:
 - Low-flow models: 1.7 – 13.0 gpm;
 - 6 nozzle tree included with each head (2, 3, 4.5, 6, 7.5 and 9)
 - High-flow models: 6.8 – 30.5 gpm;
 - 7 nozzle tree included with each head (7, 9, 12, 16, 20, 24 and 27)
- Operating pressure: 40-100 psi
- Arc adjustment: 45° – 360° (unidirectional at 360°)

Dimensions

- Body diameter: 2.7"
- Body height: 8.8"
- Rubber cover diameter: 2.2"
- Pop-up height to nozzle: 5.75"

Warranty

- Five years

NOZZLE PERFORMANCE DATA-LOW FLOW MODELS

Nozzle	psi	Radius (ft)	gpm	Precip. Rate (in/hr) ▲	Precip. Rate (in/hr) ■
2.0	40	39	1.7	0.25	0.22
	50	39	2.0	0.29	0.25
	60	40	2.2	0.30	0.26
	70	40	2.4	0.33	0.28
	80	40	2.6	0.35	0.31
	90	41	2.7	0.36	0.31
	100	41	2.9	0.38	0.33
3.0*	40	39	2.4	0.36	0.31
	50	40	2.8	0.39	0.33
	60	41	3.1	0.41	0.36
	70	41	3.4	0.45	0.39
	80	42	3.6	0.46	0.40
	90	42	3.9	0.47	0.41
	100	43	4.1	0.49	0.42
4.5	40	38	4.1	0.63	0.54
	50	41	4.7	0.62	0.53
	60	41	5.2	0.68	0.59
	70	42	5.7	0.71	0.62
	80	42	6.1	0.77	0.66
	90	43	6.5	0.78	0.68
	100	43	6.9	0.83	0.72
6.0	40	43	5.0	0.59	0.51
	50	46	5.7	0.59	0.51
	60	48	6.3	0.61	0.52
	70	49	7.0	0.65	0.57
	80	49	7.4	0.68	0.59
	90	50	7.9	0.70	0.61
	100	50	8.4	0.74	0.64
7.5	40	44	5.8	0.66	0.58
	50	46	6.7	0.70	0.60
	60	48	7.4	0.71	0.62
	70	49	8.0	0.75	0.65
	80	50	8.8	0.78	0.67
	90	50	9.5	0.84	0.73
	100	52	10.0	0.81	0.70
9.0	40	45	7.4	0.81	0.70
	50	49	8.5	0.78	0.68
	60	51	9.4	0.80	0.70
	70	53	10.4	0.83	0.72
	80	55	11.3	0.83	0.72
	90	55	12.0	0.89	0.77
	100	56	12.8	0.90	0.78

* When the sprinkler is adjusted to 360°, it will be uni-directional in that direction of rotation (clockwise or counterclockwise) at the moment when the sprinkler was changed to 360°

* Pre-installed nozzle. Data based on 180°.

Specifying Information—T7 Series Rotors

T7PSS-42XX			
Description	Optional	Thread	Optional
T7P	SS	42	X
T7P—Sports Rotor	SS—Stainless Steel Riser	42—ACME Thread	E—Effluent L—Low Flow

Example: A low flow T7P sprinkler with a stainless steel riser and effluent rubber cover would be specified as **T7PSS-42LE**



For nearly 50 years the 690 Series has set the standard for durability and reliability in golf applications. Two 2-speed models provide a slower speed in the non-overlap areas and a faster speed in the overlap areas to provide a more balanced precipitation rate than traditional single speed full circle sprinklers in these applications which lowers system costs.

FEATURES & BENEFITS

696 2-Speed Models

Used in single row applications these sprinklers operate at a slower speed over the 60 degree non-overlap area and a faster speed over the 120 degree overlapped areas to provide a balanced application rate.

698 2-Speed Models

Used in double row applications these sprinklers operate at a slower speed over the 180 degree non-overlap area and a faster speed over the 180 degree overlapped areas to provide a balanced application rate.

Artificial Playing Surfaces

Radius and flow capabilities are perfect for cooling and rinsing artificial playing surfaces.

Electric Valve In Head Models

Electric valve in head models provide individual head control that ensures run times can match differing soil, turf and terrain watering requirements, pressure regulation to ensure all nozzles perform at the same pressure and manual ON-OFF-Auto control at the head.



Additional Features

- ✓ Manual control at the sprinkler, On-Off-Auto (electric)
- ✓ Time-proven, gear-drive design
- ✓ All internal components serviceable from the top of the sprinkler
- ✓ Durable engineering plastic and stainless steel construction
- ✓ Nine arc selections



690 SERIES PERFORMANCE CHART

Base Pressure	Nozzle Set 90		Nozzle Set 91		Nozzle Set 92	
	Radius	gpm	Radius	gpm	Radius	gpm
80	87	51.0	96	61.2	100	74.0
100	90	57.1	100	73.5	108	82.2

*Radius shown in feet.
Sprinkler radius of throw per ASAE standard S398.1.*

SPECIFICATIONS

Operational

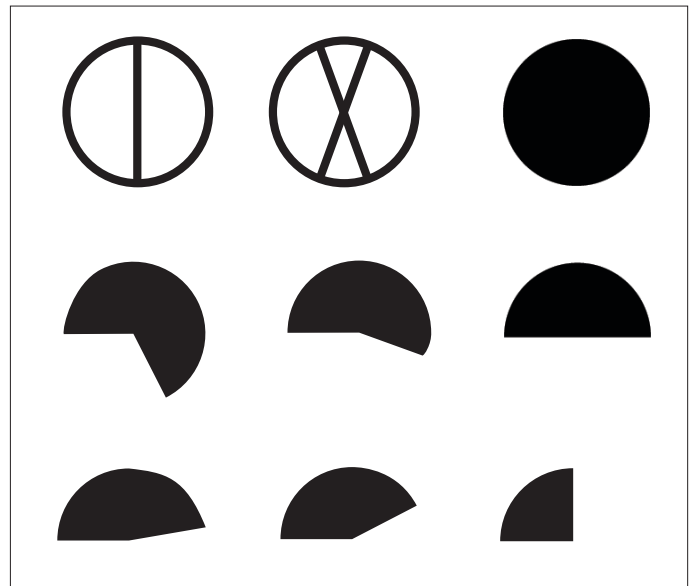
- Inlet: 1½" NPT
- Radius: 87' – 108'
- Flow Rate: 51.0 – 82.2 gpm
- Recommended Operating Pressure Range: 80-100 psi
- Maximum pressure: 150 psi
- Minimum pressure: 40 psi
- Electric Valve-In-Head Solenoid: 24V ac, 50/60 Hz
 - Inrush: 60 Hz, 0.30 Amps
 - Holding: 60 Hz, 0.20 Amps
- Check-O-Matic: Maintains 37' of elevation

Dimensions

- Body diameter: 10"
- Body height: 16"
- Weight: 5.6 lbs.
- Pop-up height to nozzle: 3/4"

Warranty

- Three years
- Five years when installed with Toro Swing Joints



Fixed Arc Drives

Nine fixed arc drive assemblies ensure positive retention of the coverage area with no arc drift.

Specifying Information—690 Series Rotors

69X-0X-XXX			
Arc	Valve-In-Head Type	Nozzle	Pressure Regulation*
69X	0X	XX	X
1—90° 2—180° 4—Full-circle 6—Full-circle, 2-speed (60°–120°) 8—Full-circle, 2-speed (180°–180°)	1—Normally Open Hydraulic 2—Check-O-Matic 6—Electric	90 91 92	8—80 psi 1—100 psi
Example: When specifying a 690 Series Sprinkler with a 180° arc, electric valve-in-head, #91 nozzle, and pressure regulation at 80 Psi, you would specify: 692-06-918			

**Electric models only.*



Toro's 590GF Series is the first spray head designed specifically for golf course irrigation with enhanced water management capabilities. The 590GF is built for the tough golf course environment, including harsh debris situations like top-dressing and sand, high water pressures, and daily mower and foot traffic. The 590GF is perfect around bunkers, on small tee boxes, and around the clubhouse. And with its patented X-Flow technology, the 590GF has a built-in shutoff device should a nozzle be damaged or removed and its standard check valve feature minimizes low head drainage.

FEATURES & BENEFITS

Nozzle Options

In addition to the full line of Toro MPR, TVAN and specialty nozzles the 590GF accepts the revolutionary Precision™ Spray and Precision™ Rotating Series nozzles with optimized distribution uniformity that provides exceptional turf conditions with minimal water usage.

Designed Flush Rate

Sprinkler flushes during pop-up and retraction clearing debris from around the riser to eliminate stick-ups and ensure positive sealing and retraction.

X-Flow® Shut Off Device

The X-Flow shut off feature stops the flow of water if the nozzle is damaged or removed to eliminate flooding, water waste and soil erosion.

Prevent Low Head Drainage

The standard check valve prevents low head drainage with up to 10' of elevation change minimizing soil erosion and water waste.



Additional Features

- ✓ Stainless steel retraction spring
- ✓ All bodies shipped with flush plug in place
- ✓ Ratcheting riser feature for arc adjustment



Without X-Flow®
Water waste, soil erosion and flooding occur



With X-Flow®
Eliminates water waste, soil erosion and flooding



Flanged Cap
Flanged cap installs below grade to stabilize the body position and maintain optimum nozzle performance.

SPECIFICATIONS

Operational

- Radius: 2' – 26'
- Recommended pressure range: 25-50 psi (maximum – 75 psi)
- Flow rate: 0.05 – 4.5 gpm
- 2 gpm flush rate

Dimensions

- Body diameter:
 - 13/8" on 4P and 6P
 - 15/8" on 12P
- Cap diameter: 2"
- Inlet: 1/2" female-threaded

Warranty

- Three years

Risers and Extenders

570-6X

- Male-inlet threads install onto any 590GF sprinkler to provide a 6" extension
- Maximum pressure: 75 psi

570SR-6 and 570SR-18 Risers

- 1/2" male-threaded inlet for installation on pipe fittings
- Maximum pressure: 75 psi
- Height: 6" and 18"



Specifying Information—590GF Series Sprays

590GF-XX-E		
Model	Pop-Up Height	Optional
590GF	XX	E
590GF—590GF Series Sprays	4—4" Pop-Up 6—6" Pop-Up 12—12" Pop-Up	E—Effluent



Based on the design of the world's leading gear-driven rotor for golf applications, the Precision™ Series Rotating Nozzle powered by its proven planetary gear drive delivers wind-resistant, multi-stream, multi-trajectory patterns. Both the full circle and adjustable arc models deliver a radius range of 14 to 26 feet with exceptional uniformity and outstanding close-in watering, preventing the need to extend irrigation cycles to compensate for brown spots. The consistent matched precipitation rate of 0.55 inches per hour helps meet the needs of tight water windows.

FEATURES & BENEFITS

Gear-Driven

Precision™ Series Rotating Nozzles utilize a proven planetary gear drive, variable stator and turbine to rotate the nozzle. The entire gear package is contained in the area beneath the fine mesh filter screen. Particles large enough to enter through the filter will exit out of the nozzle plate through the multi-streams.

Matched Precipitation Rate of 0.55"/hr.

These nozzles deliver water more slowly and evenly than standard spray nozzles.

Consistent Speed of Rotation

The gear drive mechanism delivers a consistent speed of rotation regardless of system pressure and prevents product stalling at low pressure.



Female-threaded
PRN-A



Male-threaded
PRN-TA



Female-threaded
PRN-F



Male-threaded
PRN-TF

PERFORMANCE DATA PRECISION™ SERIES ROTATING NOZZLES

Arc	psi	gpm	Radius	Precip. Rate ■ (in./hr.)	Precip. Rate ▲ (in./hr.)
45°	20	0.17	14.0	0.67	0.77
	30	0.19	15.0	0.65	0.75
	40	0.25	17.0	0.67	0.77
	50	0.31	18.5	0.70	0.81
	60	0.35	19.5	0.71	0.82
	75	0.43	22.0	0.68	0.79
90°	20	0.43	16.0	0.65	0.75
	30	0.49	17.5	0.62	0.71
	40	0.62	20.5	0.57	0.66
	50	0.75	22.5	0.57	0.66
	60	0.82	23.5	0.57	0.66
	75	0.92	25.0	0.57	0.65
120°	20	0.48	16.4	0.69	0.79
	30	0.57	17.5	0.72	0.83
	40	0.78	20.2	0.55	0.64
	50	0.97	22.5	0.55	0.64
	60	1.07	23.5	0.56	0.65
	75	1.18	25.0	0.55	0.63
180°	20	0.83	15.0	0.71	0.82
	30	0.94	17.0	0.63	0.72
	40	1.22	20.5	0.56	0.65
	50	1.46	22.5	0.56	0.64
	60	1.61	24.0	0.54	0.62
	75	1.81	26.0	0.52	0.60
240°	20	1.12	15.0	0.72	0.83
	30	1.27	17.0	0.63	0.73
	40	1.56	20.0	0.56	0.65
	50	1.80	21.5	0.56	0.65
	60	1.95	22.5	0.56	0.64
	75	2.20	24.0	0.55	0.64
270°	20	1.08	14.0	0.71	0.81
	30	1.23	16.0	0.62	0.71
	40	1.62	19.0	0.57	0.66
	50	2.00	21.5	0.55	0.64
	60	2.26	23.0	0.55	0.63
	75	2.60	25.0	0.53	0.61
360°	20	1.81	15.0	0.77	0.89
	30	2.00	17.2	0.65	0.75
	40	2.56	20.9	0.56	0.65
	50	3.09	22.9	0.57	0.65
	60	3.34	23.8	0.57	0.66
	75	3.68	25.6	0.54	0.62

Nozzle data subject to change.



Step-Up™ Technology

Designed to deliver high uniformity with matched precipitation for in-close watering all the way out to the furthest radius point. The unique "steps" create 15 streams, each designed to cover an area of the pattern.

SPECIFICATIONS

Operational

- Radius: 14'-26'
- Operating pressure range: 20-75 psi
- Recommended Pressure: 40-50 psi
- Flow Rate: 0.17-3.68 gpm

Warranty

- Five years

Additional Features

- ✓ 15 unique streams with different trajectories
- ✓ Maximum height of 20° trajectory to fight through wind
- ✓ Threads onto nearly all sprayheads and shrub adapters (male or female)
- ✓ Pre-attached screen for easy installation
- ✓ Radius reduction up to 25% by turning set screw
- ✓ Color coded to identify adjustable or full circle
- ✓ Precipitation rate = 0.55"/hr. on square spacing plans
- ✓ Maintains precipitation rate as radius is reduced
- ✓ Matched precipitation from 14-26 feet
- ✓ Matched precipitation from 20-75 psi
- ✓ Adjustable by hand or with included tool
- ✓ Consistent speed of rotation not affected by pressure



Precision™ Series Rotating Nozzle Visual Arc Adjustment

The unique adjustment method allows for pre-setting of arc by hand or tool before the nozzle is installed. Visual indicators allow the user to quickly adjust the arc pattern to the desired arc from 45-270°. The adjustment band can be adjusted by hand or with the included tool (PRNTOOL).

Specifying Information—Precision™ Series Rotating Nozzle

PRN-XX		
Model	Thread	Model
PRN	X	X
PRN—Precision™ Rotating Nozzle	T—Male Thread Blank—Female Thread	A—Adjustable arc F— Full-circle

Example: A male threaded Precision™ Series Rotating nozzle with a 24' radius and a 180° arc would be specified as: **PRN-TA**
A female threaded Precision™ Series Rotating nozzle with a 20' radius and 360° arc would be specified as: **PRN-F**



Toro's Precision™ Series Spray Nozzles are the most complete and efficient spray nozzle line available to help irrigation professionals manage water use. The Precision™ Spray nozzles 1"/hr. precipitation rate ensures that water is applied slowly and evenly. Now also available in pressure-compensating versions, further enhancing the best-in-class spray nozzle in the industry.

FEATURES & BENEFITS

Patented H²O Chip Technology

Using patented H²O chip technology – and no moving parts – each Precision™ Series Spray nozzle creates one or more high frequency oscillating streams to achieve the desired arc and radius with 1/3 less water usage.

Maximize Irrigation Efficiency

Precision™ Spray nozzles deliver an industry first 1"/hr precipitation rate, which better matches soil infiltration rate. This lower precipitation rate, along with high distribution uniformity make this nozzle family the most efficient from 5'-15'.

Pressure-Compensating Versions Available

Pressure-Compensating Precision™ Series Spray Nozzles maintain 1"/hr precipitation rate and minimizes misting up to inlet pressures of more than 40 psi, reducing the need for a regulating head, at a fraction of the cost.



*No Moving or Sonic Welded Parts
Assures no variation at the end of the
water arc for better edge definition and
consistent, reliable performance.*

Precision™ Series Spray Nozzle with PCD Performs Under Pressure!



Competitor's High Flow Nozzle:
12H Nozzle at 50 psi = 1.83 gpm or 2.45"/hr.*



Precision™ Series Spray Nozzle with PCD Nozzle:
12H Nozzle at 50 psi = 0.74 gpm or 1"/hr.*

*Based on internal flow rate test data in Riverside, CA.



Pressure Compensation Device
The elastomeric PCD disk opens and closes in response to changes in inlet pressure to maintain optimal performance, even when the pressure rises higher than 40 psi.

SPECIFICATIONS

Operational

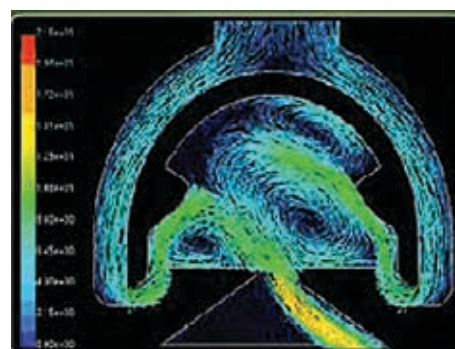
- Radius: 5'-15' (1,5-4,6m)
- Operating pressure range: 20-75 psi (1,4-5,2 Bar)
- Recommended Pressure: non-Pressure-Compensating—30 psi (2,1 Bars), Pressure Compensating—50 psi (3,4 Bars)
- Flow Rate: 0.04-2.4 gpm (0,1-9,4 LPM)
- Nozzle trajectory:
 - 5': 5°
 - 8': 10°
 - 10': 15°
 - 12': 20°
 - 15': 27°
 - Corner and Side Strips: 20°

Warranty

- Two years

Additional Features

- ✓ Specialty Arcs available (60°, 120°, 150°, 210°, 240°)
- ✓ Radius reduction 25% maximum
- ✓ Color coded for radius on top of the nozzle
- ✓ Precipitation rate ≤ 1"/hour
- ✓ Maintains precipitation rate as radius is reduced up to max of 25%
- ✓ Matched precipitation rate within radius families
- ✓ Matched precipitation rates between radius families
- ✓ Screen attached to nozzle for easy insertion into the spray body
- ✓ Works on all spray bodies—male and female



H₂O Technology

Water expands and collapses inside the H₂O Chip creating high-frequency oscillating streams which allow for distance of throw using 1/3 less flow.

Specifying Information

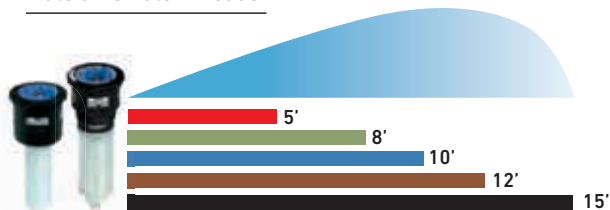
0-X-XXXX-XXXX

Nozzle	Thread	Radius	Arc	Body
0	X	XXXX	XXXX	
0—1" Per Hour	T—Toro Male Threaded Nozzle Blank—Female Threaded Nozzle	5—5' 8—8' 10—10' 12—12' 15—15' (4X15—4'X15" 4X30—4'X30" 4X9—4'X9" 4X18—4'X18'	60—60° Q—90° T—120° 150—150° H—180° 210—210° TT—240° TQ—270° F-360—Full-circle LCS—Left Corner RCS—Right Corner SST—Side Strip* P— Pressure-Compensating	Call out body as required

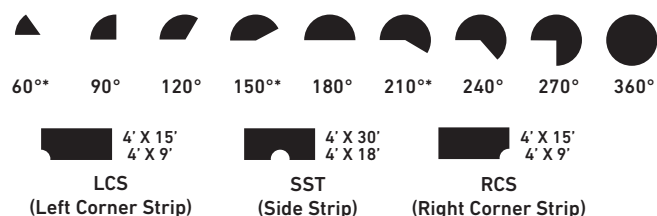
Example: A female threaded Precision™ Series Spray with a spray radius of 12' (3,7m) and a 90° arc would be specified as: **0-12-Q**

Example 2: A male threaded Pressure-Compensating Precision™ Series Spray with a spray radius of 10' (3,0m) and a 180° arc would be specified as **0-T-10-HP**

5 Radii Available in
Male & Female Threads



9 Arcs Plus Side and Corner Strips Available



* Not available with Pressure-Compensation

PERFORMANCE DATA PRESSURE-COMPENSATING PRECISION™ SERIES SPRAY NOZZLES

Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)	Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)	Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)
5Q	40	0.06	4.6	1.0	1.2	8Q	40	0.14	7.0	1.1	1.3	10Q	40	0.26	9.5	1.0	1.1
	50	0.08	5.1	1.2	1.4		50	0.17	7.7	1.2	1.3		50	0.28	10.0	1.1	1.2
	60	0.09	5.6	1.3	1.5		60	0.20	8.4	1.2	1.4		60	0.29	10.5	1.1	1.3
	70	0.11	6.2	1.5	1.7		70	0.23	9.1	1.3	1.4		70	0.31	11.1	1.2	1.4
5T	40	0.07	4.4	1.0	1.1	8T	40	0.20	7.6	1.0	1.2	10T	40	0.31	9.5	1.0	1.1
	50	0.11	4.9	1.3	1.5		50	0.24	8.0	1.1	1.3		50	0.36	10.0	1.1	1.2
	60	0.15	5.5	1.7	2.0		60	0.27	8.5	1.2	1.4		60	0.41	10.5	1.2	1.4
	70	0.19	6.0	2.0	2.4		70	0.31	8.9	1.3	1.5		70	0.46	11.0	1.3	1.5
5H	40	0.10	4.4	1.0	1.2	8H	40	0.26	7.0	1.0	1.2	10H	40	0.48	9.7	1.0	1.1
	50	0.13	4.9	1.1	1.3		50	0.33	7.6	1.1	1.3		50	0.53	10.1	1.1	1.2
	60	0.16	5.4	1.3	1.5		60	0.39	8.1	1.2	1.4		60	0.57	10.4	1.1	1.3
	70	0.19	6.0	1.4	1.6		70	0.46	8.7	1.3	1.4		70	0.62	10.8	1.2	1.4
5TT	40	0.14	4.3	1.1	1.3	8TT	40	0.34	7.0	1.0	1.1	10TT	40	0.63	9.6	1.0	1.1
	50	0.20	4.9	1.3	1.5		50	0.43	7.8	1.1	1.2		50	0.70	9.9	1.1	1.2
	60	0.25	5.4	1.4	1.7		60	0.52	8.5	1.2	1.4		60	0.77	10.3	1.1	1.3
	70	0.31	6.0	1.6	1.8		70	0.61	9.3	1.3	1.5		70	0.84	10.6	1.2	1.4
5TQ	40	0.15	4.3	1.0	1.2	8TQ	40	0.41	7.2	1.0	1.1	10TQ	40	0.71	9.5	1.0	1.1
	50	0.21	4.9	1.2	1.4		50	0.48	7.9	1.1	1.2		50	0.77	9.9	1.0	1.2
	60	0.26	5.6	1.4	1.6		60	0.55	8.6	1.1	1.3		60	0.82	10.3	1.1	1.2
	70	0.32	6.2	1.5	1.7		70	0.62	9.3	1.2	1.4		70	0.88	10.7	1.1	1.3
5F	40	0.17	4.0	1.0	1.2	8F	40	0.55	7.0	1.1	1.2	10F	40	0.95	9.6	1.0	1.1
	50	0.24	4.8	1.1	1.3		50	0.65	7.5	1.1	1.2		50	1.06	10.0	1.1	1.2
	60	0.31	5.5	1.2	1.4		60	0.74	8.0	1.1	1.3		60	1.16	10.5	1.1	1.3
	70	0.38	6.3	1.3	1.5		70	0.84	8.5	1.1	1.3		70	1.27	10.9	1.2	1.4

Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)	Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)	Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)
12Q	40	0.34	12.0	1.0	1.2	15Q	40	0.53	14.2	1.0	1.2	4X30 SST	40	0.62	4x30	1.0	1.1
	50	0.39	12.2	1.1	1.3		50	0.59	14.5	1.1	1.2		50	0.65	4x30	1.0	1.2
	60	0.43	12.5	1.2	1.3		60	0.64	14.8	1.1	1.3		60	0.67	4x30	1.1	1.3
	70	0.48	12.7	1.2	1.4		70	0.70	15.1	1.2	1.3		70	0.70	4x30	1.1	1.3
12T	40	0.46	11.5	1.0	1.2	15T	40	0.72	14.3	1.0	1.2	4X15 LCS	40	0.32	4x15	1.0	1.2
	50	0.50	11.8	1.0	1.2		50	0.77	14.8	1.0	1.2		50	0.33	4x15	1.1	1.2
	60	0.54	12.0	1.1	1.3		60	0.82	15.2	1.1	1.2		60	0.34	4x15	1.1	1.3
	70	0.58	12.3	1.1	1.3		70	0.87	15.7	1.1	1.2		70	0.35	4x15	1.2	1.3
12H	40	0.70	11.5	1.0	1.2	15H	40	1.10	14.5	1.0	1.2	4X15 RCS	40	0.32	4x15	1.0	1.2
	50	0.75	11.8	1.0	1.2		50	1.20	14.3	1.1	1.2		50	0.33	4x15	1.1	1.2
	60	0.80	12.2	1.1	1.2		60	1.29	14.0	1.1	1.3		60	0.34	4x15	1.1	1.3
	70	0.85	12.5	1.1	1.2		70	1.39	13.8	1.2	1.3		70	0.35	4x15	1.2	1.3
12TT	40	0.90	11.4	1.0	1.2	15TT	40	1.45	14.5	1.0	1.2	4X18 SST	40	0.36	4X18	1.0	1.1
	50	1.03	11.5	1.1	1.3		50	1.57	14.8	1.0	1.2		50	0.37	4X18	1.0	1.2
	60	1.16	11.5	1.2	1.3		60	1.68	15.0	1.1	1.2		60	0.38	4X18	1.0	1.2
	70	1.29	11.6	1.2	1.4		70	1.80	15.3	1.1	1.3		70	0.39	4X18	1.0	1.2
12TQ	40	1.05	11.4	1.0	1.2	15TQ	40	1.60	14.0	0.9	1.0	4X9 LCS	40	0.18	4X9	1.0	1.1
	50	1.14	11.7	1.0	1.2		50	1.70	14.4	1.0	1.1		50	0.19	4X9	1.1	1.2
	60	1.23	12.0	1.1	1.3		60	1.80	14.8	1.0	1.2		60	0.20	4X9	1.1	1.2
	70	1.32	12.3	1.1	1.3		70	1.90	15.1	1.1	1.2		70	0.21	4X9	1.2	1.3
12F	40	1.35	11.5	1.0	1.1	15F	40	2.20	14.5	1.0	1.2	4X9 RCS	40	0.18	4X9	1.0	1.2
	50	1.49	11.8	1.0	1.2		50	2.36	14.8	1.0	1.2		50	0.19	4X9	1.1	1.2
	60	1.63	12.2	1.1	1.3		60	2.52	15.1	1.1	1.2		60	0.20	4X9	1.1	1.2
	70	1.77	12.5	1.1	1.3		70	2.68	15.4	1.1	1.3		70	0.21	4X9	1.2	1.3

PERFORMANCE DATA PRECISION™ SERIES SPRAY NOZZLES

Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)	Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)	Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)
5-60° ▲	20	0.04	4.7	1.0	1.15	8-60° ▲	20	0.10	7.6	1.0	1.2	10-60° ▲	20	0.16	9.5	1.0	1.2
	30	0.04	5.0	1.0	1.15		30	0.11	8.0	1.0	1.1		30	0.17	10.0	1.0	1.1
	40	0.04	5.0	1.0	1.15		40	0.12	8.1	1.1	1.2		40	0.18	10.0	1.0	1.2
	50	0.05	5.3	1.0	1.14		50	0.13	8.3	1.1	1.3		50	0.19	10.0	1.1	1.3
5Q ■	20	0.06	4.6	1.0	1.18	8Q ■	20	0.14	7.0	1.1	1.3	10Q ■	20	0.26	9.5	1.0	1.1
	30	0.06	5.0	1.0	1.14		30	0.17	8.0	1.0	1.1		30	0.23	10.0	1.0	1.2
	40	0.07	5.0	1.0	1.16		40	0.18	8.2	1.0	1.2		40	0.28	10.2	1.0	1.2
5T ■	50	0.07	5.0	1.0	1.17	8T ■	50	0.18	8.4	1.0	1.1	10T ■	50	0.28	10.3	1.0	1.2
	20	0.07	4.4	1.0	1.17		20	0.20	7.6	1.0	1.2		20	0.31	9.5	1.0	1.1
	30	0.09	5.0	1.0	1.20		30	0.22	8.0	1.0	1.1		30	0.34	10.0	1.0	1.1
5-150° ■	40	0.09	5.2	1.0	1.15	8-150° ■	40	0.23	8.2	1.0	1.1	10-150° ■	40	0.36	10.0	1.0	1.2
	50	0.10	5.4	1.0	1.13		50	0.24	8.3	1.0	1.1		50	0.37	10.0	1.1	1.2
	20	0.07	4.0	1.0	1.18		20	0.25	7.5	1.0	1.2		20	0.41	9.8	1.0	1.1
5H ■	30	0.11	5.0	1.0	1.19	8-210° ■	30	0.27	8.0	1.0	1.1	10-210° ■	30	0.43	10.0	1.0	1.1
	40	0.12	5.2	1.0	1.20		40	0.28	8.1	1.0	1.1		40	0.44	10.2	1.0	1.1
	50	0.13	5.4	1.0	1.20		50	0.29	8.2	1.0	1.2		50	0.46	10.4	1.0	1.1
5-210° ■	20	0.10	4.4	1.0	1.15	8H ■	20	0.26	7.0	1.0	1.2	10H ■	20	0.48	9.7	1.0	1.1
	30	0.13	5.0	1.0	1.16		30	0.33	8.0	1.0	1.1		30	0.51	10.0	1.0	1.1
	40	0.14	5.1	1.0	1.15		40	0.34	8.0	1.0	1.2		40	0.55	10.3	1.0	1.2
5TT ■	50	0.14	5.2	1.0	1.14	8TT ■	50	0.34	8.0	1.0	1.2	10TT ■	50	0.56	10.4	1.0	1.2
	20	0.10	4.4	1.0	1.15		20	0.33	7.6	1.1	1.3		20	0.56	9.8	1.1	1.3
	30	0.15	5.2	1.1	1.23		30	0.36	8.0	1.1	1.3		30	0.58	10.0	1.1	1.3
5TQ ■	40	0.16	5.3	1.1	1.27	8TQ ■	40	0.37	8.1	1.1	1.3	10TQ ■	40	0.60	10.4	1.1	1.2
	50	0.17	5.5	1.1	1.25		50	0.38	8.2	1.1	1.3		50	0.62	10.5	1.1	1.3
	20	0.14	4.3	1.1	1.26		20	0.34	7.0	1.0	1.2		20	0.63	9.6	1.0	1.1
5F ●	30	0.17	5.0	1.0	1.13	8F ●	30	0.44	8.0	1.0	1.1	10F ●	30	0.69	10.0	1.0	1.2
	40	0.19	5.0	1.1	1.23		40	0.46	8.0	1.0	1.2		40	0.73	10.3	1.0	1.1
	50	0.19	5.0	1.1	1.25		50	0.46	8.0	1.0	1.2		50	0.74	10.4	1.0	1.1
5-210° ■	20	0.15	4.3	1.0	1.17	8-210° ■	20	0.41	7.2	1.0	1.1	10-210° ■	20	0.71	9.5	1.0	1.1
	30	0.20	5.0	1.0	1.16		30	0.49	8.0	1.1	1.1		30	0.79	10.0	1.0	1.1
	40	0.21	5.0	1.1	1.21		40	0.54	8.0	1.1	1.2		40	0.84	10.3	1.0	1.1
5-210° ■	50	0.22	5.0	1.1	1.27	8-210° ■	50	0.55	8.0	1.1	1.2	10-210° ■	50	0.86	10.4	1.0	1.1
	20	0.17	4.0	1.0	1.18		20	0.55	7.0	1.1	1.2		20	0.95	9.6	1.0	1.1
	30	0.26	5.0	1.0	1.16		30	0.66	8.0	1.0	1.1		30	1.03	10.0	1.0	1.1
5-210° ■	40	0.26	5.0	1.0	1.16	8-210° ■	40	0.68	8.0	1.0	1.2	10-210° ■	40	1.08	10.3	1.0	1.1
	50	0.26	5.0	1.0	1.16		50	0.71	8.0	1.1	1.2		50	1.12	10.4	1.0	1.2

Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)	Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)	Arc	psi	gpm	Radius	Precip. Rate ☒ (in./hr.)	Precip. Rate ▲ (in./hr.)
12-60° ▲	20	0.24	11.5	1.0	1.2	15-60° ▲	20	0.35	14.0	1.0	1.2	4X30 SST ■	20	0.62	4x28	1.0	1.1
	30	0.25	12.0	1.0	1.2		30	0.39	15.0	1.0	1.2		30	0.66	4x30	1.1	1.2
	40	0.26	12.1	1.0	1.2		40	0.40	15.1	1.0	1.2		40	0.67	4x30	1.1	1.2
	50	0.28	12.2	1.1	1.3		50	0.42	15.3	1.0	1.2		50	0.68	4x30	1.1	1.3
12Q ■	20	0.34	12.0	1.0	1.2	15Q ■	20	0.53	14.2	1.0	1.2	4X15 LCS ■	20	0.32	4x15	1.0	1.2
	30	0.37	12.1	1.0	1.1		30	0.58	15.0	1.0	1.1		30	0.33	4x15	1.1	1.2
	40	0.39	11.4	1.0	1.2		40	0.60	15.1	1.0	1.2		40	0.34	4x15	1.1	1.3
12T ■	50	0.39	12.0	1.0	1.1	15T ■	50	0.61	15.3	1.0	1.2	4X15 RCS ■	50	0.34	4x15	1.1	1.3
	20	0.46	11.5	1.0	1.2		20	0.72	14.3	1.0	1.2		20	0.32	4x15	1.0	1.2
	30	0.49	12.0	1.0	1.1		30	0.77	15.0	1.0	1.1		30	0.33	4x15	1.1	1.2
12-150° ■	40	0.51	12.2	1.0	1.1	15-150° ■	40	0.81	15.3	1.0	1.2	4X18 SST ■	40	0.34	4x15	1.1	1.3
	50	0.52	12.3	1.0	1.1		50	0.82	15.4	1.0	1.2		50	0.34	4x15	1.1	1.3
	20	0.60	11.6	1.0	1.2		20	0.92	14.7	1.0	1.2		20	0.36	4X18	1.0	1.1
12H ■	30	0.62	12.0	1.0	1.2	15H ■	30	0.96	15.0	1.0	1.2	4X9 LCS ■	30	0.37	4X18	1.0	1.1
	40	0.63	12.2	1.0	1.1		40	1.00	15.2	1.0	1.2		40	0.38	4X18	1.0	1.2
	50	0.64	12.3	1.0	1.1		50	1.10	15.3	1.1	1.3		50	0.38	4X18	1.0	1.2
12-210° ■	20	0.70	11.5	1.0	1.2	15-210° ■	20	1.10	14.5	1.0	1.2	4X9 RCS ■	20	0.18	4X9	1.0	1.1
	30	0.74	12.0	1.0	1.1		30	1.16	15.0	1.0	1.1		30	0.19	4X9	1.0	1.2
	40	0.79	12.3	1.0	1.2		40	1.25	15.4	1.0	1.2		40	0.20	4X9	1.1	1.2
12TT ■	50	0.80	12.4	1.0	1.2	15TT ■	50	1.28	15.5	1.0	1.2	4X9 RCS ■	50	0.20	4X9	1.1	1.1
	20	0.76	11.6	1.1	1.3		20	1.15	14.5	1.1	1.2		20	0.18	4X9	1.0	1.2
	30	0.82	12.0	1.1	1.3		30	1.20	15.0	1.0	1.2		30	0.19	4X9	1.0	1.2
12TQ ■	40	0.84	12.3	1.1	1.2	15TQ ■	40	1.30	15.5	1.0	1.2	4X9 RCS ■	40	0.20	4X9	1.1	1.2
	50	0.85	12.4	1.1	1.2		50	1.40	15.6	1.1	1.3		50	0.20	4X9	1.1	1.2
	20	0.90	11.4	1.0	1.2		20	1.45	14.5	1.0	1.2						
12F ●	30	0.99	12.0	1.0	1.1	15F ●	30	1.54	15.0	1.0	1.1						
	40	1.04	12.3	1.0	1.1		40	1.58	15.2	1.0	1.1						
	50	1.05	12.4	1.0	1.1		50	1.61	15.3	1.0	1.1						
12-210° ■	20	1.05	12.4	1.0	1.1	15-210° ■	20	1.72	14.5	1.0	1.2						
	30	1.15	12.0	1.0	1.2		30	1.78	15.0	1.0	1.1						
	40	1.19	12.2	1.0	1.2		40	1.82	15.0	1.0	1.2						
12-210° ■	50	1.22	12.3	1.0	1.2	15-210° ■	50	1.90	15.3	1.0	1.2						
	20	1.35	11.5	1.0	1.1		20	2.20	14.5	1.0	1.2						
	30	1.48	12.0	1.0	1.1		30	2.31	15.0	1.0	1.1						
12-210° ■	40	1.59	12.4	1.0	1.1	15-210° ■	40	2.35	15.2	1.0	1.1						
	50	1.60	12.5	1.0	1.1		50	2.40	15.3	1.0	1.1						



Subsurface irrigation provides water directly to the root zone to ensure maximum utilization, minimizing waste from evaporation and surface runoff. These kits provide everything you need to set up a tee box, bunker system, lake perimeter or anywhere else a low volume subsurface system applies.

FEATURES & BENEFITS

Pressure Compensating Emitters

Every emitter is equipped with a pressure compensating device to ensure the optimum operating pressure and precise flow rates are distributed from each point throughout the zone regardless of distance or elevation change.

DL2000™ Turbine with ROOTGUARD® Root Inhibitor

Each emitter is impregnated with a powerful root inhibitor than prevents roots from entering and clogging the emitter opening. This ensures even water distribution uniformity and maximum efficiency from each point of emission.

Filtration and Pressure Regulation Provided

Each kit includes a Y filter with 150 mesh/100 micron element to prevent debris contamination and a 25 psi fixed regulator to eliminate damage from high pressure spikes.

Flush Valve

Provides a momentary high velocity in the tubing to move debris out of the piping system to eliminate emitter clogging every time the zone is activated.



Specifying Information—Subsurface Irrigation

Model Number	Description
SSDS-LF-500	DL2000 500' Drip System (Bunker)—Low Flow
SSDS-HF-1000	DL2000 1000' Drip System (Bunker)—High Flow
RGP-212-05	DL2000 500' (Roll, 0.5 GPH), 12" Spacing
Example: A 500' DL2000 Drip System, would be specified as: SSDS-LF-500	



Specifying Information—Golf Zone Kits

Model	Description
GZK-25-LF-DCL	P220G valve with DC latching solenoid, 25 psi reg, low flow .1-8 gpm, 150 mesh SS filter
GZK-25-LF-SG	P220G valve with SPIKE GUARD™ solenoid, 25 psi reg, low flow .1-8 gpm, 150 mesh SS filter
GZK-25-MF-DCL	P220G valve with DC latching solenoid, 25 psi reg, medium flow 2-20 gpm, 150 mesh SS filter
GZK-25-MF-SG	P220G valve with SPIKE GUARD solenoid, 25 psi reg, medium flow 2-20 gpm, 150 mesh SS filter
GZK-40-MF-DCL	P220G valve with DC latching solenoid, 40 psi reg, medium flow 2-20 gpm, 150 mesh SS filter
GZK-40-MF-SG	P220G valve with SPIKE GUARD solenoid, 40 psi reg, medium flow 2-20 gpm, 150 mesh SS filter



FTT16-10

FEE16-10

FCC16-10

FAM16-10



FTF16-10

FJA16-10

Specifying Information—5/8" Loc-Eze™ Fittings

Model	Description
FTT16-10	Loc-Eze Tee (Bag of 10)
FEE16-10	Loc-Eze Elbow (Bag of 10)
FCC16-10	Loc-Eze Coupling (Bag of 10)
FAM16-10	Loc-Eze x 1/2" MPT Male Adapter (Bag of 10)
FTF16-10	Loc-Eze x 1/2" FPT Tee (Bag of 10)
FJA16-10	Loc-Eze x 3/4" MHT without Cap (Bag of 10)

Note: 5/8" EHW1645 is an equivalent hose size to DL2000 Dripline.



YD-500-34Z-10

FCH-H-FHT-10

FJQ16-10

SS6-50G

Specifying Information Accessories

Model	Description
YD-500-34Z-10	Air Vent—1/2" MIPT Air Release & Vacuum Relief Valve (Bag of 10)
FCH-H-FHT-10	Flush Valve—3/4" FHT (Hose Thread), 0.8 gpm, 2 psi Sealing Pressure (Bag of 10)
FJQ16-10	5/8" Figure-eight End Clamp (Bag of 10)
SS6-50G	3/4" Steel Soil Staple to Hold Tubing in Place (Bag of 50)



REG075251-8



REG100252-20



REG100402-20

Specifying Information Accessories

Model	Description
REG075251-8	Pressure regulator, 3/4" 25 psi, 1-8 gpm
REG100252-20	Pressure regulator, 1" 25 psi, 2-20 gpm
REG100402-20	Pressure regulator, 1" 40 psi, 2-20 gpm

SPECIFICATIONS

Drip System Specifications—Bunkers Only

- Flow range:
 - Low flow: 0.1 to 8.0 gpm
 - High flow: 2.0 to 20.0 gpm
- DL2000™ range:
 - Low flow: 12' to 1000'
 - High flow: 250' to 2500'
- Pressure compensating emitter: 0.5 gph
- Emitter spacing – 12"
- DL2000™ maximum run length: 250'
- Application rate (12" x 12" spacing): 0.85" per hour

Benefits On Bunkers

- Uniformly applies water to areas such as fingers
- Minimizes runoff
- Eliminates overspray into bunker keeping sand dry
- Cycle/soak allows for application on steep slopes
- Reduces bunker cave-ins
- Saves time, labor and money by eliminating the need for hand-watering

Benefits On Tees

- Applies water directly to the root zone allowing turf to stay dry
- Water is applied precisely to the tee box without watering the surrounding area

Bunker System Components

- DL2000™ subsurface dripline
- Drip Zone Valve Kit – includes control valve, pressure regulator, Y-filter and manual ball valve
- Air Vent Assembly – pre-assembled and ready to install (bunker only)
- Required inlet/outlet fittings
- Flush Assembly Fittings (8 gpm) 2 psi sealing flush valve (bunker only)
- Installation Fittings:
 - Includes Loc-Eze tees, couplings, elbows and end clamps
 - 10' of Blue Stripe® polyethylene tubing
 - Soil staples for secure tubing placement
- Pipe thread tap

Warranty

- Two years



ALFS75150-SG

ALFS10150-SG

AMP0004-1SG

Specifying Information Accessories

Model	Description
ALFS75150-SG	Filter, 3/4", 150 mesh stainless screen
ALFS10150-SG	Filter, 1", 150 mesh stainless screen
AMP0004-1SG	Filter Replacement, 150 mesh stainless screen



Toro offers a full line of swing joints that cover all Golf sprinkler thread types. Swing joints provide the flexibility to align the sprinkler to proper grade and level positioning to ensure optimum water use through maximum nozzle distribution uniformity.

FEATURES & BENEFITS

Minimize Friction Loss

1", 1¼" and 1½" models are available to cover flows exceeding 80 gpm, and minimize friction loss to ensure optimum pressure is available at each sprinkler.

Standard 2X90 And Ultra 4X90 Outlet Configurations

The standard 2x90 models provide two 90's at the outlet for alignment in two directions and the Ultra 4x90 models provide four 90's at the outlet for maximum alignment flexibility in four directions.

Saddle And Glue Tee Models

Glue tees for PVC piping applications and saddle tees for HDPE and PVC piping applications. Both tee styles are available with 1", 1¼" and 1½" double o-ring sealing outlets.

Quick Coupler Models

All swing joint styles are available with a quick coupler outlet that includes both an anti-rotation and position stabilizing feature to ensure the quick coupling valve stays secure during key installation and removal.





1 1/4" Female ACME x 1" Male ACME Adapter
Allows you to upgrade existing Rain Bird® Eagle™* 700 1 1/4" sprinklers to any Toro 800S or DT Series Sprinkler. P/N TA36-132

*Rain Bird is a registered trademark of Rain Bird Corporation. Eagle is a trademark of Rain Bird Corporation.

Durability And Reliability
Constructed from schedule 80 PVC for durability and provides double o-ring seals on all swing fittings to ensure a lifetime of reliability and leak free performance.



1", 1 1/4" and 1 1/2"



Standard 2x90 and Ultra 4x90



Quick Coupler



Glue tees, Saddle tees

Additional Features

- ✓ Schedule 80 PVC construction
- ✓ Double o-ring swivel joints
- ✓ Low friction loss characteristics
- ✓ 315 psi pressure rating
- ✓ 800 psi burst pressure safety rating
- ✓ Standard models with 2x90 outlet configuration
- ✓ Ultra models with 4x90 outlet for maximum alignment flexibility
- ✓ 3 inlet fittings styles: ACME, male thread and 4" spigot
- ✓ 2 outlet fitting styles: ACME and male thread
- ✓ 8", 12" and 18" lay lengths
- ✓ Saddle Tee models: 2" tee with 1", 1 1/4" or 1 1/2" outlet
- ✓ Glue Tee models: 2" tee with 1", 1 1/4" or 1 1/2" outlet
- ✓ Glue 90° models: 2" 90° with 1", 1 1/4" or 1 1/2" outlet
- ✓ Quick coupler models with Dura-lock anti-rotation feature
- ✓ Compatible with all brands of service and saddle tees

Warranty

- Five years
- Toro Golf sprinkler warranty extended to 5 years when purchased and installed with a Toro Swing Joint

Toro Tool Tip:

Use a 1 1/4" hole saw for the 1" Saddle Tee.

Use a 1 1/2" hole saw for the 1 1/4" and 1 1/2" Saddles.



Specifying Information—Toro Swing Joints

TSJ-XXXX-XX-XX-X-XXX*							
Description	Inlet Size	Inlet Type	Size	Length	Number of Elbows	Outlet Size	Outlet Type
TSJ	XX	XX	XX	XX	X	XX	X
TSJ—Toro Swing Joint	10—1" 12—1.25" 15—1.5"	M—MIPT (male pipe thread) S—4" Spigot A—ACME Thread GE—Glue Elbow GT—Glue Tee ST—Saddle Tee	Blank—same as inlet size 10—1" 12—1.25" 15—1.5"	8—8" Lay Length 12—12" Lay Length 18—18" Lay Length	3—Standard Unibody for Side Pipe Mount 4—Standard Unibody for Top Pipe Mount 5—Ultra Unibody for Side Pipe Mount Q* 6—Ultra Unibody for Top Pipe Mount	10—1" 15—1.5"	M—MIPT (Male pipe thread) A—ACME thread QC—Quick Coupler

Example: A Toro 1 1/2" Swing Joint with an ACME inlet, 12" lay length, 3 elbows (standard uni-body) and 1 1/2" ACME outlet fitting would be specified as: **TSJ-15A-12-3-15A**

* Use QC to designate QC when the inlet size and size are the same (TSJ-10A-12-3-10QC) use Q when the inlet size and size are different (TSJ-15A10-12-3-10Q)


995-15 Selector Tool

- All electric golf sprinklers
- Allows user to manually turn the sprinkler "ON", turn or leave it "OFF" or place it into the "AUTO" position awaiting a command from the controller


995-83 Multi Purpose Tool

- All Golf sprinklers
- Riser pull up for INFINITY®, FLEX800, DT and 800S Series
- Riser screen removal on all models
- Upper snap ring remover on all models


Riser Removal Tools

- 995-06 drive assembly extraction tool 630, 650 and 690 models
- Threads into the nozzle base and allows removal of the drive from the body
- 995-85 drive assembly extraction tool 730, 760, 780, 860S, 880S
- Threads onto the drive output shaft and allows removal of the drive from the body


995-82 Arc Adjustment Tool, 3/32" Allen Wrench

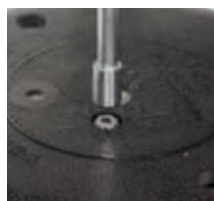
- 765, 785, 865S, 885S Arc adjustment of the part circle drives
- INFINITY®, FLEX800, DT and 800S Series. Adjustment of the radius reduction screw


Valve Removal Tools

- 995-08 All 1" golf models and 640
- 995-09 All 1.5" models and 690


Nut Drivers

- **995-105 5/16"** INFINITY®, FLEX800, DT and 800S Series TruJectory adjustment on INF5-6/ FLX5-6 models
- Inner, intermediate and back nozzle removal on all DT and 800S models
- **995-99 5/8"**
- Dual trajectory selection
- Main nozzle removal on all models
- **995-79 7/16"** 834S/854S pre August 2007
- Inner, intermediate and back nozzle removal
- 650/760/780/860S/880S Inner, intermediate and back nozzle removal
- **995-81 9/16"** 760/780 Series Main nozzle removal
- **995-80 1/2"** 760/780/860S/880S Nozzle base jam nut removal
- **995-52 1/4"** 660/680 Drive plate nut removal
- **995-53 3/8"** 660/680 Cap nut removal


Valve Insertion Tools

- Aligns and Installs Valve into the Body**
- 995-35 640 VIH body
- 995-76 All 1" golf models
- 995-101 All 1.5" golf models
- 995-12 690 body
- 995-20 690 with rubber cover
- 118-1843 INFINITY® 50 models
- 118-1844 INFINITY® 30 models


995-100 Valve Snap Ring Pliers with Screen Remover

- All Golf sprinklers lower snap ring removal on all models
- Rock screen removal on all INFINITY®, FLEX800, DT and 800S Series
- Valve removal on all models


Riser Hold Up Tools

- Allow for Nozzle Servicing**
- 118-0954 Riser hold up tool, red
- 995-55 All 700 models
- 995-102 Universal hold up tool, all 700, 800S, DT, INFINITY® and FLEX800 models


PRNTOOL

- Adjustment tool for Precision™ Series Rotating Nozzles
- Adjusts arc and radius


PNOZZTOOL Riser Pull Up Tool

- Used on 590GF sprays


102-6527

- Rotor adjustment tool


18-0954

- Riser hold up tool

VALVES AND VALVE BOXES COMPARISON CHARTS

TORO®



Valve Comparison Chart

Model		220G Brass Series	P220G Series	P220GS Series Scrubber
Catalog Pages		82-83	84-85	84-85
Flow Range		5.0-180 gpm	5.0-180 gpm	5.0-150 gpm
Operating Pressure		10-220 psi max	10-220 psi max	10-220 psi max
Conditions	Electrically Activated Systems	X	X	X
	Pressure Regulated Systems	X	X	X
	Effluent Water	X	X	X
Sizes	1"	X	X	X
	1 1/4"	X		
	1 1/2"	X	X	X
	2"	X	X	X
Configurations	Inline/Globe	X	X	X
	Angle/Globe		X	X
Inlet/Outlet	Threaded (Female)	X	X	X
Features	Manual Flow Control	X	X	X
	Pressure Regulation	X	X	X
	Internal Manual Bleed	X	X	X
	External Manual Bleed (Flush)	X	X	X
Body Construction	Glass-filled Nylon		X	X
	Brass	X		
Warranty		5 Years	5 Years	5 Years



The 220G Brass Series valves provide extra durability in the most challenging environments on the course. With precise pressure regulation the optimum operating pressure and exact flow requirements are delivered to every sprinkler ensuring maximum efficiency and uniformity.

FEATURES & BENEFITS

EZReg® Pressure Regulating System

Can be adjusted from 5-100 psi to provide the optimum operating pressure for every zone.

Spike Guard™ Solenoid

With 20,000 volt lightning rating, it virtually eliminates the need for solenoid replacements. And with half the amperage draw of traditional solenoids you can run twice as many valves simultaneously, reduce the cost of wire during installation or increase the distance from controller to valve.

Internal Manual Bleed

Ensures the optimum pressure of the system even when being operated manually.

Self Flushing And Serviceable Filter

A 120 mesh stainless steel screen in the flow of water is continually being cleaned any time the valve is in operation. Serviceable from the side of the valve the filter can be removed without valve disassembly.



220G-27-06



220G-27-04

Additional Features

- ✓ Diaphragm stem guide
- ✓ Ingot brass and stainless steel construction
- ✓ Pressure regulates in electric and manual modes, serviceable under pressure
- ✓ Forward-flow design for more precise regulation
- ✓ Standard, built-in Schrader-type valve for downstream pressure verification
- ✓ Anti-vandal dust cap on pressure-regulating models
- ✓ No external tubing
- ✓ External manual bleed for system flushing
- ✓ Manual flow control: adjustable to zero flow
 - Stainless steel diaphragm support ring for minimum wear
 - Stainless steel solenoid seat for longer life and positive shutoff
 - Low-power requirement for longer wire runs

VALVE WIRE SIZING CHART

Maximum One-way Distance (in ft.) Between Controller and Valve Using Spike-Guard™ Solenoid*

Ground Wire	Control Wire						
	18	16	14	12	10	8	6
18	2040	2520	2940	3280	3540	3720	3860
16	2520	3260	4000	4660	5220	5620	5920
14	2940	4000	5180	6360	7420	8300	8960
12	3280	4660	6360	8240	10100	11800	13180
10	3540	5220	7420	10100	13180	16060	18770
8	3720	5260	8300	11800	16060	20800	25540
6	3860	5960	8960	13180	18700	25540	33080

* Solenoid Model: 24 Vac
 Pressure: 150 psi
 Voltage Drop: 4 V
 Minimum Operating Voltage: 20 V
 Amperage (peak) 0.12 A

SPECIFICATIONS

Operational

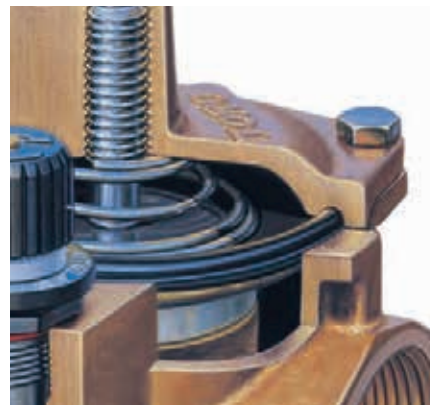
- Flow Range:
 - 1" – 5 to 40 gpm – 1¼" – 20 to 100 gpm
 - 1½" – 20 to 130 gpm – 2" – 30 to 180 gpm
- Operating Pressure (220 psi maximum pressure rating):
 - Electric – 10 to 220 psi
- Pressure regulating:
 - Outlet: 5 to 100 psi ± 3 psi
- Inlet: 10 to 220 psi
- Minimum pressure differential (between inlet and outlet) for pressure regulation: 10 psi (2" is 20 psi)
- Burst pressure safety rating: 750 psi
- Body style:
 - Globe valve – 1", 1¼", 1½", 2" female threads
- Spike Guard™ Solenoid: 24 VAC (50/60 Hz) Standard
 - Inrush: 60 Hz: 0.12 amps
 - Holding: 60 Hz: 0.1 amps
- DC latching – momentary low voltage pulse

Dimensions

- 1" – 5¼" H x 5" W
- 1¼" – 6½" H x 6" W
- 1½" – 6½" H x 6" W
- 2" – 7½" H x 7" W

Warranty

- Five years



Fabric Reinforced Diaphragm
 Provides superior performance and extended life without tearing in high pressure applications.

220 BRASS SERIES FRICTION LOSS DATA

Model	Type	gpm Flow																		
		5	10	15	20	30	40	50	60	70	80	100	120	150	170	180	200	250	300	350
1"	Electric	1.75	2.0	2.2	3.10	5.05	7.80													
1 1/4"	Electric				1.85	2.50	2.70	3.50	4.10	5.6										
1 1/2"	Electric				2.15	2.45	2.80	3.05	3.80	5.0	6.55									
2"	Electric					3.05	3.20	2.90	2.95	3.25	3.40	4.50	6.55	10.10	13.45	14.85				
2 1/2"	Electric								2.0	2.2	2.3	2.4	2.5	3.0	4.0	4.5	5.5			
3"	Electric										2.2	2.4	2.5	3.0	4.0	4.5	5.5	6.5	7.0	7.5

Notes: For optimum performance when designing a system, calculate total friction loss to ensure sufficient downstream pressure.
 For optimum regulation performance, size regulating valves toward the higher flow ranges.
 Flow rates are recommended not to exceed 5 psi loss.

Specifying Information—220G Brass Series

220G-27-0XXX			
Type	Body Style	Size	Optional
220G	27	0X	XX
220G—220G Brass Series Valve	27—NPT, Pressure-regulated (5–100 psi)	4—1" 5—1¼" 6—1½" 8—2"	DL—Latching Solenoid for 2-wire GDC Systems E—Effluent

Example: A 1" NPT pressure-regulated, 220G Brass Series Valve with 60 Hz solenoid, would be specified as: **220G-27-04**



The P220G and P220GS Series provide a full family of plastic valves that can deliver the water to meet the challenging needs of today's courses. With precise pressure regulation these valves deliver the optimum pressure and flow requirements to every sprinkler on the zone ensuring maximum uniformity of the water to the turf.

FEATURES & BENEFITS

EZReg® Pressure Regulating System

Can be adjusted from 5-100 psi to deliver the optimum pressure for every need.

Spike Guard™ Solenoid

With its 20,000 volt lightning rating, it virtually eliminates the need for solenoid replacements in high lightning environments.

Internal Manual Bleed

Ensures the optimum pressure of the system even when being operated manually.

Double-beaded Fabric Reinforced Diaphragm

Provides superior performance and extended life without tearing in high-pressure golf applications.



Self Cleaning Metering Pin
A self-cleaning feature that operates two times during every valve cycle ensuring smooth positive opening and closing.



Additional Features

- ✓ Glass-filled nylon and stainless steel construction
- ✓ Internal and External bleed
- ✓ No external tubing
- ✓ Standard, built-in Schrader-type valve for downstream pressure verification
- ✓ Flow control independent of solenoid
- ✓ Self-aligning bonnet to ensure correct installation
- ✓ Self-cleaning, stainless steel metering rod
- ✓ Low-flow capability down to 5 gpm
- ✓ Low-power requirement for longer wire runs

VALVE WIRE SIZING CHART

Maximum One-way Distance (in ft.) Between Controller and Valve Using Spike-Guard™ Solenoid*

Ground Wire	Control Wire						
	18	16	14	12	10	8	6
18	2040	2520	2940	3280	3540	3720	3860
16	2520	3260	4000	4660	5220	5620	5920
14	2940	4000	5180	6360	7420	8300	8960
12	3280	4660	6360	8240	10100	11800	13180
10	3540	5220	7420	10100	13180	16060	18770
8	3720	5260	8300	11800	16060	20800	25540
6	3860	5960	8960	13180	18700	25540	33080

* Solenoid Model: 24 V ac
Pressure: 150 psi
Voltage Drop: 4 V
Minimum Operating Voltage: 20 V
Amperage (peak) 0.12 A

"Scrubber" Turbine

Filter Surface



ACT™ System

Toro's patented technology employs a constantly rotating turbine to clean the metering/filtration area. This ensures that dirt, algae and particulates do not impede valve performance.

SPECIFICATIONS

Operational

- Flow Range:
 - 1" – 5 to 40 gpm
 - 1½" – 30 to 100 gpm
 - 2" – 80 to 180 gpm
- Operating Pressure (220 psi maximum pressure rating):
 - 1" – 1½" – 10 to 220 psi
 - 2" – 20 to 220 psi
- EZReg® Pressure regulating:
 - Outlet: 5 to 100 psi ± 3 psi
- Inlet: 10 to 220 psi
- Minimum pressure differential (between inlet and outlet) for pressure regulation: 10 psi
- Burst pressure safety rating: 750 psi
- Body styles:
 - Globe/Angle – 1", 1½", 2" female threads
- Spike Guard™ Solenoid: 24 VAC (50/60 Hz) Standard
 - Inrush: 60 Hz: 0.12 amps
 - Holding: 60 Hz: 0.1 amps
- DC latching – momentary low voltage pulse

Dimensions

- 1" – 6¾" H x 3⅝" W
- 1½" – 7¼" H x 3⅝" W
- 2" – 9½" H x 6⅞" W

Warranty

- Five years

P220G SERIES FRICTION LOSS DATA*

Size	Configuration	gpm Flow																
		5	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	180
1"	Globe	4.00	4.20	3.20	4.10	7.20												
	Angle	4.00	4.20	3.10	2.70	4.80												
1½"	Globe				1.60	2.30	3.60	5.20	7.00	9.20	11.20	13.60	16.40					
	Angle				1.30	1.60	2.80	4.00	5.50	7.10	8.90	10.90	13.50					
2"	Globe									2.10	2.70	3.30	4.00	4.80	5.60	6.50	7.50	8.70
	Angle									1.20	1.60	2.00	2.40	2.80	3.30	3.90	4.40	5.20

P220GS SERIES FRICTION LOSS DATA*

Size	Configuration	gpm Flow															
		5	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
1"	Globe	4.63	4.74	3.10	6.05	10.75											
	Angle	4.14	4.64	2.54	5.53	9.46											
1½"	Globe			1.14	1.56	2.85	4.36	6.28	8.57	11.20	14.03	17.20	20.46				
	Angle			0.95	1.51	2.28	3.69	5.29	6.97	9.26	11.80	14.60	17.40				
2"	Globe									3.57	4.62	5.33	6.80	8.20	9.02	10.46	11.61
	Angle									2.79	3.50	4.41	5.62	6.39	7.35	8.81	9.37

Note: For optimum performance when designing a system, be sure to calculate total friction loss to ensure sufficient downstream pressure. For optimum regulation performance, size regulating valves toward the higher flow ranges. Flow rates are recommended not to exceed 5 psi loss.

Specifying Information—P220G and P220GS Series

P220GS-27-0X-XXX			
Type	Body Style	Size	Optional
P220GS	27	0X	XXX
P220G—P220G Series Plastic Valve P220GS—P220GS Series Plastic Scrubber Valve	27—NPT, Pressure-regulated (5–100 psi)	4—1" 6—1½" 8—2"	E—Effluent DL—DC Latching Solenoid for GDC System DLE—DC Latching Solenoid for GDC System, Effluent

Example: A 1" P220G Series plastic electric, pressure-regulating valve with a 60 Hz solenoid, would be specified as: **P220G-27-04**



Valve boxes are used for practical, aesthetic and security reasons wherever valves or off-fairway GDC modules need to be installed below grade but remain accessible for monitoring or service. Toro offers a full line of valve boxes that will fit valves up to 4" and 1-, 2- and 4- station GDC modules.

FEATURES & BENEFITS

T-lip Lid Design

The T-lip lid design keeps dirt out to prevent jamming and provides improved grip for lid removal and easy access to the equipment inside. The secure snap fit and bolt retention ensure that only authorized personnel will have access.

Wide Range Of Sizes

Toro offers a wide range of round and rectangular boxes to meet every need. 6", 7" and 10" round; and 12" x 17" and 15" x 21" rectangular in both 12" standard depth and 6" shallow depth. With the reverse stack capability and rectangular 6" extensions tackling deeper installations can be easily accomplished.

Variety of Colors

Toro valve boxes and covers come in a wide variety of colors to blend into the surrounding environment or to identify specific applications. Green for grass, tan for sand and purple for non-potable water applications. Black and brown to blend in with a variety of soils and mulches and gray for electrical applications.

Durable Construction

Valve boxes are constructed of H.D.P.E. (High-Density Polyethylene) with heavy-duty wall sections designed to provide a secure enclosure to protect your equipment investment.



Reverse Stack
Allows for deeper installations in an initial 12" then 12" increments.



Rectangular Extension Boxes
Rectangular extensions allow for deeper installation in 6" increments

Specifying Information—Round Valve Boxes

TVB-XXRND-XX		
Type	Size	Color Description
TVB	XXRND	XX
TVB—Toro Valve Box	6—6" Round 7—7" Round 10—10" Round	Blank— Green lid and black box G—Green lid and box GY—Gray lid and box (electrical) T—Tan lid and box E—Purple lid and box (effluent) BK—Black lid and box BR—Brown lid w/black box
Example: A Toro 7" round valve box for effluent water applications would be specified as: TVB-7RND-E		

Description	A Length	B Width	C Height	Weight (lbs)
6"	6.3"	8.1"	9.0"	1.15 lbs
7"	6.8"	9.3"	9.0"	1.80 lbs
10"	9.9"	13.0"	10.3"	3.39 lbs



Specifying Information—Rectangular Valve Boxes

TVB-XXXX-XX-XX			
Type	Size	Height	Color Description
TVB	XXXX	XX	XX
TVB—Toro Valve Box	1217—12"x17" 1521—15"x21"	6—6" High 12—12" High	Blank— Green lid and black box G—Green lid and box GY—Gray lid and box (elect.) T—Tan lid and box E—Purple lid and box (effluent) BK—Black lid and box BR—Brown lid w/black box
Example: A Toro 12x17x6 rectangular valve box for effluent water applications would be specified as: TVB-1217-6-E			

Description	A Length	B Width	C Height	Weight (lbs)
12x17x6	18.8"	13.8"	6.8"	6.56 lbs
12x17x12	21.0"	16.0"	12.3"	9.05 lbs
15x21x6	24.3"	18.8"	7.2"	8.75 lbs
15x21x12	25.7"	19.1"	12.3"	12.11 lbs



Specifying Information—Rectangular Extensions

TVB-XXXX-EXT6BOX-XX			
Type	Size	Height	Color Description
TVB	XXXX	EXT6BOX	XX
TVB—Toro Valve Box	1217—12"x17" 1521—15"x21"	EXT6BOX—6" High	Blank— Black box G—Green box GY—Gray box (elect.) T—Tan box E—Purple box (effluent)
Example: A Toro 6" extension for a 12"x17" tan valve box would be specified as: TVB-1217-EXT6BOX-T			

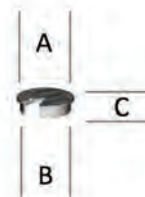
Description	A Length	B Width	C Height	Weight (lbs)
12x17x6	18.8"	13.8"	6.8"	6.71 lbs
15x21x6	24.3"	17.8"	6.9"	8.89 lbs



Specifying Information—Round Valve Box Separates

TVB-XXXX-XX		
Type	Size Box or Lid	Color Description
TVB	XXXX	XX
TVB—Toro Valve Box	6LID—6" Round lid 7LID—7" Round lid 10LID—10" Round lid BOX6—6" Box (black only) BOX7—7" Box (black only) BOX10—10" Box (black only)	G—Green lid GY—Gray lid (electrical) T—Tan lid E—Purple lid (effluent) BK—Black lid BR—Brown lid
Example: A Toro 7" round valve box lid for effluent water applications would be specified as: TVB-7LID-E		

Description	A Length	B Width	C Height	Weight (lbs)
6" lid	6.3"	8.1"	1.2"	.31 lbs
7" lid	6.8"	9.3"	1.7"	.52 lbs
10" lid	9.9"	13.0"	2.1"	1.13 lbs



Description	A Length	B Width	C Height	Weight (lbs)
6" box	6.3"	8.1"	9.0"	.77 lbs
7" box	6.8"	9.3"	9.0"	1.19 lbs
10" box	9.9"	13.0"	10.3"	2.26 lbs



Specifying Information—Rectangular Valve Box Separates

TVB-XXXX-LID-XX			
Type	Size	Height	Color Description
TVB	XXXX	LID	XX
TVB—Toro Valve Box	1217—12"x17" 1521—15"x21"	LID—Lid	Blank— Green lid G—Green lid GY—Gray lid (elect.) T—Tan lid E—Purple lid (effluent) BK—Black lid BR—Brown lid
Example: A Toro 12x17 rectangular valve box lid for effluent water applications would be specified as: TVB-1217-LID-E			

TVB-XXXX-XXXX		
Type	Size	Height
TVB	XXXX	XX
TVB—Toro Valve Box	1217—12"x17" 1521—15"x21"	6BOX—6" High valve box 12BOX—12" High valve box
Example: A Toro 12x17x6 rectangular valve box would be specified as: TVB-1217-6BOX-BK		

Description	A Length	B Width	C Height	Weight (lbs)
12"x17" lid	16.9"	11.8"	2.0"	2.73 lbs
15"x21" lid	21.3"	14.9"	1.9"	3.23 lbs
12"x17"x6" box	18.8"	13.8"	6.8"	3.83 lbs
12"x17"x12" box	21"	16"	12.3"	6.32 lbs
15"x21"x6" box	24.3"	17.8"	6.9"	5.66 lbs
15"x21"x12" box	25.7"	19.1"	12.3"	8.88 lbs



- A Dual Bolt Retention covers**
Ensures proper sealing and vandal resistance.
- B Heavy Duty Lid**
Construction molded from High Density Polyethylene (H.D.P.E), available in Green, Tan, Purple, Black, Gray and Brown.
- C Accessory Plate (optional)**
Attaches directly to the lid and allows attachments of various components like GDC modules, elec/hyd converters, battery operated controllers and more.
- D Dual Seal Lid**
Keeps water and critters from creeping in from the top.
- E Heavy Duty Box**
Construction molded from High Density Polyethylene (H.D.P.E), available in Green, Tan, Purple, Black, Gray and Brown.
- F Dirt Skirt (optional)**
Attaches directly to the bottom of the valve box and provides an outer seal to prevent intrusion from burrowing rodents, water and critters.

Specifications

Static Vertical Load Rating: SCTE – Light Duty, Pedestrian

Properties of Base Material	ASTM Test Method	HDPE
Tensile Strength	D-638	2700-4,400 psi (Typical Range)
Flexural Modulus	D-790	Minimum 140,000 not to exceed 24,000 psi
Notched Izod Impact Strength	D-256	0.5 - 3.0 (Typical Range)
Deflection Temperature @ 66psi	D-648	150-200 F (Typical Range)
Density	D-792	Minimum 0.95- not to exceed 0.965
Electrical Dielectric Strength	D-149	400-600 V/mil (Typical Range)
Chemical Resistance	D-543	Very Resistant
Water Absorption	D-570	Less than 1% weight change

Warranty

- Five years



TVB-1217-DBAP
(Accessory plate)



TVB-1217-DB (Dry Box)



TVB-12RND-DB
(Round Dry Box)

Specifying Information—Dry Box Valve Boxes

TVB-1217-12DB-XX

Type	Size	Height	Color Description
TVB	1217	12DB	XX
TVB—Toro Valve Box	1217—12"x17"	12DB—12" High Dry Box	Blank— Green lid and black box G—Green lid and box GY—Gray lid and box (elect.) T—Tan lid and box E—Purple lid and box (effluent) BK—Black lid and box BR—Brown lid w/black box

Example: A Toro 12"x17"x12" valve box for electrical applications would be specified as: **TVB-1217-12DB-GY**

Description	A Length	B Width	C Height	Weight (lbs)
12DB	21.0"	16.0"	12.3"	9.8 lbs

Description	A Length	B Width	C Height	Weight (lbs)
DBAP	11.5"	8.5"	.2"	0.99 lbs
DBDS	19.8"	14.5"	1.3"	2.8 lbs



Specifying Information—Dry Box Valve Boxes

TVB-12RND-DB-XX

Type	Size	Height	Color Description
TVB	12RND	DB	XX
TVB—Toro Valve Box	12" Round	Dry Box	G—Green GY—Gray (electrical) T—Tan E—Purple (effluent) BK—Black BR—Brown

Example: A Toro 12" round Dry Box for effluent water applications would be specified as: **TVB-12RND-DB-E**

Description	A Length	B Width	C Height	Weight (lbs)
DB	11.5"	14.5"	12.75"	7.12 lbs

Accessories	
TVB-1217-DBAP	DRY BOX Accessory Plate
TVB-1217-DBDS	DRY BOX Dirt Skirt



470 QUICK COUPLER VALVES

TORO®

470 Quick Coupler Valves

Whether it's for hand watering the hot spots, fertilizer wash in, washing down equipment or filling the sprayer and lakes the 400 Series provides a full family of quick coupling valves and accessories that connect you directly to the main water source to fill all your hand watering needs.

FEATURES & BENEFITS

- ✓ Full range of flows from 0 to 100 gallons per minute
- ✓ ¾", 1" and 1½" one- and two-piece single-lug models including ACME thread key connections to meet a variety of installation requirements
- ✓ Hose swivel provides 360° movement without hose tangling for ease of use
- ✓ A variety of sizes meet various applications
- ✓ Metal and vinyl locking and non-locking covers
- ✓ Effluent (lavender-colored) locking cover

Warranty

- Five years



Ordering Information—Quick Coupler Valve Accessories

Order Number	Description
463-01	1/2" Female, 3/4" Male, Single-lug Coupler Key
464-01	3/4" Female, 1" Male, Single-lug Coupler Key
464-02	1" Female, Single-lug Coupler Key
464-03	1" ACME Thread Coupler Key
465-01	1 1/4" Inlet, 3/4" Female, 1" Male, Single-lug Coupler Key
466-01	1 1/4" Female, 1 1/2" Male, Single-lug Coupler Key
477-00	3/4" NPT x 3/4" MHT Hose Swivel
477-01	1" NPT x 3/4" MHT Hose Swivel
477-02	1" NPT x 1" MHT Hose Swivel

470 SERIES FRICTION LOSS DATA

	gpm Flow											
	10	15	20	25	30	35	40	50	60	70	85	100
Model 473	1.5	3.1	5.3	8.5								
Model 474			1.1	2.2	3.6	5.7	8.0					
Model 475				1.0	1.8	2.7	3.6	6.4	9.8			
Model 476							1.0	1.7	2.6	3.6	5.6	8.8

Note: For optimum sprinkler performance when designing a system, be sure to calculate total friction loss to ensure sufficient downstream pressure. Flow rates are recommended not to exceed 5 psi loss. Values listed in psi.

Specifying Information—Quick Couplers

Toro Model Number	Description	Inlet Size NPT Threads	Body Type	Outlet Key Size	Corresponding Key(s)	Valve Cover Type	Corresponding Swivel(s)*		
							477-00	477-01	477-02
473-00	QCV .75, SS CVR	¾"	1 Piece	¾"	463-01	Stainless Steel	A	B	B
474-00	QCV 1, SS CVR	1"	1 Piece	1"	464-01 & 464-02	Stainless Steel	B	A	A
474-01	QCV 1, VYL CVR	1"	1 Piece	1"	464-01 & 464-02	Yellow Vinyl, Spring Loaded	B	A	A
474-03	QCV 1, VYL CVR, W/LK	1"	1 Piece	1"	464-01 & 464-02	Yellow Vinyl, Locking, Spring Loaded	B	A	A
474-04	QCV 1, LAV VYL CVR	1"	1 Piece	1"	464-01 & 464-02	Lavender Vinyl, Locking, Spring Loaded	B	A	A
474-21	QCV 1, VYL CVR, 2PC	1"	2 Piece	1"	464-01 & 464-02	Yellow Vinyl, Spring Loaded	B	A	A
474-24	QCV 1, LAV VYL CVR, 2PC	1"	2 Piece	1"	464-01 & 464-02	Lavender Vinyl, Locking, Spring Loaded	B	A	A
474-40	QCV 1, SS CVR, ACME	1"	1 Piece	1"	464-03	Stainless Steel	B	A	A
474-41	QCV 1, VYL CVR, ACME	1"	1 Piece	1"	464-03	Yellow Vinyl, Spring Loaded	B	A	A
474-44	QCV 1, LAV VYL CVR, W/LK, ACME	1"	1 Piece	1"	464-03	Lavender Vinyl, Locking, Spring Loaded	B	A	A
475-00	QCV 1.25, SS CVR	1"	1 Piece	1 1/4"	465-01	Stainless Steel	B	B	B
475-01	QCV 1.25, VYL CVR	1"	1 Piece	1 1/4"	465-01	Yellow Vinyl	B	B	B
476-00	QCV 1.5, SS CVR	1 1/2"	1 Piece	1 1/2"	466-01	Stainless Steel	B	B	B
476-01	QCV 1.5, VYL CVR	1 1/2"	1 Piece	1 1/2"	466-01	Yellow Vinyl, Spring Loaded	B	B	B
476-04	QCV 1.5, LAV VYL CVR	1 1/2"	1 Piece	1 1/2"	466-01	Lavender Vinyl, Locking, Spring Loaded	B	B	B

* A – Attaches directly to the quick coupler key. B – Requires additional fittings to be used with the quick coupler key.



The Twilight™ Golf Cup promotes twilight putting and evening special events. Highlight the beauty of the course to attract special events to the venue and drive additional revenue. The Twilight™ Golf Cup will set you apart from your competition by lighting up the putting green allowing members, guests and customers to remain longer and enjoy other attractions your facility has to offer like dining, lounges and the Pro Shop.

FEATURES & BENEFITS

Twilight Golf Cup

The wireless Twilight™ Golf Cup is sized to easily install into any standard cup hole. Convenient battery operation and wireless technology makes it quick to install. With high illumination, energy efficient LED lamps, and a proprietary optical lens, the flag and cup placements pop off the green. Their Lithium-Ion battery will provide illumination for a full eight hours and requires about five hours charge time to achieve full capacity. Charger charges up to three golf cups at once.

Quick-Connect Perimeter Lighting

The quick-connect system for perimeter lighting is a snap. The perimeter lights plug in for use during evening activities and are removable during daytime hours. Simply flip open the top of the perimeter in-ground stake and snap the lighting fixture into place creating a low voltage connection. Permanently installed receptacles are flush mounted to grade, just off the putting green surface. The directional luminaire is crafted from solid brass and has an adjustable knuckle to place the light just where you want it.



LED Technology Provides High Illumination

Working in conjunction with a proprietary optical lens design, the LEDs provide a narrow beam of light to brightly illuminate the flag.



Quick-Connect Perimeter Stake



Quick-Connect Perimeter Light



TWGC-3P



TWGC-CUPANDCATCH



TWGP-STAKE



TWGP-STAR36-12-L5



TWGP

Specifying Information—Twilight Perimeter Lighting

Model Number	Description
TWGP-STAR36-12-L5	Perimeter Post Light w/Starburst Luminaire on 36" Post, w/12-Volt, 5-Watt LED, Vertical-Spread Lens
TWGP-STAKE	Stake, Stabilizing, w/Electrical Receptacle Assembly, w/2 Waterproof Wire Splices
TWGP-TRANS-360SS	360-Watt Transformer, Indoor/Outdoor, Wall-Mountable
TWGP-TRANS-360DB	360-Watt Transformer, Direct-Burial
TWGP-TRANS-1120SS	1120-Watt Transformer, Indoor/Outdoor, Wall-Mountable
TWGP-HUB	Hub Electrical Enclosure, w/4 InLine Fuse Holders, w/4 5-Amp Fuses, 4 Spare 5-Amp Fuses, 4 Waterproof Wire Splices
TWGP-WIRE-12-2-500	Direct-Burial Cable, 12-Gauge, 2-Conductor, 500-Foot Spool
TWGP-ELECREC	Receptacle, Electrical, w/2-Wire Splice, Replacement
TWGP-5WLAMP	Lamp, LED, 5-Watt, Flood, 27K, Replacement
TWGP-LID	Receptacle, Electrical, Lid, Replacement
TWGP-LENS	Vertical-Spread Lens, Replacement
TWGP-HEXLOUVER	Hex Louver, Replacement
TWGP-GREASE	Grease, Lubricating/Sealing, for Replacement LED Installation

SPECIFICATIONS

Operational

Twilight™ Golf Cup (TWGC)

- White ABS cup aligns notches in solid brass ball catch with notches in cup. Fits most standard and putting green flags.
- CREE XB-D white LEDs, 3200K color temperature
- Bottom compartment houses the on/off switch, charging port and Lithium-Ion battery.
- Charger will charge up to three golf cups at one time – estimated charging time is 5 hours.
- Lithium-Ion battery will run the cup light for up to 8 hours

Perimeter Post Light (TWGP)

- Solid brass die cast construction of the luminaire – Tempered glass lens encased in a silicone gasket to create a weather resistant seal.
- Provided with a 5W LED MR16 lamp
- Solid brass quick-connect adaptor is mounted to the bottom of the 36" stem
- Adjustable head rotates vertically allowing for on-site adjustability, includes low-glare lamp shield

Perimeter In-Ground Stake (TWGP-STAKE)

- Sturdy, in-grade, 3" diameter stake provides electrical connection to the transformer and stability for the 36" tall perimeter post light
- Resin flip top for easy connection
- Flush mount to grade when not in use with fixture inserted
- Powered by a TUV certified low voltage transformer

Electrical

Twilight™ Golf Cup (TWGC)

- LEDs – 12VDC, (3) 1 Watt light emitting diodes
- Lithium-Ion Battery – 11.1 VDC 2600 mAh
- Charger – 120VAC/12VDC

Perimeter Light (TWGP)

- 5 Watt LED lamp, 12V AC

TWGP-TRANS-XXXXX - Transformer

- 120V AC 6' long cord
- 12V-15V output for the 360SS
- 12V-22V output for the 1120SS

Dimensions

- TWGC Cup light only: 4⁵/₁₆" Dia. x 6⁵/₁₆" H
- Flag height: 30¹/₄" H
- TWGP Perimeter Post Light: 43" H installed
- TWGP Receptacle – exposed diameter 3⁵/₈"

Warranty

- Twilight™ Golf Cup, 2 years
- Perimeter Post Light, limited lifetime warranty
- Perimeter in-ground stake & Hub, 3 years
- Transformers, limited lifetime warranty
- LED lamp in Perimeter Post Light, 5 years
- Lithium-Ion Battery, 2 years

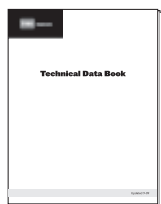
Specifying Information—Twilight Cup Lights

Model Number	Description
TWGC	Twilight Wireless Golf Cup Light, Single Unit
TWGC-3P	Kit, Twilight Golf Cup, 3-Pack
TWGC-BALLCATCH	Ball Catch, Brass
TWGC-CHARGER-S	Charger, Power Supply
TWGC-CUP	Twilight Wireless Golf Cup, Single Cup
TWGC-CUPANDCATCH	Twilight Wireless Golf Cup, Single Unit, w/Ball Catch, Brass
TWGC-FLAG	Twilight Wireless Golf Cup Flag, Pole and Nut
TWGC-LIBATT	Battery, Lithium Ion, Rechargeable

Wire Sizing Current Draw (Amperage)

Standard Wattage Solenoid

Product	Solenoids	Assumes 24 VAC, 50/60 Hz Output			
		120 VAC, 60 Hz		240 VAC, 50 Hz	
		Inrush	Holding	Inrush	Holding
Network VP® Satellite	0	—	0.20	—	0.19
	1	0.26	0.25	0.30	0.22
	2	0.35	0.30	0.34	0.25
	3	0.40	0.34	0.36	0.28
	4	0.46	0.39	0.39	0.30
	5	0.50	0.43	0.42	0.33
	6	0.64	0.48	0.44	0.36
	7	0.70	0.52	0.46	0.38
	8	0.73	0.56	0.50	0.41
	9	0.77	0.61	0.53	0.43
	10	0.80	0.65	0.57	0.46
	11	0.85	0.69	0.57	0.48
	12	0.91	0.73	0.57	0.51
	13	1.00	0.77	0.61	0.53
	14	1.03	0.81	0.62	0.55
	15	1.05	0.85	0.63	0.58
	16	1.14	0.88	0.66	0.60
Network LTC® Satellite	0	0.15	0.15	0.08	0.08
	1	0.23	0.21	0.12	0.11
	2	0.31	0.27	0.17	0.14
	3	0.39	0.33	0.22	0.17
	4	0.47	0.39	0.26	0.20
	5	0.55	0.45	0.31	0.24
	6	0.63	0.51	0.36	0.27
	7	0.71	0.57	0.40	0.30
	8	0.79	0.63	0.45	0.33
	9	0.87	0.69	0.50	0.36
	10	0.95	0.75	0.55	0.40
	11	1.03	0.81	0.59	0.43
	12	1.11	0.87	0.64	0.46
OSMAC® G3 Satellite	0	0.05	0.05	0.03	0.03
	1	0.13	0.11	0.07	0.06
	2	0.21	0.17	0.12	0.09
	3	0.29	0.23	0.17	0.12
	4	0.37	0.29	0.21	0.15
	5	0.45	0.35	0.26	0.19
	6	0.53	0.41	0.31	0.22
	7	0.61	0.47	0.35	0.25
	8	0.69	0.53	0.40	0.28
	9	0.77	0.59	0.45	0.31
	10	0.85	0.65	0.50	0.35
	11	0.93	0.71	0.54	0.38
	12	1.01	0.77	0.59	0.41
	13	1.09	0.83	0.64	0.44
	14	1.17	0.89	0.68	0.47
	15	1.25	0.95	0.73	0.51
	16	1.33	1.01	0.81	0.54



Technical Data Technical Data Book Form No. 490-1737

Spike Guard™ Low Wattage Solenoid

Product	Solenoids	Assumes 24 VAC, 50/60 Hz Output			
		120 VAC, 60 Hz		240 VAC, 50 Hz	
		Inrush	Holding	Inrush	Holding
Network VP Satellite	0	—	0.20	0.21	0.20
	1	0.24	0.22	0.22	0.21
	2	0.26	0.24	0.23	0.22
	3	0.29	0.27	0.24	0.23
	4	0.31	0.29	0.25	0.24
	5	0.33	0.31	0.26	0.26
	6	0.35	0.33	0.28	0.27
	7	0.39	0.37	0.29	0.28
	8	0.41	0.39	0.30	0.30
	9	0.43	0.41	0.32	0.31
	10	0.46	0.44	0.34	0.33
	11	0.47	0.46	0.35	0.35
	12	0.49	0.48	0.36	0.36
	13	0.52	0.50	0.37	0.38
	14	0.54	0.52	0.38	0.39
	15	0.56	0.54	0.40	0.40
	16	0.58	0.56	0.43	0.42
	17	0.60	0.58	0.44	0.43
	18	0.61	0.60	0.46	0.45
	19	0.63	0.62	0.47	0.46
	20	0.66	0.64	0.49	0.48
	21	0.68	0.66	0.50	0.49
	22	0.70	0.68	0.51	0.50
	23	0.74	0.70	0.53	0.52
	24	0.76	0.72	0.54	0.53
	25	0.79	0.74	0.55	0.54
	26	0.80	0.75	0.57	0.56
	27	0.85	0.77	0.58	0.57
	28	0.90	0.79	0.59	0.58
	29	0.93	0.81	0.60	0.59
	30	0.96	0.82	0.61	0.60
	31	1.01	0.84	0.62	0.61
	32	1.04	0.86	0.64	0.62
Network LTC Satellite and Network LTC Plus Satellite	0	0.15	0.15	0.08	0.08
	1	0.17	0.17	0.10	0.10
	2	0.20	0.19	0.11	0.11
	3	0.22	0.21	0.13	0.13
	4	0.25	0.23	0.15	0.14
	5	0.27	0.25	0.17	0.16
	6	0.29	0.27	0.18	0.17
	7	0.32	0.29	0.20	0.19
	8	0.34	0.31	0.22	0.20
	9	0.37	0.33	0.23	0.22
OSMAC® G3 Satellite	10	0.39	0.35	0.25	0.23
	11	0.41	0.37	0.27	0.25
	12	0.44	0.39	0.28	0.26
	0	0.05	0.05	0.03	0.03
	1	0.07	0.07	0.05	0.05
	2	0.10	0.09	0.06	0.06
	3	0.12	0.11	0.08	0.08
	4	0.15	0.13	0.10	0.09
	5	0.17	0.15	0.12	0.11
	6	0.19	0.17	0.13	0.12
	7	0.22	0.19	0.15	0.14
	8	0.24	0.21	0.17	0.15
	9	0.27	0.23	0.18	0.17
	10	0.29	0.25	0.20	0.18
	11	0.31	0.27	0.22	0.20
	12	0.34	0.29	0.23	0.21
	13	0.36	0.31	0.25	0.23
	14	0.39	0.33	0.27	0.24
	15	0.41	0.35	0.29	0.26
	16	0.44	0.37	0.30	0.27

CONVERSION INFORMATION

- All gallons per minute are shown in U.S.
- To convert to imperial gallons per minute, multiply by 0.833
- To convert to liters per minute, multiply by 3.78
- To convert pounds per square inch (psi) to atmospheres, divide by 14.7
- To convert pounds per square inch (psi) to kilograms per square centimeter (kg/cm2), divide by 14.22
- To convert feet to meters, divide by 3.28

WINTERIZING SPECIFICATIONS

In freezing climates, valves should be properly winterized to prevent freeze-related damage.

SPRINKLER SPACING

The Toro Company does not recommend designing for zero (0) mph wind conditions.

■ Square Spacing

- No wind - 55% of diameter
- 4 mph wind - 50% of diameter
- 6,4 kph wind - 50% of diameter
- 8 mph wind - 45% of diameter
- 12,8 kph - 45% of diameter

■ Triangular Spacing

- No wind - 60% of diameter
- 4 mph wind - 55% of diameter
- 6,4 kph wind - 55% of diameter
- 8 mph wind - 50% of diameter
- 12,8 kph - 50% of diameter

■ Single Row Spacing

- No wind - 50% of diameter
- 4 mph wind - 50% of diameter
- 6,4 kph wind - 50% of diameter
- 8 mph wind - 45% of diameter
- 12,8 kph - 45% of diameter

Design in consideration of the worst wind conditions.

PRECIPITATION RATE FORMULAS

■ Square-spaced sprinklers in pattern:

$$\frac{\text{gpm of full-circle} \times 96.3}{(\text{Spacing})^2}$$



■ Triangular-spaced sprinklers in pattern:

$$\frac{\text{gpm of full-circle} \times 96.3}{(\text{Spacing})^2 (.866)}$$



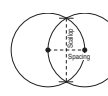
■ Area and flow:

$$\frac{\text{Total gpm of zone} \times 96.3}{\text{Total irrigated square feet of zone}}$$



■ Single row:

$$\frac{\text{gpm of full-circle} \times 96.3}{(\text{Spacing}) (\text{Scallop})}$$





The Toro Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly warrants to the owner, each new piece of irrigation equipment (featured in the current catalog at date of installation) against defects in material and workmanship for a period described below, provided they are used for irrigation purposes under manufacturer's recommended specifications.

During the warranty period, we will repair or replace, at our option, any part found to be defective. Your remedy is limited solely to the replacement or repair of defective parts.

This warranty does not apply (i) to Acts of God (e.g., lightning, flooding, etc.); or (ii) to products not manufactured by Toro when used in conjunction with Toro products; or (iii) where equipment is used, or installation is performed in any manner contrary to Toro's specifications and instructions, nor where equipment is altered or modified.

Return the defective part to your irrigation contractor or installer, or your local Golf Irrigation Distributor, or contact:

The Toro Company
5825 Jasmine Street, Riverside, CA 92504
(800) 664-4740

For the location of your nearest Toro distributor or outside the U.S., call:
(951) 688-9221.

Neither Toro nor Toro Warranty Company is liable for indirect, incidental or consequential damages in connection with the use of equipment, including but not limited to: vegetation loss, the cost of substitute equipment or services required during periods of malfunction or resulting non-use, property damage or personal injury resulting from installer's actions, whether negligent or otherwise.

Some states do not allow the exclusion of incidental or consequential damages, so the above exclusion may not apply to you.

All implied warranties, including those of merchantability and fitness for use, are limited to the duration of this express warranty. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

This warranty gives you specific legal rights and you may have other rights which vary from state to state.

Golf Sprinklers

All Toro golf sprinklers and conversion assemblies are covered by this warranty for 3 years from the date of installation. Proof of installation date required for any warranty claim.

All Toro golf sprinklers purchased and installed with a Toro swing joint will be covered by a five-year Warranty*. Proof of simultaneous installation required for any warranty claim.

* Excludes 590GF Series and sprinkler conversion assemblies.

Swing Joints

Toro swing joints are covered by this warranty for 5 years from the date of installation. Proof of installation date required for any warranty claim.

Warranty covers defects in manufacturing and excludes damage resulting from natural phenomena such as frost heave.

Valves

220G Series, P-220G Series and P-220GS Series valves are covered by this warranty for 5 years from date of installation. 470 Series quick coupler valves are covered by this warranty for 2 years from date of installation.

DL2000™ Subsurface Drip Irrigation

Toro DL2000™ Subsurface Drip Irrigation products are covered by this warranty for 2 years from date of installation.

Control Systems, Turf Guard®, Valve Boxes and Dry Boxes

All Toro golf control systems (central controls, field satellite controllers, GDC and Turf Guard), Valve Boxes and Dry Boxes, unless covered by a Toro NSN Support Plan, are covered by this warranty for 1 year from date of installation.

Twilight™ Golf Lighting

Perimeter Post Light - limited lifetime warranty; Perimeter In-Ground Stake and Hub - 3 years; Transformers - limited lifetime warranty; FLEX™ Series LED Lamps - 5-year warranty; Lithium-Ion Battery - 2 years. All Toro Twilight™ Golf Lighting products are covered by this warranty from the date of installation. Proof of installation date is required for any warranty claim.

We reserve the right to improve our products and make changes in the specifications and designs without notice and without incurring obligation. Products depicted in this brochure are for demonstration purposes only. Actual products offered for sale may vary in design and features.



International distributors can be found at:
www.toro.com/locator



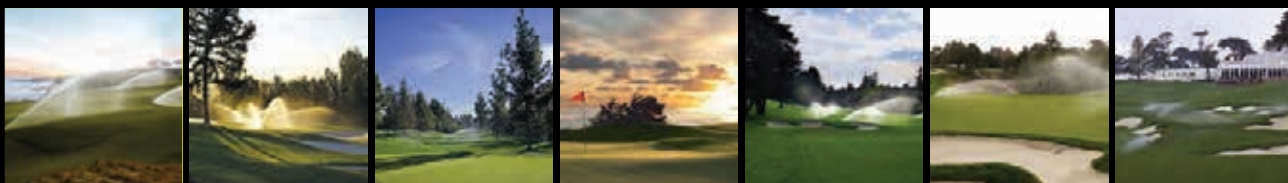
Our American Partners

1. Century Equipment, Inc.
(419) 865-7400
2. E. H. Griffith, Inc.
(412) 271-3365
3. Grassland Equipment & Irrigation Corp.
(518) 785-5841
4. Kona Irrigation Supply, Ltd.
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5. Hector Turf
(954) 429-3200
6. Jerry Pate Turf & Irrigation, Inc.
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7. Kenney Machinery Corp.
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8. L. L. Johnson Distributing Company
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9. Midland Implement Company, Inc.
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10. Midwest Turf & Irrigation, Inc.
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13. Reinders, Inc.
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19. Turf Equipment & Supply Company, Inc.
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21. Turf Star, Inc.
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22. Wesco Turf Inc.
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23. Western Equipment Distributors, Inc.
(253) 872-8858

Our Canadian Partners

24. Ful-Flo Industries, Ltd.
(204) 633-4414
25. Oakcreek Golf and Turf Inc.
(403) 279-2907
26. Turf Care Products Canada
(905) 836-0988





**Toro is always there to help you care for your landscapes the way you want,
when you want, better than anyone else.**



www.toro.com

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Phone: 877-345-8676
Fax: 800-862-8676**

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We reserve the right to improve our products and make changes in the specifications and designs without notice and without incurring obligation.

Products depicted in this brochure are for demonstration purposes only.
Actual products offered for sale may vary in design and features.



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2019 – 2020 Golf Products Catalog



PEBBLE BEACH
RESORTS

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TOTAL SYSTEM SOLUTIONS

Everything You Need for Advanced Control of Your Irrigation.

As the only manufacturer committed exclusively to irrigation, Rain Bird designs fully integrated end-to-end solutions to address both new installation and system renovation challenges. This gives you total integration of components and a full system that is easier to manage and runs more efficiently than mix-and-match systems. Plus, you get a single source for service and other benefits available only from Rain Bird.

■ Golf Rotors	4	■ Pump Stations & Filtration	44
■ Central Control Technologies	20	■ Valves	52
■ IC System™	28	■ Landscape Solutions	60
■ Field Controllers	34	■ Appendix	92

The TRUE Benefits™ of a Rain Bird System

Timeless Compatibility™

Every Rain Bird golf irrigation product is engineered for Timeless Compatibility, allowing you to have a state-of-the-art system that can be updated or changed without obsoleting your existing equipment.



Real-Time Response

Rain Bird offers continuous two-way communication, allowing for automatic optimization between your Central Control and the field. By receiving data and making instant adjustments when needed, you can protect your course from unforgiving weather and unexpected challenges.



Unmatched Quality

Throughout engineering, design and testing, Rain Bird's mission is to deliver industry-leading quality to our customers. Our stringent testing procedures are implemented at the first launch of every product as well as regularly throughout the year, and they replicate the world's harshest conditions.



Easy To Use

All Rain Bird products are engineered with the challenges of golf professionals in mind and designed to deliver everyday ease of use. From software interfaces to rotor designs, they help you and your crew find a quicker, hassle-free path to top playability.





Rockrimmon Country Club

Golf Rotors

Engineered to Perform. Built to Last.

Rain Bird® golf rotors are engineered for precise application and distribution uniformity, helping you get the most from your water source. With intelligent, easy-to-use features like a top-serviceable design and quick full- or part-circle adjustments, Rain Bird golf rotors help you and your crew save time every week.

Designed for Timeless Compatibility™ with every gear-driven golf rotor manufactured since 1992, these rotors give you the flexibility to update internals without having to dig up the case, saving you even more time.

GBS25 Solenoid

Delivers 25kV surge protection and built-in filtration for a second level of protection from debris. Eliminates the most common maintenance tasks that plague competing rotors.

Top Serviceability

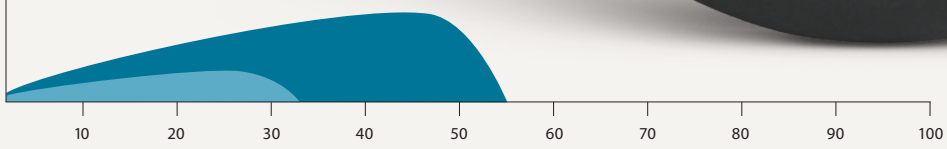
With superior performance in a smaller footprint than competing rotors and an intelligent snap-ring design for quick access to serviceable components, Rain Bird rotors have long been the perfect choice for golf courses.



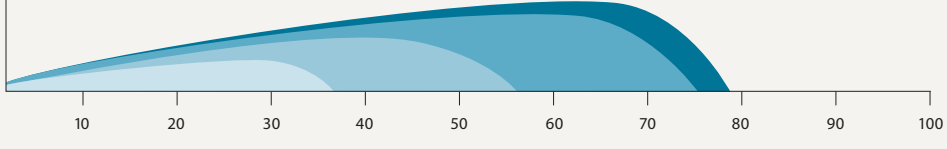
NEW



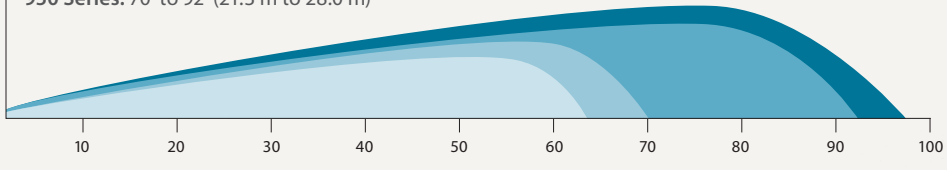
551 Series: 32' to 55' (9.8 m to 16.8 m)



700 Series: 57' to 79' (17.4 m to 23.5 m)
751 Series: 37' to 75' (11.2 m to 22.3 m)



900 Series: 63' to 97' (19.2 m to 29.6 m)
950 Series: 70' to 92' (21.3 m to 28.0 m)



551 Series Rotors

SPECIFICATIONS

Radius: 32' to 55' (9.8 m to 16.8 m)

Flow Rate: 6.83 to 13.63 gpm (0.43 to 0.86 l/s) (1.55 to 3.10 m³/h)

Arc: Full-circle 360°; Adjustable 30° to 345°

Models:

E: Electric

IC: Integrated Control

SAM: Stopamatic

B: Seal-A-Matic™ device

Maximum Inlet Pressure:

Models E and IC: 150 psi (10.3 bar)

Models SAM and B: 100 psi (6.9 bar)

Pressure Regulation Range: 60 to 100 psi (4.1 to 6.9 bar)

Factory Pressure Settings:

Models E and IC available in 70 and 80 psi (4.8 and 5.5 bar)

Dimensions:

Body Height:

Models E, IC, SAM: 12.0" (30.5 cm)

Model B: 9.6" (24.5 cm)

Pop-Up Height to Mid-Nozzle: 2.6" (6.6 cm)

Top Diameter:

Models E, IC, SAM: 6.25" (15.9 cm)

Model B: 4.25" (10.8 cm)

Nozzle Trajectory:

51 Nozzle: 12°

52, 53, 54 Nozzles: 25°

Inlet Threads:

Models E, IC, SAM: 1.25" (3.2 cm) ACME female threaded

Model B: 1" (2.5 cm) ACME

Holdback:

Block: 10' (3.1 m) elevation

SAM: 15' (4.6 m) elevation

Rotation Time: 180° in ≤ 90 seconds; 75 seconds nominally

Maximum Stream Height:

51 Nozzle: 5' (1.5 m)

52, 53, 54 Nozzles: 13' (4.0 m)

Solenoid: 24 VAC solenoid power requirement: 0.41 amp inrush current (9.8 VA);

60 cycle: 0.20 amp holding current (4.8 VA);

50 cycle: 0.23 amp holding current (5.4 VA)

Surge Resistance: Up to 25kV standard

on electric models

**Top-Serviceable Rock Screen™
and Replaceable Valve Seat:**

On models E, IC, SAM

Features and Benefits

Designed to provide the right coverage for areas like tee boxes and small areas, Rain Bird® 551 Series Rotors are the most efficient short-throw golf rotors on the market. As a true golf-quality rotor with valve-in-head options, the 551 Series delivers strong distribution uniformity in small, tight areas. Nozzles with a higher flow rate minimize your water window while large droplets reduce wind drift.



COMPATIBLE WITH
Rain Bird® Sod Cup Kit
(See page 19)



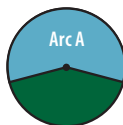
HOW TO SPECIFY

A	-	551	-	XX	-	XX	-	XX
THREAD TYPE		MODEL		BODY/ VALVE		PRESSURE REGULATOR		NOZZLE
ACME		551		E		70 (4.8)		51
				IC		80 (5.5)		52
				SAM				53
				B				54



Rapid-Adjust Technology Featuring MemoryArc®

Whether you're catering to grow-in or just trying to get more from a limited water supply, Rapid-Adjust Technology lets your staff make easy arc adjustments with the turn of a screw. MemoryArc retains two part-circle arc settings, so you can shift between full- and part-circle operation in seconds.



Step 1

Set primary rotor arc.



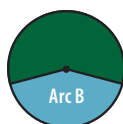
Step 2

Turn the Full/Part Adjustment Screw for full-circle operation.



Step 3

Turn the rotor to either Arc A or Arc B setting, then set to part-circle. No need to reset the arc when changing between full- and part-circle settings.



U.S. Performance Data

CASCADE NOZZLES												
Base Pressure (psi)	50		60		70		80		90		100	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
#51-Blue	32	6.83	34	7.53	35	8.00	36	8.60	37	9.03	38	9.43
#52-Beige	38	6.57	39	7.17	40	7.90	40	8.73	40	8.80	40	9.33
#53-Gray	51	9.27	51	10.20	51	11.10	51	11.80	51	12.60	51	13.17
#54-Red	53	9.71	55	10.74	53	11.49	53	12.26	55	12.97	55	13.63

Metric Performance Data

CASCADE NOZZLES																		
Base Pressure (bar)	3.4			4.1			4.8			5.5			6.2			6.9		
	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)
#51-Blue	9.8	0.43	1.55	10.4	0.48	1.71	10.7	0.50	1.82	11.0	0.54	1.95	11.3	0.57	2.05	11.6	0.59	2.14
#52-Beige	11.6	0.41	1.49	11.9	0.45	1.63	12.2	0.50	1.79	12.2	0.55	1.98	12.2	0.56	2.00	12.2	0.59	2.12
#53-Gray	15.5	0.58	2.11	15.5	0.64	2.32	15.5	0.70	2.52	15.5	0.74	2.68	15.5	0.79	2.86	15.5	0.83	2.99
#54-Red	16.2	0.61	2.21	16.8	0.68	2.44	16.2	0.72	2.61	16.2	0.77	2.78	16.8	0.82	2.95	16.8	0.86	3.10

700 Series Rotors

SPECIFICATIONS

Radius: 57' to 79' (17.4 m to 23.5 m)

Flow Rate: 16.3 to 43.8 gpm (1.03 to 2.76 l/s) (3.70 to 9.95 m³/h)

Arc: Full-circle 360°

Models:

E: Electric

IC: Integrated Control

SAM: Stopmatic

B: Seal-A-Matic™ device

Maximum Inlet Pressure:

Models E and IC: 150 psi (10.3 bar)

Models SAM and B: 100 psi (6.9 bar)

Pressure Regulation Range: 60 to 100 psi (4.1 to 6.9 bar)

Factory Pressure Settings: 700E/IC and available in 70 and 80 psi (4.8 and 5.5 bar)

Dimensions:

Body Height:

Models E, IC, SAM: 12.0" (30.5 cm)

Model B: 9.6" (24.5 cm)

Pop-Up Height to Mid-Nozzle:

Models E, IC, SAM, B: 2.6" (6.6 cm)

Top Diameter:

Models E, IC, SAM: 6.25" (15.9 cm)

Model B: 4.25" (10.8 cm)

Nozzle Trajectory:

Standard: 25°

Wind Tolerant: 12°

Inlet Threads:

Models E, IC, SAM: 1.25" (3.2 cm) ACME Female Threaded

Models B: 1" (2.5 cm) ACME Female Threaded

Holdback:

Block: 10' (3.1 m) of elevation

SAM: 15' (4.6 m) of elevation

Rotation Time: 360° in ≤ 180 seconds; 150 seconds nominally

Maximum Stream Height:

Standard: 17' (5.2 m)

Wind Tolerant: 10' (3.1 m)

Solenoid: 24 VAC solenoid power requirement: 0.41 amp inrush current (9.8 VA);

60 cycle: 0.20 amp holding current (4.8 VA);

50 cycle: 0.23 amp holding current (5.4 VA)

Surge Resistance: Up to 25kV standard on electric models

Top-Serviceable Rock Screen™ and Replaceable Valve Seat:

On models E, IC, SAM

Features and Benefits

Featuring consistent pressure regulation and high-efficiency nozzles with large droplets that cut through harsh winds, Rain Bird® 700 Series rotors give you the even distribution you need for a healthy playing surface. With the ability to drop a new Rain Bird 700 Series internal assembly into your existing rotor cases, they save you time and money year after year.

Rain Bird golf rotors offer a low cost of ownership through a powerful combination of versatility, performance and durability.



COMPATIBLE WITH
Rain Bird® Sod Cup Kit
(See page 19)



U.S. Performance Data

DUAL SPREADER™ NOZZLES												
Base Pressure (psi)	50		60		70		80		90		100	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
#28 - White	57	18.0	59	19.7	59	21.3	61	22.8	61	24.1	61	25.5
#32 - Blue	61	21.9	63	22.8	65	24.5	65	27.4	67	29.0	67	29.6
#36 - Yellow	65	23.2	65	25.5	65	27.5	67	29.5	65	31.2	67	32.9
#40 - Orange	65	25.5	67	27.8	71	29.8	71	31.9	73	33.9	73	35.6
#44 - Green	—	—	71	30.7	69	33.0	71	35.2	75	37.5	75	39.5
#48 - Black	—	—	—	—	73	37.0	77	39.4	79	41.8	77	43.8

WIND TOLERANT NOZZLES												
Base Pressure (psi)	50		60		70		80		90		100	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
#16 WTN - Gray	—	—	56	16.3	56	17.5	60	18.5	62	20.2	63	21.1
#18 WTN - Red	—	—	58	19.0	61	20.9	65	22.3	65	23.2	65	24.2
#22 WTN - Black	—	—	—	—	65	27.6	65	34.8	67	38.8	71	40.5

Metric Performance Data

DUAL SPREADER™ NOZZLES																		
Base Pressure (bar)	Radius (m)	3.4		Radius (m)	4.1		Radius (m)	4.8		Radius (m)	5.5		Radius (m)	6.2		Radius (m)	6.9	
		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)
#28 - White	17.4	1.14	4.09	18.0	1.24	4.47	18.0	1.34	4.84	18.6	1.44	5.18	18.6	1.52	5.47	18.6	1.61	5.79
#32 - Blue	18.6	1.38	4.97	19.2	1.44	5.18	19.8	1.55	5.56	19.8	1.73	6.22	20.4	1.83	6.59	20.4	1.87	6.72
#36 - Yellow	19.8	1.46	5.27	19.8	1.61	5.79	19.8	1.73	6.25	20.4	1.86	6.70	19.8	1.97	7.09	20.4	2.08	7.47
#40 - Orange	19.8	1.61	5.79	20.4	1.75	6.31	21.6	1.88	6.77	21.6	2.01	7.25	22.3	2.14	7.70	22.3	2.25	8.09
#44 - Green	—	—	—	21.6	1.94	6.97	21.0	2.08	7.49	21.6	2.22	7.99	22.9	2.37	8.52	22.9	2.49	8.97
#48 - Black	—	—	—	—	—	—	22.3	2.33	8.40	23.5	2.49	8.95	24.1	2.64	9.49	23.5	2.76	9.95
WIND TOLERANT NOZZLES																		
Base Pressure (bar)	Radius (m)	3.4		Radius (m)	4.1		Radius (m)	4.8		Radius (m)	5.5		Radius (m)	6.2		Radius (m)	6.9	
		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)		Flow (l/s)	Flow (m³/h)
#16 WTN - Gray	—	—	—	17.1	1.03	3.70	17.1	1.10	3.97	18.3	1.17	4.20	18.9	1.27	4.59	19.2	1.33	4.79
#18 WTN - Red	—	—	—	17.7	1.20	4.32	18.6	1.32	4.75	19.8	1.41	5.06	19.8	1.46	5.27	19.8	1.53	5.50
#22 WTN - Black	—	—	—	—	—	—	19.8	1.74	6.27	19.8	2.20	7.90	20.4	2.45	8.81	21.6	2.56	9.20

HOW TO SPECIFY

A	—	700	—	XX	—	XX	—	XX
THREAD TYPE		MODEL 700		BODY/ VALVE		PRESSURE REGULATOR		NOZZLE
ACME				E		70 (4.8)		28
				IC		80 (5.5)		32
				SAM				36
				B				40
								44
								48

751 Series Rotors

SPECIFICATIONS

Radius: 37' to 75' (11.2 m to 22.3 m)

Flow Rate: 7.0 to 37.7 gpm (0.44 to 2.38 l/s)
(1.59 to 8.56 m³/h)

Arc: Full-circle 360°; Adjustable 30° to 345°

Models:

- E:** Electric
- IC:** Integrated Control
- SAM:** Stopamatic
- B:** Seal-A-Matic™ device

Maximum Inlet Pressure:

- Models E and IC:** 150 psi (10.3 bar)
- Models SAM and B:** 100 psi (6.9 bar)

Pressure Regulation Range: 60 to 100 psi
(4.1 to 6.9 bar)

Factory Pressure Settings: 751E/IC available
in 70 and 80 psi (4.8 and 5.5 bar)

Dimensions:

Body Height:

- Models E, IC, SAM:** 12.0" (30.5 cm)
- Model B:** 9.6" (24.5 cm)

Pop-Up Height to Mid-Nozzle:

- Models E, IC, SAM, B:** 2.6" (6.6 cm)

Top Diameter:

- Models E, IC, SAM:** 6.25" (15.9 cm)
- Model B:** 4.25" (10.8 cm)

Nozzle Trajectory:

- Standard:** 25°
- Wind Tolerant:** 12°
- Low-Angle:** 15°

Inlet Threads:

- Models E, IC, SAM:** 1.25" (3.2 cm)
ACME Female Threaded
- Model B:** 1" (2.5 cm) ACME
Female Threaded

Holdback:

- Block:** 10' (3.1 m) of elevation
- SAM:** 15' (4.6 m) of elevation

Rotation Time: 180° in ≤ 90 seconds;
75 seconds nominally

Maximum Stream Height:

- Standard:** 17' (5.2 m)
- Wind Tolerant:** 10' (3.1 m)
- Low Angle:** 12' (3.7 m)

Solenoid: 24 VAC solenoid power
requirement: 0.41 amp inrush current
(9.8 VA); **60 cycle:** 0.20 amp holding
current (4.8 VA); **50 cycle:** 0.23 amp holding
current (5.4 VA)

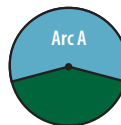
Surge Resistance: Up to 25kV standard
on electric models

**Top-Serviceable Rock Screen™ and
Replaceable Valve Seat:** On models
E, IC, SAM



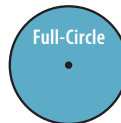
Rapid-Adjust Technology Featuring MemoryArc®

Whether you're catering to grow-in or just trying to get more from a limited water supply, Rapid-Adjust Technology lets your staff make easy arc adjustments with the turn of a screw. MemoryArc retains two part-circle arc settings, so you can shift between full- and part-circle operation in seconds.



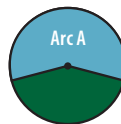
Step 1

Set primary rotor arc.



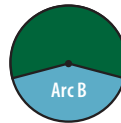
Step 2

Turn the Full/Part Adjustment Screw for full-circle operation.



Step 3

Turn the rotor to either Arc A or Arc B setting, then set to part-circle. No need to reset the arc when changing between full- and part-circle settings.



HOW TO SPECIFY

A	-	751	-	XX	-	XX	-	XX
THREAD TYPE		MODEL		BODY/ VALVE		PRESSURE REGULATOR		NOZZLE
ACME		751		E		70 (4.8)		20
				IC		80 (5.5)		22
				SAM				28
				B				32
								36
								40
								44
								48



COMPATIBLE WITH
Rain Bird® Sod Cup Kit
(See page 19)

NEW

Low Angle Nozzle Housing Kit

The Rain Bird 751 Series low angle nozzle housing kit with 15° trajectory gives the user capability to optimize rotors to meet challenging field conditions such as elevation differences, wind and obstacles.

U.S. Performance Data

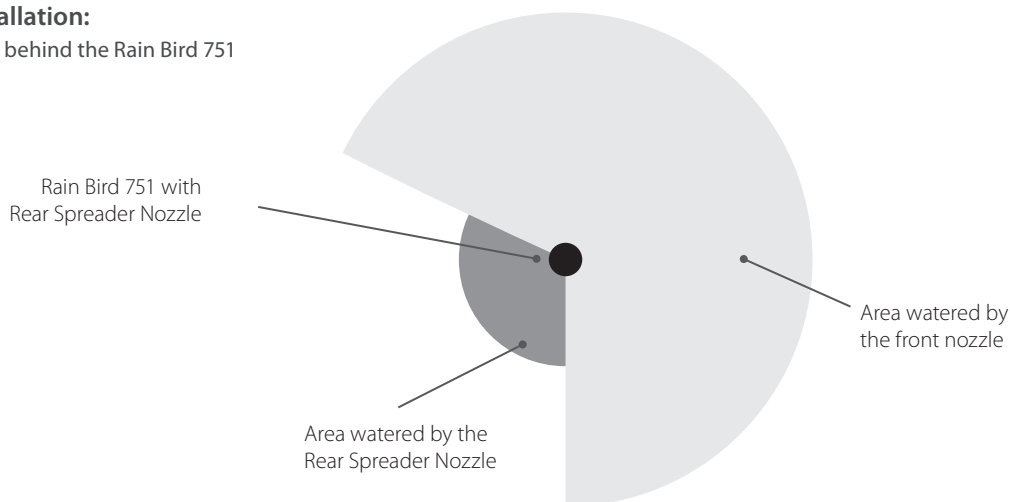
Dual Spreader® Nozzles with Standard and Low Angle (LA) Housings																		
Base Pressure (psi)	50			60			70			80			90			100		
	Radius (ft)	Flow (gpm)	LA (ft)	Radius (ft)	Flow (gpm)	LA (ft)	Radius (ft)	Flow (gpm)	LA (ft)	Radius (ft)	Flow (gpm)	LA (ft)	Radius (ft)	Flow (gpm)	LA (ft)	Radius (ft)	Flow (gpm)	LA (ft)
#20 - Gray	37	32	7.0	39	32	7.8	39	32	8.4	41	34	8.9	—	—	—	—	—	—
#22 - Red	40	40	8.3	45	40	9.5	45	42	10.2	43	41	10.8	—	—	—	—	—	—
#28 - White	55	52	15.2	57	55	16.8	59	56	18.1	59	55	19.3	59	55	20.5	57	56	21.5
#32 - Blue	59	59	17.1	61	61	18.6	61	61	20.0	61	61	21.4	63	62	22.5	63	63	23.9
#36 - Yellow	61	60	19.1	63	63	20.8	65	65	22.6	67	67	24.0	69	69	25.5	69	69	26.5
#40 - Orange	63	62	21.7	67	65	23.8	69	67	25.6	71	67	27.5	71	70	28.9	71	70	30.7
#44 - Green	—	—	—	65	65	26.3	69	69	28.3	71	71	30.4	71	71	32.1	73	73	34.1
#48 - Black	—	—	—	—	—	—	69	69	31.4	73	73	33.7	75	75	35.7	73	73	37.7
Wind Tolerant Nozzles																		
Base Pressure (psi)	50			60			70			80			90			100		
	Radius (ft)	Flow (gpm)		Radius (ft)	Flow (gpm)		Radius (ft)	Flow (gpm)		Radius (ft)	Flow (gpm)		Radius (ft)	Flow (gpm)		Radius (ft)	Flow (gpm)	
#16 WTN - Gray	—	—		60	15.7		62	16.7		62	17.8		64	18.8		66	20.4	
#18 WTN - Red	—	—		63	18.8		63	20.0		65	21.4		67	22.7		67	24.0	
#22 WTN - Black	—	—		—	—		65	27.6		65	35.8		67	37.6		71	41.1	

Metric Performance Data

Dual Spreader™ Nozzles with Standard and Low Angle (LA) Housings																								
Base Pressure (bar)	3.4				4.1				4.8				5.5				6.2				6.9			
	Radius (m)	LA (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	LA (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	LA (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	LA (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	LA (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	LA (m)	Flow (l/s)	Flow (m³/h)
#20 - Gray	11.3	9.8	0.40	1.59	11.8	9.8	0.49	1.77	11.9	9.8	0.53	1.91	12.5	10.4	0.56	2.02	—	—	—	—	—	—	—	—
#22 - Red	12.2	12.2	0.52	1.89	13.7	12.2	0.60	2.16	13.7	12.8	0.64	2.32	13.1	12.5	0.68	2.45	—	—	—	—	—	—	—	—
#28 - White	16.8	15.8	0.96	3.45	17.4	16.8	1.06	3.82	18.0	17.1	1.14	4.11	18.0	16.8	1.22	4.38	18.0	16.8	1.29	4.66	17.4	17.1	1.36	4.88
#32 - Blue	18.0	18.0	1.08	3.88	18.6	18.6	1.17	4.22	18.6	18.6	1.26	4.54	18.6	18.6	1.35	4.86	19.2	18.9	1.42	5.11	19.2	19.2	1.51	5.43
#36 - Yellow	18.6	18.3	1.21	4.34	19.2	19.2	1.31	4.72	19.8	19.8	1.43	5.13	20.4	20.4	1.51	5.45	21.0	21.0	1.61	5.79	21.0	21.0	1.67	6.02
#40 - Orange	19.2	18.9	1.37	4.93	20.4	19.8	1.50	5.41	21.0	20.4	1.62	5.81	21.0	20.4	1.73	6.25	21.6	21.3	1.82	6.56	21.6	21.3	1.94	6.97
#44 - Green	—	—	—	—	19.8	19.8	1.66	5.97	21.0	21.0	1.79	6.43	21.6	21.6	1.92	6.90	21.6	21.6	2.03	7.29	22.3	22.3	2.15	7.74
#48 - Black	—	—	—	—	—	—	—	—	21.0	21.0	1.98	7.13	22.3	22.3	2.13	7.65	22.9	22.9	2.25	8.11	22.3	22.3	2.38	8.56
Wind Tolerant Nozzles																								
Base Pressure (bar)	3.4			4.1			4.8			5.5			6.2			6.9								
	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)						
#16 WTN - Gray	—	—	—	18.3	0.99	3.57	18.9	1.05	3.79	18.9	1.12	4.04	19.5	1.19	4.27	20.1	1.29	4.63						
#18 WTN - Red	—	—	—	19.2	1.19	4.27	19.2	1.26	4.54	19.8	1.35	4.86	20.4	1.43	5.16	20.4	1.51	5.45						
#22 WTN - Black	—	—	—	—	—	—	19.8	1.74	6.27	19.8	2.26	8.13	20.4	2.37	8.54	21.6	2.59	9.33						

Typical Installation:

Watering area behind the Rain Bird 751



751 Series U.S. Performance Data

REAR SPREADER NOZZLES																			
Spreader Nozzle Color	Flow (gpm)	Nozzle Range Main (ft) Rear (ft)		Flow (gpm)	Nozzle Range Main (ft) Rear (ft)		Flow (gpm)	Nozzle Range Main (ft) Rear (ft)		Flow (gpm)	Nozzle Range Main (ft) Rear (ft)		Flow (gpm)	Nozzle Range Main (ft) Rear (ft)		Flow (gpm)	Nozzle Range Main (ft) Rear (ft)		
MAIN NOZZLE #28 – WHITE										MAIN NOZZLE #32 – BLUE									
Pressure (psi)		60		70		80				60		70		80					
Orange	20.00	55.00	25.00	21.40	55.00	23.00	22.80	55.00	23.00	22.10	61.00	29.00	23.40	61.00	29.00	25.20	61.00	29.00	
Green	22.90	51.00	47.00	24.00	53.00	45.00	25.60	51.00	47.00	24.60	57.00	47.00	26.60	59.00	45.00	28.40	59.00	45.00	
Blue	22.63	50.98	44.98	24.39	50.98	44.98	25.27	52.99	44.98	24.57	58.99	42.98	26.55	58.99	44.98	28.27	60.99	44.98	
Black	21.13	52.99	36.98	23.12	52.99	38.98	24.39	50.98	38.98	23.20	58.99	36.98	24.79	56.99	36.98	26.64	58.99	38.98	
Red	21.90	53.00	49.00	23.60	55.00	49.00	25.10	55.00	47.00	24.10	55.00	49.00	25.00	59.00	47.00	26.50	57.00	47.00	
Blue + Diffuser	20.90	57.00	33.00	21.50	55.00	33.00	22.90	55.00	33.00	23.20	61.00	31.00	24.90	61.00	31.00	26.30	61.00	31.00	
Black + Diffuser	19.20	54.99	30.97	29.28	56.99	30.97	21.84	54.99	30.97	20.96	56.99	32.97	22.63	56.99	32.97	24.08	56.99	32.97	
MAIN NOZZLE #36 – YELLOW										MAIN NOZZLE #40 – ORANGE									
Pressure (psi)		60		70		80				60		70		80					
Orange	23.40	61.00	29.00	25.40	63.00	29.00	27.10	63.00	27.00	27.70	69.00	29.00	29.60	69.00	29.00	31.60	71.00	29.00	
Green	26.90	61.00	43.00	29.10	61.00	45.00	30.50	63.00	45.00	30.20	63.00	47.00	32.40	65.00	49.00	34.50	69.00	51.00	
Blue	25.93	58.99	40.98	28.00	60.99	38.98	29.76	60.99	38.98	29.68	62.99	40.98	32.10	64.99	40.98	34.25	66.99	40.98	
Black	26.42	60.99	36.98	27.78	60.99	34.97	29.54	60.99	36.98	28.97	60.99	36.98	31.22	62.99	36.98	34.20	62.99	36.98	
Red	26.10	61.00	45.00	28.20	61.00	43.00	30.20	61.00	43.00	30.40	63.00	47.00	32.80	67.00	45.00	34.70	67.00	45.00	
Blue + Diffuser	24.60	63.00	35.00	26.30	63.00	31.00	27.90	65.00	33.00	28.00	63.00	31.00	30.30	67.00	31.00	32.10	69.00	31.00	
Black + Diffuser	24.48	64.99	34.97	25.67	64.99	34.97	27.12	64.99	34.97	27.21	62.99	30.97	29.46	64.99	30.97	31.30	66.99	30.97	
MAIN NOZZLE #44 – GREEN										MAIN NOZZLE #48 – BLACK									
Pressure (psi)		60		70		80				70		80		90					
Orange	29.30	65.00	27.00	31.70	69.00	27.00	33.70	71.00	27.00	35.00	73.00	29.00	37.60	75.00	29.00	39.70	79.00	29.00	
Green	32.80	65.00	47.00	35.40	67.00	43.00	37.80	69.00	43.00	38.30	71.00	45.00	40.70	77.00	45.00	42.80	77.00	47.00	
Blue	32.27	64.99	38.98	35.00	66.99	38.98	37.16	69.00	38.98	37.47	71.00	40.98	39.49	75.00	38.98	42.27	75.00	38.98	
Black	31.79	64.99	34.97	34.25	66.99	34.97	36.50	71.00	32.97	37.47	75.00	36.98	40.11	77.00	34.97	42.14	78.97	36.98	
Red	32.30	65.00	45.00	34.90	67.00	45.00	37.10	67.00	33.00	37.80	73.00	47.00	40.40	73.00	47.00	42.80	77.00	47.00	
Blue + Diffuser	30.90	67.00	33.00	33.20	73.00	31.00	35.50	73.00	33.00	36.00	77.00	31.00	38.30	77.00	31.00	40.60	77.00	31.00	
Black + Diffuser	29.06	64.99	32.97	31.22	69.00	28.97	33.37	71.00	30.97	35.22	73.00	30.97	37.25	73.00	30.97	39.14	77.00	30.97	



751 Series Metric Performance Data

REAR SPREADER NOZZLES																		
Spreader Nozzle Color	Flow (m³/h)	Nozzle Range Main (m) Rear (m)		Flow (m³/h)	Nozzle Range Main (m) Rear (m)		Flow (m³/h)	Nozzle Range Main (m) Rear (m)		Flow (m³/h)	Nozzle Range Main (m) Rear (m)		Flow (m³/h)	Nozzle Range Main (m) Rear (m)		Flow (m³/h)	Nozzle Range Main (m) Rear (m)	
MAIN NOZZLE #28 – WHITE									MAIN NOZZLE #32 – BLUE									
Pressure (bar)		4.1		4.8		5.5				4.1		4.8		5.5				
Orange	4.54	16.76	7.62	4.86	16.76	7.01	5.18	16.76	7.01	5.02	18.59	8.84	5.31	18.59	8.84	5.72	18.59	8.84
Green	5.20	15.54	14.33	5.45	16.15	13.72	5.81	15.54	14.33	5.59	17.37	14.33	6.04	17.98	13.72	6.45	17.98	13.72
Blue	5.14	15.54	13.71	5.54	15.54	13.71	5.74	16.15	13.71	5.58	17.98	13.10	6.03	17.98	13.71	6.42	18.59	13.71
Black	4.80	16.15	11.27	5.25	16.15	11.88	5.54	15.54	11.88	5.27	17.98	11.27	5.63	17.37	11.27	6.05	17.98	11.88
Red	4.97	16.15	14.94	5.36	16.76	14.94	5.70	16.76	14.33	5.47	16.76	14.94	5.68	17.37	14.33	6.02	17.37	14.33
Blue + Diffuser	4.75	17.37	10.06	4.88	16.76	10.06	5.20	16.76	10.06	5.27	18.59	9.45	5.66	18.59	9.45	5.97	18.59	9.45
Black + Diffuser	4.36	16.76	9.44	6.65	17.37	9.44	4.96	16.76	9.44	4.76	17.37	10.05	5.14	17.37	10.05	5.47	17.37	10.05
MAIN NOZZLE #36 – YELLOW									MAIN NOZZLE #40 – ORANGE									
Pressure (bar)		4.1		4.8		5.5				4.1		4.8		5.5				
Orange	5.31	18.59	8.84	5.77	19.2	8.84	6.16	19.2	8.23	6.29	21.03	8.84	6.72	21.03	8.84	7.18	21.64	8.84
Green	6.11	18.59	13.11	6.61	18.59	13.72	6.93	19.2	13.72	6.86	19.2	14.33	7.36	19.81	14.94	7.84	21.03	15.54
Blue	5.89	17.98	12.49	6.36	18.59	11.88	6.76	18.59	11.88	6.74	19.20	12.49	7.29	19.81	12.49	7.78	20.42	12.49
Black	6.00	18.59	11.27	6.31	18.59	10.66	6.71	18.59	11.27	6.58	18.59	11.27	7.09	19.20	11.27	7.77	19.20	11.27
Red	5.93	18.59	13.72	6.40	18.59	13.11	6.86	18.59	13.11	6.90	19.20	14.33	7.45	20.42	13.72	7.88	20.42	13.72
Blue + Diffuser	5.59	19.20	10.67	5.97	19.20	9.45	6.34	19.81	10.06	6.36	19.20	9.45	6.88	20.42	9.45	7.29	21.03	9.45
Black + Diffuser	5.56	19.81	10.66	5.83	19.81	10.66	6.16	19.81	10.66	6.18	19.20	9.44	6.69	19.81	9.44	7.11	20.42	9.44
MAIN NOZZLE #44 – GREEN									MAIN NOZZLE #48 – BLACK									
Pressure (bar)		4.1		4.8		5.5				4.8		5.5		6.2				
Orange	6.65	19.81	8.23	7.20	21.03	8.23	7.65	21.64	8.23	7.95	22.25	8.84	8.54	22.86	8.84	9.02	24.08	8.84
Green	7.45	19.81	14.33	8.04	20.42	13.11	8.59	21.03	13.11	8.70	21.64	13.72	9.24	23.47	13.72	9.72	23.47	14.33
Blue	7.33	19.81	11.88	7.95	20.42	11.88	8.44	21.03	11.88	8.51	21.64	12.49	8.97	22.86	11.88	9.60	22.86	11.88
Black	7.22	19.81	10.66	7.78	20.42	10.66	8.29	21.64	10.05	8.51	22.86	11.27	9.11	23.47	10.66	9.57	24.07	11.27
Red	7.34	19.81	13.72	7.93	20.42	13.72	8.43	20.42	10.06	8.59	22.25	14.33	9.18	22.25	14.33	9.72	23.47	14.33
Blue + Diffuser	7.02	20.42	10.06	7.54	22.25	9.45	8.06	22.25	10.06	8.18	23.47	9.45	8.70	23.47	9.45	9.22	23.47	9.45
Black + Diffuser	6.60	19.81	10.05	7.09	21.03	8.83	7.58	21.64	9.44	8.00	22.25	9.44	8.46	22.25	9.44	8.89	23.47	9.44

EAGLE 900 Series Rotors

SPECIFICATIONS

Radius: 63' to 97' (19.2 m to 29.6 m)

Flow Rate: 21.4 to 57.1 gpm
(1.35 to 3.60 l/s) (4.85 to 12.97 m³/h)

Arc: Full-circle, 360°

Models:

E: Electric; **IC:** Integrated Control;
SAM: Stopamatic

Maximum Inlet Pressure:

Models E and IC: 150 psi (10.3 bar)
Model SAM: 100 psi (6.9 bar)

Pressure Regulation Range:

60 to 100 psi (4.1 to 6.9 bar)

Factory Pressure Settings:

Models E and IC available in 70 and 80 psi
(4.8 and 5.5 bar)

Dimensions:

Body Height: 13.4" (34.0 cm)
Pop-Up Height to Mid-Nozzle: 2.25" (5.7 cm)
Top Diameter: 7" (17.8 cm)

Nozzle Trajectory: 25°

Inlet Threads: 1.5" (3.8 cm) (15/21) ACME
Female Threaded

Holdback: SAM 15' (4.6 m) elevation

Rotation Time: 360° in ≤ 240 seconds;
210 seconds nominally

Maximum Stream Height: 20' (6.1 m)

Solenoid: 24 VAC solenoid power
requirement: 0.41 amp inrush current
(9.8 VA); **60 cycle:** 0.20 amp holding
current (4.8 VA); **50 cycle:** 0.23 amp
holding current (5.4 VA)

Surge Resistance: Up to 25kV standard
on electric models

**Top-Serviceable Rock Screen™
and Replaceable Valve Seat:**
All 900 models

Features and Benefits

With up to a 97' (29.6 m) throw range, the 900 Series rotors deliver the longest throw radius coverage in a full-circle rotor. The 900 high performance nozzles allow you to reach longer distances with increased droplet size for maximum efficiency and coverage.



HOW TO SPECIFY

A	-	900	-	X	-	XX	-	XX
THREAD TYPE		MODEL		BODY/ VALVE		PRESSURE REGULATOR		NOZZLE
ACME		900		E		70 (4.8)		44
				IC		80 (5.5)		48
				SAM				52
								60
								64

U.S. Performance Data

HIGH PERFORMANCE NOZZLES

#44 Blue			#48 Yellow		#52 Orange		#56 Green		#60 Black		#64 Red	
Base Pressure (psi)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
60	63	21.4	73	28.9	75	31.9	—	—	—	—	—	—
70	67	23.5	73	31.9	79	34.6	83	40.7	87	43.2	91	47.2
80	71	24.7	75	34.1	81	37.1	85	43.5	91	46.4	93	51.0
90	71	26.5	77	35.0	81	39.5	87	46.4	91	49.5	95	54.0
100	73	27.9	77	36.2	83	41.8	89	49.1	91	52.2	97	57.1

Metric Performance Data

HIGH PERFORMANCE NOZZLES

#44 Blue				#48 Yellow			#52 Orange			#56 Green			#60 Black			#64 Red		
Base Pressure (bar)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)
4.1	19.2	1.35	4.85	22.3	1.82	6.56	22.9	2.01	7.25	—	—	—	—	—	—	—	—	—
4.5	19.8	1.42	5.11	22.3	1.89	6.81	23.5	2.10	7.57	25.0	2.48	8.94	26.2	2.63	9.47	27.4	2.88	10.35
5.0	20.7	1.50	5.40	22.4	2.00	7.22	24.2	2.22	8.00	25.5	2.61	9.40	26.8	2.78	10.00	27.9	3.04	10.94
5.5	21.6	1.55	5.59	22.8	2.14	7.72	24.7	2.34	8.41	25.9	2.74	9.87	27.7	2.92	10.52	28.3	3.21	11.56
6.0	21.6	1.64	5.90	23.3	2.19	7.88	24.7	2.45	8.81	26.3	2.87	10.34	27.7	3.20	11.86	28.8	3.35	12.06
6.5	21.9	1.71	6.16	23.5	2.24	8.06	24.9	2.55	9.19	26.8	3.00	10.80	27.7	3.20	11.86	29.2	3.49	12.57
6.9	22.3	1.76	6.35	23.5	2.28	8.22	25.3	2.64	9.49	27.1	3.10	11.15	27.7	3.29	11.86	29.6	3.60	12.97

EAGLE 950 Series Rotors

SPECIFICATIONS

Radius: 70' to 92' (21.3 m to 28.0 m)

Flow Rate: 19.5 to 59.4 gpm (1.23 to 3.75 l/s)
(4.43 to 13.49 m³/h)

Arc: Part-circle, 40° to 345°

Models:

E: Electric; **IC:** Integrated Control;
SAM: Stopmatic

Maximum Inlet Pressure:

Models E and IC: 150 psi (10.3 bar)

Model SAM: 100 psi (6.9 bar)

Pressure Regulation Range: 60 to 100 psi
(4.1 to 6.9 bar)

Factory Pressure Settings: Models E and IC
available in 70 and 80 psi (4.8 and 5.5 bar)

Dimensions:

Body Height: 13.4" (34.0 cm)

Pop-Up Height to Mid-Nozzle: 2.25"
(5.7 cm)

Top Diameter: 7" (17.8 cm)

Nozzle Trajectory: 25°

Inlet Threads: 1.5" (3.8 cm) (15/21) ACME
Female Threaded

Holdback: SAM 15' (4.6 m) elevation

Rotation Time: 180° in ≤ 120 seconds;
105 seconds nominally

Maximum Stream Height: 20' (6.1 m)

Solenoid: 24 VAC solenoid power requirement:
0.41 amp inrush current (9.8 VA);

60 cycle: 0.20 amp holding current (4.8 VA);

50 cycle: 0.23 amp holding current (5.4 VA)

Surge Resistance: Up to 25kV standard on
electric models

Top-Serviceable Rock Screen™ and

Replaceable Valve Seat: All 950 models

Features and Benefits

With up to a 92' (28.0 m) throw range, the 950 Series rotors deliver the longest throw radius coverage in a part-circle rotor. The 950 high performance nozzles allow you to reach longer distances with increased droplet size for maximum efficiency and coverage.

HOW TO SPECIFY					
A	950	X	XX	XX	
THREAD TYPE	MODEL	BODY/ VALVE	PRESSURE REGULATOR	NOZZLE	
ACME	950	E	70 (4.8)	18	26
		IC	80 (5.5)	20	28
		SAM		22	30
				24	32



U.S. Performance Data

DUAL SPREADER™ NOZZLES																
Base Pressure (psi)	#18 White-C		#20 Gray-C		#22 Blue-C		#24 Yellow-C		#26 Orange		#28 Green		#30 Black		#32 Brown	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
60	70	19.5	72	23.0	74	26.5	76	30.8	78	36.0	—	—	—	—	—	—
70	72	21.3	74	25.1	76	28.8	80	33.5	82	38.7	84	42.9	84	47.3	84	50.4
80	74	22.9	76	27.0	80	30.9	84	36.0	84	41.5	86	47.3	86	50.4	85	53.1
90	75	24.4	78	28.7	82	32.9	88	38.4	86	43.4	89	48.5	90	52.9	88	55.6
100	76	25.8	80	30.5	84	34.6	90	40.5	88	46.7	91	52.2	92	55.8	92	59.4

Metric Performance Data

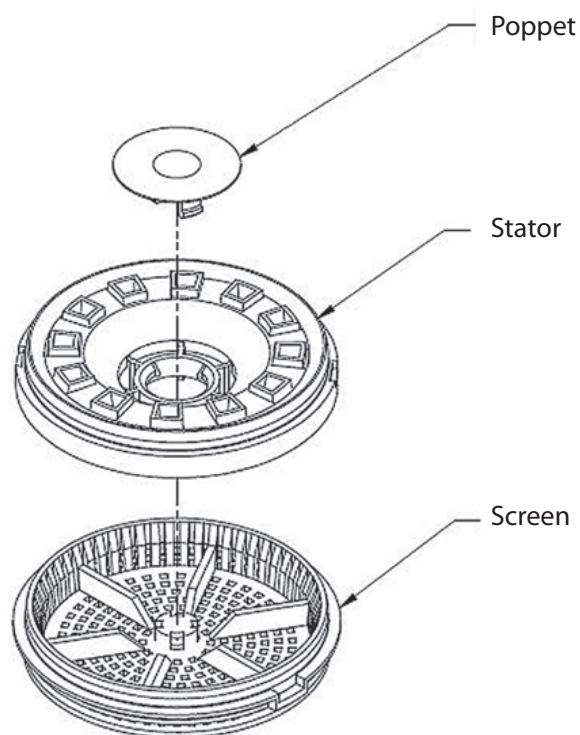
DUAL SPREADER™ NOZZLES																								
Base Pressure (bar)	#18 White-C			#20 Gray-C			#22 Blue-C			#24 Yellow-C			#26 Orange			#28 Green			#30 Black			#32 Brown		
	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)
4.1	21.3	1.23	4.43	21.9	1.45	5.22	22.6	1.67	6.06	23.2	1.94	7.00	23.8	2.27	8.18	—	—	—	—	—	—	—	—	—
4.5	21.7	1.29	4.64	22.3	1.52	5.48	22.9	1.75	6.29	23.8	2.03	7.32	24.4	2.36	8.50	25.2	2.62	9.44	25.2	2.90	—	25.3	3.10	11.17
5.0	22.1	1.37	4.93	22.7	1.61	5.81	23.5	1.85	6.66	24.7	2.15	7.75	25.1	2.49	8.95	25.8	2.78	10.00	25.8	3.03	10.92	25.7	3.22	11.60
5.5	22.5	1.44	5.19	23.2	1.70	6.12	24.4	1.95	7.01	25.6	2.27	8.16	25.6	2.61	9.41	26.2	2.98	10.72	26.2	3.18	11.43	25.9	3.35	12.05
6.0	22.8	1.51	5.44	23.6	1.78	6.40	24.8	2.04	7.34	26.5	2.38	8.56	26.0	2.70	9.73	26.9	3.04	10.93	27.1	3.29	11.85	26.6	3.46	12.46
6.5	23.0	1.58	5.68	24.0	1.86	6.69	25.3	2.12	7.64	27.1	2.48	8.93	26.5	2.83	10.18	27.4	3.16	11.37	27.7	3.42	12.30	27.3	3.61	13.00
6.9	23.2	1.63	5.86	24.4	1.92	6.93	25.6	2.18	7.86	27.4	2.56	9.20	26.8	2.95	10.61	27.7	3.29	11.86	28.0	3.52	12.67	28.0	3.75	13.49



Features	551	700	751	900	950	
Radius	32' to 55' (9.8 m to 16.8 m)	57' to 79' (17.4 m to 23.5 m)	37' to 75' (11.2 m to 22.3 m)	63' to 97' (19.2 m to 29.6 m)	70' to 92' (21.3 m to 28.0 m)	
Flow Rate	6.83 to 13.63 gpm (0.43 to 0.86 l/s) (1.55 to 3.10 m³/h)	16.3 to 43.8 gpm (1.03 to 2.76 l/s) (3.70 to 9.95 m³/h)	7.0 to 37.7 gpm (0.44 to 2.38 l/s) (1.59 to 8.56 m³/h)	21.4 to 57.1 gpm (1.35 to 3.60 l/s) (4.85 to 12.97 m³/h)	19.5 to 59.4 gpm (1.23 to 3.75 l/s) (4.43 to 13.49 m³/h)	
Arc	Full-circle 360° Adjustable 30° to 345°	Full-circle 360°	Full-circle 360° Adjustable 30° to 345°	Full-circle 360°	Adjustable 40° to 345°	
Models	Full- and Part-Circle 551E: Electric 551IC: Integrated Control 551SAM: Stopamatic 551B: Seal-A-Matic™	Full-Circle 700E: Electric 700IC: Integrated Control 700SAM: Stopamatic 700B: Seal-A-Matic™	Full- and Part-Circle 751E: Electric 751IC: Integrated Control 751SAM: Stopamatic 751B: Seal-A-Matic™	Full-Circle 900E: Electric 900IC: Integrated Control 900SAM: Stopamatic	Part-Circle 950E: Electric 950IC: Integrated Control 950SAM: Stopamatic	
Maximum Inlet Pressure	Models E and IC: 150 psi (10.3 bar) Models SAM and B: 100 psi (6.9 bar)	Models E and IC: 150 psi (10.3 bar) Models SAM and B: 100 psi (6.9 bar)		Models E and IC: 150 psi (10.3 bar) Model SAM: 100 psi (6.9 bar)		
Pressure Regulation Range	60 to 100 psi (4.1 to 6.9 bar)		60 to 100 psi (4.1 to 6.9 bar)		60 to 100 psi (4.1 to 6.9 bar)	
Factory Pressure Settings	E and IC: Available in 70 and 80 psi (4.8 and 5.5 bar)		E and IC: Available in 70 and 80 psi (4.8 and 5.5 bar)		E and IC: Available in 70 and 80 psi (4.8 and 5.5 bar)	
Body Height	Models E, IC, SAM: 12.0" (30.5 cm) Model B: 9.6" (24.5 cm)		Models E, IC, SAM: 12.0" (30.5 cm) Model B: 9.6" (24.5 cm)		13.4" (34.0 cm)	
Pop-Up Height	2.6" (6.6 cm)		2.6" (6.6 cm)		2.25" (5.7 cm)	
Top Diameter	Models E, IC, SAM: 6.25" (15.9 cm) Model B: 4.25" (10.8 cm)		Models E, IC, SAM: 6.25" (15.9 cm) Model B: 4.25" (10.8 cm)		7" (17.8 cm)	
Nozzle Trajectory	51 Nozzle: 12° 52, 53, 54 Nozzles: 25°		Standard: 25° Wind Tolerant: 12°	Standard: 25° Wind Tolerant: 12° Low-Angle: 15°	25°	
Inlet Threads	Models E, IC, SAM: 1.25" (3.2 cm) ACME Female Threaded Model B: 1" (2.5 cm) ACME Female Threaded		Models E, IC, SAM: 1.25" (3.2 cm) ACME Female Threaded Model B: 1" (2.5 cm) ACME Female Threaded		1.5" (3.8 cm) (15/21) ACME Female Threaded	
Holdback	Block: 10' (3.1 m) of elevation SAM: 15' (4.6 m) of elevation		Block: 10' (3.1 m) of elevation SAM: 15' (4.6 m) of elevation		SAM: 15' (4.6 m) elevation	
Rotation Time	360° in ≤ 180 seconds; 150 seconds nominally	180° in ≤ 90 seconds; 75 seconds nominally	360° in ≤ 180 seconds; 150 seconds nominally	180° in ≤ 90 seconds; 75 seconds nominally	360° in ≤ 240 seconds; 210 seconds nominally	180° in ≤ 120 seconds; 105 seconds nominally
Maximum Stream Height	51 Nozzle: 5' (1.5 m) 52, 53, 54 Nozzles: 13' (4.0 m)		Standard: 17' (5.2 m) Wind Tolerant: 10' (3.1 m)	Standard: 17' (5.2 m) Wind Tolerant: 10' (3.1 m) Low-Angle: 12' (3.7 m)	20' (6.1 m)	
Solenoid	24 VAC solenoid power requirement		24 VAC solenoid power requirement		24 VAC solenoid power requirement	
Surge Resistance	Up to 25kV standard on electric models with the GBS-25 solenoid		Up to 25kV standard on electric models		Up to 25kV standard on electric models	
Top-Serviceable Rock Screen™ and Replaceable Valve Seat	E, IC, SAM		E, IC, SAM		E, IC, SAM	

Golf Rotor Stator Configuration

Nozzle	Pressure Settings psi (bar)				All SAM and B
	60 (4.1)	70 (4.8)	80 (5.5)	100 (6.9)	
551					
#51-Blue*	S-4	S-4	S-4	S-4	S-4
#52-Beige*	S-4	S-4	S-4	S-4	S-4
#53-Gray*	S-4	S-4	S-4	S-4	S-4
#54-Red*	S-8	S-8	S-8	S-8	S-8
700					
#28-White	SPC	SPC	SPC	SPC	SPC
#32-Blue	SPO	SPO	SPO	SPO	SPO
#36-Yellow	SPO	SPO	SPO	SPO	SPO
#40-Orange	SNP	SNP	SNP	SNP	SNP
#44-Green	SNP	SNP	SNP	SNP	SNP
#48-Black	N/R	SNP	SPR	SPR	SNP
#16 WTN	SPC	SPC	SPC	SPC	SPC
#18 WTN	SPO	SPO	SPO	SPO	SPO
#22 WTN	N/R	SNP	SNP	SNP	SNP
751					
#20-Gray*	S-4	S-4	S-4	S-4	S-4
#22-Red*	S-8	S-8	S-8	S-8	S-8
#28-White	SPC	SPC	SPC	SPC	SPC
#32-Blue	SPO	SPO	SPO	SPO	SPO
#36-Yellow	SPO	SPO	SPO	SPO	SPO
#40-Orange	SNP	SNP	SNP	SNP	SNP
#44-Green	SNP	SNP	SNP	SNP	SNP
#48-Black	SNP	SPR	SPR	SPR	SNP
#16 WTN	SPC	SPC	SPC	SPC	SPC
#18 WTN	SPO	SPO	SPO	SPO	SPO
#22 WTN	N/R	SNP	SNP	SNP	SNP
900					
#44-Blue	SPC	SPC	SPC	SPC	SPC
#48-Yellow	SPC	SPC	SPC	SPC	SPC
#52-Orange	SPC	SPO	SPO	SPO	SPO
#56-Green	N/R	SNP	SNP	SNP	SNP
#60-Black	N/R	SNP	SPR	SPR	SPR
#64-Red	N/R	SPR	SPR	SPR	SPR
950					
#18C-White	SPC	SPC	SPC	SPC	SPC
#20C-Gray	SPC	SPC	SPC	SPC	SPC
#22C-Blue	SPC	SPC	SPC	SPC	SPC
#24C-Yellow	SPC	SPC	SPO	SPO	SPO
#26-Orange	SPO	SPO	SPO	SPO	SPO
#28-Green	N/R	SNP	SPR	SPR	SPR
#30-Black	N/R	SNP	SPR	SPR	SPR
#32-Brown	N/R	SNP	SPR	SPR	SPR

**Key:**

SPC = Stator Poppet Closed

SPO = Stator Poppet Open

SNP = Stator No Poppet

SPR = Spacer

SO = Screen Only

S4 = Stator with four holes

S8 = Stator with eight holes

N/R = Not a recommended pressure and nozzle combination

* Requires low-flow valve

Swing Joints

Featuring superior flow characteristics and excellent structural integrity, these swing joints are designed to deliver the performance you expect from Rain Bird while saving you money. They are available in a wide range of configurations. Rain Bird® Swing Joints are the perfect complement to our golf series rotors.

SPECIFICATIONS

Diameter: 1" (2.5 cm), 1 ¼" (3.2 cm) and 1 ½" (3.8 cm)

Lay Arm Lengths: 8" (20.3 cm), 12" (30.5 cm) and 18" (45.7 cm)

Inlet Type: NPT, BSP, ACME and spigot

Outlet Thread Type: NPT, BSP or ACME

Enlarging NPT, BSP or ACME Outlets: Available on 1" (2.5 cm) and 1 ¼" (3.2 cm) swing joints for connections to many rotors with 1 ¼" (3.2 cm) and 1 ½" (3.8 cm) inlet sizes respectively (no additional adapters required)

Inlet Configurations: Standard side or top-mount connections to lateral lines

Outlet Configuration: Single-top or triple-top for added rotor positioning flexibility

Pressure Rating: 315 psi (21.7 bar) at 73°F (22.8°C)

Reducing ACME Inlet: Available on 1 ¼" (3.2 cm) diameter swing joints for connection to a 1 ½" (3.8 cm) ACME service tee

Superior Flow Characteristics. An innovative swept elbow design reduces pressure loss by up to 50 percent over other swing joints.

Excellent Structural Integrity. Reduces the costs associated with fatigue-related failures.

Double O-ring Protection. Provides a better seal to ensure that joints are kept clean and can be repositioned easily.

Modified ACME Outlet. Improves safety by losing seal engagement before losing thread engagement during rotor removal.

Color-coding and Distinct Size Markings. Reduce costs by eliminating errors and improving installation efficiency with quick size identification at the job site.

Oversized Threaded Inlets. Make hand-tightening and blind installations (underwater) easier. This also reduces the risk of potential damage caused by over-tightening with a wrench.

Extended Warranty. When used with Rain Bird golf rotors, extends rotor and swing joint warranty to five years.

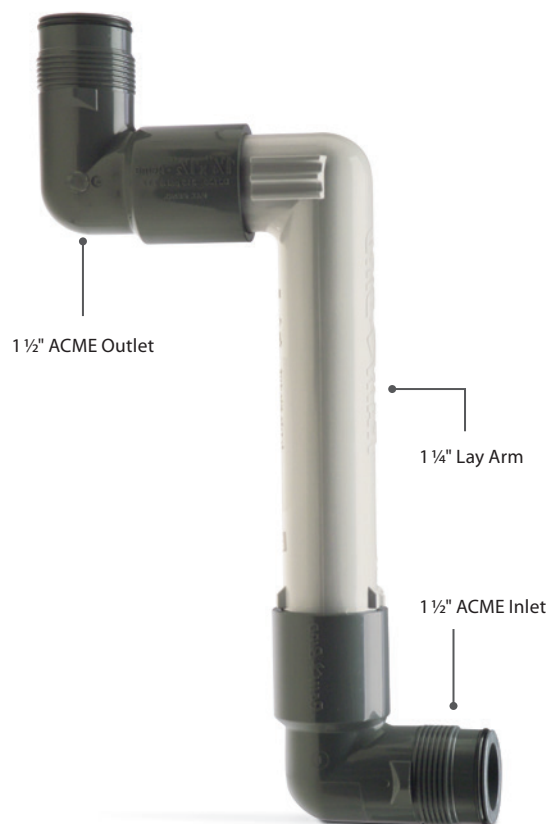
ALSO AVAILABLE

NPT and BSP ACME Adapters

If you currently have NPT or BSP swing joints, you can now enjoy the benefits of ACME-threaded rotors by utilizing a Rain Bird NPT-ACME or BSP-ACME side of the adapter. Just screw the adapter into the inlet on the ACME case, and then screw the rotor with the adapter onto the NPT or BSP swing joint until it is snug.



Available for 1", 1 ¼", and 1 ½" swing joints, the adapter adds only about 1 ⅜" to the installed height of the rotor, and is rated at the same operating pressures as Rain Bird Swing Joints.



HOW TO SPECIFY*

J - X	-	X	-	X - 00	-	X	-	X
LENGTH		CONFIG		CONFIG		INLET STYLE		OUTLET STYLE
Lay Pipe Arm		0 = Standard 1 = Triple Top		0 = Standard 1 = Top Mount		1 = NPT 2 = BSP 3 = ACME 4 = Spigot R = Reducing ACME Inlet ‡		1 = NPT 2 = BSP 3 = ACME 4 = Enlarging NPT † 6 = Enlarging ACME Inlet †
A = 1" 8"								
B = 1" 12"								
C = 1" 18"								
D = 1 ¼" 8"								
E = 1 ¼" 12"								
F = 1 ¼" 18"								
G = 1 ½" 8"								
H = 1 ½" 12"								
I = 1 ½" 18"								

*Not all configurations are available. †Enlarging outlet available only on 1" and 1 ¼" diameter models ‡Reducing inlet available on 1 ¼" diameter models

Service Tools

Rain Bird offers a full line of quality tools for the service and maintenance of Rain Bird golf rotors. Constructed of heavy-duty metal alloys and durable plastic, these tools are lightweight and easy to use.



D02203 – Snap-Ring Pliers 900/950/1100/1150



Y05100 – Rotor Tool



B41720 – Selector Service Tool/Key



D02236 – Snap-Ring Pliers 551/700/751



D02237 – Installation Socket for Top-Serviceable Rock Screen



D05205 – Universal Hose Adapter



B41730 – Valve Insertion Tool 900/950



236571 – UF Cable Stripper



D02215 – 7" Selector Valve Key



B41710 – Valve Insertion Tool 551/700/751



D02221 – 18" Selector Valve Key



Sod Cup Kit

Enhance the playability and appearance of your course with easy-to-install sod cups. Turf growth directly on top of the rotor eliminates the need to trim around heads while keeping it easily accessible for service.





Desert Highlands Golf Club

Central Control Technologies

The Right Level of Control — Right Now.

Designed to deliver real-time responses to changing conditions, Rain Bird® Central Control systems simplify irrigation management. Easy-to-use programming, advanced features like Rain Watch™, and MI Series™ mobile control helps your crew quickly create detailed programs that efficiently manage water.

Timeless Compatibility™ assures your Rain Bird software and its future updates will work with your existing Rain Bird field hardware.



Options to Fit Any Course

Our Central Control products are compatible with all Rain Bird golf field control systems.

- Cirrus™
- Nimbus™ II
- Stratus™ II
- StratusLT™



Cirrus™

Our most advanced option, Cirrus controls many of golf's most sophisticated irrigation systems. GPS geo-referenced images. State-of-the-art ET-based scheduling. Cirrus delivers the most innovative features in an intuitive package that lets you spend less time dealing with issues and more time achieving solutions.



Nimbus™ II

Nimbus delivers advanced features with simple administration, ideal for saving time and effort while maintaining premier playing conditions. ET-based scheduling, precise flow management and real-time adjustments help you get the most out of every drop of water.



Stratus™ II and StratusLT™

Offering two options, the Stratus platform is an excellent choice for simple-time or ET-based scheduling. Choose to start with the basics, or upgrade to more advanced capabilities. With either system, Rain Bird delivers the ease and convenience you want in a Central Control system, aiding superior turf and playing conditions throughout the year.

Specifications	Cirrus	Nimbus II	Stratus II	StratusLT
Map-Based Control	Up to 3 Courses (54 Holes)	Up to 3 Courses (54 Holes)	Up to 2 Courses (27 Holes)	Up to 18 Holes
Programs	Unlimited	Unlimited	500	250
Schedules	Up to 50 per Program	Up to 50 per Program	Up to 25 per Program	Up to 25 per Program
Interfaces	Up to 12	Up to 8	Up to 2	1 (Not expandable)
Satellite Stations	Up to 32,256	Up to 21,504	Up to 5,376	Up to 672
IC™ Stations	Up to 36,000	Up to 24,000	Up to 6,000	Up to 750
Pump Stations	Up to 6	Up to 6	Up to 6	Up to 2
Weather Stations	Up to 5	Up to 5	1	1 (WS-PRO LT only)
Hybrid Communication	Up to 12 Interfaces	Up to 8 Interfaces	Up to 2 Interfaces	—

		Cirrus™	Nimbus™ II	Stratus™ II	StratusLT™
Features	Real-time decision making	✓	✓	✓	✓
	Radio communication option	✓	✓	✓	✓
	Works with Rain Bird Integrated Control™ System (ICS)	✓	✓	✓	✓
	Works with all Rain Bird satellites	✓	✓	✓	✓
	Works with Rain Bird decoders	✓	✓	✓	✓
	Works with Rain Bird MI Series™ Mobile Controller	✓	✓	✓	✓
	Works with The FREEDOM System™	✓	✓	✓	✓
	Maximum number of interfaces - Hybrid (same or mix)	12	8	2	1
	Number of ICS™ wire groups (paths) standard	4	4	1	1
	Maximum number of ICS™ stations	36,000*	24,000‡	6,000§	750
	Number of 2-wire satellite wire groups (paths) standard	4	4	2	1
	Maximum number of 2-wire satellite wire groups	48**	32**	8**	1
	Maximum number of 2-wire satellite stations	32,256**	21,504**	5,376**†	672
	Maximum number of wireless satellite stations	32,256**	21,504**	5,376**†	672
	Number of decoders/solenoids standard	500/1,000	500/1,000	500/1,000	200/400 ◊
	Maximum number of decoders/solenoids	6,000/12,000 Δ	4,000/8,000 Δ	700/1,400 Δ	300/600 with LDI
	Number of simultaneously active decoder solenoids per interface	40/LDI	40/LDI	40/LDI	15/LDI
	Maximum number of weather stations	5	5	1	1 (WS-PRO LT only)
Programming	Maximum number of pump stations	6	6	6	2
	Standard/QuickIRR™/SimpleIRR™	✓	✓	✓	✓
	Number of courses	3	3	2	1
	Number of holes	54	54	27	18
	Number of Flo-Zones™	999	999	999	999
	Programs	Unlimited	Unlimited	500	250
	Schedules	50 per program	50 per program	25 per program	25 per program
	Irrigation programs - active simultaneous	50	50	20	10
	Temporary Program adjust	✓	✓	✓	✓
	Temporary Schedule adjust	✓	✓	✓	✓
Software Features	Temporary Station adjust	✓	✓	✓	✓
	Flo-Manager® - Dynamic Power and Hydraulic Optimization	✓	✓	✓	✓
	Flo-Guard™	✓	✓	✓	✓
	ET Management (Fully Automatic)	✓	✓	✓	✓
	ET-Based Scheduling - Irrigation by Volume	✓	✓	✓	✓
	Minimum ET Operation	✓	✓	✓	✓
	ET Spreadsheet™ Analysis	✓	✓	✓	✓
	Advanced IC™ diagnostics with pinpoint accuracy	✓	✓	✓	✓
	Wireless satellite radio diagnostics	✓	✓	✓	✓
	Comprehensive decoder diagnostics	✓	✓	✓	✓
	Real-Time Operation Log	✓	✓	✓	✓
	Report Generation	✓	✓	✓	–
	Water budgeting 0-300%	✓	✓	✓	✓
	Rain Bucket™ - accumulated rainfall allowance	✓	✓	✓	✓
	Rain Sensor	✓	✓	✓	✓
	Rain Watch™ - respond and use rain events immediately	✓	✓	✓	✓
	QuickStart™ - system setup and run irrigations in minutes	✓	✓	✓	✓
	Help Screens	✓	✓	✓	✓
	Course Monitor™	✓	✓	✓	✓
	Hole View	✓	✓	✓	✓
	DryRun™ - projected flow and runtimes	✓	✓	✓	✓
	Course View™ - map based graphical view of course	✓	✓	✓	✓
	Import GPS, CAD, and/or Aerial photos	✓	✓	✓	✓
	Virtual Monitoring and Control - area	✓	✓	✓	✓
	Virtual Monitoring and Control - individual stations	✓	✓	✓	–
	Smart Weather™ - monitoring and alarms	✓	✓	✓	–
	Precipitation Data	✓	✓	✓	✓
	Rotor Data	✓	✓	✓	✓
	Cycle + Soak™	✓	✓	✓	✓
	Smart Weather™	✓	✓	✓	✓
	Multiple Weather Stations	✓	✓	✓	–
	Hybrid - System expansion with additional interfaces (same or mix)	✓	✓	✓	–
	Station Layers - Map/Operations	✓	✓	✓	–
	Rain Bird Messenger - email alerts	✓	✓	✓	✓
	Smart Pump™	✓	Keycode Module Option	Keycode Module Option	Keycode Module Option
	Additional Wire Groups (path) - expand from standard	✓	✓	Keycode Module Option	–

MI Series™ Mobile Controllers

Remote access to your central control is now as convenient as the Internet, with mobile control. This software runs on your central control computer to provide remote irrigation control via a web-enabled device or smart phone.

Rain Bird® MI Series mobile controllers are designed to work on a smartphone or tablet with Internet connectivity and offer greater remote operation capabilities than anything else available.

When connected to the Internet, up to nine (9) remote users can simultaneously control sprinklers and programs, review system activity or directly change settings on both sprinklers and irrigation programs. All activity is logged and viewable in MI at the central control for convenient review.

MI Series mobile controllers also include the MI FREEDOM user interface. MI FREEDOM provides two smartphone interfaces for users to implement traditional FREEDOM commands: 1) Handheld radio keypad for users with handheld radio keypad experience. 2) Soft keyboard interface for use of The FREEDOM System™ commands on a standard smartphone virtual keyboard.

MI Series Mobile controllers now include the Command Console input method. Combining the speed of MI FREEDOM keypad input with the convenience of drop down action menus, Command Console is the most powerful and fastest activity control method available for manual activation, deactivation, status checks and remote programming.

SYSTEM REQUIREMENTS

- Rain Bird Central Control.
- Requires an Internet connection to the central control.
- Requires a web-enabled smart phone or tablet with a data plan.

HOW TO SPECIFY

MI	-	XXXX(X)
MODEL		CONTROL TYPE
MI		ADVAN = Advanced PROF = Professional

Software license only —
phone or tablet not included.

Feature Comparison

Link Name	Advanced	Professional
Satellites (Areas)/Stations	X	X
Programs/Schedules	X	X
Diagnostics		X
Accessories		X
Alarm Log		X
Cancel All	X	X

Accessories

Link Name	Advanced	Professional
Water Budget		X
Demand Flow	X	X
Smart Pump™		X
Smart Weather™		X
Activity Log	X	X
Online Users	X	X

Available Options

	Advanced	Professional
PROGRAMS		
Execute	X	X
Get Status	X	X
Edit Data	X	X
SCHEDULES		
Execute	X	X
Get Status	X	X
Edit Data	X	X



The FREEDOM System™

The FREEDOM System handheld provides reliable, two-way communication with your Rain Bird system. Use it to choose from command-based or schedule-based operations, making irrigation adjustments a snap. Either way, The FREEDOM System puts you in control of your irrigation management system wherever you are.

SYSTEM FEATURES AND BENEFITS

- **Two-way Communication with Rain Bird Centrals.** Audio response at radio indicates command received by central.
- **Station- and Program-Based Commands.** Provides the flexibility to turn ON or OFF any station or an entire area with the click of a few buttons.
- **FREEDOM-Based Commands Recorded at Central.** Irrigation activity logged at the central whether stations turned ON with FREEDOM System or with central.
- **Optional Flo-Manager® Bypass.** Permits FREEDOM user to bypass Flo-Manager.
- **Optional Operating Window.** Allows user to define FREEDOM usage hours, which helps superintendents to control irrigation activity.
- **Two-Way Voice Communication.**
- **Telephone Operation.** All FREEDOM commands can be activated using a telephone connection.

RADIO FEATURES AND BENEFITS

Weather-resistant and reliable. The NX-3320-k3 handheld radio is built to survive the drops, hard-knocks and weather environments of its users. The NX-3320-k3 meets or exceeds the demanding MIL-STD "driven rain" standard, which guarantees water-resistant performance even in wet weather.

- **LCD Display.** 4-line basic (2-line main/sub-LCD, icon & key guide) with 14 characters; 5-line text message frame (3 lines of text, icon & key guide).
- **Extra-Long Battery Life.** 1400 mAh batteries deliver more than nine (9) hours of operating time on a single charge (5-5-90 duty).
- **One-Year Warranty.**
- **MIL-STD 810 C/D/E/F Environmental Tests.** Meets or exceeds the stringent IP/54/55 dust and IP67 water intrusion standards and full range of tough MIL-STD 810 C, D, E, F and G environmental standards in categories such as vibration, shock, dust, humidity, rain, temperature, solar radiation and atmospheric pressure.



SPECIFICATIONS

Frequency: 450 – 470 MHz (Narrowband)

NOTE: Site survey and license required

Power:
100 V/110 V: 60 Hz

HOW TO SPECIFY

FREEDOM	–	SP
MODEL FREEDOM		CONTROL TYPE SP



Rain Can

A Rain Can working in tandem with our patented Rain Bird® Rain Watch™ technology responds in real time to rain events; reducing wear and tear and creating a more efficient, intelligent system.

FEATURES AND BENEFITS

- The industry's first active rainfall monitoring and response system.
- The only system designed to automatically react to rainfall and adjust sprinkler application rates to take full advantage of natural rain, thereby eliminating over-watering.
- Saves water and electricity, while keeping the course drier and more playable, by pausing, adjusting or canceling irrigation in the event of rainfall.
- Results in reduced wear and tear on irrigation system components.
- An integral part of Rain Bird® Central Control Software versions 4.0 and higher.

HOW RAIN WATCH MANAGES RAINFALL

- Stationed throughout the course, up to four (4) high-resolution Rain Watch rain cans collect rainfall data.
- Each irrigation program can be set to react to any one of the available rain cans.
- The central control system continuously polls each rain can.
- Rainfall data received by the system is used to make intelligent decisions based on user-defined responses:

System Response: For course-wide reactions

Program Response: For program-specific responses

No-Action Response: For monitoring only

Intelligent Responses Include:

- Pause
- Resume
- Adjust runtimes and resume
- Cancel

AN EXAMPLE OF RAIN WATCH IN ACTION

- Your daily irrigation schedule calls for 0.20 inches (0.51 cm) of precipitation.
- A storm begins and once accumulated rainfall reaches your desired 0.04-inch (0.10 cm) threshold, Rain Watch suspends irrigation.
- The storm passes after putting down 0.11 inches (0.28 cm) of rain.
- Rain Bird software automatically adjusts remaining runtimes for active stations, as well as those stations yet to run.
- Natural precipitation is seamlessly integrated into scheduled irrigation, resulting in a water savings of 0.11 inches (0.28 cm).



Weather Stations

Rain Bird offers two Weather Station options to help meet your course's unique irrigation management needs. Both WS-PRO2 and the WS-PRO LT provide evapotranspiration (ET) management and reporting capabilities; while only the WS-PRO2 offers optional intelligent alarm and irrigation control responses through Rain Bird's powerful Smart Weather™ software.

FEATURES AND BENEFITS

Superior ET Model. Rain Bird's Central Control Systems use weather sensor input to determine ET rates based upon a field-proven proprietary equation for ET.

Automatic ET Download/Selective Usage. Automatically download weather data daily and calculate ET to determine irrigation times for the entire system or by specific areas, holes or stations.

ET Override. Allows you to easily set certain programs to ignore ET values when determining run times.

Rain Bucket. Allows rainfall from one day to be carried over to the following day(s) for more accurate ET calculations.

Multiple Station Capacity. Connect up to five (5) weather stations to one central control system for more precise ET values based upon different weather conditions and micro climates around the golf course.

Max Rainfall. User-defined maximum rainfall can be set to limit the amount of acceptable rainfall for specific soil types or other areas that are subject to high run-off.

Weather Data Reports. Generate reports to show current or past weather conditions by the hour, day, week, month or year.

Unlimited Data Storage. Store unlimited weather data at the central control.

Multiple Languages. Choose from 10 different languages (English, French, German, Italian, Japanese, Korean, Portuguese, Spanish, Swedish or Chinese).

English or Metric Measurement Units. Easily select between English or Metric units of measure.

The WS-PRO2 Weather Station along with Rain Bird's Smart Weather Software supports alarms when thresholds are exceeded in:

- Rain
- High or low ambient temperatures
- High winds
- Rainfall intensity

When any of these alarms exceed user-defined thresholds in a programmed time period, the system will initiate an alarm condition. The alarms will automatically reset when temperature, rain or wind conditions are again within acceptable ranges for irrigation.

Automatic Shut Off/Turn On. Rain Bird Central Control Systems automatically shut OFF irrigation operation for the entire system or in specific areas of the course (tee box, fairway, green, etc.) when alarm conditions are detected at the weather station. They also automatically turn ON irrigation when weather conditions return to the acceptable range for irrigation.

Automatic Pause/Resume. Rain Bird Central Control Systems automatically suspend irrigation to the entire system or specific areas (tee box, fairway, greens, etc.) when alarm conditions are detected. They also automatically resume irrigation when weather conditions return to the acceptable range for irrigation.

Automatic Notification. The WS-PRO2 Weather Station, using Rain Bird® Messenger™, can automatically notify you wherever you are — at the central control, via text messaging or e-mail — when alarm conditions exist.

HOW TO SPECIFY

WS – XXXX (XX)	–	XX	–	X
MODEL		CONNECTION		POWER
PRO2 = Professional Series		SH = Short Haul		Blank = User Supplied
PRO LT = Professional Light Series				S = Solar Powered

WS-PRO LT

WS-PRO2



Atlanta Athletic Club

IC System™

A Revolutionary, Yet Simple Approach to Field Control.

Achieving optimal playing conditions isn't so much an issue of working harder, it's working smarter. Add the Rain Bird intelligent and intuitive IC System with IC CONNECT™ and you're on your way. Communicate directly with every rotor on your course, and gain one-of-a-kind property management with IC CONNECT. With an intuitive interface operated from a computer, tablet or mobile device, the IC System puts control in your hands, anywhere.



Streamlined Installation and Expansion

- Cut installation cost and time by eliminating unneeded wire, trenching and splices.
- Minimize labor costs during expansion by simply connecting new IC rotors to any existing MAXI™ Wire.

Pinpoint Diagnostics and Control

- 45 seconds for 1000+ stations.
- Narrow in on potential problems and resolve issues quickly to prevent turf damage and unnecessary labor costs.
- Bring greater precision and water savings to areas requiring supplemental watering (hot spots, greens, grow-ins).

IC Rotors and Valves

SPECIFICATIONS

System Capacity*: 750 ICMs per Output Wire Path, 1,500 ICMs per Output Driver Board, 3,000 ICMs per IC Interface (ICI), up to 36,000 ICMs with Cirrus™

ICI Electrical Specifications:

115 VAC: Nominal 98-132 VAC

220-240 VAC: Nominal 208-255 VAC

100 VAC: Nominal 91-110 VAC

Electrical Output: 28.5 VAC, 1.25 AMP Per Wire Path

Active Stations: No electrical limit — only limited by hydraulics of pipe network and size of pump station

ICM Current Requirements: Varies based on wire path length — Nominal Current Draw is 0.33 mA on 5,000 feet (1,500 meters) of wire

Grounding Requirements: Integrated Control Surge Device (ICSD) to be grounded to 50 ohms or less every 500 feet (150 meters) or 15 ICMs, whichever is less. The central control to be grounded to 10 ohms or less of resistance

Compliance: CE, FCC, UL

Environment:

Working Range: 32° F to 122° F (0° C to 50° C)

Storage Temperature: -40° F to 150° F (-40° C to 65° C)

Operating and Storage Humidity: 100%

Dimensions:

ICM: 2.23" x 1.70" (57 mm x 43 mm)

ICSD: 2.00" x 1.41" (51 mm x 43 mm)

Compatibility: Rain Bird 500/550 Series Rotors, Rain Bird 551 Series Rotors, Rain Bird 700/751 Series Rotors, Rain Bird EAGLE™ 700 and 900 Series Rotors**, Rain Bird 900 Series Rotors and Rain Bird PEB, PESB, PESB-R, PGA, EFB, BPE and BPES electric valves

Maximum Wire Paths:

Cirrus: 12 interfaces, 48 wire paths

Nimbus: 8 interfaces, 32 wire paths

Stratus II: 2 interfaces, 8 wire paths

StratusLT: 1 interface, 1 wire path

* Specific System Capacity is dependent on the Central Control System

** **NOTE:** EAGLE™ Rotors sold before 6/2009 will have a random orientation of the ICM relative to the Selector Housing

HOW TO SPECIFY — ROTORS

A	—	XXX	—	IC	—	XX	—	XX
THREAD TYPE		MODEL		BODY		PRESSURE REGULATOR		NOZZLE
ACME		551		IC		70 (4.8)		See nozzle charts for each rotor model.
		700				80 (5.5)		
		751						
		900						
		950						

For exact combinations of Rotors (Nozzles and Pressure Regulator), see pages 6–15 for correct model.

HOW TO SPECIFY — VALVES

XXX	—	XXX(X)
SIZE		MODEL
100		PESIC
150		PESIC-R
200		EFIC-CP
300		BPESIC

NOTE: IC Valve Kit must be ordered separately. See page 31.

For exact combinations of Valves (size), see pages 54–56 for correct model.



IC Module

FEATURES AND BENEFITS

Timeless Compatibility. The Integrated Control Module (ICM) is compatible with all Rain Bird golf rotors, making hardware and software updates simple and easy.

Simple to Install. Requires up to 90% less wire than traditional satellite control systems and 50% fewer splices than a traditional decoder system.

Cost Savings. Fewer splices and less wire require less time and effort to install the system.

System Database Management. The ICM offers a tear-off bar code for easy scanning into the central control system database. As soon as the ICM is connected to a live wire path with address entered, the station is operational.

Reliable Control. The IC System is a simple yet sophisticated controller. Built using Rain Bird's proven solenoid technology with on board computer redundancy.

Easier to Design. The IC System is easier to design – only simple calculations are required. It eliminates an array of troublesome considerations – there are no controllers to design around or conceal and no looped wires.

Easier Maintenance. The IC System is capable of intelligent, two-way communication with each and every ICM and IC CONNECT on the golf course.

Dependable. The IC System is designed to always turn off if problems occur. When the wire path is damaged or cut, or if central control communication is lost, the ICM is designed to turn off automatically with built-in redundancy.

True "Below 30 Volt Control System". As the IC System wire path output is 28.5 Volt, the IC System is a "true less than 30 Volt" control system. A lower than 30 Volt system is considered a low voltage system and is typically not subjected to code requirements regarding deep burial of the wire path.

Below Ground Control. Since the ICM is built right into the rotor or valve, the entire control system is below ground. Unlike field controller systems, the below-ground system offers protection against damage from vandalism, flooding and wildlife.

Golf Course Aesthetics. Since the IC System control is designed to be entirely below ground, the golf course vistas are clear of irrigation components as envisioned by the golf course designer.

Central Control "Smart Features". With the IC System, you have the ability to utilize all of Rain Bird's Central Control "Smart Features" including: Minimum ET,™ Smart Weather,™ Smart Pump™ mapping with custom graphics, and superior monitoring of system operation.

Surge Resistance. Each ICM has 20kV of onboard surge resistance standard.

HOW TO SPECIFY — ICI

ICI	—	XXXX	—	XXX
MODEL		STATION COUNT		POWER
ICI		1500 = 1 Driver Board*		100 = 100 VAC
		3000 = 2 Driver Boards*		120 = 120 VAC
				230 = 230 VAC

* Each driver board has two-wire paths.
See page 23 for the number of wire paths enabled per central control system.

IC Valve Kit Now you can get the Integrated Control Module and valve adapter preassembled and ready for installation with the IC Valve Kit.



For information regarding the IC System Wire Path Design, see the table in the Appendix, page 100.

IC CONNECT™

IC CONNECT allows you to feed more data into your system with IC-IN and remotely control field equipment using IC-OUT.

FEATURES AND BENEFITS

Simple and Elegant Design. IC-IN can be connected to any IC System MAXI® wire path (wire path can be shared with multiple ICM, IC-OUT or IC-IN devices).

- Each IC-IN is equivalent to 15 ICMs and each IC-OUT is equivalent to 1 ICM towards the maximum 750 ICMs per MAXI wire path
- Each IC-IN and IC-OUT is equivalent to 1 ICM for determining placement of ICSD surge protection devices
- Built-in 20kV surge protection

Hybrid Capabilities. When connected to an ICI interface, IC-IN and IC-OUT can be used in a hybrid design configuration with Satellite field controllers and/or decoders.

SPECIFICATIONS

Environment:

Operating Temperature: 14° F to 125° F (-10° C to 51° C)

Storage Temperature: -40° F to 150° F (-40° C to 65° C)

Operating and Humidity: 75% max at 40° F to 180° F (4° C to 42° C)

IC System™ Field Wiring Voltage: 26-28.5 VAC (max)

Dimensions:

Excluding Wires: 3.71" x 2.70" x 1.66" (94 mm x 69 mm x 42 mm)

Wire Length: 24" (61 cm)

Sensor Types Supported:

Voltage: 0-10VDC

Current: 4-20mA DC

IC-IN Contact Closure:

Pulse Counting: 50% duty cycle 1kHz (max)

Pulses in 10 Seconds: 50% duty cycle 1kHz (max)

Pulses per Second: 50% duty cycle 1kHz (max)

Wiring Connections:

Red: MAXI wire Red

Black: MAXI wire Black

Red/White:

IC-IN: Sensor (+)

IC-OUT: Output (+)

Black/White:

IC-IN: Sensor (-)

IC-OUT: Output (-)

IC-IN

Collect information from multiple field sensors:

- Rain cans
- Flow sensors
- Lake level sensors

HOW TO SPECIFY

IC -	IN
MODEL	INPUT / OUTPUT
IC	IN



Simplified Design

By eliminating up to 90% of the wire and all decoders and satellites, IC System protects the aesthetics of your course while streamlining installation, maintenance and expansion.



IC-OUT

Centralize ON and OFF control of non-irrigation products around the facility:

- Transfer pumps
- Greens fans
- Fountains and water features
- Lighting

HOW TO SPECIFY

IC	OUT
MODEL	INPUT / OUTPUT
IC	OUT



Medalist Golf Club

Field Controllers

Unparalleled Compatibility. Unmatched Quality.

Compatible with any Rain Bird® Central Control system, Rain Bird field controllers deliver the trusted performance that golf course professionals rely on to maximize course appearance and playability. From best-in-class satellite systems to reliable field decoders, you'll get a full range of solutions that make irrigation scheduling, adjustments and maintenance easier.



Easy to Use

From pre-coded addressing for easy installation of decoders to the modular configuration for easy expansion on PAR+ES controllers, Rain Bird field controllers are designed for easier installation, programming and expansion.

Proven Performance

Every Rain Bird field controller is built and tested to endure decade after decade. Controllers feature premium surge protection, extensive diagnostics and a best-in-class pedestal enclosure. Decoders are no exception with industry proven surge containment and water-tight housing.



PAR+ES Controller

The easy-to-program Rain Bird® PAR+ES Controller is compatible with any Rain Bird Central Control system and any other Rain Bird Controller. It features up to 72-Station capability, unlimited programs with central control, premium surge protection, extensive diagnostics and best-in-class pedestal enclosure.

FEATURES AND BENEFITS

Communication. Standalone, two-wire and LINK™.

Central Control Ready. Works with any Rain Bird® Central Control system. End-users can access controller via The MI Series™ Mobile Controller* or FREEDOM System™.

- Dynamic Flo-Manager®
- Smart Pump™
- Smart Sensor™
- Smart Weather™

Easy to Use. Large, raised control buttons with clear, descriptive icons and a high-contrast Liquid Crystal Display (LCD) panel make programming easy. Lights indicate active schedules and central control status, while unique copy/paste function speeds programming process. An angled keypad aids visibility as well as water drainage, and makes the PAR+ES controller extremely easy to use.

Greater Water Precision. The PAR+ES controller allows you to program six (6) automatic and two (2) manual schedules. It allows you to turn on a maximum of 16 solenoids at 60 Hz and 12 solenoids at 50 Hz, and features four (4) control modes — giving you ample programming and operating control.

Modular Configuration Allows Easy Expansion. The PAR+ES is available in any configuration and can be easily upgraded in 8-station increments. By simply plugging in an 8-station Output Station Module (OSM) you can expand your PAR+ES controller capabilities to accommodate any configuration.

Multi Manual with Station and Program Stacking. Perfect for syringing or putting down fertilizer, multi manual allows you to manually launch up to 16 stations at one time. Split second delayed start prevents water hammer and high inrush current.

Multiple Schedule Operation. No schedule limit when operated with Rain Bird Central Control systems.

Universal Performance Simplifies Installation and Operation. The intuitive PAR+ES Controller reduces installation and training hassles with its many universal features. For quick electrical hookups, the system automatically senses and adjusts for either a 50 or 60 Hz current; while one (1) transformer accommodates 100 V/120 V, 220 V or 230 V/240 V with the flip of a switch. The PAR+ES Controller also displays system activities and accepts user input in eight (8) different languages. The icon-driven controls and multilingual display eliminate confusion and translation problems.

Mix and Match. Mix and match with any other Rain Bird Controller and with any Rain Bird Central Control system.

Enclosed Electronics. Provides the best protection against the elements.

16-Solenoid Simultaneous Operation. Heavy-duty transformer permits simultaneous operation of up to 16 solenoids (12 at 50 Hz).

Irrigation Control. Variable or weekday programming, for weekday cycle or for irrigation every other day, every three (3) days or up to every nine (9) days.

Water Budget. Increase or decrease run times on a schedule in 10% increments from 0 to 200%.

Simplified Installation. Supplied templates make install easier.

Front Panel Lighting. Illumination LEDs and backlit faceplate buttons make programming easy even in poor lighting.

Large Capacity Terminal Strip. Accepts up to two (2) 14-gauge wires per station.

Standard Station Lights and Switches. OSM lights provide easy identification of active stations — turn stations on or off quickly for easy operation and troubleshooting.

Premium Surge Protection. Premium surge protection included in all models.

Sensor Response. Sensor activation cancels irrigation at controller.

Master Valve Activation. Activate master valve output with station activation.

Available PAR+ES Retro Kit. Extends the useful life of older satellites by converting to PAR+ES water-saving technology (see page 37).

The flexible PAR+ES can be ordered in the following configurations:

- PAR+ES standalone controller in a plastic pedestal.
- PAR+ES satellite with two-wire module in a plastic pedestal.
- PAR+ES satellite with LINK (wireless) module in a plastic pedestal.

All configurations are offered with a weather-proof and impact-resistant plastic pedestal.

Buy only the control you need today, and increase your operating capabilities or change your communication method at any time.

*Software required

HOW TO SPECIFY

PAR ES	XX	X	S
MODEL	STATION COUNT	CONFIGURATION	OSM TYPE
PAR ES	16 [‡] 24 32 [‡] 40 48 56 [‡] 64 72	Blank = Standalone 2 = Two-wire L = LINK**	S = OSMs with Station Switches

NOTE: Expandable up to 72-Station count by adding OSMs.

**LINK Radios must be ordered separately from controller.

‡ Only options available in standalone configuration.



SPECIFICATIONS

Station Capacity: 72 stations, up to 16 solenoids operating simultaneously (60 Hz) (12 @ 50 Hz)

Electrical Input: (50/60 Hz); 117 VAC Nominal 98 to 132 VAC; 220 VAC Nominal 208 to 232 VAC; 240 VAC Nominal 225 to 255 VAC

Electrical Output: 26.5 VAC, 5.25 AMP

Station Load Capacity: Up to four (4) 24 VAC, seven (7) VA solenoids per station

Plastic Pedestal Dimensions:

Width: 17" (43.2 cm)

Height: 34 3/4" (88 cm)

Depth: 21" (53.4 cm)

Programs: As many programs as possible with Rain Bird Central Control Systems or six (6) automatic (12 start times each) and two (2) manual in standalone mode

Water Budget: 0 to 200% in 10% increments



Station Runtimes: One (1) to 120 minutes, in one (1) minute increments

Languages: English, French, German, Italian, Japanese, Portuguese, Spanish and Dutch

Grounding Requirements: Less than 10 ohms

Compliance: UL & C-UL Listed, CE approved, C-Tick Compliant and FCC

PAR+ES Retro Kit

The PAR+ES Retro Kit is the perfect controller upgrade for low budget retrofit to extend the life of your irrigation system.

FEATURES

Installation: Installs in any existing Rain Bird small plastic or stainless steel pedestal.

Versatile Configurations: Available as standalone, hardwired¹ or wireless². Hardwired and wireless configurations have real-time two-way communication with central control. In wireless mode, up to four controllers can share a single radio.

Expandable: 16-station configuration up to 48-station using plug-in 8-station output station modules with switches and station LED.

SPECIFICATIONS

Water Budget: 0 to 200% in 10% increments

Station Runtimes: One (1) to 120 minutes, in one (1) minute increments

Configurations: Standalone, hardwired and wireless

Programs: No limit with Rain Bird Central Control systems. Six (6) automatic (12 start times each) and two (2) manual programs

Schedule: Variable day watering (up to nine (9) days), custom day-of-the-week by program

Electrical Input: 117 VAC $\pm$ 10% (60 Hz); 220 VAC (50 Hz)

Electrical Output: 26.5 VAC, 3 AMP

Station Load Capacity: Up to four (4) 24 VAC, seven (7) VA solenoids per station

Languages: English, French, German, Italian, Japanese, Portuguese, Spanish and Dutch

¹Requires interface module not included.

²Requires additional transformer.

PAR+ES Sat Decoder Controller

The PAR+ES Sat Decoder combines the features and benefits of a satellite controller with those of a decoder system. The advantages include:

- Easy Installation
- Reduced Installation Costs
- Easy Expansion

The Idea is Simple:

- Install the controller.
- Install a single two-wire path to control all the sprinklers.
- Install decoder between wire path and each sprinkler head.
 - Uses up to 80 percent fewer wires than conventional controllers
 - Built-in diagnostic tools
 - Compatible with all Rain Bird Golf Decoders (FD-101, FD-102, FD-202, FD-401 and FD-601)
 - Simply attach new decoder to the wire path
 - Operates as a standalone controller or add a Rain Bird® Central Control system for greater control
 - Operates up to 72 decoder addresses
- Program controller with decoder address.

SPECIFICATIONS

Station Capacity: 72 decoder addresses, up to 16 solenoids operating simultaneously (60 Hz)

Configurations: Standalone, two-wire and LINK

Electrical Input: (50/60 Hz); 115 VAC Nominal 98 – 132 VAC; 220 VAC Nominal 208 – 232 VAC; 240 VAC Nominal 225 – 255 VAC

Electrical Output: 26.5 VAC, 5.25 AMP

Station Load Capacity: Up to two (2) 24 VAC, seven (7) VA solenoids per station depending on decoder type

Plastic Pedestal Dimensions:

Width: 17" (43.2 cm)

Height: 34¾" (88 cm)

Depth: 21" (53.4 cm)

Programs: As many programs as possible with Rain Bird Central Control systems or six (6) automatic (12 start times each) and two (2) manual in standalone mode

Water Budget: 0 – 200% in 10% increments

Station Runtimes: One (1) – 120 minutes, in one (1) minute increments

Languages: English, French, German, Italian, Japanese, Portuguese, Spanish and Dutch

Grounding Requirements: Less than 10 ohms

Compliance: UL & C-UL Listed, CE approved, C-Tick Compliant and FCC

Maximum Wire Length Between Controller and Decoder:

#12 AWG:

Star Design: 3.8 miles (6.1 km)

Loop Design: 15.2 miles (24.4 km)

#14 AWG

Star Design: 2.4 miles (3.8 km)

Loop Design: 9.6 miles (15.2 km)

Maximum Wire Length Between Decoder and Rotor: 456 ft (#14 AWG)

Maximum Wire Paths: Four (4), plus multiple branches per wire path

HOW TO SPECIFY

PAR ES-DEC - X - 72

MODEL	CONFIGURATION
PAR ES	Blank = Standalone
	2 = Two-wire
	L = LINK*

*LINK Radios must be ordered separately from controller.



Decoders

A proven technology on golf courses around the world, Rain Bird decoders provide best-in-class field control on centrally controlled irrigation systems. Installed underground and featuring simple, low-cost wiring, decoders are an aesthetically pleasing, full-featured, economical option for reliable in-field control.

FEATURES AND BENEFITS

- Improve aesthetics and reduce costs with buried in-field controls.
- Easy system expansion — simply splice into the communication line and add additional decoders.
- Installation requires up to 80 percent less wire than conventional controller systems.
- Electronic components are completely encapsulated to protect against the elements.
- Underground decoders reduce the chance of damage from wildlife, vandals or natural disasters.
- Pre-coded addressing eliminates confusion associated with switch-based addressing.
- With the addition of Rain Bird's Decoder Programming Unit (DPU), decoder addresses can be reassigned if necessary.

A Cost-Effective Alternative

A simple wiring configuration and absence of valve boxes keeps installation and maintenance costs low. Rain Bird decoders are a "true lower than 30 Volt" system that utilize a two-wire path of 14-gauge wire connecting the central control system, decoders and valves or valve-in-head sprinklers.

Simple, Reliable Control

If you're looking for an alternative to satellites, Rain Bird decoders may be the right solution for you. These decoders for your central control system are simple, robust and reliable. They work with your central control system just like satellites but are buried underground away from the elements.

Sensor Capability

If you need information from analog, pulse or switch sensors to manage your irrigation, connect the sensor to the SD-210 sensor decoder and view the data at the central. Using Smart Sensor™, sensor data can even be used to control the irrigation.

Excellent for Renovations

Thanks to advanced central control technology and simple wiring requirements, decoders are a smart choice for many golf course renovations. Using Cirrus™, Nimbus™ II, and Stratus™ II Central Control systems with Rain Bird's hybrid feature capabilities, Field Control systems and IC can be mixed and matched on one computer. This makes it easy to expand irrigation coverage using a minimal amount of wire and decoders.

Protect Against the Elements

With all electronic components fully sealed within a water-tight enclosure and buried underground, damage from floods, frost, rodents or vandals is virtually eliminated. Rain Bird decoders are an especially good choice for flood plains.

An Out-of-Sight Solution

Buried decoder systems leave nothing exposed to the elements. With no evidence of in-field control, this aesthetically pleasing alternative works perfectly in situations where satellites are unwanted or impractical.

In-Field Control Options

The addition of decoders doesn't mean the elimination of in-field control. Decoders can be turned on and off in the field with The FREEDOM System™ or MI Series™ mobile controllers*. The MI Series mobile controller allows precise control of the decoder system anywhere Internet access is available. Another alternative is The FREEDOM System. This handheld radio remote allows you to signal changes to the central control system from anywhere on the course.

The Right Amount of Control

Select different decoders to operate one, two, four or six solenoids. Five different decoders let you choose the amount of control you need.

HOW TO SPECIFY

FD - XXX

MODEL	DECODER TYPE
101	Single Address (1 solenoid)
102	Single Address (up to 2 solenoids)
202	Dual Address (up to 4 solenoids)
401	Four Addresses (up to 4 solenoids)
601	Six addresses (up to 6 solenoids)



* Additional software required

Basic Data for a Decoder System

Decoder addresses per LDI interface unit: 500 maximum[‡]

Decoder addresses per SDI interface unit: 200 maximum

Active solenoids per LDI (with 20 mA current draw each): 40 maximum

Active solenoids per SDI (with 20 mA current draw each): 15 maximum

Active solenoids per two-wire path on LDI (with 20 mA current draw each): 20 maximum

Active solenoids per two-wire path on SDI (with 20 mA draw current each): 15 maximum

Maximum allowable voltage drop per two-wire path: 9 Volts

For LDI or SDI Lights: 15 mA (total)[◊]

For each inactive FD-101 or FD-102 decoder: 0.5 mA each

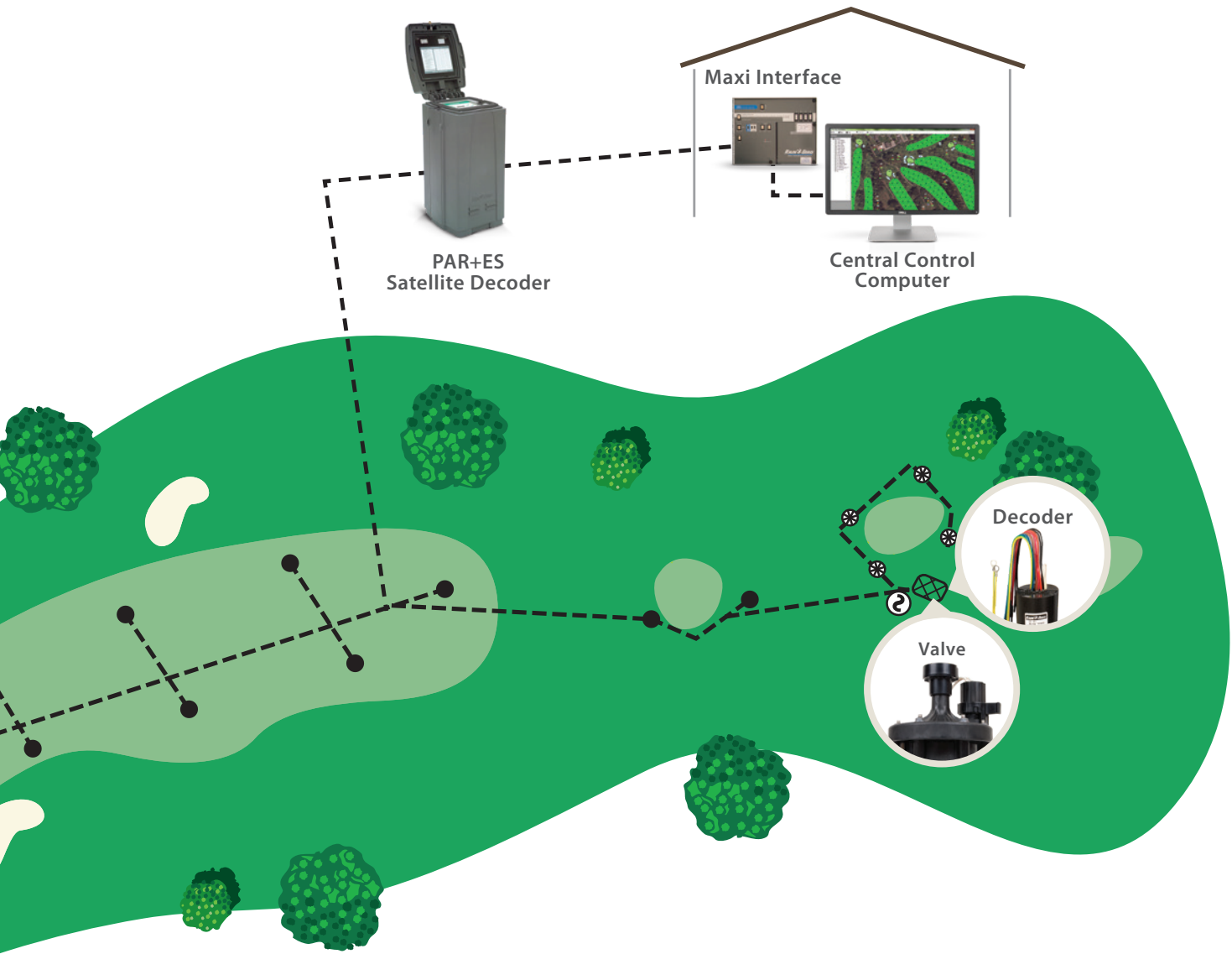
For each inactive FD-401, FD-202 or FD-601 decoder: 1.0 mA each

Golf Black Solenoid (GBS25) coil: 20 mA each

LSP-1 Installation: No more than 8 decoders between two LSP-1 surge arrestors or no more than 500 ft., whichever is less. LSP-1 ground grid resistance of 50 ohms or less is recommended.



[‡] Although the LDI can handle a maximum of 500 decoder addresses total. With any number over 380, the number of active decoders you will be able to operate simultaneously may be reduced. [◊] Although the LDI and SDI can supply 1,000 mA and 500 mA respectively, allow 50 mA of safety factor (design 950 mA with a LDI and 450 mA with a SDI)



Maximum Critical Path Lengths for Two-Wire Paths

Nominal Wire Size	ohms/1000' ohms/Km	Loop (Nominal Wire Size)		Star	
		Km	Miles	Km	Miles
2.5 mm**	15.00 ohms/Km	12.0	7.5	3.0	1.8
14 AWG	2.58 ohms/1000*	15.2	9.6	3.8	2.4
12 AWG	1.62 ohms/1000*	24.4	15.2	6.1	3.8
10 AWG	1.02 ohms/1000*	39.2	24.4	9.8	6.1

Characteristic Table for Various Decoder Models

Decoder Model	Number of Address per Decoder	Maximum Number of Solenoids per Address	Maximum Addresses Operating at Once	Current Draw (mA at Rest per Decoder)
FD-101	1	1	1	0.5 mA
FD-102	1	2	1	0.5 mA
FD-202	2	2	2	1.0 mA
FD-401 *	4	1	4	1.0 mA
FD-601 *	6	1	4	1.0 mA

Design Criteria

Condition	Cirrus™	Nimbus™ II	Stratus™ II	StratusLT™
Maximum resistance in critical path	33 ohms	33 ohms	33 ohms	33 ohms
Maximum number of addresses per wire path **	250	250	250	200
Maximum number of addresses per LDI	500	500	500	300
Maximum number of addresses per SDI	200	200	200	200
Maximum number of active solenoids per wire path	20	20	20	15
Recommended interface unit	LDI	LDI	LDI	SDI
Maximum number of active solenoids per recommended interface ^Δ	40	40	40	15
Golf Black Solenoid (GBS2S)	20 mA	20 mA	20 mA	20 mA
Hybrid system max number of interfaces per system (LDI, SDI)	12	8	2	1

Maximum Wire Lengths for Secondary Path Wire Runs

Wire Size	1.5 mm**	2.0 mm**	2.5 mm**	16.0 AWG	14.0 AWG	12.0 AWG
Meters	100	133	166	88	139	220
Feet	328	436	545	289	456	720

* Has LSP-1 surge protection built-in. ** A wire path is the leg coming off the LDI, SDI or LTB. ΔThe number of decoders on a large system with long wire runs may reduce the number of active decoders that you will be able to operate at one time before the interface maximum current draw is exceeded and the interface shuts down (disconnects from the field wiring).

WC100 Wire Connectors

Install Faster

When your installation crew is making countless wire connections on a jobsite, why slow them down with unnecessary work steps? Use Rain Bird® Wire Connectors to get the job done faster.

Reduce Inventory

This is the only wire connector you'll need. It is ideal for use on two-wire control systems.

- Use for standard controllers, valve boxes and soil moisture sensors.
- Wire combinations ranging from 22ga to 6ga.
- Use on connections from 24 VAC to 600 VAC.
- UL 486D certified for direct burial.

Avoid Call Backs

Locating and repairing a corroded wire splice costs time and money. Avoid unnecessary service, due to splicing. Use Rain Bird Wire Connectors for reliable connections.

- The strain relief ensures wires are secure and won't pull apart.
- Waterproof silicone sealant protects against corrosion.
- UV-resistant material ensures product performance does not degrade even after long periods of exposure to sunlight.

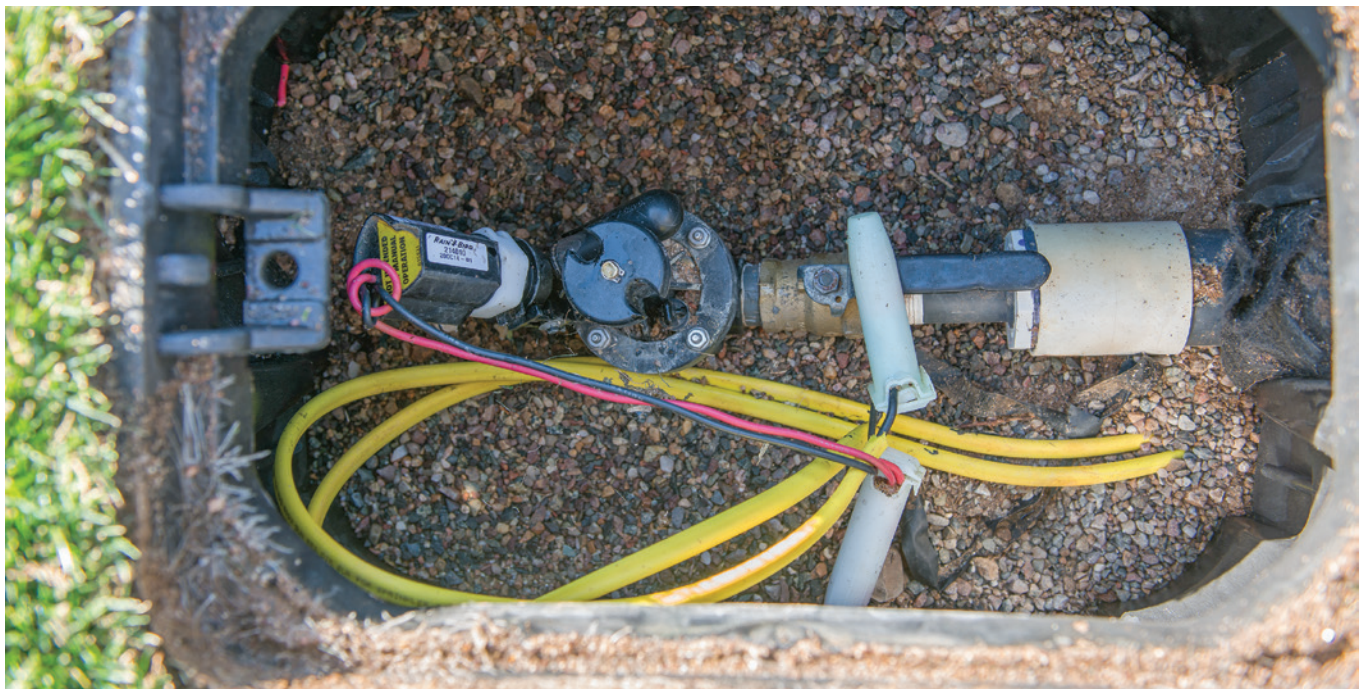


HOW TO SPECIFY

WC	-	XXX
WIRE CONNECTOR		PACK
WC		100

FEATURES AND BENEFITS

- Direct-bury silicone-filled tube with strain relief
- UL 486D listed and 600V rated waterproof and corrosion-proof
- Patented snap-fit lid provides strain relief
- UV- and impact-resistant
- Excellent for above-ground or direct-bury applications
- Pre-filled with silicone that never hardens
- Includes Red Nut Connector
- Wire Range: Red #6 – #22
- Perfect for Two-Wire Decoder Systems, Field Controllers or Integrated Control Systems (ICS)





Atlanta Athletic Club

Pump Stations and Filtration

System-Powering Performance and Efficiency.

Rain Bird applies our world-leading irrigation expertise to the design and manufacture of golf pump stations and filters. As part of a fully integrated Rain Bird irrigation system, these pump stations bring real-time response to your pump, monitoring the operation of the pump and maximizing flow throughout the irrigation cycle. You'll get reduced water use, lower energy costs and less wear and tear on your pump station.

RAIN BIRD®

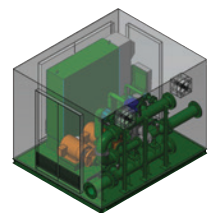
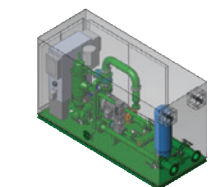


Designed for Durability

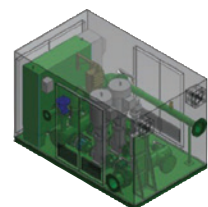
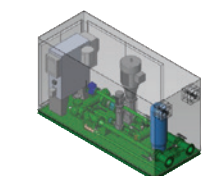
Rain Bird® pump stations and filters are built to the highest quality standards. Whether it's a sophisticated suppression system that reduces the risk of electronic component damage or a durable polyester powder coating that protects the appearance of your investment, these pumps and filters offer enduring performance.

A Fit for Any Environment or Budget

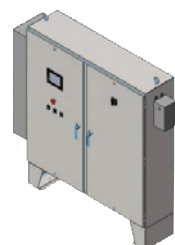
Every Rain Bird pump station is custom built for the specific requirements of your course, offering a variety of options that make it easier to achieve the most efficient performance possible.



HORIZONTAL PUMPS						
	Pump Direction and Number	Motor (with VFD)	Max psi (bar)	Max gpm (lps) (m³/h)	Enclosure	Display
HES1	One horizontal end suction pump	15 to 60 HP	125 psi (8.6 bar)	600 gpm (37.8 lps, 136.3 m³/h)	Aluminum	Monochrome touch-panel Optional color touch-panel
HES2	Two horizontal end suction pumps	15 to 60 HP	125 psi (8.6 bar)	1200 gpm (76 lps, 409 m³/h)	Aluminum	Monochrome touch-panel Optional color touch-panel
HES3	Three horizontal end suction pumps	20 to 60 HP	125 psi (8.6 bar)	1800 gpm (114 lps, 409 m³/h)	Aluminum	Monochrome touch-panel Optional color touch-panel

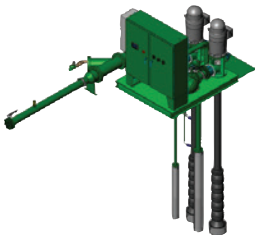
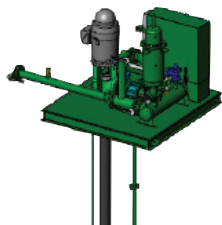


VERTICAL PUMPS						
	Pump Direction and Number	Motor (with VFD)	Max psi (bar)	Max gpm (lps) (m³/h)	Enclosure	Display
VM1	One vertical multistage pump	15 to 60 HP	155 psi (10.7 bar)	500 gpm (31.5 lps, 113.6 m³/h)	Aluminum	Monochrome touch-panel Optional color touch-panel
VM2	Two vertical multistage pumps	15 to 60 HP	150 psi (10.3 bar)	1000 gpm (63.1 lps, 227 m³/h)	Aluminum	Monochrome touch-panel Optional color touch-panel

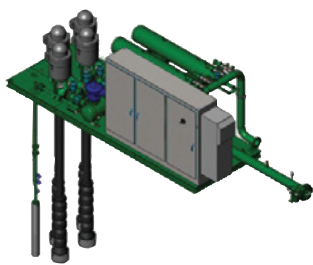
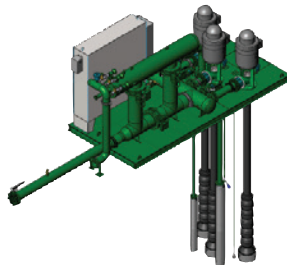
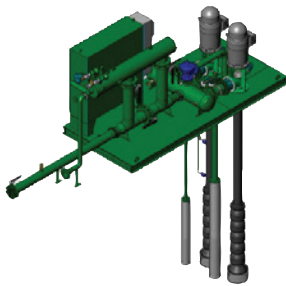


PANEL ONLY			
	Number of Pumps	Motor Type	Additional Accessories
Panel	Controls 1 to 10 pumps up to 100 HP each	VFD or VPM	Flow meter and pressure transducer included

Ask about our retrofit options for existing panels.



COMPACT DECKS		
Features	VT1	VT2
Motor (with VFD)	15 to 75 HP	25 to 75 HP
Max psi (bar)	140 psi (9.7 bar)	140 psi (9.7 bar)
Max gpm (lps) (m³/h)	800 gpm (51 lps, 181 m³/h)	1600 gpm (101 lps, 363 m³/h)
Display	Color touch-panel	Color touch-panel



LARGE DECKS			
Features	VT2	VT3	VT4
Integrated Filtration	Yes	Yes	Yes
Motor (with VFD)	20 to 100 HP	40 to 100 HP	40 to 100 HP
Max psi (bar)	140 psi (9.7 bar)	140 psi (9.7 bar)	140 psi (9.7 bar)
Max gpm (lps) (m³/h)	2000 gpm (126 lps, 454 m³/h)	3000 gpm (189 lps, 681 m³/h)	4000 gpm (252 lps, 908 m³/h)
Display	Color touch-panel	Color touch-panel	Color touch-panel

VT-Custom

- Custom-designed to meet your requirements.
- Provide us with your specifications.
- Five or more motors
- Multiple filter configurations

Remote Pump Station Access

Rain Bird's user interface is a network ready design that allows for remote access via PC, laptop, tablet, smart phone or any web-enabled mobile device. The screen always formats properly to the remote device and allows complete control and monitoring of the golf pump station. This remote accessibility provides Rain Bird customers the confidence to control their pumping systems when they are away from the course.

Electrical Design

Rain Bird® pump stations are UL508A listed and use the industry's best surge suppression, reducing the risk of electronic component damage that could lead to inconvenient and costly downtime. This design includes full heavy-duty circuit breaker integration providing the ultimate protection with the best serviceability.

Backup Pressure Regulation

Every station comes with a properly sized pressure relief valve to provide automatic pressure regulation in the event of an overpressure situation.

VFD Per Motor (VPM) Option

Rain Bird offers the industry's most comprehensive catalog of customer-focused solutions, including a VFD for each main motor on a multi-pump station. This option provides superior flow and pressure regulation, and eliminates mechanical switching components, increasing uptime. It also provides a level of efficient backup pressure regulation that a pressure relief valve or butterfly valve cannot deliver.

Durable Polyester Powder-Coating

Rain Bird's in-house steel-grit blasting system assures all exterior surfaces of the pump station are prepared to white metal specification standards and allows for the best coating adhesion. The polyester powder-coat Rain Bird applies is far more durable than competitive solvent-based multi-layer coatings. In fact, Rain Bird's powder-coating process scores a 10 out of 10 on an ASTM corrosion test provided by Sherwin Williams. Other industry pump stations scored four (4) out of 10 on the very same test. In addition, the powder-coating process is considered very environmentally friendly.

Engineered Pump Station Skid Design

Using 3D modeling, the channel steel skid frame is engineered for strength and rigidity. This engineered design reduces vibration and eliminates the need for raised, extra-thick steel plates under the pump heads, which can be a trip hazard. The deck is the industry's strongest and longest lasting with continuously welded smooth steel plate. In addition, Rain Bird follows industry standards and manufacturers' recommendations for station components such as the proper specifications for flow meters.

Advanced Controls

With the industry's leading touch screens, Rain Bird continues to innovate by offering sizes up to 15". Beyond being network ready, this interface offers up to 20 years of historical memory capability and USB backup. With features such as filtration integration, water feature control, lake level control, pump lockouts, auto set point adjustment per pump, motor starts protection, and many more, Rain Bird has driven pump station innovation in the golf industry for the last decade.

Real-Time System Integration

Rain Bird pump stations have Pump Manager 2 and Smart Pump™ technology at the central control, so you can configure your system to automatically monitor and self-adjust to changing conditions. This seamless integration by Rain Bird improves your system's overall performance by reducing watering windows and minimizing energy use.

Pump and Motor Options

Rain Bird offers custom designed cast ductile iron discharge heads for golf irrigation pump stations. With superior flow characteristics and 12 times the required tensile strength for golf pump stations, they are the obvious choice for the application. Rain Bird utilizes G.E. motors with industry-leading warranties, efficiencies and durability. The standard Class H motor insulation provides unmatched motor life.

Air Relief

Rain Bird provides air relief on each pump. Individual air relief valves allow for the maximum amount of air to be removed from the pump columns and not enter into the irrigation system.

User Controls

Rain Bird pump stations have set the bar with simple, large-icon touchscreen controls in nine (9) different languages. Each pump has a lighted, three position Manual-Off-Auto switch for intuitive, safe backup control of the station.



Custom colors available.

Pump Manager 2

Rain Bird® Pump Manager 2 is engineered for the golf course professional looking to simplify pump control, monitoring and data reporting. This powerful software application gives you full control of your pump station from your computer or central control.

FEATURES AND BENEFITS

- Provides a direct link to the pump station touchscreen so you can view and modify pump operations from your computer or tablet as though you were standing right in front of it.
- Since all pump operation data is contained on your computer, Pump Manager 2 and its built-in reporting capabilities can keep you apprised of operations, flow, water use and other key information.
- Includes common reports for future review or regulatory reporting.
- For customized reporting, data can be exported in a file compatible with common spreadsheet applications such as Microsoft® Excel®.
- Standard with 11 different language options.
- Can be used with any computer and provide remote monitoring for any irrigation system using a competitive control system.
- Best of all, Pump Manager 2 is fully integrated with Rain Bird's exclusive central control feature, Smart Pump™.



Smart Pump™

FEATURES AND BENEFITS

Rain Bird's Smart Pump is a powerful central control software tool that improves pump station performance more than any comparable product on the market. It integrates your irrigation system from reservoir to rotor, constantly comparing actual flow to expected flow. By making smart, real-time decisions based on this information, it optimizes your system — saving water, conserving electricity and reducing wear and tear on your valuable pumping system.

Actual Flow Measurement

Unlike other irrigation central control software, Smart Pump bases its decisions on actual flow, not estimated flow. By using accurate information — in real time — Smart Pump automatically balances supply with system demand. That means greater efficiency and an end to wasted water and electricity.

24-Hour Pump Supervision

With Smart Pump, you can relax knowing your system will instantly respond to actual field conditions with the right decisions. For instance, if a pipe breaks, Smart Pump will stop water flow to the pipe to prevent turf damage. Or if a pump fails, Smart Pump will make immediate water demand adjustments to keep the system from shutting down permanently. It's like having your own irrigation supervisor at every sprinkler, 24/7.

Integration Meets Intelligence

Smart Pump seamlessly integrates your entire irrigation system. It automatically starts waiting sprinklers or pauses active sprinklers to reduce flow or increase demand, keeping your irrigation system running at peak efficiency at all times.

Rain Bird is the only manufacturer providing both irrigation and pump station control software. This provides a level of integration that is unmatched in the industry.

HOW TO SPECIFY

SMARTPUMP

MODEL

Smart Pump

I Series Hydraulic Suction Scanning Filter

Self-cleaning line powered hydraulic water filters for turf, landscape, agriculture, greenhouse, golf course and nursery applications.

FEATURES

- **Flow Rate:** 600 – 3,400 gpm
- **Max Temperature:** 160° F
- **Flushing Operations:** Single electric ball valve for flushing operations standard
- **Screen:** 316 L stainless steel sintered screens standard
- **Screen Opening:** 5μ – 4000μ
- **Working Pressure:** 35 – 150 psi
- **Material:** 304 Stainless Steel
- **Configurations Available:** Filter only, or a complete assembly with bypass manifold and valves



Performance Data

Model Number Stainless Steel	Line Size (in)	Standard Flow Rate (gpm)	Sintered Screen Area (in ²)	Flush Line Size (in)	Min. Inlet Pressure During Rinse Cycle (psi)
HT-I-04-PE-S	4	600	720	2.0	40
HT-I-06-PE-S	6	800	720	2.0	40
HT-I-08-PS-S	8	1400	1008	2.0	40
HT-I-08-PE-S	8	1500	1152	2.0	40
HT-I-10-PS-S	10	1700	1584	2.0	40
HT-I-10-PE-S	10	3200	1800	2.0	40
HT-I-12-PS-S	12	3400	1800	2.0	40

All models have a rinse duration of 5 to 10 seconds.

The above calculated flow rates are based on good quality water. For fair, poor or bad water contact Rain Bird at filters@RainBird.com. Drawings of standard filter models are available at rainbird.com. Standard Rain Bird controllers: 115 or 230 VAC, 50/60 Hz (I Series filters integrated with a Rain Bird Pump station are controlled by pump station PLC). Other flow ranges available. Please contact Rain Bird at filters@RainBird.com.



Chiricahua at Desert Mountain

Valves

Raising the Standards of Reliability.

Rain Bird® valves are expertly engineered and manufactured to provide a level of quality and durability that's unmatched in the industry. Constructed of industrial-strength glass-filled nylon or classic brass, every model is built to stand up to the harshest environments. For decades, these valves have been delivering trouble-free performance that continues to earn the trust of golf course maintenance professionals worldwide.



Options for Every Need

Hold every aspect of your system to the highest standard. From reclaimed water applications to integrated control (IC) configuration, Rain Bird valves are designed to meet the needs of any course.



PESB / PESB-R Series

SPECIFICATIONS

Models:

- 100-PESB: 1" (2.5 cm) (26/34)
- 100-PESB-R: 1" (2.5 cm) (26/34)
- 150-PESB: 1 ½" (3.8 cm) (40/49)
- 150-PESB-R: 1 ½" (3.8 cm) (40/49)
- 200-PESB: 2" (5.1 cm) (50/60)
- 200-PESB-R: 2" (5.1 cm) (50/60)

Valve and PRS-D module must be ordered separately. See pages 58-59 for more information on the PRS-D option. For non-U.S. applications it is necessary to specify NPT or BSP thread type.

Flow: 0.25 to 200 gpm
(1.2 to 757 l/m); (0.06 to 45.5 m³/h)

Flow with PRS-D*: 5 to 200 gpm
(19.2 to 757 l/m); (1.1 to 45.4 m³/h)

Pressure: 20 to 200 psi (1.38 to 13.8 bar)
Pressure with PRS-D*: Up to 100 psi
(6.90 bar)

Electrical Specifications:

Power: 24 VAC 50/60 Hz (cycles/sec)
solenoid

Inrush Current: 0.41 A (9.84 VA)
at 60 Hz

Holding Current: 0.14 A (3.43 VA)
at 60 Hz

Coil Resistance: 30 to 39 ohms

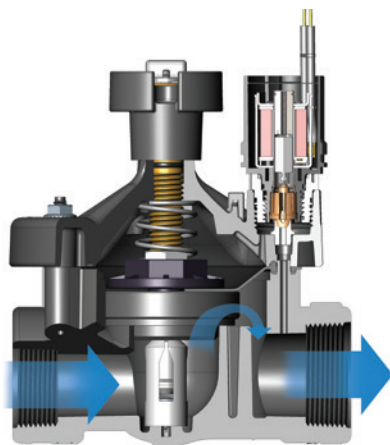
Temperature: 150°F (66°C) maximum

Dimensions:

100-PESB/PESB-R (1"):
Height: 6 ½" (16.5 cm)
Length: 4" (10.2 cm)
Width: 4" (10.2 cm)

150-PESB / PESB-R (1 ½"):
Height: 8" (20.3 cm)
Length: 6" (15.2 cm)
Width: 6" (15.2 cm)

200-PESB / PESB-R (2"):
Height: 8" (20.3 cm)
Length: 6" (15.2 cm)
Width: 6" (15.2 cm)



HOW TO SPECIFY

XXX	-	XXXX-X	-	XXX-X
SIZE		MODEL		OPTIONAL FEATURE
100 = 1"		PESB		PRS-D = PRS Dial
150 = 1 ½"		PESB-R		ICM = ICM Module
200 = 2"				

NOTE: Valve and PRS-D or ICM must be ordered separately. See pages 30-31 on how to specify the IC configuration.

U.S. Data — Pressure Loss** (psi)

Flow gpm	100-PESB 1"	100-PESB-R 1"	150-PESB 1 ½"	150-PESB-R 1 ½"	200-PESB 2"	200-PESB-R 2"
0.25	0.8	1.6	—	—	—	—
0.5	1.0	3.0	—	—	—	—
1	1.3	1.8	—	—	—	—
5	1.7	2.9	—	—	—	—
10	1.8	2.9	—	—	—	—
20	2.9	2.6	3.9	3.5	—	—
30	5.6	5.8	3.6	3.1	—	—
40	10.0	10.2	3.5	2.3	—	—
50	15.6	16.0	3.6	2.1	4.8	3.7
75	—	—	5.4	4.3	4.5	3.3
100	—	—	9.6	7.5	5.2	4.7
125	—	—	14.6	11.9	8.2	8.6
150	—	—	21.2	17.0	11.8	12.6
175	—	—	—	—	15.5	14.8
200	—	—	—	—	19.5	18.9

Rain Bird recommends flow rates in the supply line not to exceed 7 ½ ft/sec (2.29 m/s) in order to reduce the effects of water hammer. For flows below 5 gpm (19.2 l/m, 1.14 m³/h), Rain Bird recommends use of upstream filtration to prevent debris from collecting below the diaphragm. For flows below 10 gpm (37.8 l/m, 2.27 m³/h), Rain Bird recommends that the flow control stem be turned down two full turns from the fully open position. PRS-D recommended for use in shaded area only.

Metric Data — Pressure Loss** (bar)

Flow l/m m³/h	100-PESB 2.5 cm	100-PESB-R 2.5 cm	150-PESB 3.8 cm	150-PESB-R 3.8 cm	200-PESB 5.1 cm	200-PESB-R 5.1 cm
1	0.06	0.06	0.11	—	—	—
5	0.3	0.09	0.13	—	—	—
10	0.6	0.10	0.15	—	—	—
20	1.2	0.12	0.20	—	—	—
50	3	0.15	0.19	—	—	—
100	6	0.32	0.32	0.26	0.22	—
150	9	0.68	0.69	0.24	0.16	—
200	12	—	—	0.26	0.16	0.33
250	15	—	—	0.33	0.24	0.32
300	18	—	—	0.42	0.33	0.32
350	21	—	—	0.57	0.45	0.34
400	24	—	—	0.74	0.59	0.41
450	27	—	—	0.92	0.75	0.51
500	30	—	—	1.14	0.91	0.64
550	33	—	—	1.38	1.10	0.77
600	36	—	—	—	—	0.90
650	39	—	—	—	—	1.04
700	42	—	—	—	—	1.18
757	45	—	—	—	—	1.34

EFB-CP Series

SPECIFICATIONS

Models:

- 100-EFB-CP:** 1" (2.5 cm)
- 150-EFB-CP:** 1 ½" (3.8 cm)
- 200-EFB-CP:** 2" (5.1 cm) (Brass)

Valve and PRS-D module must be ordered separately.
See pages 58-59 for more information on the PRS-D option. For non-U.S. applications it is necessary to specify NPT or BSP thread type.

Flow with or without PRS-D*: 5 to 200 gpm
(19.2 to 757 l/m)

Pressure: 15 to 200 psi (1.0 to 13.8 bar)

Pressure with PRS-D*: 15 to 100 psi (1.0 to 6.9 bar)

Pressure Requirements using PRS-D*: 15 psi (1.0 bar)
inlet pressure above desired outlet pressure

Electrical Specifications:

- Power:** 24 VAC 50/60 Hz (cycles/sec) solenoid
- Inrush current:** 0.41 A (9.84 VA) at 60 Hz
- Holding current:** 0.14 A (3.43 VA) at 60 Hz
- Coil resistance:** 30 to 39 ohms

Dimensions:

- | | |
|-------------------------------|-------------------------------|
| 100-EFB-CP (1"): | 150-EFB-CP (1 ½"): |
| Height: 6" (15.2 cm) | Height: 6 ½" (16.5 cm) |
| Length: 4 ½" (11.4 cm) | Length: 5 ½" (14.0 cm) |
| Width: 3 ¼" (8.3 cm) | Width: 4 ½" (11.4 cm) |

- | |
|-------------------------------|
| 200-EFB-CP (2"): |
| Height: 7" (17.8 cm) |
| Length: 6 ¾" (17.1 cm) |
| Width: 5 ¾" (14.6 cm) |

Temperature: 150°F (66°C) maximum

Reclaimed Water Compatible

All models feature chlorine-resistant EPDM diaphragm for applications using reclaimed water.

U.S. Data — Pressure Loss** (psi)

Flow gpm	100-EFB-CP 1"	150-EFB-CP 1 ½"	200-EFB-CP 2"
5	0.2	—	—
10	0.7	—	—
15	1.2	—	—
20	2.1	2.3	0.5
30	5.0	2.9	0.6
40	8.2	2.0	0.8
50	13.0	3.3	1.1
60	—	4.6	1.8
80	—	7.5	2.4
100	—	11.8	3.8
120	—	16.6	5.9
140	—	—	7.8
160	—	—	10.0
180	—	—	12.5
200	—	—	15.8

Metric Data — Pressure Loss** (bar)

Flow l/m	m³/h	100-EFB-CP 2.5 cm	150-EFB-CP 3.8 cm	200-EFB-CP 5.1 cm
19	1	0.01	—	—
50	3	0.07	—	—
100	6	0.27	0.19	0.04
150	9	0.56	0.14	0.05
200	12	—	0.25	0.09
250	15	—	0.38	0.14
300	18	—	0.51	0.16
350	21	—	0.70	0.23
400	24	—	0.91	0.30
450	27	—	1.13	0.40
500	30	—	—	0.49
550	33	—	—	0.58
600	36	—	—	0.68
650	39	—	—	0.79
700	42	—	—	0.92
757	45	—	—	1.09

Rain Bird recommends flow rates in the supply line not to exceed 7 ½ ft/sec (2.29 m/s) in order to reduce the effects of water hammer. For flows below 5 gpm (19.2 l/m, 1.14 m³/h), Rain Bird recommends use of upstream filtration to prevent debris from collecting below the diaphragm. For flows below 10 gpm (37.8 l/m, 2.27 m³/h), Rain Bird recommends that the flow control stem be turned down two full turns from the fully open position.

Purple handle cover included to designate non-potable water.



HOW TO SPECIFY

XXX	—	EFB-CP	—	XXX-X
SIZE		MODEL		OPTIONAL FEATURE
100 = 1"		EFB-CP		PRS-D = PRS Dial
150 = 1 ½"				
200 = 2"				

NOTE: Valve and PRS-D or ICM must be ordered separately. See pages 30–31 on how to specify the IC configuration.

BPES Brass Valves

SPECIFICATIONS

Model: 300-BPES: 3" (7.6 cm) (80/90)

Valve and PRS-D module must be ordered separately. See pages 58-59 for more information on the PRS-D option. For non-U.S. applications it is necessary to specify NPT or BSP thread type.

Flow with or without PRS-D*: 60 to 300 gpm
(227 to 1136 l/m); (13.6 to 68.1 m³/h)

Pressure: 20 to 200 psi (1.4 to 13.8 bar)

Pressure with PRS-D*: Up to 100 psi (6.9 bar)

Pressure Requirements using PRS-D*: 15 psi (1.04 bar) inlet pressure above desired outlet pressure

Dimensions:

Height: 13 5/8" (34.6 cm)

Length: 8" (20.32 cm)

Width: 7" (17.78 cm)

Temperature: 110°F (43°C) maximum

Electrical Specifications:

Power: 24 VAC 50/60 Hz (cycles/sec) solenoid

Inrush current: 0.41 A (9.84 VA) at 60 Hz

Holding current: 0.28 A (6.72 VA) at 60 Hz

Coil resistance: 28 ohms, nominal

U.S. Data — Pressure Loss**

Flow gpm	Globe psi	Angle psi
60	6.6	6.8
80	5.1	5.9
100	3.2	3.5
120	1.8	1.8
140	1.8	2.1
160	2.0	2.1
180	2.2	2.0
200	2.7	2.5
250	4.0	3.4
300	4.9	4.5

Metric Data — Pressure Loss** (bar)

l/m	Flow m ³ /h	Globe 2.5 cm	Angle 3.8 cm
227	13.6	0.46	0.47
400	24	0.19	0.21
600	36	0.14	0.14
800	48	0.21	0.19
1000	60	0.29	0.26
1136	68	0.34	0.31

Rain Bird recommends flow rates in the supply line not to exceed 7 1/2 ft/sec (2.29 m/s) in order to reduce the effects of water hammer. For flows below 5 gpm (19.2 l/m, 1.14 m³/h), Rain Bird recommends use of upstream filtration to prevent debris from collecting below the diaphragm. For flows below 10 gpm (37.8 l/m, 2.27 m³/h), Rain Bird recommends that the flow control stem be turned down two full turns from the fully open position.



HOW TO SPECIFY

XXX	—	BPES	—	XXX-X
SIZE		MODEL		OPTIONAL FEATURE
300 = 3"		BPES		PRS-D = PRS Dial ICM = IC Module

NOTE: Valve and PRS-D must be ordered separately. See pages 30-31 on how to specify the IC configuration.



Quick Coupling Valves and Valve Keys

SPECIFICATIONS

Models:

- 3RC:** ¾" (1.9 cm) (20/27) Rubber cover, one-piece body
33DRC: ¾" (1.9 cm) (20/27) Double track key lug, rubber cover, two-piece body
33DLRC: ¾" (1.9 cm) (20/27) Double track key lug, locking rubber cover, two-piece body
33DNP: ¾" (1.9 cm) (20/27) Non-potable, purple locking rubber cover, two-piece body
44RC: 1" (2.5 cm) (26/34) Rubber cover, two-piece body
44LRC: 1" (2.5 cm) (26/34) Locking rubber cover, two-piece body
44NP: 1" (2.5 cm) (26/34) Non-potable, purple locking rubber cover, two-piece body
5RC: 1" (2.5 cm) (26/34) Rubber cover, one-piece body
5LRC: 1" (2.5 cm) (26/34) Locking rubber cover, one-piece body
5NP: 1" (2.5 cm) (26/34) Non-potable, purple locking rubber cover, one-piece body
7: 1 ½" (3.8 cm) (40/49) Metal cover, one-piece body

Flow:

- Models 3RC, 33DRC, 33DLRC, 33DNP, 44RC, 44LRC, 44NP, 5RC, 5LRC, 5NP, 7:** 10 to 125 gpm (37.8 to 473 l/m; 2.27 to 28.39 m³/h)
Models 33DNP, 44NP, 5NP: 10 to 70 gpm (37.8 to 265 l/m; 2.27 to 15.89 m³/h)

Pressure:

Height:

- 3RC:** 4.3" (10.8 cm)
33DRC: 4.4" (11.1 cm)
33DLRC: 4.6" (11.8 cm)
33DNP: 4.4" (11.1 cm)
44RC: 6.0" (15.2 cm)
44LRC: 6.0" (15.2 cm)
44NP: 6.0" (15.2 cm)
5RC: 5.5" (14.0 cm)
5LRC: 5.5" (14.0 cm)
5NP: 5.5" (14.0 cm)
7: 5.8" (14.6 cm)



Quick Coupling Valve Keys

Top Pipe Threads

Valve	Key	Male		Female	
3RC	33DK	¾"	19 mm	½"	13 mm
33DRC	33DK	¾"	19 mm	½"	13 mm
33NP	33DK	¾"	19 mm	½"	13 mm
44NP	44K	1"	25 mm	¾"	19 mm
44RC	44K	1"	25 mm	¾"	19 mm
5RC	55K-1	1"	25 mm	—	—
5NP	55K-1	1"	25 mm	—	—
7	7K	1 ½"	38 mm	—	—



Quick Coupling Valves

U.S. Data — Pressure Loss* (psi)

Flow gpm	3RC ¾"	33DRC, 33DLRC, 33DNP ¾"	44RC, 44LRC, 44NP 1"	5RC, 5LRC, 5NP 1"	7 1 ½"
10	1.8	2.0	—	—	—
15	4.7	4.3	2.2	—	—
20	7.2	7.6	4.4	—	—
30	—	—	11.5	4.1	—
40	—	—	—	7.3	—
50	—	—	—	11.0	1.7
60	—	—	—	15.7	2.5
70	—	—	—	21.5	3.6
80	—	—	—	—	4.9
90	—	—	—	—	8.4
100	—	—	—	—	14.0

Metric Data — Pressure Loss* (bar)

Flow l/m	Flow m³/h	3RC 1.9 cm	33DRC, 33DLRC, 33DNP 1.9 cm	44RC, 44LRC, 44NP 2.5 cm	5RC, 5LRC, 5NP 2.5 cm	7 3.8 cm
38	2.3	0.12	0.12	—	—	—
67	4	0.41	0.42	0.23	—	—
83	5	0.57	0.62	0.40	—	—
100	6	—	—	0.62	—	—
117	7	—	—	0.83	0.30	—
133	8	—	—	—	0.40	—
150	9	—	—	—	0.50	—
167	10	—	—	—	0.61	—
200	12	—	—	—	0.85	0.13
233	14	—	—	—	1.15	0.18
267	16	—	—	—	1.50	0.25
367	22	—	—	—	—	0.54
473	28	—	—	—	—	0.97

PRS-Dial

The PRS-Dial is an excellent means of regulating outlet pressure at the valve regardless of incoming pressure fluctuations. The visible scale makes adjustment quick and easy. The regulator fits all Rain Bird® PGA, PEB, PESB, PESB-R, GB, EFB-CP and BPES series valves.

- Regulates and maintains constant outlet pressure between 15 and 100 psi (1.04 to 6.9 bar) within ± 3 psi (± 0.21 bar).
- Adjustment knob with detents permits fine-tune setting in $\frac{1}{3}$ psi (0.02 bar) increments. Dial cartridge makes installation and adjustment quick, easy and accurate.

FEATURES

- Improved spike reduction capabilities reduce water hammer.
- Ergonomic design with snap-tight cover to prevent vandalism.
- Waterproof dial cartridge eliminates fogging and binding.
- Dial cartridge retrofits into all existing PRS-D units.
- Schrader valve connects pressure hose gauge, ordered separately.
- Easy field installation — PRS-Dial threads underneath the solenoid and adapter.
- Corrosion-resistant glass-filled nylon for rugged performance.

SPECIFICATIONS

Operating Range:

Pressure: Up to 100 psi (6.9 bar)*

Regulation: 15 to 100 psi (1.04 to 6.9 bar)

Flow: Refer to chart

Model: PRS-D

APPLICATION INFORMATION

- Proper operation requires inlet pressure to be a minimum of 15 psi (1.04 bar) higher than desired outlet pressure.
- For areas with very high pressure or uneven terrain, install sprinklers with PRS pressure regulating stems and/or SAM check valves.
- When inlet pressure exceeds 100 psi (6.9 bar), a pressure regulating master valve or inline pressure regulator is required.
- Rain Bird does not recommend using the pressure regulating module for applications outside the recommended flow ranges.
- To reduce the effects of water hammer, Rain Bird recommends flow rates in the supply line not to exceed $7\frac{1}{2}$ ft/sec (2.29 m/s).
- For flows below 10 gpm (37.8 l/m, 2.27 m³/h), Rain Bird recommends the flow control stem be turned down two full turns from the fully open position.
- The PRS-D option adds an additional 2" (5.1 cm) to valve height.

*While the PRS-Dial unit can withstand pressures up to 200 psi (13.8 bar), accurate pressure regulation can be maintained only up to 100 psi (6.9 bar).

NOTE: Valve and PRS-D module must be ordered separately.



U.S. Data — Valve Flow Ranges **

Model	gpm
PGA	
100-PGA	5 – 40
150-PGA	30 – 100
200-PGA	40 – 150
PEB	
100-PEB	5 – 50
150-PEB	20 – 150
200-PEB	75 – 200
PESB / PESB-R	
100-PESB/PESB-R	5 – 50
150-PESB/PESB-R	20 – 150
200-PESB/PESB-R	75 – 200
GB	
100-GB	5 – 50
125-GB	20 – 80
150-GB	20 – 120
200-GB	20 – 200
EFB-CP-R	
100-EFB-CP-R	5 – 50
125-EFB-CP-R	20 – 80
150-EFB-CP-R	20 – 120
200-EFB-CP-R	20 – 200
BPES	
300-BPES	60 – 300

**The PRS-Dial regulates only up to 100 psi (6.9 bar).

Metric Data — Valve Flow Ranges **

Model	l/m	m³/h
PGA		
100-PGA	19.2 – 15.1	1.14 – 9.08
150-PGA	113 – 378	6.81 – 22.70
200-PGA	151 – 568	9.08 – 34.05
PEB		
100-PEB	19.2 – 189	1.14 – 11.35
150-PEB	76 – 568	4.54 – 34.05
200-PEB	284 – 757	17.03 – 45.40
PESB / PESB-R		
100-PESB/PESB-R	19.2 – 189	1.14 – 11.35
150-PESB/PESB-R	76 – 568	4.54 – 34.05
200-PESB/PESB-R	284 – 757	17.03 – 45.40
GB		
100-GB	19.2 – 189	1.14 – 11.35
125-GB	76 – 302	4.54 – 18.16
150-GB	76 – 529	4.54 – 31.78
200-GB	76 – 757	4.54 – 45.40
EFB-CP-R		
100-EFB-CP-R	19.2 – 189	1.14 – 11.35
125-EFB-CP-R	76 – 302	4.54 – 18.16
150-EFB-CP-R	76 – 529	4.54 – 31.78
200-EFB-CP-R	76 – 757	4.54 – 45.40
BPES		
300-BPES	227 – 1136	13.62 – 68.10



150-PESB with PRS-D

ICM Valve Kit

Rain Bird ICM Valve Kit includes a ready to install ICM (Integrated Control Module) and a Rain Bird valve adapter with necessary o-rings and filter. This kit is designed to convert Rain Bird PEB, PESB, BPES, EFB-CP series electric remote control valves into Integrated Control (IC) valves.



PESB with ICM Valve Kit

See pages 28–33 for more information on the IC System™.



Old Marsh Golf Club

Landscape Solutions

Specialized Solutions for Every Application.

Rain Bird offers many landscape irrigation solutions that manage water responsibly while promoting the growth of healthy, stress-free plants and grass areas. From seals and filters that protect your system from debris to materials specially engineered to withstand harsh chemicals, these products are built to a standard the competition can't match.



Customized Coverage for Landscapes—and More

Offering a full range of sizes and options, Rain Bird® sprays, rotors and drip irrigation products provide a solution for every irrigation challenge. Whether you're watering flower beds or taking a precise new approach to tee boxes, Rain Bird has you covered.



RD1800™ Series Spray Heads

FEATURES

- Patented Triple-Blade Wiper Seal precisely balances flushing, flow-by and debris protection to optimize performance and durability at pop-up and retraction, clearing debris and ensuring positive stem retraction in all soil types.
- Unique debris pockets hold grit in place, removing it from circulation and preventing long-term damage.
- Parts resistant to corrosion for use in treated recycle water containing chlorine.

RD1800 SAM PRS Series

Incorporates all RD1800 Series SAM and PRS features. Meets the needs of all spray areas, regardless of changing elevation or water pressures.

RD1800 Flow-Shield™ Series

Provides low flow vertical water jet visible from +200' line of sight when a nozzle has been removed.

RD1800 Non-Potable Water Series

Provides an alternative to clip-on caps and molded purple covers. Easy-to-read English "DO NOT DRINK" and Spanish "NO BEBA" warnings and international do not drink symbol.

SPECIFICATIONS

Operating Range:

Spacing: 2.5' to 24' (0.8 m to 7.3 m)

Pressure: 15 to 100 psi (1.0 to 6.9 bar)

Dimensions:

RD04 Series: 4" (10.2 cm) pop-up height; 6" (15.0 cm) body height

RD06 Series: 6" (15.0 cm) pop-up height; 9 3/8" (23.8 cm) body height

RD12 Series: 12" (30.5 cm) pop-up height; 16" (40.6 cm) body height

Inlet: 1/2" (15/21) NPT female threaded

SAM Capability: Holds up to 14 feet (4.2 m) of head; 6 psi (0.3 bar)

Flow-By:

SAM Models: 0 at 15 psi (1.0 bar) or greater; 0.5 gpm (0.03 l/s; 0.1 m³/h) otherwise

All Other Models: 0 at 10 psi (0.7 bar) or greater; 0.5 gpm (0.03 l/s; 0.1 m³/h) otherwise

Pressure Regulation: SAM-PRS models regulate to an average 30 or 45 psi (2.1 or 3.1 bar) with inlet pressures of up to 100 psi (6.9 bar)

Side Inlets: SAM models only

Warranty: 5-year trade warranty

Models

4"	6"	12"
RD-04	—	—
RD-04-NP	—	—
RD-04-S-P-30	RD-06-S-P-30	RD-12-S-P-30
RD-04-S-P-30-NP	RD-06-S-P-30-NP	RD-12-S-P-30-NP
RD-04-S-P-30-F	RD-06-S-P-30-F	RD-12-S-P-30-F
RD-04-S-P-30-F-NP	RD-06-S-P-30-F-NP	RD-12-S-P-30-F-NP
RD-04-S-P-45-NP	RD-06-S-P-45-NP	RD-12-S-P-45-NP
RD-04-S-P-45-F	RD-06-S-P-45-F	RD-12-S-P-45-F
RD-04-S-P-45-F-NP	RD-06-S-P-45-F-NP	RD-12-S-P-45-F-NP

HOW TO SPECIFY

RD-XX	-	X(XX)	-	Nozzle
POP-UP HEIGHT 04 = 4" (10.2 cm) 06 = 6" (15.0 cm) 12 = 12" (30.5 cm)		OPTIONAL FEATURES S = SAM P-30 = 30 psi (2.1 bar) in-stem pressure regulation P-45 = 45 psi (3.1 bar) in-stem pressure regulation F = Flow-Shield™ technology NP = Non-potable water use indicating cover		COMPATIBLE NOZZLES See Rotary Nozzle, U-Series and HE-VAN Nozzle specifications for more information.

Flow-Shield™ Technology available in P30 and P45 models only. Specify sprinkler bodies and nozzles separately.



1800® Series Spray Heads

FEATURES

- Co-molded wiper seal provides unmatched resistance to grit, pressures and the environment.
- Constructed of time-proven UV-resistant plastic and corrosion-resistant stainless steel parts, ensuring long product life.
- Precision-controlled flush at pop-down clears debris from unit, assuring positive stem retraction in all soil types.
- Two-piece ratchet mechanism allows easy nozzle patter alignment and provides added durability.

1800 PRS Series

PRS pressure regulator built into the stem maintains a constant outlet pressure of 30 psi (2.1 bar). Eliminates misting and fogging caused by high pressure.

1800 SAM Series

Built-in Seal-A-Matic™ (SAM) check valve eliminates the need for under-the-head check valves. Traps water in lateral pipes in elevation changes of up to 14 ft (4.2 m).

1800 SAM PRS Series

Incorporates all 1800 Series SAM and PRS features. Meets the needs of all spray areas, regardless of changing elevation or water pressures.

1800 SAM-P45 Series

Maintains a constant outlet pressure of 45 psi (3.1 bar) at varying inlet pressures. Maintains constant pressure regardless of nozzle used.

SPECIFICATIONS

Operating Range:

Spacing: 2.5' to 24' (0.8 m to 7.3 m)*

Pressure: 15 to 70 psi (1.0 to 4.8 bar)

Dimensions:

1802 Series: 2" (5.1 cm) pop-up height; 4" (10.2 cm) body height

1804 Series: 4" (10.2 cm) pop-up height; 6" (15.0 cm) body height

1806 Series: 6" (15.0 cm) pop-up height; 9 3/8" (23.8 cm) body height

1812 Series: 12" (30.5 cm) pop-up height; 16" (40.6 cm) body height

Inlet: 1/2" (15/21) NPT female threaded

Exposed Surface Diameter: 2 1/4" (5.7 cm)

SAM Capability: Holds up to 14 feet (4.2 m) of head; 6 psi (0.3 bar)

Flow-By: 0 gpm at 8 psi (0.6 bar) or greater; 0.10 gpm (0.36 l/m; 0.02 m³/h) otherwise

Pressure Regulation: SAM-PRS models regulate to an average 30 or 45 psi (2.1 or 3.1 bar) with inlet pressures of up to 70 psi (4.8 bar)

Side Inlets: SAM models only

Warranty: 5-year trade warranty

HOW TO SPECIFY

18XX

POP-UP HEIGHT
02 = 2" (5.1 cm)
04 = 4" (10.2 cm)
06 = 6" (15.0 cm)
12 = 12" (30.5 cm)

XXX

OPTIONAL FEATURE
SAM = Seal-A-Matic™
check valve
PRS = Pressure
regulator

XXX

OPTIONAL FEATURE
PRS = Pressure regulator
P45 = 45 psi pressure
regulator



R-VAN Rotary Nozzles

FEATURES

- Adjust arc and radius without tools.
- Color-coded for easy identification.
- Low precipitation rate reduces run-off and erosion.
- Maintains efficient performance at high operating pressures without misting or fogging.
- Exclusive manual flush makes it easy to clear dirt and debris in seconds.
- Compatible with all models of Rain Bird spray bodies in addition to a wide variety of risers and adapters.
- Matched precipitation rates across radius and arcs simplify the design process and enable large and small turf areas to be zoned together by mixing R-VAN, R-Series and 5000 Series Rotors with the MPR nozzle set.



SPECIFICATIONS

Models:

8' to 14' (2.4 m to 4.6 m)

R-VAN14: Blue top, 45° – 270° Adjustable Arc

R-VAN14-360: Blue top, 360° Full Circle

13' to 18' (4.0 m to 5.5 m)

R-VAN18: 45° to 270° Adjustable Arc

R-VAN18-360: 360° Full Circle

17' to 24' (5.2 m to 7.3 m)

R-VAN24: 45° to 270° Adjustable Arc

R-VAN24-360: 360° Full Circle

Strip Nozzles

R-VAN-LCS: 5' x 15' (1.5 m x 4.6 m) Left Corner Strip

R-VAN-RCS: 5' x 15' (1.5 m x 4.6 m) Right Corner Strip

R-VAN-SST: 5' x 30' (1.5 m x 9.1 m) Side Strip

Pressure Range: 30 to 55 psi (2.1 to 3.8 bar)

Recommended Operating Pressure: 45 psi (3.1 bar)*

Spacing: 8' to 24' (2.4 m to 7.3 m)

Adjustments: Arc and radius should be adjusted while water is running

Warranty: 3-year trade warranty



HOW TO SPECIFY

R-VAN	–	XX(X)-XXX
MODEL		RADIUS RANGE / ARC
R-VAN = Rotary		14 = 8' to 14' (2.4 m to 4.6 m)
Variable Arc Nozzle		45° to 270° Variable Arc
		14-360 = 8' to 14' (2.4 m to 4.6 m)
		360° Full Circle
		18 = 13' to 18' (4.0 m to 5.5 m)
		45° to 270° Variable Arc
		18-360 = 13' to 18' (4.0 m to 5.5 m)
		360° Full Circle
		24 = 17' to 24' (5.2 m to 7.3 m)
		45° to 270° Variable Arc
		24-360 = 17' to 24' (5.2 m to 7.3 m)
		360° Full Circle
		LCS = 5' x 15' (1.5 m x 4.6 m)
		RCS = 5' x 15' (1.5 m x 4.6 m)
		SST = 5' x 30' (1.5 m x 9.1 m)

U.S. Performance Data

R-VAN14 ADJUSTABLE ARC NOZZLES																								
	 270° Arc						 210° Arc						 180° Arc						 90° Arc					
Pressure (psi)	30	35	40	45	50	55	30	35	40	45	50	55	30	35	40	45	50	55	30	35	40	45	50	55
Radius (ft)	13	13	14	14	15	15	13	13	14	14	15	15	13	13	14	14	15	15	13	13	14	14	15	15
Flow (gpm)	0.84	0.87	0.92	0.94	1.11	1.17	0.65	0.68	0.72	0.73	0.86	0.91	0.56	0.58	0.61	0.63	0.74	0.78	0.28	0.29	0.31	0.31	0.37	0.39
■ Precipitation (in/h)	0.64	0.66	0.62	0.60	0.63	0.67	0.64	0.66	0.60	0.62	0.63	0.67	0.64	0.66	0.62	0.60	0.63	0.67	0.64	0.66	0.62	0.60	0.63	0.67
▲ Precipitation (in/h)	0.74	0.76	0.71	0.70	0.73	0.77	0.64	0.66	0.60	0.62	0.63	0.67	0.74	0.76	0.71	0.70	0.73	0.77	0.74	0.76	0.71	0.70	0.73	0.77

Metric Performance Data

R-VAN14 ADJUSTABLE ARC NOZZLES																								
	270° Arc						210° Arc						180° Arc						90° Arc					
Pressure (bar)	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8
Radius (m)	4.0	4.0	4.3	4.3	4.6	4.6	4.0	4.0	4.3	4.3	4.6	4.6	4.0	4.0	4.3	4.3	4.6	4.6	4.0	4.0	4.3	4.3	4.6	4.6
Flow (l/m)	3.2	3.3	3.6	3.5	4.2	4.4	2.5	2.6	2.7	2.8	3.3	3.4	2.1	2.2	2.4	2.3	2.8	3.0	1.1	1.1	1.2	1.2	1.4	1.5
■ Precipitation (mm/h)	16	17	16	15	16	17	16	17	15	16	16	17	16	17	16	15	16	17	16	17	16	15	16	17
▲ Precipitation (mm/h)	19	19	18	18	19	20	19	19	18	18	19	20	19	19	18	18	19	20	19	19	18	18	19	20

U.S. Performance Data

R-VAN14-360 FULL CIRCLE NOZZLES						
	 360° Arc					
Pressure (psi)	30	35	40	45	50	55
Radius (ft)	13	13	14	14	15	15
Flow (gpm)	1.1	1.1	1.2	1.3	1.4	1.5
■ Precipitation (in/h)	0.63	0.64	0.60	0.62	0.60	0.62
▲ Precipitation (in/h)	0.72	0.74	0.69	0.72	0.70	0.72

Metric Performance Data

R-VAN14-360 FULL CIRCLE NOZZLES						
	360° Arc					
Pressure (bar)	2.1	2.4	2.8	3.1	3.4	3.8
Radius (m)	4.0	4.0	4.3	4.3	4.6	4.6
Flow (l/m)	4.2	4.2	4.6	4.8	5.3	5.5
■ Precipitation (mm/h)	16	16	15	16	15	16
▲ Precipitation (mm/h)	18	19	18	18	18	18

8' to 14' | 2.4 m to 4.6 m



R-VAN14 | 45° – 270°

R-VAN14-360 | 360°

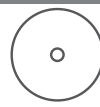
U.S. Performance Data

R-VAN18 ADJUSTABLE ARC NOZZLES																								
	 270° Arc						 210° Arc						 180° Arc						 90° Arc					
Pressure (psi)	30	35	40	45	50	55	30	35	40	45	50	55	30	35	40	45	50	55	30	35	40	45	50	55
Radius (ft)	16	16	17	17	18	18	16	16	17	17	18	18	16	16	17	17	18	18	16	16	17	17	18	18
Flow (gpm)	1.26	1.35	1.42	1.51	1.57	1.62	0.98	1.05	1.10	1.17	1.22	1.26	0.85	0.91	0.98	1.01	1.07	1.09	0.42	0.47	0.50	0.50	0.54	0.58
■ Precipitation (in/h)	0.65	0.64	0.63	0.64	0.60	0.60	0.63	0.68	0.63	0.64	0.62	0.64	0.65	0.64	0.63	0.64	0.60	0.60	0.65	0.64	0.63	0.64	0.60	0.60
▲ Precipitation (in/h)	0.75	0.74	0.73	0.73	0.69	0.69	0.73	0.78	0.73	0.77	0.72	0.74	0.75	0.74	0.73	0.73	0.69	0.69	0.75	0.74	0.73	0.73	0.69	0.69

Metric Performance Data

R-VAN18 ADJUSTABLE ARC NOZZLES																								
	270° Arc						210° Arc						180° Arc						90° Arc					
Pressure (bar)	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8
Radius (m)	4.9	4.9	5.2	5.2	5.5	5.5	4.9	4.9	5.2	5.2	5.5	5.5	4.9	4.9	5.2	5.2	5.5	5.5	4.9	4.9	5.2	5.2	5.5	5.5
Flow (l/m)	4.77	5.11	5.38	5.72	5.94	6.13	3.71	3.97	4.16	4.43	4.62	4.77	3.22	3.44	3.71	3.82	4.05	4.13	1.59	1.78	1.89	1.89	2.04	2.20
■ Precipitation (mm/h)	17	16	16	16	15	15	16	17	16	16	16	16	17	16	16	16	15	15	17	16	16	16	15	15
▲ Precipitation (mm/h)	19	19	18	18	18	18	19	20	19	20	18	19	19	19	18	18	18	18	19	19	18	18	18	18

U.S. Performance Data

R-VAN18-360 FULL CIRCLE NOZZLES						
	 360° Arc					
Pressure (psi)	30	35	40	45	50	55
Radius (ft)	16	16	17	17	18	18
Flow (gpm)	1.65	1.67	1.80	1.85	2.05	2.11
■ Precipitation (in/h)	0.62	0.63	0.60	0.62	0.61	0.63
▲ Precipitation (in/h)	0.72	0.73	0.69	0.71	0.70	0.72

Metric Performance Data

R-VAN18-360 FULL CIRCLE NOZZLES						
	360° Arc					
Pressure (bar)	2.1	2.4	2.8	3.1	3.4	3.8
Radius (m)	4.9	4.9	5.2	5.2	5.5	5.5
Flow (l/m)	6.25	6.32	6.81	7.00	7.76	7.99
■ Precipitation (mm/h)	16	16	15	16	15	16
▲ Precipitation (mm/h)	18	19	18	18	18	18

13' to 18' | 4.0 m to 5.5 m



R-VAN18 | 45° – 270°

R-VAN18-360 | 360°

U.S. Performance Data

R-VAN24 ADJUSTABLE ARC NOZZLES																								
	 270° Arc						 210° Arc						 180° Arc						 90° Arc					
Pressure (psi)	30	35	40	45	50	55	30	35	40	45	50	55	30	35	40	45	50	55	30	35	40	45	50	55
Radius (ft)	16	16	17	17	18	18	16	16	17	17	18	18	16	16	17	17	18	18	16	16	17	17	18	18
Flow (gpm)	1.26	1.35	1.42	1.51	1.57	1.62	0.98	1.05	1.10	1.17	1.22	1.26	0.85	0.91	0.98	1.01	1.07	1.09	0.42	0.47	0.50	0.50	0.54	0.58
■ Precipitation (in/h)	0.65	0.64	0.63	0.64	0.60	0.60	0.63	0.68	0.63	0.64	0.62	0.64	0.65	0.64	0.63	0.64	0.60	0.60	0.65	0.64	0.63	0.64	0.60	0.60
▲ Precipitation (in/h)	0.75	0.74	0.73	0.73	0.69	0.69	0.73	0.78	0.73	0.77	0.72	0.74	0.75	0.74	0.73	0.73	0.69	0.69	0.75	0.74	0.73	0.73	0.69	0.69

Metric Performance Data

R-VAN24 ADJUSTABLE ARC NOZZLES																								
	270° Arc						210° Arc						180° Arc						90° Arc					
Pressure (bar)	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8	2.1	2.4	2.8	3.1	3.4	3.8
Radius (m)	4.9	4.9	5.2	5.2	5.5	5.5	4.9	4.9	5.2	5.2	5.5	5.5	4.9	4.9	5.2	5.2	5.5	5.5	4.9	4.9	5.2	5.2	5.5	5.5
Flow (l/m)	4.77	5.11	5.38	5.72	5.94	6.13	3.71	3.97	4.16	4.43	4.62	4.77	3.22	3.44	3.71	3.82	4.05	4.13	1.59	1.78	1.89	1.89	2.04	2.20
■ Precipitation (mm/h)	17	16	16	16	15	15	16	17	16	16	16	16	17	16	16	16	15	15	17	16	16	16	15	15
▲ Precipitation (mm/h)	19	19	18	18	18	18	19	20	19	20	18	19	19	19	18	18	18	18	19	19	18	18	18	18

U.S. Performance Data

R-VAN24-360 FULL CIRCLE NOZZLES						
	 360° Arc					
Pressure (psi)	30	35	40	45	50	55
Radius (ft)	16	16	17	17	18	18
Flow (gpm)	1.65	1.67	1.80	1.85	2.05	2.11
■ Precipitation (in/h)	0.62	0.63	0.60	0.62	0.61	0.63
▲ Precipitation (in/h)	0.72	0.73	0.69	0.71	0.70	0.72

Metric Performance Data

R-VAN24 360 FULL CIRCLE NOZZLES						
	360° Arc					
Pressure (bar)	2.1	2.4	2.8	3.1	3.4	3.8
Radius (m)	4.9	4.9	5.2	5.2	5.5	5.5
Flow (l/m)	6.25	6.32	6.81	7.00	7.76	7.99
■ Precipitation (mm/h)	16	16	15	16	15	16
▲ Precipitation (mm/h)	18	19	18	18	18	18

17' to 24' | 5.2 m to 7.3 m



R-VAN24 | 45° - 270°

R-VAN24-360 | 360°

U.S. Performance Data

R-VAN-LCS LEFT CORNER STRIP / R-VAN RCS RIGHT CORNER STRIP



5' x 15'

Pressure (psi)	30	35	40	45	50	55
Size (ft)	4 x 14	5 x 15	5 x 15	5 x 15	5 x 15	6 x 16
Flow (gpm)	0.18	0.22	0.23	0.24	0.25	0.28
— Precipitation (in/h)	0.62	0.56	0.59	0.62	0.64	0.56
▲ Precipitation (in/h)	0.62	0.56	0.59	0.62	0.64	0.56

Metric Performance Data

R-VAN-LCS LEFT CORNER STRIP

1.5 m x 4.6 m

Pressure (bar)	2.1	2.4	2.8	3.1	3.4	3.8
Size (m)	1.2 x 4.3	1.5 x 4.6	1.5 x 4.6	1.5 x 4.6	1.5 x 4.6	1.8 x 4.9
Flow (l/m)	0.68	0.83	0.87	0.91	0.95	1.06
— Precipitation (mm/h)	16	14	15	16	16	14
▲ Precipitation (mm/h)	16	14	15	16	16	14

5' to 15' | 1.5 m to 4.6 m



R-VAN-LCS | Left Corner Strip

R-VAN-LCS | Left Corner Strip

U.S. Performance Data

R-VAN-SST SIDE STRIP



5' x 30'

Pressure (psi)	30	35	40	45	50	55
Size (ft)	4 x 28	5 x 30	5 x 30	5 x 30	5 x 30	6 x 32
Flow (gpm)	0.36	0.44	0.46	0.48	0.50	0.56
— Precipitation (in/h)	0.62	0.56	0.59	0.62	0.64	0.56
▲ Precipitation (in/h)	0.62	0.56	0.59	0.62	0.64	0.56

Metric Performance Data

R-VAN-SST SIDE STRIP

1.5 m x 9.1 m

Pressure (bar)	2.1	2.4	2.8	3.1	3.4	3.8
Size (m)	1.2 x 8.5	1.5 x 9.1	1.5 x 9.1	1.5 x 9.1	1.5 x 9.1	1.8 x 9.8
Flow (l/m)	1.36	1.67	1.74	1.82	1.89	2.12
— Precipitation (mm/h)	16	14	15	16	16	14
▲ Precipitation (mm/h)	16	14	15	16	16	14

5' to 30' | 1.5 m to 9.1 m



R-VAN-LCS | Left Corner Strip

HE-VAN Series Nozzles

FEATURES

- High-Efficiency Variable Arc (HE-VAN) nozzles have even coverage that allows you to shorten run times by up to 35%, while still maintaining a healthy lawn. HE-VAN has more than a 40% even-coverage improvement over existing variable arc nozzles.
- Low-trajectory spray and large water droplets prevent misting and airborne evaporation so the right amount of water is delivered to the right place. Gentle close-in watering eliminates dry spots around the spray head.
- Unique stream pattern that throws to the exact specified radius, delivering the cleanest edge of any VAN on the market today.
- Reduced zone run times help stay within tight watering windows, conserve water and save money.
- With full adjustability from 0° to 360°, you'll be able to efficiently water landscapes of all shapes while stocking fewer nozzles.
- Matched precipitation rates allow you to install Rain Bird® HE-VAN, MPR and U-Series nozzles on the same zone.

SPECIFICATIONS

Models:

- HE-VAN-08:** Green top; 6' to 8' (1.8 m to 2.4 m)
- HE-VAN-10:** Blue top; 8' to 10' (2.4 m to 3.0 m)
- HE-VAN-12:** Brown top; 9' to 12' (2.7 m to 3.7 m)
- HE-VAN-15:** Black top; 12' to 15' (3.7 m to 4.6 m)

Radius: Adjustable, 0° to 360°

Pressure Range: 15 to 30 psi (1.0 to 2.1 bar)

Recommended Operating Pressure: 30 psi (2.1 bar)*

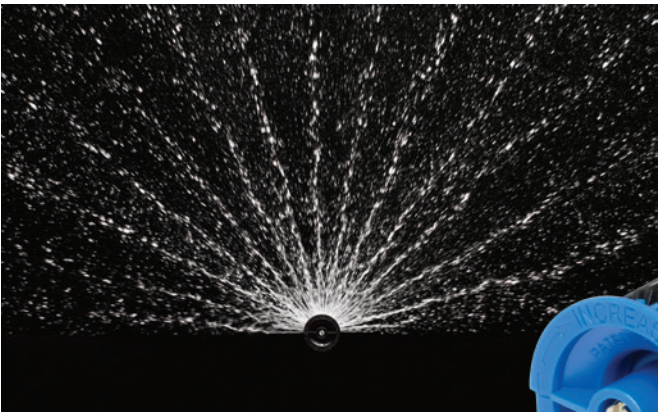
Spacing: 6' to 15' (1.8 m to 2.4 m)

Adjustment: Tactile click keeps arc setting from drifting over time

Warranty: 3-year trade warranty

HOW TO SPECIFY

HE	-	VAN	-	XX
MODEL		FEATURE		RADIUS RANGE
HE = High-Efficiency Nozzle		VAN = Variable Arc		08 = 6–8 ft (1.8–2.4 m)
				10 = 8–10 ft (2.4–3.0 m)
				12 = 9–12 ft (2.7–3.7 m)
				15 = 12–15 ft (3.7–4.6 m)



*Rain Bird recommends using 1800/RD1800 PRS Spray Bodies to maintain optimum nozzle performance in higher pressure situations.

U.S. Performance Data

8 SERIES HE-VAN — 24° TRAJECTORY

	 360° Arc				 270° Arc				 180° Arc				 90° Arc			
Pressure (psi)	15	20	25	30	15	20	25	30	15	20	25	30	15	20	25	30
Radius (ft)	5	6	7	8	5	6	7	8	5	6	7	8	5	6	7	8
Flow (gpm)	0.83	0.96	1.07	1.17	0.62	0.72	0.80	0.88	0.41	0.48	0.53	0.59	0.21	0.24	0.27	0.29
■ Precipitation (in/h)	3.19	2.56	2.10	1.76	3.19	2.56	2.10	1.76	3.19	2.56	2.10	1.76	3.19	2.56	2.10	1.76
▲ Precipitation (in/h)	3.68	2.95	2.42	2.03	3.68	2.95	2.42	2.03	3.68	2.95	2.42	2.03	3.68	2.95	2.42	2.03

Metric Performance Data

8 SERIES HE-VAN — 24° TRAJECTORY

	360° Arc				270° Arc				180° Arc				90° Arc			
Pressure (bar)	1.03	1.38	1.72	2.07	1.03	1.38	1.72	2.07	1.03	1.38	1.72	2.07	1.03	1.38	1.72	2.07
Radius (m)	1.52	1.83	2.13	2.44	1.52	1.83	2.13	2.44	1.52	1.83	2.13	2.44	1.52	1.83	2.13	2.44
Flow (l/m)	3.14	3.62	4.05	4.43	2.35	2.72	3.04	3.33	1.57	1.81	2.02	2.22	0.78	0.91	1.01	1.11
Flow (m³/h)	0.19	0.22	0.25	0.27	0.14	0.16	0.18	0.20	0.10	0.11	0.12	0.13	0.05	0.05	0.06	0.07
■ Precipitation (mm/h)	82	66	54	45	82	66	54	45	82	66	54	45	82	66	54	45
▲ Precipitation (mm/h)	95	76	62	52	95	76	62	52	95	76	62	52	95	76	62	52

U.S. Performance Data

10 SERIES HE-VAN — 27° TRAJECTORY

	 360° Arc				 270° Arc				 180° Arc				 90° Arc			
Pressure (psi)	15	20	25	30	15	20	25	30	15	20	25	30	15	20	25	30
Radius (ft)	7	8	9	10	7	8	9	10	7	8	9	10	7	8	9	10
Flow (gpm)	1.26	1.46	1.63	1.78	0.95	1.09	1.22	1.34	0.63	0.73	0.81	0.89	0.32	0.36	0.41	0.45
■ Precipitation (in/h)	2.48	2.19	1.94	1.72	2.48	2.19	1.94	1.72	2.48	2.19	1.94	1.72	2.48	2.19	1.94	1.72
▲ Precipitation (in/h)	2.86	2.53	2.24	1.98	2.86	2.53	2.24	1.98	2.86	2.53	2.24	1.98	2.86	2.53	2.24	1.98

Metric Performance Data

10 SERIES HE-VAN — 27° TRAJECTORY

	360° Arc				270° Arc				180° Arc				90° Arc			
Pressure (bar)	1.03	1.38	1.72	2.07	1.03	1.38	1.72	2.07	1.03	1.38	1.72	2.07	1.03	1.38	1.72	2.07
Radius (m)	2.13	2.44	2.74	3.05	2.13	2.44	2.74	3.05	2.13	2.44	2.74	3.05	2.13	2.44	2.74	3.05
Flow (l/m)	4.78	5.52	6.17	6.76	3.59	4.14	4.63	5.07	2.39	2.76	3.09	3.38	1.20	1.38	1.54	1.69
Flow (m³/h)	0.29	0.34	0.37	0.41	0.22	0.25	0.28	0.31	0.15	0.17	0.19	0.21	0.07	0.08	0.09	0.10
■ Precipitation (mm/h)	64	56	50	44	64	56	50	44	64	56	50	44	64	56	50	44
▲ Precipitation (mm/h)	74	65	57	51	74	65	57	51	74	65	57	51	74	65	57	51

U.S. Performance Data

12 SERIES HE-VAN — 23° TRAJECTORY																
	 360° Arc				 270° Arc				 180° Arc				 90° Arc			
Pressure (psi)	15	20	25	30	15	20	25	30	15	20	25	30	15	20	25	30
Radius (ft)	9	10	11	12	9	10	11	12	9	10	11	12	9	10	11	12
Flow (gpm)	1.67	1.93	2.16	2.37	1.25	1.45	1.62	1.77	0.84	0.97	1.08	1.18	0.42	0.48	0.54	0.59
■ Precipitation (in/h)	1.99	1.86	1.72	1.58	1.99	1.86	1.72	1.58	1.99	1.86	1.72	1.58	1.99	1.86	1.72	1.58
▲ Precipitation (in/h)	2.30	2.15	1.99	1.83	2.30	2.15	1.99	1.83	2.30	2.15	1.99	1.83	2.30	2.15	1.99	1.83

Metric Performance Data

12 SERIES HE-VAN — 23° TRAJECTORY																
	360° Arc				270° Arc				180° Arc				90° Arc			
Pressure (bar)	1.0	1.4	1.7	2.1	1.0	1.4	1.7	2.1	1.0	1.4	1.7	2.1	1.0	1.4	1.7	2.1
Radius (m)	2.7	3.0	3.4	3.7	2.7	3.0	3.4	3.7	2.7	3.0	3.4	3.7	2.7	3.0	3.4	3.7
Flow (l/m)	6.33	7.31	8.18	8.96	4.75	5.48	6.16	6.72	3.17	3.66	4.09	4.48	1.58	1.83	2.04	2.24
Flow (m³/h)	0.38	0.44	0.49	0.54	0.28	0.33	0.37	0.40	0.19	0.22	0.25	0.27	0.09	0.11	0.12	0.13
■ Precipitation (mm/h)	50.5	47.3	43.7	40.2	50.5	47.3	43.7	40.2	50.5	47.3	43.7	40.2	50.5	47.3	43.7	40.2
▲ Precipitation (mm/h)	58.3	54.6	50.4	46.4	58.3	54.6	50.4	46.4	58.3	54.6	50.4	46.4	58.3	54.6	50.4	46.4

U.S. Performance Data

15 SERIES HE-VAN — 25° TRAJECTORY																
	 360° Arc				 270° Arc				 180° Arc				 90° Arc			
Pressure (psi)	15	20	25	30	15	20	25	30	15	20	25	30	15	20	25	30
Radius (ft)	11	12	14	15	11	12	14	15	11	12	14	15	11	12	14	15
Flow (gpm)	2.62	3.02	3.38	3.70	1.96	2.27	2.53	2.78	1.31	1.51	1.69	1.85	0.65	0.76	0.84	0.93
■ Precipitation (in/h)	2.08	2.02	1.66	1.58	2.08	2.02	1.66	1.58	2.08	2.02	1.66	1.58	2.08	2.02	1.66	1.58
▲ Precipitation (in/h)	2.40	2.33	1.92	1.83	2.40	2.33	1.92	1.83	2.40	2.33	1.92	1.83	2.40	2.33	1.92	1.83

Metric Performance Data

15 SERIES HE-VAN — 25° TRAJECTORY																
	360° Arc				270° Arc				180° Arc				90° Arc			
Pressure (bar)	1.0	1.4	1.7	2.1	1.0	1.4	1.7	2.1	1.0	1.4	1.7	2.1	1.0	1.4	1.7	2.1
Radius (m)	3.4	3.7	4.3	4.6	3.4	3.7	4.3	4.6	3.4	3.7	4.3	4.6	3.4	3.7	4.3	4.6
Flow (l/m)	9.91	11.44	12.79	14.01	7.43	8.58	9.59	10.51	4.95	5.72	6.39	7.00	2.48	2.86	3.20	3.50
Flow (m³/h)	0.59	0.69	0.77	0.84	0.45	0.51	0.58	0.63	0.30	0.34	0.38	0.42	0.15	0.17	0.19	0.21
■ Precipitation (mm/h)	52.9	51.3	42.2	40.2	52.9	51.3	42.2	40.2	52.9	51.3	42.2	40.2	52.9	51.3	42.2	40.2
▲ Precipitation (mm/h)	61.1	59.3	48.7	46.5	61.1	59.3	48.7	46.5	61.1	59.3	48.7	46.5	61.1	59.3	48.7	46.5

U-Series Nozzles

FEATURES

- Additional orifice for close-in watering minimizes brown spots around the spray head and eliminates gaps in coverage so the entire watering area is more uniformly covered.
- Superior coverage for efficient watering. Use up to 30% less water.
- Matched precipitation rate with Rain Bird HE-VAN and MPR nozzles.

SPECIFICATIONS

Operating Range:

Spacing: 5' to 15' (1.7 m to 4.6 m)

Pressure: 15 to 30 psi (1.0 to 2.1 bar)

Models:

U-8: Green top; 5' to 8' (1.7 m to 2.4 m)

U-10: Blue top; 7' to 10' (2.1 m to 3.0 m)

U-12: Brown top; 9' to 12' (2.7 m to 3.7 m)

U-15: Black top; 12' to 15' (3.7 m to 4.6 m)

Warranty: 5-year trade warranty



U-Series nozzles offer better, more uniform water distribution. Water flowing from both orifices combines to form a continuous water stream, thereby eliminating gaps for more uniform coverage throughout the entire watering area.

HOW TO SPECIFY

U	XX	X
MODEL	RADIUS RANGE	PATTERN
U-Series Nozzle	8 = 5' to 8' (1.7 m to 2.4 m)	F = Full
	10 = 7' to 10' (2.1 m to 3.0 m)	H = Half
	12 = 9' to 12' (2.7 m to 3.7 m)	Q = Quarter
	15 = 11' to 15' (3.4 m to 4.6 m)	

U.S. Performance Data

U-SERIES FULL CIRCLE PATTERN					
		Pressure (psi)	Radius (ft)	Flow (gpm)	Precipitation (in/hr) ■ ▲
	U-8F (10° Trajectory)	15	5	0.74	2.85 3.29
		20	6	0.86	2.30 2.66
		25	7	0.96	1.89 2.18
		30	8	1.05	1.58 1.83
	U-10F (12° Trajectory)	15	7	1.16	2.07 2.39
		20	8	1.34	2.01 2.32
		25	9	1.50	1.62 1.87
		30	10	1.64	1.58 1.83
	U-12F (23° Trajectory)	15	9	1.80	2.14 2.47
		20	10	2.10	2.02 2.34
		25	11	2.40	1.91 2.21
		30	12	2.60	1.74 2.01
	U-15F (23° Trajectory)	15	11	2.60	2.07 2.39
		20	12	3.00	2.01 2.32
		25	14	3.30	1.62 1.87
		30	15	3.70	1.58 1.83

Metric Performance Data

U-SERIES FULL CIRCLE PATTERN					
Pressure (bar)	Radius (m)	Flow (l/m)	Flow (m³/h)	Precipitation (mm/hr) ■	▲
1.0	1.7	2.8	0.16	72	84
1.5	2.1	3.4	0.20	58	68
2.0	2.4	3.9	0.23	48	55
2.1	2.4	4.0	0.24	40	46
1.0	2.1	4.4	0.226	52	60
1.5	2.6	5.3	0.30	47	55
2.0	3.0	6.1	0.34	41	48
2.1	3.1	6.2	0.37	40	46
1.0	2.7	6.8	0.40	55	63
1.5	3.2	8.3	0.48	47	54
2.0	3.6	9.7	0.59	46	53
2.1	3.7	9.8	0.60	44	51
1.0	3.4	9.8	0.60	52	60
1.5	3.9	11.8	0.72	47	55
2.0	4.5	13.7	0.84	41	48
2.1	4.6	14.0	0.84	40	46

U.S. Performance Data

U-SERIES HALF CIRCLE PATTERN					
	Pressure (psi)	Radius (ft)	Flow (gpm)	Precipitation (in/hr)	
				■	▲
 U-8H (10° Trajectory)	15	5	0.37	2.85	3.29
	20	6	0.42	2.25	2.59
	25	7	0.47	1.85	2.13
	30	8	0.52	1.58	1.83
 U-10H (12° Trajectory)	15	7	0.58	2.07	2.39
	20	8	0.67	2.01	2.32
	25	9	0.75	1.62	1.87
	30	10	0.82	1.58	1.83
 U-12H (23° Trajectory)	15	9	0.90	2.14	2.47
	20	10	1.05	2.02	2.34
	25	11	1.20	1.91	2.21
	30	12	1.30	1.74	2.01
 U-15H (23° Trajectory)	15	11	1.30	2.07	2.39
	20	12	1.50	2.01	2.32
	25	14	1.65	1.62	1.87
	30	15	1.85	1.58	1.83

Metric Performance Data

U-SERIES HALF CIRCLE PATTERN					
	Pressure (bar)	Radius (m)	Flow (l/m)	Flow (m³/h)	Precipitation (mm/hr)
					■ ▲
	1.0	1.7	1.4	0.08	72 84
	1.5	2.1	1.7	0.10	57 66
	2.0	2.4	1.9	0.12	47 54
	2.1	2.4	2.0	0.12	40 46
	1.0	2.1	2.2	0.13	52 60
	1.5	2.6	2.6	0.15	47 55
	2.0	3.0	3.1	0.17	41 48
	2.1	3.1	3.1	0.19	40 46
	1.0	2.7	3.4	0.20	55 63
	1.5	3.2	4.2	0.24	47 54
	2.0	3.6	4.8	0.30	46 53
	2.1	3.7	4.9	0.30	44 51
	1.0	3.4	4.9	0.30	52 60
	1.5	3.9	5.9	0.36	47 55
	2.0	4.5	6.9	0.42	41 48
	2.1	4.6	7.0	0.42	40 46

U.S. Performance Data

U-SERIES QUARTER CIRCLE PATTERN					
	Pressure (psi)	Radius (ft)	Flow (gpm)	Precipitation (in/hr)	
				■	▲
 U-8Q (10° Trajectory)	15	5	0.18	2.77	3.20
	20	6	0.21	2.25	2.59
	25	7	0.24	1.89	2.18
	30	8	0.26	1.58	1.83
 U-10Q (12° Trajectory)	15	7	0.29	2.07	2.39
	20	8	0.33	2.01	2.32
	25	9	0.37	1.62	1.87
	30	10	0.41	1.58	1.83
 U-12Q (23° Trajectory)	15	9	0.45	2.14	2.47
	20	10	0.53	2.02	2.34
	25	11	0.60	1.91	2.21
	30	12	0.65	1.74	2.01
 U-15Q (23° Trajectory)	15	11	0.65	2.07	2.39
	20	12	0.75	2.01	2.32
	25	14	0.82	1.62	1.87
	30	15	0.92	1.58	1.83

Metric Performance Data

U-SERIES QUARTER CIRCLE PATTERN					
	Pressure (bar)	Radius (m)	Flow (l/m)	Flow (m³/h)	Precipitation (mm/hr)
					■ ▲
	1.0	1.7	0.7	0.04	70 81
	1.5	2.1	0.8	0.05	57 66
	2.0	2.4	1.0	0.06	48 55
	2.1	2.4	1.0	0.06	40 46
	1.0	2.1	1.1	0.07	52 60
	1.5	2.6	1.3	0.08	47 55
	2.0	3.0	1.5	0.08	41 48
	2.1	3.1	1.6	0.09	40 46
	1.0	2.7	1.7	0.10	55 63
	1.5	3.2	2.1	0.12	47 54
	2.0	3.6	2.4	0.15	46 53
	2.1	3.7	2.5	0.15	44 51
	1.0	3.4	2.5	0.15	52 60
	1.5	3.9	2.9	0.18	47 55
	2.0	4.5	3.4	0.21	41 48
	2.1	4.6	3.5	0.21	40 46

5000 Series Rotors

FEATURES

- Oversized wiper seal prevents leaks and protects internals from debris.
- Rain Curtain™ nozzles deliver even distribution over the entire radius including large wind resistant droplets and gentle close-in watering resulting in greener turf using less water.
- A history of proven performance and reliability tested in millions of installations.
- Self-flushing arc adjustment port that prevents buildup of debris.
- Models available in Part Circle and reversing Full Circle (PC) or non-reversing Full Circle (FC).

SPECIFICATIONS

Models:

5004: 4" (10.2 cm) pop-up height; 7 3/8" (18.73 cm) body height

5006: 6" (15.2 cm) pop-up height; 9 3/8" (24.5 cm) body height

5012: 12" (30.5 cm) pop-up height; 16 7/8" (42.9 cm) body height

Plus: Flow shut-off

Shrub: Mounted above ground on a 3/4" fixed threaded riser

Precipitation Rate: 0.20 to 1.50 in/hr (5 to 38 mm/h)

Radius: 25' to 50' (7.6 m to 15.2 m)*

Pressure: 25 to 65 psi (1.7 to 4.5 bar)

Flow Rate: 0.76 to 9.63 gpm (3.0 to 36.6 l/m; 0.17 to 2.19 m³/h)

Inlet: 3/4" (20/27) NPT female threaded

Warranty: 5-year trade warranty

*Radius may be reduced up to 25% with radius reduction screw.



HOW TO SPECIFY

50XX	-	X	-	X	-	XX	-	XXX	-	X	-	XX	-	XX
MODEL		MODEL		MODEL		ROTATION		OPTION		OPTION		OPTION		MODEL
5004: 4" pop-up		+ = Plus		S = Shrub		PC = 40° - 360°		SAM = Seal-A-Matic™		R = PRS		NP = Non-Potable Cover		SS = Stainless Steel
5006: 6" pop-up						FC = 360°								
5012: 12" pop-up														



U.S. Performance Data

STANDARD ANGLE RAIN CURTAIN™ NOZZLE PERFORMANCE					
Pressure psi	Nozzle	Radius ft	Flow gpm	Precipitation	
				■ in/h	▲ in/h
25	1.5	33	1.12	0.20	0.23
	2.0	35	1.50	0.24	0.27
	2.5	35	1.81	0.28	0.33
	3.0	36	2.26	0.34	0.39
	4.0	36	2.91	0.43	0.49
	5.0	37	3.72	0.52	0.60
	6.0	37	4.25	0.60	0.69
	8.0	33	5.90	1.26	1.50
35	1.5	34	1.35	0.22	0.26
	2.0	36	1.81	0.27	0.31
	2.5	37	2.17	0.31	0.35
	3.0	38	2.71	0.36	0.42
	4.0	40	3.50	0.42	0.49
	5.0	41	4.47	0.51	0.59
	6.0	43	5.23	0.54	0.63
	8.0	41	7.06	0.94	1.10
45	1.5	35	1.54	0.24	0.28
	2.0	37	2.07	0.29	0.34
	2.5	37	2.51	0.35	0.41
	3.0	39	3.09	0.37	0.43
	4.0	42	4.01	0.44	0.51
	5.0	43	5.09	0.48	0.56
	6.0	44	6.01	0.59	0.69
	8.0	44	8.03	0.92	1.06
55	1.5	35	1.71	0.27	0.31
	2.0	37	2.30	0.32	0.37
	2.5	37	2.76	0.39	0.45
	3.0	40	3.47	0.42	0.48
	4.0	42	4.44	0.48	0.56
	5.0	45	5.66	0.54	0.62
	6.0	50	6.63	0.51	0.59
	8.0	47	8.86	0.80	0.93
65	1.5	34	1.86	0.31	0.36
	2.0	35	2.52	0.40	0.46
	2.5	37	3.01	0.42	0.49
	3.0	40	3.78	0.45	0.53
	4.0	42	4.83	0.53	0.61
	5.0	45	6.16	0.59	0.68
	6.0	50	7.22	0.55	0.64
	8.0	48	9.63	0.84	0.97

Precipitation based on half-circle operation.

■ Square and ▲ triangular spacing based on 50% diameter of throw.

Performance data collected in zero wind conditions.

Metric Performance Data

STANDARD ANGLE RAIN CURTAIN™ NOZZLE PERFORMANCE						
Pressure bar	Nozzle	Radius m	Flow		Precipitation	
			l/m	m³/h	■ mm/h	▲ mm/h
2.0	1.5	10.2	4.8	0.28	5	6
	2.0	10.8	6.0	0.36	6	7
	2.5	10.9	7.2	0.44	7	9
	3.0	11.2	9.0	0.55	9	10
	4.0	11.6	12.0	0.71	11	12
	5.0	12.1	15.0	0.91	13	15
	6.0	12.4	17.4	1.05	15	17
	8.0	11.8	24.0	1.45	32	37
2.5	1.5	10.4	5.4	0.31	6	7
	2.0	11.0	6.6	0.41	7	8
	2.5	11.3	8.4	0.50	8	9
	3.0	11.2	10.2	0.62	9	11
	4.0	12.3	13.2	0.81	11	13
	5.0	12.7	17.4	1.03	13	15
	6.0	13.2	20.4	1.21	14	16
	8.0	13.3	27.0	1.63	24	28
3.0	1.5	10.6	6.0	0.34	6	7
	2.0	11.2	7.8	0.45	7	8
	2.5	11.3	9.6	0.56	9	10
	3.0	12.1	11.4	0.69	9	11
	4.0	12.7	15.0	0.89	11	13
	5.0	13.5	18.6	1.13	12	14
	6.0	13.4	22.2	1.34	13	17
	8.0	13.4	30.0	1.79	23	27
3.5	1.5	10.7	6.0	0.37	7	8
	2.0	11.3	8.4	0.49	8	9
	2.5	11.3	10.2	0.60	9	11
	3.0	12.2	12.6	0.74	10	12
	4.0	12.8	16.2	0.97	12	14
	5.0	13.7	20.4	1.23	13	15
	6.0	14.2	24.0	1.45	13	15
	8.0	14.9	32.4	1.93	20	24
4.0	1.5	10.6	6.6	0.40	7	8
	2.0	11.1	9.0	0.52	8	10
	2.5	11.3	10.8	0.64	10	12
	3.0	12.2	13.2	0.80	11	12
	4.0	12.8	17.4	1.04	13	15
	5.0	13.7	22.2	1.32	14	16
	6.0	14.9	25.8	1.55	14	16
	8.0	15.2	34.2	2.06	21	25
4.5	1.5	10.4	7.2	0.42	8	9
	2.0	10.7	9.0	0.55	10	11
	2.5	11.3	11.4	0.68	11	12
	3.0	12.2	13.8	0.84	11	13
	4.0	12.8	18.0	1.10	13	15
	5.0	13.7	23.4	1.40	15	17
	6.0	14.6	28.2	1.64	15	18
	8.0	15.2	36.6	2.19	19	22

5000 Series MPR Nozzles

FEATURES

- Rain Curtain™ nozzles deliver even distribution over the entire radius including large wind resistant droplets and gentle close-in watering resulting in greener turf using less water.
- Precipitation rate is automatically matched with a uniform radius that does not require stream deflection.
- Matched 0.6"/hour precipitation rates enable large and small turf areas to be zoned together by mixing rotors and Rain Bird R-VAN or R-Series rotary nozzles.

SPECIFICATIONS

Models:

5000MPRMPK: 5000/5000 Plus Series MPR nozzle tree multi pack.
25' (red), 30' (green) and 35' (beige) radius. Each tree contains Quarter, Third, Half and Full arcs.



HOW TO SPECIFY

5000	- MPR	- XX	- X
MODEL	NOZZLE	RADIUS RANGE	PATTERN
Rotors	Matched	25'	Q = Quarter
	Precipitation	30'	T = Third
	Rate	35'	H = Half
			F = Full

U.S. Performance Data

5000-MPR-25 (RED)

	Quarter					Third					Half					Full				
																				
Pressure (psi)	25	35	45	55	65	25	35	45	55	65	25	35	45	55	65	25	35	45	55	65
Radius (ft)	23	24	25	25	25	23	24	25	25	25	23	24	25	25	25	23	24	25	25	25
Flow (gpm)	0.74	0.88	1.00	1.11	1.21	1.00	1.21	1.38	1.53	1.67	1.44	1.73	1.98	2.21	2.41	2.78	3.34	3.82	4.25	4.63
■ Precipitation (in/h)	0.54	0.59	0.62	0.68	0.75	0.55	0.61	0.64	0.71	0.77	0.52	0.58	0.61	0.68	0.74	0.51	0.56	0.59	0.65	0.71
▲ Precipitation (in/h)	0.62	0.68	0.71	0.79	0.86	0.63	0.70	0.74	0.82	0.89	0.61	0.67	0.70	0.79	0.86	0.58	0.64	0.68	0.76	0.82

Metric Performance Data

5000-MPR-25 (RED)

	Quarter					Third					Half					Full				
Pressure (bar)	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5
Radius (m)	7.0	7.3	7.6	7.6	7.6	7.0	7.3	7.6	7.6	7.6	7.0	7.3	7.6	7.6	7.6	7.0	7.3	7.6	7.6	7.6
Flow (l/m)	3.0	3.6	3.6	4.2	4.8	3.6	4.8	5.4	6.0	6.6	5.4	6.6	7.2	8.4	9.0	10.8	12.6	14.4	16.2	17.4
Flow (m³/h)	0.17	0.20	0.23	0.25	0.27	0.23	0.27	0.31	0.35	0.38	0.33	0.39	0.45	0.50	0.55	0.63	0.76	0.87	0.97	1.05
■ Precipitation (mm/h)	13.7	14.9	15.6	17.4	18.9	13.9	15.4	16.2	18.0	19.6	13.3	14.7	15.5	17.3	18.9	12.8	14.2	14.9	16.6	18.1
▲ Precipitation (mm/h)	15.8	17.3	18.1	20.1	21.9	16.0	17.8	18.7	20.7	22.6	15.4	17.0	17.9	20.0	21.8	14.8	16.4	17.3	19.2	20.9

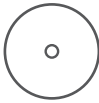
U.S. Performance Data

5000-MPR-30 (GREEN)																				
	 Quarter					 Third					 Half					 Full				
Pressure (psi)	25	35	45	55	65	25	35	45	55	65	25	35	45	55	65	25	35	45	55	65
Radius (ft)	29	30	30	30	30	29	30	30	30	30	29	30	30	30	30	29	30	30	30	30
Flow (gpm)	1.03	1.23	1.40	1.56	1.69	1.34	1.62	1.85	2.06	2.24	2.15	2.59	2.96	3.30	3.60	4.24	5.08	5.78	6.39	6.92
■ Precipitation (in/h)	0.47	0.53	0.60	0.67	0.72	0.46	0.52	0.59	0.66	0.72	0.49	0.55	0.63	0.71	0.77	0.49	0.54	0.62	0.68	0.74
▲ Precipitation (in/h)	0.54	0.61	0.69	0.77	0.83	0.53	0.60	0.69	0.76	0.83	0.57	0.64	0.73	0.82	0.89	0.56	0.63	0.71	0.79	0.85

Metric Performance Data

5000-MPR-30 (GREEN)																				
	Quarter					Third					Half					Full				
Pressure (bar)	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5
Radius (m)	8.8	9.1	9.1	9.1	9.1	8.8	9.1	9.1	9.1	9.1	8.8	9.1	9.1	9.1	9.1	8.8	9.1	9.1	9.1	9.1
Flow (l/m)	3.6	4.8	5.4	6.0	6.6	4.8	6.0	7.2	7.8	8.4	8.4	9.6	11.4	12.6	13.8	16.2	19.2	21.6	24.0	26.4
Flow (m³/h)	0.23	0.28	0.32	0.35	0.38	0.30	0.37	0.42	0.47	0.51	0.49	0.59	0.67	0.75	0.82	0.96	1.15	1.31	1.45	1.57
■ Precipitation (mm/h)	12.0	13.4	15.2	17.0	18.4	11.7	13.2	15.1	16.8	18.3	12.5	14.1	16.1	17.9	19.6	12.3	13.8	15.7	17.4	18.8
▲ Precipitation (mm/h)	13.8	15.4	17.6	19.6	21.2	13.5	15.2	17.4	19.4	21.1	14.4	16.2	18.6	20.7	22.6	14.2	15.9	18.1	20.0	21.7

U.S. Performance Data

5000-MPR-35 (BEIGE)																				
																				
	Quarter					Third					Half					Full				
Pressure (psi)	25	35	45	55	65	25	35	45	55	65	25	35	45	55	65	25	35	45	55	65
Radius (ft)	32	34	35	35	35	32	34	35	35	35	32	34	35	35	35	32	34	35	35	35
Flow (gpm)	1.40	1.67	1.92	2.13	2.31	1.77	2.15	2.46	2.74	2.99	2.75	3.33	3.81	4.23	4.62	5.36	6.62	7.58	8.43	9.18
■ Precipitation (in/h)	0.53	0.56	0.60	0.67	0.73	0.50	0.54	0.58	0.65	0.70	0.52	0.55	0.60	0.66	0.73	0.50	0.55	0.60	0.66	0.72
▲ Precipitation (in/h)	0.61	0.64	0.70	0.77	0.84	0.58	0.62	0.67	0.75	0.81	0.60	0.64	0.69	0.77	0.84	0.58	0.64	0.69	0.76	0.83

Metric Performance Data

5000-MPR-35 (BEIGE)																				
	Quarter					Third					Half					Full				
Pressure (bar)	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5	1.7	2.4	3.1	3.8	4.5
Radius (m)	9.8	10.4	10.7	10.7	10.7	9.8	10.4	10.7	10.7	10.7	9.8	10.4	10.7	10.7	10.7	9.8	10.4	10.7	10.7	10.7
Flow (l/m)	5.4	6.6	7.2	7.8	9.0	6.6	8.4	9.6	10.2	11.4	10.2	12.6	14.4	16.2	17.4	20.4	25.2	28.8	31.8	34.8
Flow (m³/h)	0.32	0.38	0.44	0.48	0.52	0.40	0.49	0.56	0.62	0.68	0.62	0.76	0.87	0.96	1.05	1.22	1.50	1.72	1.91	2.09
■ Precipitation (mm/h)	13.4	14.1	15.3	17.0	18.4	12.7	13.6	14.7	16.4	17.9	13.1	14.1	15.2	16.9	18.4	12.8	14.0	15.1	16.8	18.3
▲ Precipitation (mm/h)	15.4	16.3	17.7	19.6	21.3	14.6	15.8	17.0	18.9	20.7	15.2	16.3	17.6	19.5	21.3	14.8	16.2	17.5	19.4	21.2

Root Watering System (RWS)

FEATURES

- Subsurface aeration and irrigation prevents tree and shrub transplant shock.
- Highest efficiency solution for tree irrigation — up to 95% emission uniformity with minimal wind, evaporation or edge control losses.
- Aesthetically designs subsurface bubbler contributes to a landscape's natural appearance.
- Locking grate at grade deters vandals.
- Helps prevent shallow root growth and hardscape damage.
- Aesthetically attractive below-grade installation.
- Self-contained and factory-assembled units for assured reliability.

SPECIFICATIONS

RWS

Dimensions:

Length: 36" (91.4 cm) semi-rigid mesh tube

Top Diameter: 4" (10.2 cm) retaining cap with vandal-resistant locking grate

Bubbler Options: On a factory-installed swing assembly with fixed riser

1401: 0.25 gpm; 0.95 l/m

1402: 0.5 gpm; 1.9 l/m

1404: 1.0 gpm; 3.8 l/m

Options:

Check Valve: Keep lines from draining

Sand Sock: For use in fine soils

RWS-Mini

Dimensions:

Length: 18" (45.7 cm) semi-rigid mesh tube

Top Diameter: 4" (10.2 cm) retaining cap with vandal-resistant locking grate

Bubbler Options: On a factory-installed ½" spiral barb elbow

1401: 0.25 gpm; 0.95 l/m

1402: 0.5 gpm; 1.9 l/m

Options:

Check Valve: Keep lines from draining

Sand Sock: For use in fine soils

RWS-Supplemental

Dimensions:

Length: 10" (25.4 cm) semi-rigid mesh tube

Top Diameter: 2" (5.1 cm) snap-on cap and base cap

Bubbler Options: On a factory-installed ½" spiral barb elbow

PCT: Pressure-compensating ½" FPT inlet (0.08 gpm; 0.32 l/m)

1401: 0.25 gpm; 0.95 l/m

Options:

Check Valve: Keep lines from draining

Sand Sock: For use in fine soils

HOW TO SPECIFY

RWS	-	X	-	X	-	X	-	XXXX
MODEL RWS		MODEL M = Mini S = Supplemental		BUBBLER B = Bubbler preinstalled		OPTION C = Check Valve		BUBBLER MODEL PCTS = 0.08 gpm (0.32 l/m) 1401 = 0.25 gpm (0.95 l/m) 1402 = 0.50 gpm (1.9 l/m) 1404 = 1.00 gpm (3.8 l/m)



RWS-Sock

Designed to fit over the outside of the unit. Ideal for use in sandy soil, it will deter fine soil from infiltrating the RWS canister.



RWS integrated collar and locking grate retainer.

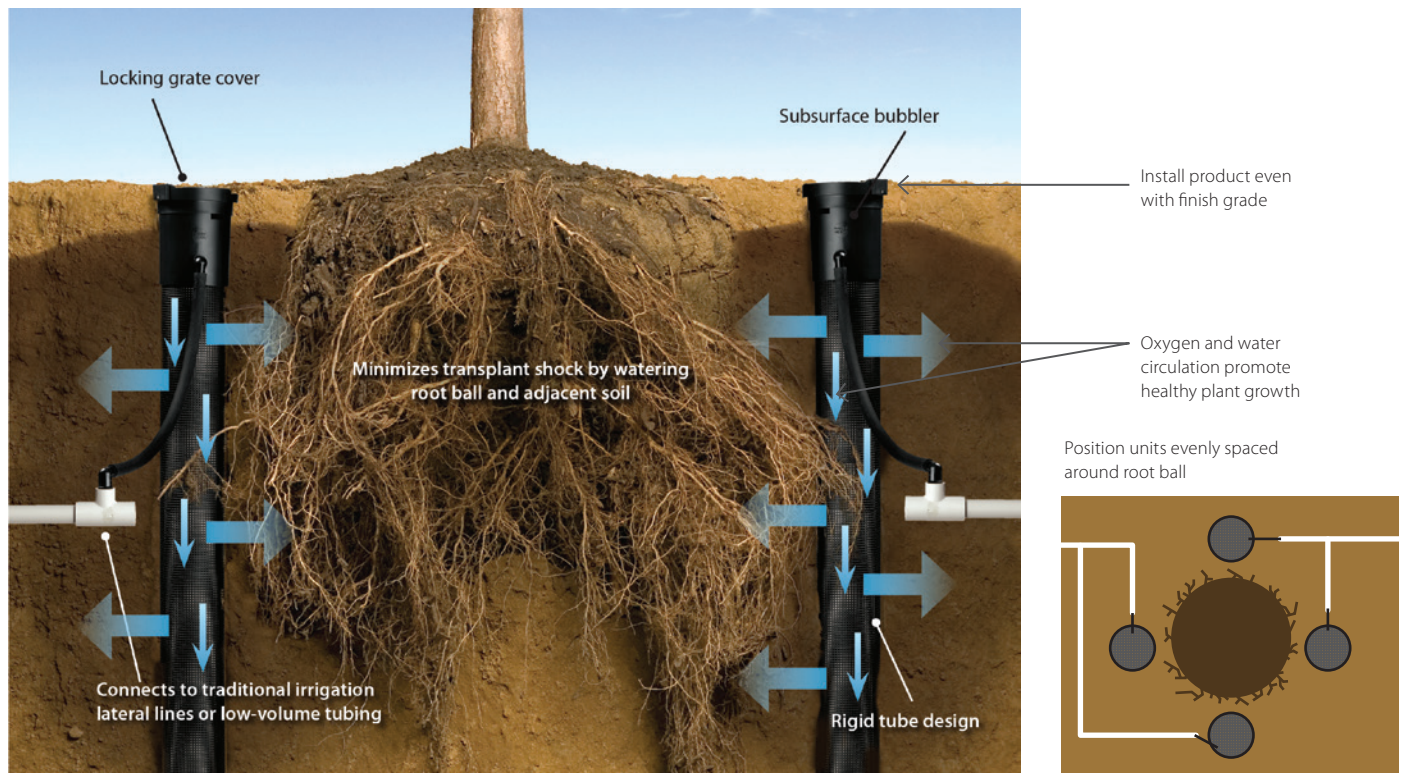
RWS Models / Specifications

Model	Bubbler	Check Valve*	Swing Assembly	Spiral Barb Elbow
Root Watering System — 36" (91.4 cm) with 4" (10.2 cm) vandal-resistant locking grate				
RWS	¼" drip tubing or customer-provided hardware	—	—	—
RWS-B-C-1401	0.25 gpm (0.95 l/m)	✓	✓	—
RWS-B-1401	0.25 gpm (0.95 l/m)	—	✓	—
RWS-B-X-1401	0.25 gpm (0.95 l/m)	—	✓ (18" with no elbow)	—
RWS-B-C-1402	0.50 gpm (1.9 l/m)	✓	✓	—
RWS-B-1402	0.50 gpm (1.9 l/m)	—	✓	—
RWS-B-C-1404	1.00 gpm (3.8 l/m)	✓	✓	—
Root Watering System-Mini — 18" (45.7 cm) with 4" (10.2 cm) vandal-resistant locking grate				
RWS-M	¼" drip tubing or customer-provided hardware	—	—	—
RWS-M-B-C-1401	0.25 gpm (0.95 l/m)	✓	—	✓
RWS-M-B-1401	0.25 gpm (0.95 l/m)	—	—	✓
RWS-M-B-C-1402	0.50 gpm (1.9 l/m)	✓	—	✓
RWS-M-B-1402	0.50 gpm (1.9 l/m)	—	—	✓
Root Watering System-Supplemental — 10" (25.4 cm) with 2" (5.1 cm) pop-on cap and base				
RWS-S-B-C-PCT5	0.08 gpm (0.32 l/m)	✓	—	✓
RWS-S-B-C-1401	0.25 gpm (0.95 l/m)	✓	—	✓
RWS-S-B-1401	0.25 gpm (0.95 l/m)	—	—	✓

Accessories

RWS-SOCK = Root Watering Sock

RWS-GRATE-P = Purple grate for RWS and RWS-Mini



XFS Sub-Surface Dripline with Copper Shield™ Technology

Rain Bird® XFS Sub-Surface Copper-Colored Dripline with Copper Shield Technology is the latest innovation in the Rain Bird Landscape Drip Family. Rain Bird's patent-pending Copper Shield Technology protects the emitter from root intrusion, creating a long-lasting, low maintenance sub-surface drip irrigation system for use under turf grass or shrub and groundcover areas. A proprietary tubing material makes the XFS Sub-Surface Dripline with Copper Shield the most flexible tubing in the industry, and the easiest sub-surface dripline to design with and install.

SPECIFICATIONS

Dimensions:

OD: 0.634" (16 mm)

ID: 0.536" (13.6 mm)

Thickness: 0.049" (1.2 mm)

Spacing: 12" or 18" (30.5 cm or 45.7 cm)

Coil Lengths: 100' (30.5 m) and 500' (152.4 m)

Coil Colors: Copper

Operating Range:

Pressure: 8.5 to 60.0 psi (0.58 to 4.14 bar)

Flow Rates: 0.4, 0.6 and 0.9 gph (1.6, 2.3 and 3.5 l/hr)

Temperature:

Water: Up to 100° F (37.8° C)

Ambient: Up to 125° F (51.7° C)

Required Filtration: 120 mesh

Compatible Fittings: XF Dripline Insert Fittings

HOW TO SPECIFY

XFS	-	X	-	XX	-	XX	-	XXX
MODEL		OPTIONAL		FLOW RATE		EMITTER SPACING		COIL LENGTH
Sub-Surface Dripline		P = Purple over Black		04 = 0.42 gph (1.61 l/h) 06 = 0.61 gph (2.3 l/h) 09 = 0.92 gph (3.5 l/h)		12 = 12" (30.5 cm) 18 = 18" (45.7 cm) 24 = 24" (61.0 cm)		100 = 100' (30.5 m) 500 = 500' (152.4 m)



U.S. Performance Data

MAXIMUM LATERAL LENGTH (FEET)

	12" Spacing			18" Spacing		
	Nominal Flow (gph)			Nominal Flow (gph)		
Inlet Pressure (psi)	0.42	0.6	0.9	0.42	0.6	0.9
15	352	273.	155	374	314	250
20	399	318	169	417	353	294
30	447	360	230	481	413	350
40	488	395	255	530	465	402
50	505	417	285	610	528	420
60	573	460	290	734	596	455

FLOW (PER 100 FEET OF TUBING)

Emitter Spacing	0.42 gph		0.6 gph		0.9 gph	
	gph	gpm	gph	gpm	gph	gpm
12"	42.0	0.70	61.0	1.02	92.0	1.53
18"	28.0	0.47	41.0	0.68	61.0	1.02

Metric Performance Data

MAXIMUM LATERAL LENGTH (METERS)

	30.5 cm Spacing			45.7 cm Spacing		
	Nominal Flow (l/h)			Nominal Flow (l/h)		
Inlet Pressure (bar)	1.6	2.3	3.4	1.6	2.3	3.4
1.0	107.2	83.2	47.2	114.0	95.7	76.2
1.4	121.6	96.9	51.5	127.1	107.6	89.6
2.1	136.2	109.7	70.1	146.6	125.9	106.7
2.8	148.7	120.4	77.7	161.5	141.7	122.5
3.5	153.9	127.1	86.9	185.9	160.9	128.0
4.1	174.6	140.2	88.4	223.7	181.7	138.7

FLOW (PER 100 METERS OF TUBING)

Emitter Spacing	1.6 l/h		2.3 l/h		3.4 l/h	
	l/h	l/m	l/h	l/m	l/h	l/m
0.30 meter	531.1	8.85	757.9	12.6	1136.7	18.9
0.46 meter	351.8	5.86	502.2	8.4	741.3	12.4

QF Dripline Header

A quick and flexible replacement for site-built header, the QF Dripline Header is a patent-pending product that is the landscape industry's first pre-fabricated header for dripline installations. Using a proprietary blend of polyethylene, similar to Rain Bird's XF Series Dripline, the QF Dripline Header allows installers to simply roll out the header and attach the dripline at a guaranteed 12" or 18" spacing — eliminating the need for measuring, cutting, gluing and taping.

FEATURES

- Header elbows rotate 360° and incorporate a protective ring — preventing damage and ensuring a proper seal.
- Rotating barb manages trenching misalignment — move left or right to accommodate the dripline without the need to retrench.
- Elbows utilize the same design as Rain Bird's popular XFF Fitting, requiring 50% less insertion force, and are compatible with the XFF Fittings Tool.

SPECIFICATIONS

¾" QF Header

Dimensions:

OD: 0.94" (23.9 mm)

ID: 0.82" (20.8 mm)

Thickness: 0.06" (1.5 mm)

Spacing: 12" or 18"

(30.5 cm or 45.7 cm)

Coil Length: 100' (30.5 m)

Coil Colors: Copper or Purple

1" QF Header

Dimensions:

OD: 1.20" (30.5 mm)

ID: 1.06" (26.9 mm)

Thickness: 0.07" (1.8 mm)

Spacing: 12" or 18"

(30.5 cm or 45.7 cm)

Coil Length: 100' (30.5 m)

Coil Colors: Copper or Purple

Models

Coil	12" Spacing		18" Spacing	
	¾" Dripline	1" Dripline	¾" Dripline	1" Dripline
100'	XQF7512100	XQF1012100	XQF7518100	XQF1018100
100' Purple	—	XQF101210P	—	XQF101810P

HOW TO SPECIFY

XQF	—	XX	—	XX	—	XXX
MODEL		DIAMETER		EMITTER SPACING		COIL LENGTH
XQF = Xerigation Quick Flexible		75 = ¾"		12 = 12" (30.5 cm)		100 = 100' (30.5 m)
		10 = 1"		18 = 18" (45.7 cm)		10P = 100' (30.5 m) Purple

Compatible Fittings

See page 89 for more information.



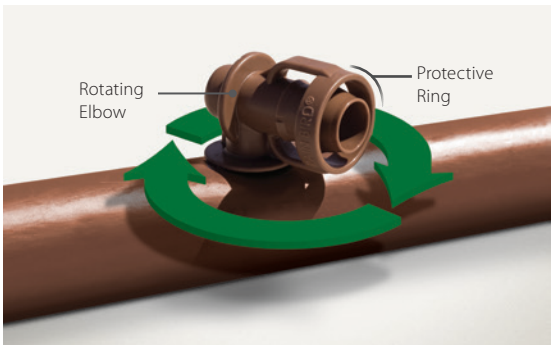
¾" QF Header:

Twist Lock Fittings 800 Series



1" QF Header:

Twist Lock Fittings 1000 Series



XFD On-Surface Dripline

FEATURES

- Extra flexible tubing for fast, easy installation.
- Dual-layered tubing (brown over black or purple over black) provides unmatched resistance to chemicals, UV damage and algae growth.
- Patent-pending emitter design provides for increased reliability.
- Longer lateral runs than the competition.
- Unique material offers significantly greater flexibility, allowing tighter turns with fewer elbows for easier installation.
- Choice of flow rates, spacing and coil lengths provides design flexibility for a variety of non-turfgrass applications.

SPECIFICATIONS

Dimensions:

OD: 0.634" (16.1 mm)

ID: 0.536" (13.6 mm)

Thickness: 0.049" (1.2 mm)

Spacing: 12" or 18" (30.5 cm or 45.7 cm)

Coil Lengths: 100' (30.5 m), 250' (76.2 m), and 500' (152.4 m)

Coil Colors: Copper or Purple

Operating Range:

Pressure: 8.5 to 60 psi (0.58 to 4.1 bar)

Flow Rates: 0.6 and 0.9 gph (2.3 and 3.5 l/hr)

Temperature:

Water: Up to 100° F (37.8° C)

Ambient: Up to 125° F (51.7° C)

Required Filtration: 120 mesh

Compatible Fittings: XF Dripline Insert Fittings, Rain Bird Easy Fit Compression Fittings or Twist Lock Fittings



HOW TO SPECIFY

XFD	-	X	-	XX	-	XX	-	XXX
MODEL		OPTIONAL		FLOW RATE		EMITTER SPACING		COIL LENGTH
XFD = Xerigation Flexible Dripline		P = Purple		06 = 0.61 gph (2.3 l/h)		12 = 12" (30.5 cm)		100 = 100' (30.5 m)
				09 = 0.92 gph (3.5 l/h)		18 = 18" (45.7 cm)		250 = 250' (76.2 m)
								500 = 500' (152.4 m)



Twist Lock Fittings

- Simplify installation of QF Header, Dripline and Blank Distribution Tubing.
- Fittings provide an even tighter seal on tubing by using high quality barbs and twist locking nuts.
- Unique barb design reduces insertion force while maintaining a secure fit.

SPECIFICATIONS

Pressure: 0 to 60 psi (0 to 4.1 bar)

MODELS

600 Series

- TLF-CUPL-0600:** ½" Coupler
TLF-TEE-0600: ½" Tee
TLF-ELBW-0600: ½" Elbow
TLF-MPT6-0600: ½" NPT to ½" Adapter
TLF-MPT8-0600: ¾" NPT to ½" Adapter

800 Series

- TLF-CUPL-0800:** ¾" Coupler
TLF-TEE-0800: ¾" Tee
TLF-ELBW-0800: ¾" Elbow
TLF-MPT8-0800: ¾" NPT Adapter
TLF-CAP-0800: ¾" Cap

1000 Series

- TLF-CUPL-1000:** 1" Coupler
TLF-TEE-1000: 1" Tee
TLF-ELBW-1000: 1" Elbow
TLF-MPT8-1000: 1" NPT Adapter



XF Dripline Insert Fittings

- Complete line of 17 mm insert fittings to simplify installation of XF Series Dripline.
- Unique barb design reduces insertion force and still retain a secure fit.
- Non-obtrusive colored fittings to compliment natural earth tones.

SPECIFICATIONS

Pressure: 0 to 50 psi (1.0 to 3.5 bar); If using 60 psi (4.1 bar), clamps will be required

MODELS

- XFF-COUP:** 17 mm Barb x Barb Coupling
XFF-ELBOW: 17 mm Barb x Barb Elbow
XFF-MA-050: 17 mm Barb x ½" MPT Male Adapter
XFF-TEE: 17 mm Barb x Barb x Barb Tee
XFF-TMA-050: 17 mm Barb x ½" MPT x 17 mm Barb Tee Male Adapter
XFF-MA-075: 17 mm Barb x ¾" MPT Male Adapter
XFF-FA-050: Low-Profile Barb Elbow Female Adapter 17 mm x ½" FPT
XFF-TFA-050: Low-Profile Barb Tee Female Adapter 17 mm x ½" FPT x 17 mm
XFD-CROSS: Barb Cross 17 mm x 17 mm x 17 mm x 17 mm
XFS-TFA-075: Barb Tee Female Adapter 17 mm x ¾" FPT x 17 mm
LD165TK: 7 ¾" Barbed Tubing Plastic Stake
FITTINGS-TOOL: XF Fitting Insertion Tool. Compatible with XFF-COUP, XFF-ELBOW, XFF-TEE and QF Dripline Header.



Easy Fit Compression System

- Multi-diameter compression fittings work with a wide range of 16 mm to 17 mm tubing or dripline.
- 50% less force required to connect tubing and fittings versus competitive compression fittings. Adapters swivel for easy installation.
- Patented fittings and adapters are molded from UV-resistant and durable ABS materials.
- Removable flush caps can be used to flush end of line and temporarily cap off lines for later expansion.
- Not recommended with subsurface irrigation.

SPECIFICATIONS

Pressure: 0 to 60 psi (0 to 4.1 bar)

Tubing: Accepts tubing with an OD of 0.630" (16 mm) to 0.669" (17 mm)

MODELS

Easy Fit Fittings

- MDCF-COUP:** Coupling
MDCF-EL: Elbow
MDCF-TEE: Tee

Easy Fit Adapters

- MDCF-50MPT:** ½" Male Pipe Thread Adapter
MDCF-75MPT: ¾" Male Pipe Thread Adapter
MDCF-50FPT: ½" Female Pipe Thread Adapter
MDCF-75FPT: ¾" Female Pipe Thread Adapter
MDCF-75FHT: ¾" Female Hose Thread Adapter
MDCF-CAP: Black Removable Flush Cap
MDCF-PCAP: Purple Removable Flush Cap

NOTE: Easy Fit Adapters are not barbed fittings. They are to be used only with Easy Fit Compression Fittings.



XF Series Blank Tubing

FEATURES

- Greater flexibility is easier to install and saves time.
- Brown color matches landscape and blends with mulch.
- Compatible with XF Series Dripline (0.634" (16.1 mm) OD x 0.536" (13.6 mm) ID).
- Accepts Rain Bird® Easy Fit Compression Fittings, XF Dripline Insert Fittings and 17 mm insert fittings. Not compatible with 16 mm fittings.

SPECIFICATIONS

Dimensions:

OD: 0.634" (16.1 mm)

ID: 0.536" (13.6 mm)

Thickness: 0.049" (1.2 mm)

Models:

XFD100: 100' coil (30 m)

XFD250: 250' coil (76 m)

XFD500: 500' coil (152 m)



U.S. Performance Data

Friction Loss Characteristics (psi/100 ft)												
	Flow (gpm)											
	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Velocity (fps)	0.70	1.40	2.10	2.80	3.50	4.20	4.90	5.60	6.30	7.00	7.70	8.40
Loss (psi)	0.27	0.97	2.06	3.50	5.29	7.42	9.87	12.64	15.72	19.11	22.80	26.78

Metric Performance Data

FRICTION LOSS CHARACTERISTICS (BAR/100 M)												
	Flow (l/m)											
	1.89	3.79	5.68	7.57	9.46	11.36	13.25	15.14	17.03	18.93	20.82	22.71
Velocity (m/s)	0.21	0.43	0.64	0.85	1.07	1.28	1.49	1.71	1.92	2.13	2.35	2.56
Loss (bar)	0.06	0.22	0.46	0.79	1.20	1.68	2.23	2.86	3.56	4.32	5.16	6.06

NOTE: Use of tubing at flows shown in shaded area is not recommended, as velocities exceed 5 ft/sec (1.5 m/s).

XT-700 Distribution Tubing

FEATURES

- Thick-walled, flexible tubing resists kinks and damage caused by routine landscape maintenance activities.
- Extruded from UV-resistant polyethylene resin materials.
- Accepts Rain Bird ½" Twist Lock Fittings — 600 Series.

SPECIFICATIONS

Dimensions:

OD: 0.70" (18 mm)

ID: 0.58" (15 mm)

Thickness: 0.06" (1.5 mm)

Pressure: 0 to 60 psi (0 to 4.1 bar)

Models:

XT-700-100: 100' coil (30 m)

XT-700-500: 500' coil (152 m)



U.S. Performance Data

Friction Loss Characteristics (psi/100 ft)												
	Flow (gpm)											
	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50	6.00
Velocity (fps)	0.61	1.21	1.82	2.43	3.03	3.64	4.24	4.85	5.46	6.06	6.67	7.28
Loss (psi)	0.19	0.69	1.45	2.47	3.74	5.24	6.97	8.93	11.10	13.50	16.10	18.92

Metric Performance Data

FRICTION LOSS CHARACTERISTICS (BAR/100 M)												
	Flow (l/m)											
	1.89	3.79	5.68	7.57	9.50	11.36	13.25	15.14	17.03	18.93	20.82	22.71
Velocity (m/s)	0.19	0.37	0.56	0.74	0.92	1.11	1.29	1.48	1.67	1.85	2.03	2.22
Loss (bar)	0.01	0.05	0.10	0.17	0.26	0.36	0.48	0.62	0.77	0.93	1.11	1.31

NOTE: Use of tubing at flows shown in shaded area is not recommended, as velocities exceed 5 ft/sec (1.5 m/s).

Xeri-Bubblers™

FEATURES

- Ideal for shrub plantings, trees, containers and flower beds.
- Adjust flow and radius by turning outer cap.
- Stream Bubbler (SXB) has wetting patterns of either half-circle, 5 stream or half-circle, 8 stream.
- Umbrella Bubbler (UXB) has a full-circle, umbrella wetting pattern.

SPECIFICATIONS

Pressure: 15 to 30 psi (1.0 to 2.1 bar)

Flow:

SXB Series: 0 to 13 gph (0 to 49.21 l/h) at 30 psi (2.1 bar); 0 to 8.5 gph (0 to 30 l/h) at 15 psi (1 bar)

UXB Series: 0 to 35 gph (0 to 132.48 l/h) at 30 psi (2.1 bar); 0 to 26 gph (0 to 98 l/h) at 15 psi (1 bar)

Models:

SXB-180: Half-circle, 5 streams, 10-32 thread

SXB-180-025: Half-circle, 5 streams, ¼" barb

SXB-180-SPYK: Half-circle, 5 streams, 5" spike; includes barb x barb coupler

SXB-360: Full-circle, 8 streams, 10-32 thread

SXB-360-025: Full-circle, 8 streams, ¼" barb

SXB-360-SPYK: Full-circle, 8 streams, 5" spike; includes barb x barb coupler

UXB-360: Full-circle, umbrella, 10-32 thread

UXB-360-025: Full-circle, umbrella, ¼" barb

UXB-360-SPYK: Full-circle, umbrella, 5" spike; includes barb x barb coupler



HOW TO SPECIFY

XXX	-	XXX	-	XXX(X)
MODEL		PATTERN		CONNECTION
SXB: Stream Bubbler		180 = Half-Circle		025 = ¼" Barb
UXB: Umbrella Bubbler		360 = Full-Circle		SPYK = 5" Spike

Xeri-Bug™ Emitters

FEATURES

- Point-source low-flow emitters Ideal for watering the root zones of shrub plantings, trees and container plants.
- Flow rates of 0.5, 1.0 and 2.0 gph (1.89, 3.79 and 7.57 l/h).
- Outlet barb securely retains ¼" distribution tubing.

SPECIFICATIONS

Operating Range:

Flow: 0.5 to 2.0 gph (1.89 to 7.57 l/h)

Pressure: 15 to 50 psi (1.0 to 3.5 bar)

Required Filtration: 150 to 200 mesh (75 to 100 micron)

Barb Inlet x Barb Outlet Models:

XB-05PC: Blue, 0.5 gph (1.89 l/h)

XB-10PC: Black, 1.0 gph (3.79 l/h)

XB-20PC: Red, 2.0 gph (7.57 l/h)

10-32 Thread Inlet x Barb Outlet Models:

XB-05PC-1032: Blue, 0.5 gph (1.89 l/h)

XB-10PC-1032: Black, 1.0 gph (3.79 l/h)

XB-20PC-1032: Red, 2.0 gph (7.57 l/h)

½" FPT Inlet x Barb Outlet Models:

XBT-10: Black, 1.0 gph (3.79 l/h)

XBT-20: Red, 2.0 gph (7.57 l/h)



HOW TO SPECIFY

XB	-	T	-	XX	-	PC	-	XXXX
MODEL		OPTIONAL		FLOW		FEATURE		OPTIONAL
XB = Xeri-Bug		T = ½" FPT Inlet		05 = 0.5 gph (1.89 l/h)		PC = Pressure Compensating		1032 = 10-32 Threaded Inlet
				10 = 1.0 gph (3.79 l/h)				
				20 = 2.0 gph (7.57 l/h)				

Large-Capacity Filters

FEATURES

- Provides extra large filtration capacity for residential, commercial and municipal applications.
- Durable filters can be easily removed for cleaning. Disc filters can decompress for easy cleaning.
- Auxiliary connection with a threaded cap can be drilled to allow draining or depressurization.

OPERATING RANGE

1" Model:

Maximum Flow: Up to 26 gpm (6 m³/hr)

Disc Filtering Surface: 28 in² (180 cm²)

1.5" Model:

Maximum Flow: Up to 62 gpm (14 m³/hr)

Disc Filtering Surface: 48 in² (310 cm²)

Screen Filtering Surface: 42 in² (270 cm²)

2" Model:

Maximum Flow: Up to 110 gpm (25 m³/hr)

Disc Filtering Surface: 81 in² (525 cm²)

Screen Filtering Surface: 75 in² (485 cm²)

Maximum Pressure: 116 psi (8 bar)

Maximum Temperature: 140° F (60° C)

MODELS

LCRBY100D: 1" Large-Capacity Disc Filter

LCRBY150S: 1.5" Large-Capacity Screen Filter

LCRBY150D: 1.5" Large-Capacity Disc Filter

LCRBY200S: 2" Large-Capacity Screen Filter

LCRBY200D: 2" Large-Capacity Disc Filter

Replacement Filters:

LGFC120MS: 1.5" – 2" Screen Filter

LGFC120MD: 1.5" – 2" Disc Filter

SPECIFICATIONS

Inlet/Outlet Size:

1" Models: 1" NPT

1.5" Models: 1.5" NPT

2" Models: 2" NPT

FILTRATION

Stainless Steel Screen Filter: 120 mesh (130 micron)*

Plastic Filter Discs: 120 mesh (130 micron)

*Screen not available in 1" model.

NOTE: Filter should be installed downstream of valve.



Disc Filter Pressure Loss Characteristics

Flow Rate		1" Filter		1.5" Filter		2" Filter	
gpm	l/m	psi	bar	psi	bar	psi	bar
5	18.93	0.60	0.04	0.08	0.01	0.10	0.01
11	41.67	1.16	0.08	0.18	0.01	0.10	0.01
22	83.33	2.61	0.18	0.40	0.03	0.10	0.01
33	125.00	4.35	0.30	0.73	0.05	0.24	0.02
44	166.67	—	—	1.05	0.07	0.40	0.03
55	208.33	—	—	1.50	0.10	0.60	0.04
66	250.00	—	—	2.18	0.15	0.82	0.06
77	291.67	—	—	3.10	0.21	1.10	0.08
88	333.33	—	—	3.95	0.27	1.60	0.11
99	375.00	—	—	—	—	2.03	0.14
110	416.67	—	—	—	—	2.47	0.17



Plastic Filter Discs:

These filters are made up of over a hundred grooved discs that allow water to pass while trapping debris. Less maintenance required due to large surface area.

Screen Filter Pressure Loss Characteristics

Flow Rate		1" Filter		1.5" Filter		2" Filter	
gpm	l/m	psi	bar	psi	bar	psi	bar
5	18.93	0.80	0.06	0.00	0.00	0.00	0.00
11	41.67	1.74	0.12	0.00	0.00	0.00	0.00
22	83.33	2.90	0.20	0.50	0.03	0.20	0.01
33	125.00	4.06	0.28	0.95	0.07	0.25	0.02
44	166.67	—	—	1.45	0.10	0.44	0.03
55	208.33	—	—	1.89	0.13	0.60	0.04
66	250.00	—	—	2.32	0.16	0.87	0.06
77	291.67	—	—	2.76	0.19	1.16	0.08
88	333.33	—	—	3.19	0.22	1.45	0.10
99	375.00	—	—	—	—	1.89	0.13
110	416.67	—	—	—	—	2.32	0.16



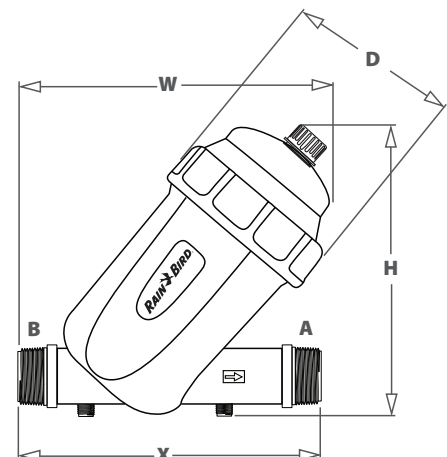
Screen Filter:

The 120 mesh screen filters are easy to clean and provide reliable filtration.

NOTE: Filter should be installed downstream of the valve to prevent the filter from being under constant pressure.

Filter Housing Dimensions

Model	A, B	H	W	X	D
1" (2.5 cm)	1" NPT	6.81" (17.3 cm)	7.48" (19.0 cm)	6.22" (15.8 cm)	3.27" (8.3 cm)
1.5" (3.8 cm)	1.5" NPT	9.53" (24.2 cm)	10.25" (26.0 cm)	9.92" (25.2 cm)	5.67" (14.4 cm)
2" (5.1 cm)	2" NPT	9.76" (24.8 cm)	10.63" (27.0 cm)	10.51" (26.7 cm)	5.67" (14.4 cm)



ESP-9V Battery-Operated Controller

FEATURES

Controller Features

- Waterproof case ensures long life, even when installed in a valve box.
- Common programming features are easily accessed on one screen, making programming quick and easy.
- Operates for approximately one full year using one 9-volt alkaline battery, or two years with two 9-volt alkaline batteries.
- Large LCD display with easy to navigate user interface.
- Sensor input with bypass override.
- Mast valve/pump-start circuit (multi-zone units only).
- Non-volatile (100-year) program memory.
- IP68 certified for protection against dust and water intrusion.
- Plastic controller case has outstanding resistance to weather, yellowing and aging.

Scheduling Features

- Dedicated manual watering button for easy operation.
- Automatic zone-stacking ensures that only one valve irrigates at the same time. ESP-9V will automatically irrigate the lower number zone first if zones are scheduled to water at the same time.
- Contractor Rapid Programming™ automatically copies the start times and watering days from zone 1 to all remaining zones at initial setup.
- Run times, start times, and watering days are customizable by zone.
- 6 start times per zone.
- 4 watering day options per zone: Custom days of the week, Cyclic, and ODD or EVEN calendar days.
- Delay watering (1 to 9 days).

VALVE COMPATIBILITY

- Rain Bird K80920, Hunter 458200, Irritrol DCL, Toro DCLS-P

MODELS

ESP9V1: 1-Zone ESP-9V Controller

ESP9V2: 2-Zone ESP-9V Controller

ESP9V4: 4-Zone ESP-9V Controller

ESP9V6: 6-Zone ESP-9V Controller

ESP9V1SOL: 1-Zone + 9V Solenoid

ESP9VDVKIT: 1-Zone + 1" DV Valve (SLIP)

9VMOUNT: Wall-mount kit

SPECIFICATIONS

Dimensions:

Width: 5.35" (13.59 cm)

Height: 4.04" (10.26 cm)

Depth: 2.42" (6.15 cm)

Weight: 2.0 lbs (907 g)

LCD Screen Dimensions:

Width: 2.25" (5.72 cm)

Height: 1.25" (3.18 cm)

Optional Wall Mount Dimensions:

Width: 4.25" (10.76 cm)

Height: 6.93" (17.60 cm)

Depth: 1.97" (4.99 cm)

Weight: 3.6 oz (107 g)



Optional Wall Mount

CERTIFICATIONS

- cULus, FCC, IC, CE, RCM, IP68, RoHS, WEEE



TBOS-BT Battery-Operated Controller



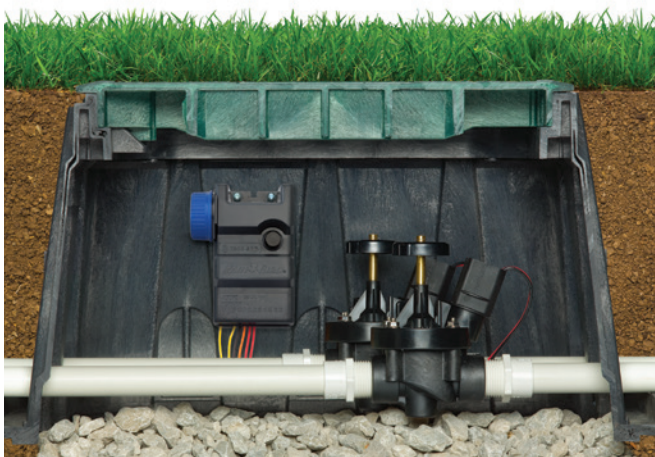
FEATURES

Controller Features

- Operates for approximately one full year using one 9-volt alkaline battery.
- Completely potted to obtain IP68 conformity.
- Independent station operation allows sequential start times (with stacking in case of overlap) restriction compliance.
- Master valve output (on TBOS-II 2, 4, and 6 Control Modules).
- No loss of irrigation program after a battery replacement.
- Backward-compatible with the TBOS-II Field Transmitter.

Rain Bird App Features

- Create, review and transmit irrigation programs.
- Capability to set zones or programs to manually irrigate.
- Basic programming includes 3 independent programs A,B and C, each with 8 start times per day.
- Stations can be assigned to several programs with different watering run times.
- Run time is from 1 minute to 12 hours in 1-minute increments.
- Five watering day cycle modes (Custom, even, odd, odd-31, cyclical) selectable by program for maximum flexibility and watering.
- Program and global Monthly Seasonal Adjust; 0% to 300% (1% increments).
- Built-in ID with naming capability. The control module and stations can be individually named.
- Optional passcode.
- Delay watering from 1 to 14 days.
- Permanently turn the controller off to prevent irrigation.
- Battery indicator reports the status of the control module's battery.
- Capability to clear the control module's irrigation program.



VALVE COMPATIBILITY

- Rain Bird TBOS Potted Latching Solenoid (K80920)
 - DV, DVF, ASF, PGA, PEB, PESB, GB, EFB-CP, BPE and BPES series
- Hunter 458200, Irritrol DCL, Toro DCLS-P

MODELS

TBOS-BT1: 1 Station

TBOS-BT2: 2 Station

TBOS-BT4: 4 Station

TBOS-BT6: 6 Station

SPECIFICATIONS

Dimensions:

Width: 3.8" (9.5 cm)

Height: 5.1" (13.0 cm)

Depth: 2.0" (5.3 cm)

Weight: 17.6 oz (500 g)

Rain Bird App (TBOS-BT): Available for Android and IOS devices

ACCESSORIES

- TBOS Potted Latching Solenoid
- RSD Series Rain Sensors
- The TBOS solenoid adapters will adapt the potted latching solenoid for use in retrofit applications with selected Irritrol® (Hardie/Richdel) and Buckner® valves or Champion® and Superior® valve actuators

CERTIFICATIONS

- cULus, CE, RoHS, WEEE, FCC



NEW

VB Series Valve Boxes

FEATURES

- Commercial-grade boxes.
- Multiple sizes and shapes designed with corrugated sides and wide flange bases for maximum durability, compression strength and stability.
- Smart lid design with no holes to keep out pests and beveled edges to minimize damage potential from turf equipment with an easy-access shovel slot for lid removal.
- Interlocking stacking capabilities, extension models and pipe hole knockouts support deeper and more flexible installations.
- All black bodies and lids are made from 100% recycled materials, making them earth-friendly and LEED compliant.
- Locking systems with vandal-resistant hex or penta bolt, washers and clips.
- **Warranty:** 5-year trade warranty

Locking Systems:

VB-LOCK-H: Hex Head $\frac{3}{8}$ " x $2\frac{1}{4}$ " (1.0 x 5.7 cm) bolt, washer and clip

VB-LOCK-P: Penta Head $\frac{3}{8}$ " x $2\frac{1}{4}$ " (1.0 x 5.7 cm) bolt, washer and clip

Bolt Hole Knock-Out keeps hazardous insects and pests out when bolt is not used.

Beveled Lid Edges prevent damage from lawn equipment.

Finger or Shovel Access Slot for easy removal of lid.

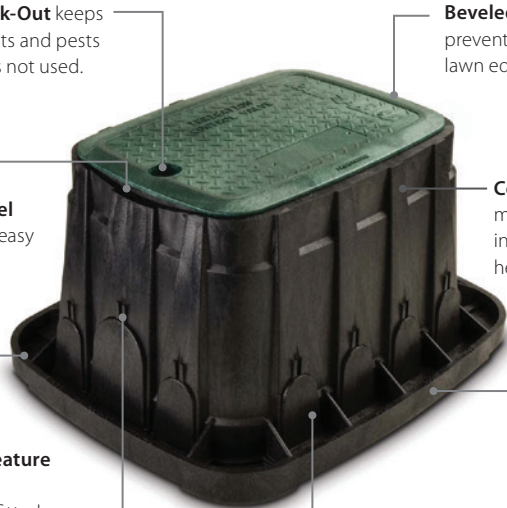
Corrugated Sides maintain structural integrity under heavy loads.

Interlocking Feature locks two boxes together when fitted bottom-to-bottom for deep installations.

Knock-Out Retainers hold removed knock-outs in place during backfill.

Knock-Outs built into all four sides.

Wide Flange stabilizes box eliminating need for brick and provides enhanced side load strength.



Size	7" Round	10" Round	Standard	Jumbo
Bottom Diameter	9.9" (25.1 cm)	13.7" (34.9 cm)	—	—
Length x Width	—	—	21.8" (55.4 cm) x 16.6" (42.2 cm)	26.3" (66.8 cm) x 19.8" (50.3 cm)
Height	9.0" (22.9 cm)	10.0" (25.4 cm)	12.0" (30.5 cm)	12.1" (30.7 cm)
Number of Knockouts	4	4	13	2
Specifications	Takes up to 2" (5.0 cm) pipe	Takes up to 2" (5.0 cm) pipe	2 take up to 3.5" (8.9 cm) pipe 11 take up to 2.0" (5.0 cm) pipe	Takes up to 3.5" (8.9 cm) pipe



MODELS

7" Round

Item ID	Lid Color	Model Number
G11480	Green	GVB7RNDGR
G11481	Black	GVB7RNDBLK
G11482	Purple	GVB7RNDPUR
G11483	Tan	GVB7RNDTAN

Standard

Item ID	Lid Color	Model Number
G11400	Green	GVBSTDGR
G11401	Black	GVBSTDBLK
G11402	Purple	GVBSTDPURP
G11403	Tan	GVBSTD TAN

10" Round

Item ID	Lid Color	Model Number
G11450	Green	GVB10RNDGR
G11451	Black	GVB10RNDBL
G11452	Purple	GVB10RNDPU
G11453	Tan	GVB10RNDTA

Jumbo

Item ID	Lid Color	Model Number
G11430	Green	GVBJMBGR
G11431	Black	GVBJMBBLK
G11432	Purple	GVBJMBPURP
G11433	Tan	GVBJMBTAN

Areas

6,452 sq cm	1 sq in
144 sq in	1 sq ft
9 sq ft	1 sq yd
43,560 sq ft	1 acre
1 acre	43,560 sq ft
1 acre	4,840 sq yd
1 acre	160 sq rods
1 sq rod	272.25 sq ft
1 sq rod	30.25 sq yd
640 acres	1 sq mi
640 acres	1 section
Area of a Circle	$r^2 \times 3.1416$
Area of a Square	One Side Squared
Area of a Triangle	$\frac{1}{2}$ Base x Altitude
Area of a Rectangle	Length x Width
Area of a Parallelogram	Base x Altitude

Lineal Measurements

1 centimeter	0.3937 inches
1 cubit	18 inches
1 meter	39.37 inches
1 rod	16.5 feet
1 rod	5.5 yards
1 chain	4 rods
1 chain	66 feet
320 rods	1 mile
5280 feet	1 mile
Circumference of Circle	Diameter x 3.1416

Volume

1728 cu in	1 cu ft
231 cu in	1 gallon
27 cu ft	1 cu yd
1 cu ft	7.48052 gal (U.S.)
1 cu yd	202 gallons (U.S.)
16 drams	1 ounce
32 ounces	1 quart
4 quarts	1 gallon
1 gallon	3.785 liters
1 gallon	0.00379 cu m
1 gallon	0.833 imperial gallons
27,154 gallons	1 acre inch
325,851 gallons	1 acre foot
1,000,000 gallons	3.0689 acre ft
1 acre foot	43,560 cu ft
Volume of a Cube	Area of Base x Height
Volume of a Pyramid	$\frac{1}{2}$ Area of Base x Height
Volume of a Sphere	Diameter ³ x 0.5236

Mass/Weight

1 kg	2.204 lbs
1 lb	454 g = 7,000 grains
1 slug	14.5 kg
1 stone	14 lb

Weights

1 U.S. Gallon (Water)	8.3357 lbs
1 Cu Foot (Water)	62.3554 lbs
1 Imperial Gallon	10.0 lbs
1 Liter	2.2 lbs
Earth, in Place Undisturbed	100 lbs/cu ft
Earth, Dry and Loose	82-90 lbs/cu ft
Earth, Moist	75-100 lbs/cu ft
Sand, Dry	90-106 lbs/cu ft
Shale or Red Rock	162 lbs/cu ft
Limestone	160-163 lbs/cu ft
Base Gravel	12.0 lbs/sq ft/inch Thick in Place
Asphalt	12.5 lbs/sq ft/inch Thick in Place
Sack Cement	94 lbs
Concrete (Plain)	140 lbs/cu ft
Concrete (Reinforced)	150 lbs/cu ft

Pressures

1 atmosphere	29.921 inches of hg @ 32° F
1 atmosphere	33.94 ft of water @ 62° F
1 atmosphere	14.6963 lbs/sq in
1 lb/sq inch	2.31 feet of head
1 foot of water	0.433 lbs/sq in
1 kg/sq cm	14.22 lbs/sq in
1 foot of water	62.3554 lbs/sq ft
1 bar	14.5 lbs/sq in

Flows

1 gallon/min (U.S.)	0.002228 cu ft/sec
1 gallon/min (U.S.)	0.13368 cu ft/min
1 gallon/min (U.S.)	8.0208 cu ft/hr
1 gallon/min (U.S.)	0.06309 liters/sec
1 gallon/min (U.S.)	3.78533 liters/min
1 gallon/min (U.S.)	0.0044192 acre ft/24 hrs
1 gallon/min (U.S.)	0.22712 cu m/hr
1 cu ft/sec	448.83 gpm
1 liter/sec	15.85 gpm
1 cu m/min	264 gpm
1 acre in/hr	452.57 gpm
1 acre ft/day	226.3 gpm
1,000,000 gallons/day	694.4 gpm
1 cu ft/sec	0.992 acre in/hr

Power

1 horsepower	33,000 ft lbs/min
1 horsepower	746 watts
1 horsepower	0.746 kilowatts

Temperature

F	°C x 9/5 + 32
C	(°F - 32) x 5/9

Design Formulas

Precipitation Rate (in/hr)	Run-Time	Velocity
$\text{Square} = \frac{96.3 \times \text{GPM} \times 360}{S \times S \times \text{Sprinkler Arc}}$	$\text{Run-Time} = \frac{\text{Desired Application} \times 60}{\text{Precipitation Rate}}$	$V = \frac{0.480 \times Q}{(ID)^2}$
$\text{Triangular} = \frac{96.3 \times \text{GPM} \times 360}{S \times S \times 0.866 \times \text{Sprinkler Arc}}$		Where: V = Velocity in feet per second Q = Gallons per minute ID = Inside diameter of pipe
$\text{Single Row} = \frac{96.3 \times \text{GPM}}{S \times 0.8 \text{ Diameter}}$		

Power Formulas

Horse Power	Electrical Power	Pump Laws (Affinity Laws)
1 hp = 550 foot pounds per second = 746 watts or 0.746 kW = 1 second foot of water falling 8.8'	3ϕ kVA = $\frac{1.732 \times \text{FLA} \times \text{Voltage}}{1000}$ 1ϕ kVA = $\frac{\text{FLA} \times \text{Voltage}}{1000}$ Ohm's Law: V = IR Where: V = Voltage in Volts I = Current in Amperes R = Resistance in ohms Amp Calculation Amps = Watts / Volts	RPM₂ / RPM₁ = Flow₂ / Flow₁ (RPM₂ / RPM₁)² = Pressure₂ / Pressure₁ (RPM₂ / RPM₁)³ = Power₂ / Power₁ Example: An irrigation pump operating at 1800 RPM and producing 600 gpm at 120 psi is switched to 3600 RPM: RPM₂ / RPM₁ = Flow₂ / Flow₁ = 3600 RPM / 1800 RPM = Flow₂ / 600 gpm = 1200 gpm (RPM₂ / RPM₁)² = Pressure₂ / Pressure₁ = (3600 RPM / 1800 RPM)² = Pressure₂ / 120 psi = 480 psi (RPM₂ / RPM₁)³ = Power₂ / Power₁ = (3600 RPM / 1800 RPM)³ = Power₂ / 60 HP = 480 HP
Water HP = $\frac{\text{GPM} \times \text{TDH}}{3960}$ Where: GPM = Gallons per minute TDH = Total dynamic head		
Brake HP = $\frac{\text{GPM} \times \text{TDH}}{3960 \times E}$ Where: GPM = Gallons per minute TDH = Total dynamic head E = Pump efficiency		
1 kilowatt (kW) = 1,000 watts = 1,341 HP = 735.5 foot pounds per second		

Electric Formulas for Calculating Amperes, Horsepower, Kilowatts and kVA

ALTERNATING CURRENT			
To Find:	Single Phase	Two Phase-Four Phase Wire	Three Phase
Amperes when "HP" is known	$\frac{\text{HP} \times 746}{E \times \% \text{EFF} \times \text{PF}}$	$\frac{\text{HP} \times 746}{E \times \% \text{EFF} \times \text{PF} \times 2}$	$\frac{\text{HP} \times 746}{E \times \% \text{EFF} \times \text{PF} \times 1.73}$
Amperes when "kW" is known	$\frac{\text{kW} \times 1000}{E \times \text{PF}}$	$\frac{\text{kW} \times 1000}{E \times \text{PF} \times 2}$	$\frac{\text{kW} \times 1000}{E \times \text{PF} \times 1.73}$
Amperes when "kVa" is known	$\frac{\text{kVA} \times 1000}{E}$	$\frac{\text{kVA} \times 1000}{E \times 2}$	$\frac{\text{kVA} \times 1000}{E \times 1.73}$
Kilowatts	$\frac{E \times I \times \text{PF}}{1000}$	$\frac{E \times I \times \text{PF} \times 2}{1000}$	$\frac{E \times I \times \text{PF} \times 1.73}{1000}$
Kilovolt-Amperes "kVA"	$\frac{E \times I}{1000}$	$\frac{E \times I \times 2}{1000}$	$\frac{E \times I \times 1.73}{1000}$
Horsepower	$\frac{E \times I \times \% \text{EFF} \times \text{PF}}{746}$	$\frac{E \times I \times \% \text{EFF} \times \text{PF} \times 2}{746}$	$\frac{E \times I \times \% \text{EFF} \times \text{PF} \times 1.73}{746}$

Where:

Power Factor (PF) = $\frac{\text{Power Used (Watts)}}{\text{Apparent Power}}$ or $\frac{\text{kW}}{\text{kVA}}$

Power Efficiency (%EFF) = $\frac{\text{Output (Watts)}}{\text{Input (Watts)}}$

E = Volts

I = Amperes

W = Watts

Conductor Properties For Insulated Annealed Copper Direct Current Resistance

OHMS PER 1,000 FEET					
Copper Awg	Temperature				Cross Sectional Area Circular Mils
	167° F (75° C)	149° F (65° C)	77° F (25° C)	68° F (20° C)	
18 Solid	7.77	7.519	6.515	6.390	1,620
18 Stranded	7.95	7.693	6.666	6.538	1,620
16 Solid	4.89	4.732	4.100	4.021	2,580
16 Stranded	4.99	4.829	4.184	4.104	2,580
14 Solid	3.07	2.971	2.574	2.525	4,110
14 Stranded	3.14	3.039	2.633	2.582	4,110
12 Solid	1.93	1.868	1.618	1.587	6,530
12 Stranded	1.98	1.916	1.660	1.628	6,530
10 Solid	1.21	1.171	1.015	0.995	10,380
10 Stranded	1.24	1.200	1.040	1.020	10,380
8 Solid	0.764	0.739	0.641	0.628	16,510
8 Stranded	0.778	0.753	0.652	0.640	16,510
6 Stranded	0.491	0.475	0.412	0.404	26,240
4 Stranded	0.308	0.298	0.258	0.253	41,740
2 Stranded	0.194	0.188	0.163	0.160	66,360
1/0 Stranded	0.122	0.118	0.102	0.100	105,600
2/0 Stranded	0.097	0.094	0.081	0.080	133,100

Source: 2008 Edition of *National Electric Code* (NFPA 70), Chapter 9, Table 8.

System designer must use resistance values which correlate to temperatures and applications for each specific project.

Full Load Amperage (FLA)

Motor HP	Single Phase A-C		Three Phase A-C Induction Type Squirrel Cage & Wound Rotor		
	115 VOLTS	230 VOLTS*	230 VOLTS*	460 VOLTS	575 VOLTS
½	9.8	4.9	2.2	1.1	0.9
¾	13.8	6.9	3.2	1.6	1.3
1	16	8	4.2	2.1	1.7
1½	20	10	6.0	3.0	2.4
2	24	12	6.8	3.4	2.7
3	34	17	9.6	4.8	3.9
5	56	28	15.2	7.6	6.1
7½	80	40	22	11	9
10	100	50	28	14	11
15	—	—	42	21	17
20	—	—	54	27	22
25	—	—	68	34	27
30	—	—	80	40	32
40	—	—	104	52	41
50	—	—	130	65	52
60	—	—	154	77	62
75	—	—	192	96	77
100	—	—	240	120	96
125	—	—	296	148	118
150	—	—	350	175	140
200	—	—	456	228	182
250	—	—	558	279	223

* For 208V applications, increase the 230V FLA by 10%.

Horsepower to Kilowatts

Horsepower	Kilowatt
1	0.746
3	2.2
5	3.7
10	7.5
15	11.2
20	14.9
25	18.7
30	22.4
40	29.8
50	37.3
60	44.8
75	56.0

Pressure Conversion

psi	Feet	Meter	Bar	kPa
1	2.3090	0.7038	0.0689	6.8948
80	185	56	5.5	552
85	196	60	5.9	586
90	208	63	6.2	621
95	219	67	6.6	655
100	231	70	6.9	689
105	242	74	7.2	724
110	254	77	7.6	758
115	266	81	7.9	793
120	277	84	8.3	827
125	289	88	8.6	862
130	300	91	9.0	896
135	312	95	9.3	931
140	323	99	9.7	965
150	346	106	10.3	1034
160	369	113	11.0	1103
170	393	120	11.7	1172
180	416	127	12.4	1241
190	439	134	13.1	1310
200	462	141	13.8	1379

Flow Rate Conversion

gpm	ft ³ /s	m ³ /h	l/s	acre-ft/day
1	0.0022	0.2271	0.0002	0.004419
100	0.22	22.7	6.3	0.442
250	0.56	56.8	15.8	1.105
500	1.11	113.6	31.5	2.210
750	1.67	170.3	47.3	3.314
1000	2.23	227.1	63.1	4.419
1500	3.34	340.7	94.6	6.629
2000	4.46	454.2	126.2	8.838
2500	5.57	567.8	157.7	11.048
3000	6.68	681.4	189.3	13.258
3500	7.80	794.9	220.8	15.467
4000	8.91	908.5	252.4	17.677
4500	10.03	1022.1	283.9	19.886
5000	11.14	1135.6	315.5	22.096
6000	13.37	1362.7	378.5	26.515
7000	15.60	1589.9	441.6	30.934
8000	17.82	1817.0	504.7	35.353
9000	20.05	2044.1	567.8	39.773
10000	22.28	2271.2	630.9	44.192

Lake Intake Box Screen Sizing

Flow Rate In (gpm)	Box Screen Size
0 - 500	18" square
501 - 1000	24" square
1001 - 1800	30" square
1801 - 2800	36" square
2801 - 4000	42" square
4001 - 5000	48" square
5001 - 7000	54" square
7001 - 8500	60" square
8501 - 10000	66" square

Based on screen velocities of less than 0.5 feet per second.

Micron to Mesh Conversion

Micron	U.S. Mesh	Inches
2000	10	0.0787
1680	12	0.0661
1410	14	0.0555
1190	16	0.0469
1000	18	0.0394
841	20	0.0331
707	25	0.028
595	30	0.0232
500	35	0.0197
420	40	0.0165
354	45	0.0138
297	50	0.0117
250	60	0.0098
210	70	0.0083
177	80	0.007
149	100	0.0059
125	120	0.0049
105	140	0.0041
88	170	0.0035
74	200	0.0029
63	230	0.0024
53	270	0.0021
44	325	0.0017
37	400	0.0015

Wet Well Intake Pipe Sizing

Flow Rate In gpm	Length of Pipe in Feet			
	50'	100'	200'	300'
0 - 500	12"	12"	12"	14"
501 - 1000	18"	18"	18"	18"
1001 - 1500	24"	24"	24"	24"
1501 - 2000	26"	26"	26"	26"
2001 - 2500	28"	28"	28"	28"
2501 - 3000	30"	30"	30"	30"
3001 - 3500	32"	32"	32"	32"
3501 - 4000	34"	34"	34"	34"
4001 - 5000	36"	36"	36"	36"

The nominal IPS pipe diameters listed in this chart assume a total equivalent pipe length as listed for friction loss calculations. A recommended internal pipe water velocity of up to 1.5 feet per second and/or a draw down of 1 inch or less is used to develop this conservative intake sizing table. Consult a Rain Bird engineer for values ranging outside of this chart.

Wet Well Open Area Sizing

Size	Shape	Number of Pumps
36"	Round	1 – Vertical Turbine
48"	Round	1 or 2 – Vertical Turbines
60"	Round	1 or 2 – Vertical Turbines
72"	Round	1 to 3 – Vertical Turbines
84"	Round	1 to 5 – Vertical Turbines
96"	Round	1 to 6 – Vertical Turbines
6' x 8'	Rectangular	1 to 7 – Vertical Turbines

PE 4710 IPS HDPE DR 13.5 (161 psi) Pipe

VELOCITY IN FEET PER SECOND — FRICTION LOSS IN PSI PER 100 FEET (C = 150)																				
Nominal Size (ID) Flow (gpm)	2" (2.002)		3" (2.950)		4" (3.793)		6" (5.585)		8" (7.271)		10" (9.062)		12" (10.748)		14" (11.801)		16" (13.487)		18" (15.173)	
	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss
2	0.20	0.01	0.09	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.41	0.02	0.19	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.61	0.04	0.28	0.01	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.81	0.07	0.38	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.02	0.10	0.47	0.02	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.22	0.14	0.56	0.02	0.34	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	1.43	0.19	0.66	0.03	0.40	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	1.63	0.25	0.75	0.04	0.45	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	1.83	0.31	0.84	0.05	0.51	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	2.04	0.37	0.94	0.06	0.57	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	2.24	0.44	1.03	0.07	0.62	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	2.44	0.52	1.13	0.08	0.68	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	2.65	0.61	1.22	0.09	0.74	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	2.85	0.70	1.31	0.11	0.79	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	3.05	0.79	1.41	0.12	0.85	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	3.56	1.05	1.64	0.16	0.99	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	4.07	1.35	1.88	0.20	1.13	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	4.58	1.67	2.11	0.25	1.28	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	5.09	2.04	2.34	0.31	1.42	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	5.60	2.43	2.58	0.37	1.56	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	6.11	2.85	2.81	0.43	1.70	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	6.62	3.31	3.05	0.50	1.84	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	7.13	3.80	3.28	0.58	1.99	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	7.63	4.31	3.52	0.65	2.13	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	8.14	4.86	3.75	0.74	2.27	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	8.65	5.44	3.99	0.82	2.41	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	9.16	6.04	4.22	0.92	2.55	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100			4.69	1.11	2.84	0.33	1.31	0.05	0.77	0.01	0.50	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110			5.16	1.33	3.12	0.39	1.44	0.06	0.85	0.02	0.55	0.01	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120			5.63	1.56	3.40	0.46	1.57	0.07	0.93	0.02	0.60	0.01	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130			6.09	1.81	3.69	0.53	1.70	0.08	1.00	0.02	0.65	0.01	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140			6.56	2.08	3.97	0.61	1.83	0.09	1.08	0.03	0.70	0.01	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150			7.03	2.36	4.25	0.69	1.96	0.11	1.16	0.03	0.75	0.01	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160			7.50	2.66	4.54	0.78	2.09	0.12	1.23	0.03	0.79	0.01	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170			7.97	2.98	4.82	0.88	2.22	0.13	1.31	0.04	0.84	0.01	0.60	0.01	0.00	0.00	0.00	0.00	0.00	0.00
180			8.44	3.31	5.10	0.97	2.35	0.15	1.39	0.04	0.89	0.01	0.64	0.01	0.00	0.00	0.00	0.00	0.00	0.00
190			8.91	3.66	5.39	1.08	2.49	0.16	1.47	0.05	0.94	0.02	0.67	0.01	0.00	0.00	0.00	0.00	0.00	0.00
200			9.38	4.02	5.67	1.18	2.62	0.18	1.54	0.05	0.99	0.02	0.71	0.01	0.00	0.00	0.00	0.00	0.00	0.00
225			10.55	5.00	6.38	1.47	2.94	0.22	1.74	0.06	1.12	0.02	0.79	0.01	0.00	0.00	0.00	0.00	0.00	0.00
250			11.72	6.08	7.09	1.79	3.27	0.27	1.93	0.08	1.24	0.03	0.88	0.01	0.00	0.00	0.00	0.00	0.00	0.00
275			12.89	7.25	7.80	2.13	3.60	0.32	2.12	0.09	1.37	0.03	0.97	0.01	0.00	0.00	0.00	0.00	0.00	0.00
300			14.06	8.52	8.51	2.51	3.92	0.38	2.32	0.11	1.49	0.04	1.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00

■ Use caution at shaded velocities.

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PE 4710 IPS HDPE DR 13.5 (161 psi) Pipe

VELOCITY IN FEET PER SECOND — FRICTION LOSS IN PSI PER 100 FEET (C = 150)																				
Nominal Size (ID) Flow (gpm)	2" (2.002)		3" (2.950)		4" (3.793)		6" (5.585)		8" (7.271)		10" (9.062)		12" (10.748)		14" (11.801)		16" (13.487)		18" (15.173)	
	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss
325			15.24	9.88	9.22	2.91	4.25	0.44	2.51	0.12	1.61	0.04	1.15	0.02	0.00	0.00	0.00	0.00	0.00	0.00
350			16.41	11.34	9.93	3.34	4.58	0.51	2.70	0.14	1.74	0.05	1.24	0.02	0.00	0.00	0.00	0.00	0.00	0.00
375				12.88	10.63	3.79	4.91	0.58	2.89	0.16	1.86	0.05	1.32	0.02	0.00	0.00	0.00	0.00	0.00	0.00
400				14.52	11.34	4.27	5.23	0.65	3.09	0.18	1.99	0.06	1.41	0.03	0.00	0.00	0.00	0.00	0.00	0.00
425				16.24	12.05	4.78	5.56	0.73	3.28	0.20	2.11	0.07	1.50	0.03	0.00	0.00	0.00	0.00	0.00	0.00
450				18.06	12.76	5.31	5.89	0.81	3.47	0.22	2.24	0.08	1.59	0.03	0.00	0.00	0.00	0.00	0.00	0.00
475				19.96	13.47	5.87	6.21	0.89	3.67	0.25	2.36	0.08	1.68	0.04	0.00	0.00	0.00	0.00	0.00	0.00
500					14.18	6.46	6.54	0.98	3.86	0.27	2.48	0.09	1.77	0.04	0.00	0.00	0.00	0.00	0.00	0.00
550					15.60	7.71	7.19	1.17	4.24	0.32	2.73	0.11	1.94	0.05	0.00	0.00	0.00	0.00	0.00	0.00
600					17.02	9.05	7.85	1.38	4.63	0.38	2.98	0.13	2.12	0.06	0.00	0.00	0.00	0.00	0.00	0.00
650					18.43	10.50	8.50	1.60	5.02	0.44	3.23	0.15	2.30	0.07	0.00	0.00	0.00	0.00	0.00	0.00
700					19.85	12.05	9.16	1.83	5.40	0.51	3.48	0.17	2.47	0.08	0.00	0.00	0.00	0.00	0.00	0.00
750					21.27	13.69	9.81	2.08	5.79	0.58	3.73	0.20	2.65	0.09	0.00	0.00	0.00	0.00	0.00	0.00
800									6.17	0.65	3.97	0.22	2.83	0.10	2.34	0.06	1.79	0.03	1.42	0.02
850									6.56	0.73	4.22	0.25	3.00	0.11	2.49	0.07	1.91	0.04	1.51	0.02
900									6.95	0.81	4.47	0.28	3.18	0.12	2.64	0.08	2.02	0.04	1.59	0.02
950									7.33	0.89	4.72	0.31	3.36	0.13	2.78	0.08	2.13	0.04	1.68	0.02
1000									7.72	0.98	4.97	0.34	3.53	0.15	2.93	0.09	2.24	0.05	1.77	0.03
1050									8.10	1.08	5.22	0.37	3.71	0.16	3.08	0.10	2.36	0.05	1.86	0.03
1100									8.49	1.17	5.47	0.40	3.89	0.18	3.22	0.11	2.47	0.06	1.95	0.03
1150									8.88	1.27	5.71	0.44	4.06	0.19	3.37	0.12	2.58	0.06	2.04	0.04
1200									9.26	1.38	5.96	0.47	4.24	0.21	3.52	0.13	2.69	0.07	2.13	0.04
1250									9.65	1.49	6.21	0.51	4.41	0.22	3.66	0.14	2.80	0.07	2.22	0.04
1300									10.03	1.60	6.46	0.55	4.59	0.24	3.81	0.15	2.92	0.08	2.30	0.04
1350									10.42	1.71	6.71	0.59	4.77	0.26	3.96	0.16	3.03	0.08	2.39	0.05
1400									10.80	1.83	6.96	0.63	4.94	0.27	4.10	0.17	3.14	0.09	2.48	0.05
1450									11.19	1.96	7.20	0.67	5.12	0.29	4.25	0.19	3.25	0.10	2.57	0.05
1500									11.58	2.08	7.45	0.71	5.30	0.31	4.39	0.20	3.36	0.10	2.66	0.06
1550											7.70	0.76	5.47	0.33	4.54	0.21	3.48	0.11	2.75	0.06
1600											7.95	0.80	5.65	0.35	4.69	0.22	3.59	0.12	2.84	0.07
1650											8.20	0.85	5.83	0.37	4.83	0.24	3.70	0.12	2.92	0.07
1700											8.45	0.90	6.00	0.39	4.98	0.25	3.81	0.13	3.01	0.07
1750											8.69	0.95	6.18	0.41	5.13	0.26	3.93	0.14	3.10	0.08
1800											8.94	1.00	6.36	0.44	5.27	0.28	4.04	0.14	3.19	0.08
1900											9.44	1.11	6.71	0.48	5.57	0.31	4.26	0.16	3.37	0.09
2000											9.94	1.22	7.06	0.53	5.86	0.34	4.49	0.18	3.54	0.10
2100											10.43	1.33	7.42	0.58	6.15	0.37	4.71	0.19	3.72	0.11
2200											10.93	1.45	7.77	0.63	6.45	0.40	4.93	0.21	3.90	0.12
2300											11.43	1.57	8.12	0.69	6.74	0.44	5.16	0.23	4.08	0.13
2400											11.92	1.70	8.48	0.74	7.03	0.47	5.38	0.25	4.25	0.14
2500											12.42	1.84	8.83	0.80	7.32	0.51	5.61	0.27	4.43	0.15

■ Use caution at shaded velocities.

SDR 21 (Class 200) PVC Pipe

VELOCITY IN FEET PER SECOND — FRICTION LOSS IN PSI PER 100 FEET (C = 150)																						
Nominal Size (ID) Flow (gpm)	1" (1.189)		1 ¼" (1.502)		1 ½" (1.720)		2" (2.149)		2 ½" (2.601)		3" (3.166)		4" (4.072)		6" (5.993)		8" (7.805)		10" (9.728)		12" (11.538)	
	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss
2	0.58	0.07	0.36	0.02	0.28	0.01	0.18	0.00	0.12	0.00	0.08	0.00	0.05	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.01	0.00
4	1.15	0.24	0.72	0.08	0.55	0.04	0.35	0.01	0.24	0.01	0.16	0.00	0.10	0.00	0.05	0.00	0.03	0.00	0.02	0.00	0.01	0.00
6	1.73	0.51	1.09	0.16	0.83	0.08	0.53	0.03	0.36	0.01	0.24	0.00	0.15	0.00	0.07	0.00	0.04	0.00	0.03	0.00	0.02	0.00
8	2.31	0.86	1.45	0.28	1.10	0.14	0.71	0.05	0.48	0.02	0.33	0.01	0.20	0.00	0.09	0.00	0.05	0.00	0.03	0.00	0.02	0.00
10	2.89	1.30	1.81	0.42	1.38	0.22	0.88	0.07	0.60	0.03	0.41	0.01	0.25	0.00	0.11	0.00	0.07	0.00	0.04	0.00	0.03	0.00
12	3.46	1.83	2.17	0.59	1.65	0.30	1.06	0.10	0.72	0.04	0.49	0.02	0.30	0.00	0.14	0.00	0.08	0.00	0.05	0.00	0.04	0.00
14	4.04	2.43	2.53	0.78	1.93	0.40	1.24	0.14	0.84	0.05	0.57	0.02	0.34	0.01	0.16	0.00	0.09	0.00	0.06	0.00	0.04	0.00
16	4.62	3.11	2.89	1.00	2.21	0.52	1.41	0.17	0.96	0.07	0.65	0.03	0.39	0.01	0.18	0.00	0.11	0.00	0.07	0.00	0.05	0.00
18	5.19	3.87	3.26	1.24	2.48	0.64	1.59	0.22	1.09	0.09	0.73	0.03	0.44	0.01	0.20	0.00	0.12	0.00	0.08	0.00	0.06	0.00
20	5.77	4.71	3.62	1.51	2.76	0.78	1.77	0.26	1.21	0.10	0.81	0.04	0.49	0.01	0.23	0.00	0.13	0.00	0.09	0.00	0.06	0.00
22	6.35	5.62	3.98	1.80	3.03	0.93	1.94	0.32	1.33	0.12	0.90	0.05	0.54	0.01	0.25	0.00	0.15	0.00	0.09	0.00	0.07	0.00
24	6.93	6.60	4.34	2.12	3.31	1.09	2.12	0.37	1.45	0.15	0.98	0.06	0.59	0.02	0.27	0.00	0.16	0.00	0.10	0.00	0.07	0.00
26	7.50	7.65	4.70	2.45	3.59	1.27	2.30	0.43	1.57	0.17	1.06	0.07	0.64	0.02	0.30	0.00	0.17	0.00	0.11	0.00	0.08	0.00
28	8.08	8.78	5.06	2.82	3.86	1.46	2.47	0.49	1.69	0.19	1.14	0.07	0.69	0.02	0.32	0.00	0.19	0.00	0.12	0.00	0.09	0.00
30	8.66	9.97	5.43	3.20	4.14	1.65	2.65	0.56	1.81	0.22	1.22	0.08	0.74	0.02	0.34	0.00	0.20	0.00	0.13	0.00	0.09	0.00
35	10.10	13.27	6.33	4.26	4.83	2.20	3.09	0.74	2.11	0.29	1.42	0.11	0.86	0.03	0.40	0.01	0.23	0.00	0.15	0.00	0.11	0.00
40	11.54	16.99	7.23	5.45	5.52	2.82	3.53	0.95	2.41	0.38	1.63	0.14	0.98	0.04	0.45	0.01	0.27	0.00	0.17	0.00	0.12	0.00
45			8.14	6.78	6.21	3.51	3.98	1.19	2.71	0.47	1.83	0.18	1.11	0.05	0.51	0.01	0.30	0.00	0.19	0.00	0.14	0.00
50			9.04	8.24	6.90	4.26	4.42	1.44	3.02	0.57	2.04	0.22	1.23	0.06	0.57	0.01	0.33	0.00	0.22	0.00	0.15	0.00
55			9.95	9.83	7.59	5.08	4.86	1.72	3.32	0.68	2.24	0.26	1.35	0.08	0.62	0.01	0.37	0.00	0.24	0.00	0.17	0.00
60			10.85	11.55	8.27	5.97	5.30	2.02	3.62	0.80	2.44	0.31	1.48	0.09	0.68	0.01	0.40	0.00	0.26	0.00	0.18	0.00
65			11.76	13.39	8.96	6.93	5.74	2.34	3.92	0.93	2.65	0.36	1.60	0.10	0.74	0.02	0.44	0.00	0.28	0.00	0.20	0.00
70					9.65	7.95	6.18	2.69	4.22	1.06	2.85	0.41	1.72	0.12	0.80	0.02	0.47	0.01	0.30	0.00	0.21	0.00
75					10.34	9.03	6.63	3.05	4.52	1.21	3.05	0.46	1.85	0.14	0.85	0.02	0.50	0.01	0.32	0.00	0.23	0.00
80					11.03	10.17	7.07	3.44	4.82	1.36	3.26	0.52	1.97	0.15	0.91	0.02	0.54	0.01	0.34	0.00	0.25	0.00
85					11.72	11.38	7.51	3.85	5.13	1.52	3.46	0.58	2.09	0.17	0.97	0.03	0.57	0.01	0.37	0.00	0.26	0.00
90							7.95	4.28	5.43	1.69	3.66	0.65	2.21	0.19	1.02	0.03	0.60	0.01	0.39	0.00	0.28	0.00
100							8.83	5.20	6.03	2.06	4.07	0.79	2.46	0.23	1.14	0.04	0.67	0.01	0.43	0.00	0.31	0.00
110							9.72	6.21	6.63	2.45	4.48	0.94	2.71	0.28	1.25	0.04	0.74	0.01	0.47	0.00	0.34	0.00
120							10.60	7.30	7.24	2.88	4.88	1.11	2.95	0.33	1.36	0.05	0.80	0.01	0.52	0.00	0.37	0.00
130									7.84	3.34	5.29	1.28	3.20	0.38	1.48	0.06	0.87	0.02	0.56	0.01	0.40	0.00
140									8.44	3.83	5.70	1.47	3.44	0.43	1.59	0.07	0.94	0.02	0.60	0.01	0.43	0.00
150									9.05	4.36	6.11	1.67	3.69	0.49	1.70	0.08	1.00	0.02	0.65	0.01	0.46	0.00
160									9.65	4.91	6.51	1.89	3.94	0.55	1.82	0.08	1.07	0.02	0.69	0.01	0.49	0.00
170									10.25	5.49	6.92	2.11	4.18	0.62	1.93	0.09	1.14	0.03	0.73	0.01	0.52	0.00
180											7.33	2.35	4.43	0.69	2.04	0.11	1.21	0.03	0.78	0.01	0.55	0.00
190											7.73	2.59	4.68	0.76	2.16	0.12	1.27	0.03	0.82	0.01	0.58	0.00
200											8.14	2.85	4.92	0.84	2.27	0.13	1.34	0.04	0.86	0.01	0.61	0.01
225											9.16	3.55	5.54	1.04	2.56	0.16	1.51	0.04	0.97	0.02	0.69	0.01
250											10.18	4.31	6.15	1.27	2.84	0.19	1.67	0.05	1.08	0.02	0.77	0.01
275													6.77	1.51	3.12	0.23	1.84	0.06	1.19	0.02	0.84	0.01
300													7.38	1.78	3.41	0.27	2.01	0.07	1.29	0.03	0.92	0.01

■ Use caution at shaded velocities.

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SDR 21 (Class 200) PVC Pipe

VELOCITY IN FEET PER SECOND — FRICTION LOSS IN PSI PER 100 FEET (C = 150)																						
Nominal Size (ID) Flow (gpm)	1" (1.189)		1 ¼" (1.502)		1 ½" (1.720)		2" (2.149)		2 ½" (2.601)		3" (3.166)		4" (4.072)		6" (5.993)		8" (7.805)		10" (9.728)		12" (11.538)	
	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss
325													8.00	2.06	3.69	0.31	2.18	0.09	1.40	0.03	1.00	0.01
350													8.61	2.36	3.98	0.36	2.34	0.10	1.51	0.03	1.07	0.01
375													9.23	2.68	4.26	0.41	2.51	0.11	1.62	0.04	1.15	0.02
400													9.84	3.03	4.54	0.46	2.68	0.13	1.72	0.04	1.23	0.02
425													10.46	3.38	4.83	0.52	2.85	0.14	1.83	0.05	1.30	0.02
450															5.11	0.57	3.01	0.16	1.94	0.05	1.38	0.02
475															5.40	0.63	3.18	0.18	2.05	0.06	1.46	0.03
500															5.68	0.70	3.35	0.19	2.16	0.07	1.53	0.03
550															6.25	0.83	3.68	0.23	2.37	0.08	1.69	0.03
600															6.82	0.98	4.02	0.27	2.59	0.09	1.84	0.04
650															7.38	1.13	4.35	0.31	2.80	0.11	1.99	0.05
700															7.95	1.30	4.69	0.36	3.02	0.12	2.15	0.05
750															8.52	1.48	5.02	0.41	3.23	0.14	2.30	0.06
800															9.09	1.67	5.36	0.46	3.45	0.16	2.45	0.07
850															9.66	1.86	5.69	0.52	3.66	0.18	2.61	0.08
900															10.22	2.07	6.03	0.57	3.88	0.20	2.76	0.09
950																	6.36	0.63	4.10	0.22	2.91	0.09
1000																	6.70	0.70	4.31	0.24	3.06	0.10
1050																	7.03	0.76	4.53	0.26	3.22	0.11
1100																	7.37	0.83	4.74	0.28	3.37	0.12
1150																	7.70	0.90	4.96	0.31	3.52	0.13
1200																	8.04	0.98	5.17	0.33	3.68	0.15
1250																	8.37	1.05	5.39	0.36	3.83	0.16
1300																	8.71	1.13	5.60	0.39	3.98	0.17
1350																	9.04	1.21	5.82	0.42	4.14	0.18
1400																	9.38	1.30	6.04	0.44	4.29	0.19
1450																	9.71	1.39	6.25	0.47	4.44	0.21
1500																	10.05	1.48	6.47	0.51	4.60	0.22
1550																			6.68	0.54	4.75	0.23
1600																			6.90	0.57	4.90	0.25
1650																			7.11	0.60	5.06	0.26
1700																			7.33	0.64	5.21	0.28
1750																			7.54	0.67	5.36	0.29
1800																			7.76	0.71	5.52	0.31
1900																			8.19	0.78	5.82	0.34
2000																			8.62	0.86	6.13	0.38
2100																			9.05	0.94	6.44	0.41
2200																			9.48	1.03	6.74	0.45
2300																			9.92	1.11	7.05	0.49
2400																			10.35	1.21	7.36	0.53
2500																			10.78	1.30	7.66	0.57

■ Use caution at shaded velocities.

Integrated Control System™ (ICS) Wire Path Design

Recommended to load balance wire path.

Do not utilize the full system capacity of 750 ICMs on one wire path. Instead, leave room to expand the system and add sensing capability in the future.

The wire distance is the “trunk length” of the wire path.

The trunk length is the “longest single run of wire” needed for accommodating the installed ICMs.

Branches can be added to the trunk wire.

Branches do not increase the maximum number of ICMs on the wire path.

Wire Distance in Feet (ft)

No. of Units	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000
50	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
100	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
150	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
200	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
250	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG
300	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG
350	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG
400	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG
450	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG
500	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG
550	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG
600	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	10 AWG
650	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	—	—
700	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	—	—	—
750	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	10 AWG	—	—	—

Wire Distance in Meters (m)

No. of Units	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500	3,750	4,000	4,250	4,500
50	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²
100	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²
150	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²
200	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²
250	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²
300	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²
350	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²
400	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²
450	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²
500	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²
550	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	6.0 mm²
600	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	6.0 mm²	6.0 mm²
650	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	6.0 mm²	6.0 mm²	6.0 mm²	6.0 mm²
700	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	6.0 mm²	6.0 mm²	6.0 mm²	6.0 mm²	—
750	2.5 mm²	2.5 mm²	2.5 mm²	2.5 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	4.0 mm²	6.0 mm²	6.0 mm²	6.0 mm²	6.0 mm²	—	—

Water Velocity

Flow gpm	Internal Pipe Diameter																							
	2"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"
10	1.0	0.3	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	2.0	0.5	0.2	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30	3.1	0.8	0.3	0.2	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	4.1	1.0	0.5	0.3	0.2	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	5.1	1.3	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60	6.1	1.5	0.7	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—
70	7.2	1.8	0.8	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—
80	8.2	2.0	0.9	0.5	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—
90	9.2	2.3	1.0	0.6	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—
100	10.2	2.6	1.1	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—
150	15.3	3.8	1.7	1.0	0.6	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—
200	20.4	5.1	2.3	1.3	0.8	0.6	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—
250	25.5	6.4	2.8	1.6	1.0	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	—	—
300	30.7	7.7	3.4	1.9	1.2	0.9	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
350	35.8	8.9	4.0	2.2	1.4	1.0	0.7	0.6	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
400	40.9	10.2	4.5	2.6	1.6	1.1	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
450	46.0	11.5	5.1	2.9	1.8	1.3	0.9	0.7	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
500	51.1	12.8	5.7	3.2	2.0	1.4	1.0	0.8	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
600	61.3	15.3	6.8	3.8	2.5	1.7	1.3	1.0	0.8	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
700	71.5	17.9	7.9	4.5	2.9	2.0	1.5	1.1	0.9	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
800	81.7	20.4	9.1	5.1	3.3	2.3	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
900	92.0	23.0	10.2	5.7	3.7	2.6	1.9	1.4	1.1	0.9	0.8	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
1000	102.2	25.5	11.4	6.4	4.1	2.8	2.1	1.6	1.3	1.0	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2
1250	127.7	31.9	14.2	8.0	5.1	3.5	2.6	2.0	1.6	1.3	1.1	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2
1500	153.3	38.3	17.0	9.6	6.1	4.3	3.1	2.4	1.9	1.5	1.3	1.1	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3
1750	178.8	44.7	19.9	11.2	7.2	5.0	3.6	2.8	2.2	1.8	1.5	1.2	1.1	0.9	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.3
2000	204.4	51.1	22.7	12.8	8.2	5.7	4.2	3.2	2.5	2.0	1.7	1.4	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4
2500	255.4	63.9	28.4	16.0	10.2	7.1	5.2	4.0	3.2	2.6	2.1	1.8	1.5	1.3	1.1	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4
3000	306.5	76.6	34.1	19.2	12.3	8.5	6.3	4.8	3.8	3.1	2.5	2.1	1.8	1.6	1.4	1.2	1.1	0.9	0.8	0.8	0.7	0.6	0.6	0.5
3500	357.6	89.4	39.7	22.4	14.3	9.9	7.3	5.6	4.4	3.6	3.0	2.5	2.1	1.8	1.6	1.4	1.2	1.1	1.0	0.9	0.8	0.7	0.7	0.6
4000	408.7	102.2	45.4	25.5	16.3	11.4	8.3	6.4	5.0	4.1	3.4	2.8	2.4	2.1	1.8	1.6	1.4	1.3	1.1	1.0	0.9	0.8	0.8	0.7
4500	459.8	114.9	51.1	28.7	18.4	12.8	9.4	7.2	5.7	4.6	3.8	3.2	2.7	2.3	2.0	1.8	1.6	1.4	1.3	1.1	1.0	0.9	0.9	0.8
5000	510.9	127.7	56.8	31.9	20.4	14.2	10.4	8.0	6.3	5.1	4.2	3.5	3.0	2.6	2.3	2.0	1.8	1.6	1.4	1.3	1.2	1.1	1.0	0.9
5500	562.0	140.5	62.4	35.1	22.5	15.6	11.5	8.8	6.9	5.6	4.6	3.9	3.3	2.9	2.5	2.2	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0
6000	613.1	153.3	68.1	38.3	24.5	17.0	12.5	9.6	7.6	6.1	5.1	4.3	3.6	3.1	2.7	2.4	2.1	1.9	1.7	1.5	1.4	1.3	1.2	1.1

Main line pipe diameter under standard practice is sized to achieve < 5 feet-per-second water velocity. Wet-well intake pipe diameter under standard practice is sized to achieve < 1.5 feet-per-second water velocity. Velocities listed are based on the actual internal diameter for the pipe. Verify internal diameter based on class or type of pipe being used.

Controller Power Wiring Sizing Worksheet

	PAR+ES	PAR+ES Link with Radio	PAR+ES SAT Decoder**	PAR+ES SAT Decoder Link with Radio**
Input (VAC)	117	117	117	117
Output (VAC)	26.5	26.5	26.5	26.5
Simultaneous Rain Bird Solenoids at 60 Hz (50 Hz) per Controller†	16 (12)	16 (12)	16 (12)	16 (12)
Simultaneous Rain Bird Solenoids at 60 Hz (50 Hz) per Station	4	4	2	2
AMP Draw at Rest†	0.15	0.17	0.235	0.250
1	0.22	0.24	0.250	0.265
2	0.30	0.32	0.258	0.273
3	0.37	0.40	0.264	0.281
4	0.45	0.47	0.272	0.289
5	0.52	0.54	0.280	0.297
6	0.60	0.62	0.288	0.305
7	0.67	0.70	0.296	0.313
8	0.75	0.77	0.304	0.321
9	0.82	0.84	0.312	0.329
10	0.90	0.92	0.320	0.337
11	0.97	0.99	0.328	0.345
12	1.05	1.07	0.336	0.353
13	1.12	1.14	0.344	0.361
14	1.20	1.22	0.352	0.369
15	1.27	1.29	0.360	0.377
16	1.35	1.37	0.368	0.385

*Includes Master Valve. **Considering 72 decoders installed. † Total AMP Draw in chart is based on 117 VAC input. For 220/240 VAC input controllers, use 50% of amp draw shown in chart.

Rain Bird will repair or replace at no charge any Rain Bird professional product that fails in normal use within the warranty period stated below. You must return it to the dealer or distributor where you bought it. Product failures due to acts of God including without limitation, lightning and flooding, are not covered by this warranty. This commitment to repair or replace is our sole and total warranty.

Implied Warranties of Merchantability and Fitness, if Applicable, are Limited to One Year from the Date of Sale. We will not, under any circumstances be liable for incidental or consequential damages, no matter how they occur.

I. Landscape Irrigation Products

1800® Series Pop-Up Spray Heads, U-Series Nozzles, Brass MPR Nozzles, A-8S and PA-8S-PRS Shrub Adapters, and 1300 and 1400 Bubblers, 5000 Series Rotors, 5500 Series Rotors, 7005/8005 Rotors, Falcon® 6504 Series Rotors, PEB and PESB Plastic Valves — **5 Years**

All other Landscape Irrigation products — **3 years**

II. Golf Products

Rain Bird Golf Rotors — **3 years**, extended to **5 years** if installed in conjunction with Rain Bird Swing Joints. Proof of concurrent installation is required.

Swing Joints — **5 years**

Brass Remote Control Valves, Valve Boxes and Brass Quick Coupling and Keys — **3 years**

Filtration system controllers — **3 years**

LINK™ Radios — **3 years**

Golf Controllers and Satellites — **1 year**

All other golf products — **1 year**

III. Agricultural Products

LF Series Sprinklers — **5 years**

Other Impact Sprinklers — **2 years**

All other AG products — **1 year**

IV. Pump Stations

Rain Bird guarantees that its pump station will be free of manufacturer defects for three years from the date of start-up but not beyond forty months from the date of purchase by the original customer with a copy of the seller's invoice required for coverage under this Policy. Start-up or service by anyone other than a Rain Bird authorized representative, when required, will void these terms and conditions.

Provided that all installation, start-up, operation responsibilities, and recommended maintenance procedures have been properly executed and performed by authorized Rain Bird representatives, when required, Rain Bird will replace or repair, at Rain Bird's option, any Rain Bird part found to be defective under normal recommended use during the effective period of this Policy, such evaluation to be solely determined by Rain Bird. Rain Bird's only obligation and customer's exclusive remedy under this Policy is limited to repair or replacement, at Rain Bird's option, of the parts or the products the defects of which are reported to Rain Bird within the applicable Policy period, which prove to be defective and such evaluation will be solely determined by Rain Bird.

In no case will Rain Bird cover labor costs associated with repair or replacement of parts beyond one year from date of start-up. Repairs performed and parts used at Rain Bird's expense must be authorized by Rain Bird, in writing, prior to repairs being performed. Product repairs or replacement under this Policy will not extend this Policy. Coverage for repaired or replaced product shall end when this Policy terminates. Rain Bird's sole obligation and customer's exclusive remedy under this Policy shall be limited to such repair or replacement.

Upon request, Rain Bird may provide advice on trouble-shooting a defect during the effective period of this Customer Satisfaction Policy. Repair service must be performed by a Rain Bird authorized representative regardless of whether the labor is covered by Rain Bird or is at the owner's expense during the effective period of this Policy. However, no service, replacement or repair under this Customer Satisfaction Policy will be rendered while the customer is in default of any payments due to Rain Bird.

Rain Bird will not accept responsibility for costs associated with the removal, replacement or repair of equipment in difficult-to-access locations and such evaluation will be solely determined by

Rain Bird. Difficult-to-access locations include (but are not limited to) locations where any of the following are required:

- 1) Cranes larger than 15 tons
- 2) Divers
- 3) Barges
- 4) Helicopters
- 5) Dredging
- 6) Roof removal or other such construction/deconstruction requirements
- 7) Any other unusual means or requirements

Such extraordinary cost associated with difficult-to-access locations shall be the sole responsibility of the customer, regardless of the reason requiring removal, repair or replacement of the equipment.

The terms and conditions of this Customer Satisfaction Policy do not cover damage, loss or injury caused by or resulting from the following:

- 1) Misapplication, abuse, or failure to conduct routine maintenance (to include winterization/winter lay-up procedures).
- 2) Pumping of liquids other than fresh water as defined by the U.S. Environmental Protection Agency, unless the pump station quoted by Rain Bird specifically lists these other liquids and their concentrations.
- 3) Use of pesticides (to include insecticides, fungicides and herbicides), free chlorine or other strong biocides.
- 4) Exposure to electrolysis, erosion, or abrasion.
- 5) Use or presence of destructive gases or chemicals unless these materials and their concentrations are specified in the Rain Bird quotation.
- 6) Electrical supply voltages above or below those specified for correct pump station operation.
- 7) Electrical phase loss or reversal.
- 8) Use of a power source other than that specified in the original quotation.
- 9) Non-WYE configured power supplies such as open delta, phase converters or other forms of unbalanced three phase power supplies.
- 10) Improper electrical grounding or exposure to incoming power lacking circuit breaker or fused protection.
- 11) Using the control panel as a service disconnect.
- 12) Lightning, earthquake, flood, windstorm or other Acts of Nature.
- 13) Failure of pump packing seal (unless the failure occurs on initial start-up).
- 14) Any damage or loss to plants, equipment or groundwater or injury to people caused by the failure of or improper use of an injection system or improper concentration of chemicals or plant nutrients introduced into the pump station by an injection system.
- 15) Any failure of nutrient or chemical storage or spill containment equipment or facilities associated with the pump station location.

The foregoing terms and conditions constitute Rain Bird's entire pump station customer satisfaction policy. This policy is exclusive and in lieu of any other warranties whatsoever, whether express, implied, or statutory including the implied warranties of merchantability and fitness for a particular purpose, which are all hereby expressly disclaimed. The sole remedy under this policy shall be limited to the repair or replacement of the pump station or its components pursuant to the terms and conditions contained herein. In the case of any components or injection systems manufactured by others (as noted on the pump station quotation), there is no warranty provided by Rain Bird and these items are covered solely by and to the extent of the warranty if any, offered by those other manufacturers.

Rain Bird shall not be liable to the customer or any other person or entity for any liability, loss, delay or damage caused or alleged to be caused, directly or indirectly, by any use, defect, failure or malfunction of the pump station or by any injection system whether a claim for such liability, loss, delay or damages is based upon warranty, contract, tort or otherwise. Rain Bird shall not be liable for incidental, consequential, collateral or indirect damages or delay or loss of profit or loss of use or any damages related to the customer's business operations, nor for those caused by acts of nature. In no case and under no circumstances shall Rain Bird's liability exceed the Rain Bird Corporation's net sale price of the pump station.

Laws concerning customer warranties and disclaimers vary from state to state, jurisdiction to jurisdiction, province to province or country to country and therefore some of the foregoing limitations may not apply to you. The exclusions and limitations set out above are not intended to, and should not be construed so as to contravene mandatory provisions of applicable law. If any part or term of this policy is held to be illegal, unenforceable or in conflict with applicable law by a court of competent jurisdiction, the validity of the remaining portions of this policy shall not be affected, and all rights and obligations shall be construed and enforced as if this policy did not contain the particular part or term held to be invalid.

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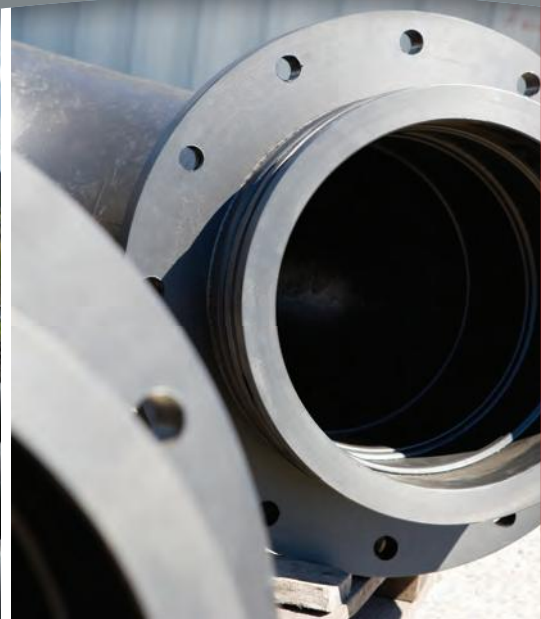
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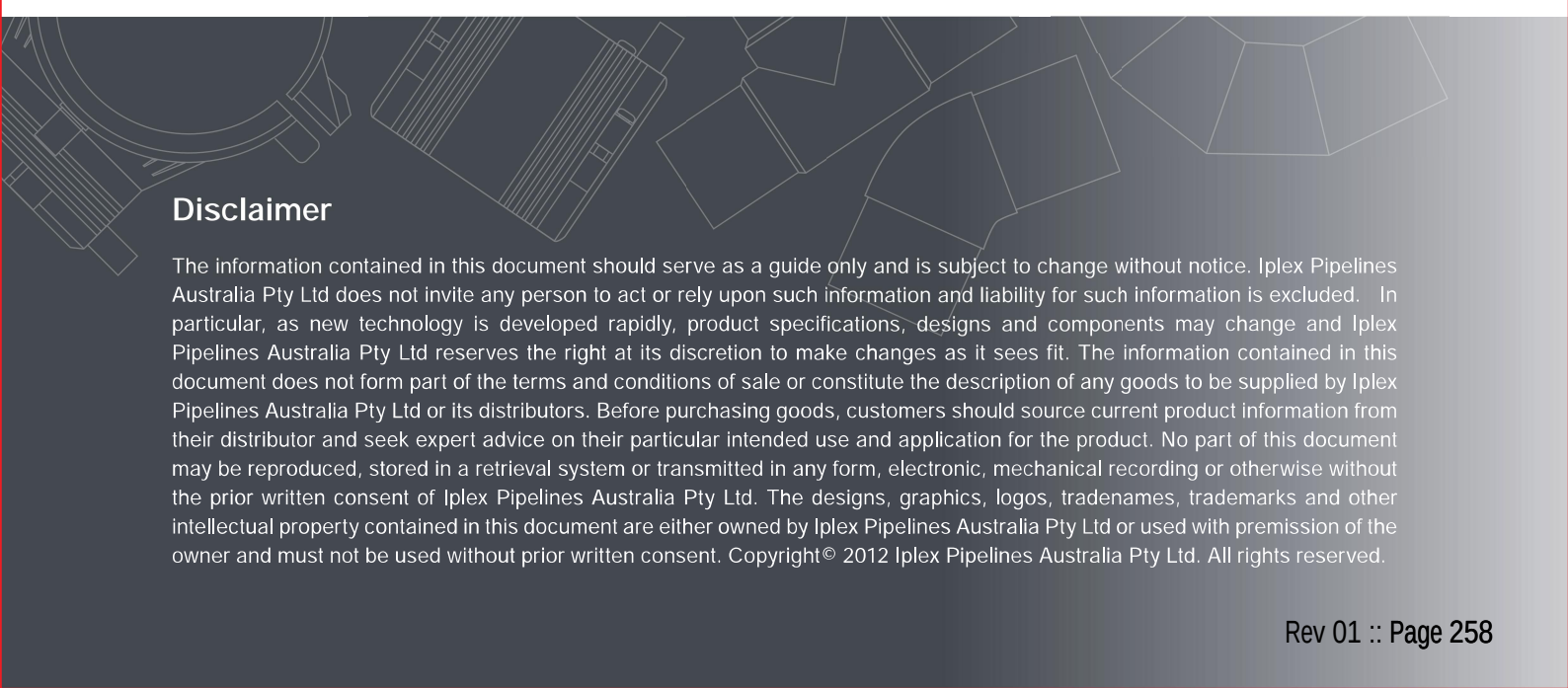
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POLIplex[®] PE Pipe & Fittings Systems

Product Catalogue



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1.0 Introduction

Polyethylene (PE) pipes have been produced in Australia and New Zealand since the mid 1950's. Whilst initially in small diameters for industrial and agricultural applications, polyethylene pipes and fittings are now available in diameters as large as 2000mm.

The first Australian Standard for polyethylene pipe was released in 1962 and Iplex commenced production of its POLIplex® range in the early 1970's.

Usage has grown rapidly over the past forty years with approximately 200,000 tonnes of PE pipes now being produced annually in Australasia. Over this period, polyethylene pipe resins have more than trebled in strength and Iplex's POLIplex® range has become one of Australia's most widely used plastic pipe systems, with strong forecast growth over the coming decades.

1.1 Applications

POLIplex® pipes are used for all types of liquids and gases. Common applications include:

- Urban water and gas supply #1
- Mine dewatering
- Irrigation supply
- Slurry pipelines
- Vacuum, pressure and gravity sewer systems #2
- Submarine pipelines and ocean outfalls
- Trenchless pipeline installation and rehabilitation installed by directional drilling, slip lining and pipe bursting methods
- Industrial process pipe work
- Compressed air services
- Electricity and telecommunication cable conduits
- Upstream coal seam gas and water pipelines

#1 Refer to Iplex POLIplex® BLUE catalogue

#2 Refer to Iplex SewerPlex catalogue

1.2 Benefits

POLIplex® polyethylene pipes offer the following benefits:

- Full axial restraint which eliminates the need for thrust blocks
- Low celerity material minimises water hammer
- UV stability for above ground pipelines
- Rust and corrosion free
- Long length availability to minimise joints
- Complete range of fittings
- Weldable using butt and electrofusion methods
- High ring stiffness for deeply buried pipelines
- Excellent abrasion resistance
- Possibility of 100+ year asset life
- Diameter range from DN16 to DN2000
- Security of Third-Party certification to Australian Standard AS/NZS 4130



1.3 Joining Systems

POLIplex® polyethylene pipes may be joined economically using thermal butt-welding or electrofusion equipment; alternately diameters up to DN110 are commonly joined using Iplex compression couplings complying with AS/NZS 4129. These fittings make joints quick and easy, which can be undone and reused when altering the system layout.

In summary, developments in Iplex POLIplex® polyethylene pipe and fitting materials will continue to improve their already outstanding properties and afford the asset owner confidence in long term durability and asset life.

2.0 Product Data

2.1 Material Properties

Iplex POLIplex® AS/NZS 4130 pipes are manufactured from PE100 polyethylene resin, with a 50-year minimum required strength of 10MPa.

Table 2.1 Physical properties of polyethylene

PE material type	PE100
MRS (50 year)	10MPa
Flexural yield strength	32MPa
Circumferential flexural modulus (3 minutes)	950MPa
Circumferential flexural creep modulus (50 year)	260MPa
Density	955kg/m ³
Tensile yield stress (50mm/min)	25MPa
Tensile yield strain (50mm/min)	10%
Tensile modulus	900MPa
Poisson's ratio	0.4
Thermal expansion coefficient	1.8 x 10 ⁻⁴ /°C
Thermal conductivity	0.38W/m.K
Durometer hardness (ASTMD2240)	63 Shore D

2.2 PE100 Material Composition

The PE100 polyethylene resin used in POLIplex® pipes and fittings are pre-compounded, either black or coloured with pigment, complying with AS/NZS 4131. Anti-oxidants are used to inhibit oxidation of the polymer at the compounding stage and during subsequent processing.

Carbon black is used in all black POLIplex® pipe at a concentration of $2.25 \pm 0.25\%$ by mass as an ultra violet radiation absorber.

In natural and coloured POLIplex® materials, hindered amine light stabiliser (HALS), ultra violet absorber, is used in lieu of carbon black.





2.3 Thermal Properties

The co-efficient of thermal linear expansion of polyethylene varies with temperature but at ambient lies in the range 1.2 to 2.4×10^{-4} per degree C. In broad terms, this is about twenty times that of steel, and therefore unrestrained pipe will expand or contract much more than the steel structure that may be supporting it.

Should the pipe be fully restrained, the strain due to thermal change will generate stress in the material. However due to the relatively low tensile deformation modulus of polyethylene and assuming a typical ambient temperature fluctuation of less than 40°C , it can be assumed that the safe allowable stress will not be exceeded. Over the longer term, stress relaxation will increase the ability of polyethylene to accommodate high thermal strains.

The conductivity of polyethylene varies with temperature almost linearly and is typically 0.47W/m.K at 0°C to 0.37W/m.K at 70°C .

The specific heat of polyethylene varies with temperature from 1800 Joules/kg.K at 0°C to 2200J/kg.K at 60°C .

At temperatures above 25°C it is necessary to rate polyethylene pressure pipe systems. Table 2.3 provides guidance as to the maximum operating pressure of PE100 pipes at temperature. It should be noted that at constant temperatures greater than 40°C , the 50-year design life of POLIplex® pipes may be reduced.

Table 2.3 Thermal rating of PE100 polyethylene POLIplex® pipe
Maximum allowable operating pressure - PE100 Water pipe (m head)

Temp °C	PN4	PN6.3	PN8	PN10	PN12.5	PN16	PN20	PN25
20	40	63	80	100	125	160	200	250
25	36	58	73	91	115	145	182	227
30	36	58	73	91	115	145	182	227
35	33	53	67	83	106	133	167	208
40	33	53	67	83	106	133	167	208
45 (35y)*	31	49	62	77	99	123	154	192
50 (22y)*	29	46	57	71	91	114	143	179
55 (15y)*	29	46	57	71	91	114	143	179
60 (7y)*	27	43	53	67	85	107	133	167
80 (1y)*	20	32	40	50	63	80	100	125

NOTE:

- The values tabled are for POLIplex® pipe manufactured to AS/NZS 4130 and fittings made from compounds complying with AS/NZS 4131.
- The times given in years as (35y) are allowable extrapolation limits obtained by applying the factors in Table 1 of ISO 9080 to two years of test data at 80°C . Where appropriate, specific advice should be obtained from the manufacturer, and data provided shall be derived from testing to ISO 9080.

2.4 Chemical Resistance

Polyethylene is a polyolefin resin, in chemical terms a non-polar high molecular weight paraffin of the hydrocarbon family. Hence it is very resistant to (non-oxidising) strong acids, strong bases and salts. It is mildly affected by aliphatic solvents although aromatic and chlorinated solvents will cause some swelling. Polyethylene is affected by strongly oxidising substances such as halogens and concentrated inorganic acids. POLIplex® pressure pipes should not be used to convey water disinfected with chlorine dioxide at any temperature which has been found to rapidly deplete the antioxidant additives at elevated temperature.

A full Chemical Resistance Library can be viewed on Iplex's website www.iplex.com.au.

2.5 Standards and Approvals

POLIplex® is an integrated family of polyethylene pipes produced by Iplex, based on PE100 resin. POLIplex® pipes are manufactured to AS/NZS 4130 from resin compounds complying with AS/NZS 4131 and are StandardsMark licensed to AS/NZS 4130 by third-party certifier, SAI Global.



3.0 Pipe and Dimensions

3.1 POLIplex® PE100

POLIplex® diameters range from DN16 to DN2000, with pressure classes of up to 2500kPa. Pipe sizes up to DN160 can be supplied in coil lengths of up to 300 metres in some diameters. Larger diameters are typically 12m long, although longer lengths are manufactured by arrangement.

Note - The nominal diameter of POLIplex® pipes refers to the outside diameter in accordance with international practice.



Table 3.1 POLIplex® - PE100 Series 1 - Pressure pipe dimensions AS/NZS4130

SDR PN for PE100	41				26				21				17				13.6				11				9				7.4				SDR PN for PE100
	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m	Min Wall	Mean ID	Ovality Max	Weight Ave kg/m					
DN																													DN				
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16					
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20					
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25					
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32					
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40					
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50					
63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63					
75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	75					
90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90					
110	2.7	104.7	2.2	0.95	4.3	101.3	2.2	1.48	5.3	99.2	2.2	1.80	6.6	96.5	2.2	2.20	8.1	93.3	2.2	2.66	10.0	89.4	2.2	3.20	12.3	84.5	2.2	3.84	15.1	78.6	2.2	4.57	110
125	3.1	118.9	2.5	1.24	4.8	115.4	2.5	1.86	6.0	112.9	2.5	2.30	7.4	109.9	2.5	2.80	9.2	106.1	2.5	3.42	11.4	101.5	2.5	4.15	14.0	96.1	2.5	4.96	17.1	89.5	2.5	5.88	125
140	3.5	133.2	2.8	1.56	5.4	129.2	2.8	2.35	6.7	126.5	2.8	2.87	8.3	123.0	2.8	3.52	10.3	118.9	2.8	4.29	12.7	113.9	2.8	5.17	15.7	107.6	2.8	6.23	19.2	100.2	2.8	7.39	140
160	4.0	152.3	3.2	2.02	6.2	147.6	3.2	3.08	7.7	144.5	3.2	3.77	9.5	140.7	3.2	4.59	11.8	135.9	3.2	5.60	14.6	130.0	3.2	6.78	17.9	123.0	3.2	8.11	21.9	114.7	3.2	9.62	160
180	4.4	171.5	3.6	2.51	6.9	166.3	3.6	3.84	8.6	163.1	3.6	4.74	10.7	158.3	3.6	5.81	13.3	152.8	3.6	7.10	16.4	146.3	3.6	8.58	20.1	138.5	3.6	10.26	24.6	129.1	3.6	12.16	180
200	4.9	190.5	4.0	3.08	7.7	184.6	4.0	4.76	9.6	180.6	4.0	5.87	11.9	175.8	4.0	7.16	14.7	170.0	4.0	8.71	18.2	162.5	4.0	10.57	22.4	153.7	4.0	12.68	27.3	143.4	4.0	15.00	200
225	5.5	214.4	4.5	3.90	8.6	207.9	4.5	5.98	10.8	203.3	4.5	7.42	13.4	197.8	4.5	9.09	16.6	191.0	4.5	11.06	20.5	182.9	4.5	13.39	25.1	173.2	4.5	16.00	30.8	161.3	4.5	19.02	225
250	6.2	238.0	5.0	4.89	9.6	230.9	5.0	7.41	11.9	226.0	5.0	9.08	14.8	220.0	5.0	11.14	18.4	212.4	5.0	13.63	22.7	203.4	5.0	16.46	27.9	192.5	5.0	19.73	34.2	179.2	5.0	23.48	250
280	6.9	266.7	5.8	6.06	10.7	258.7	5.8	9.25	13.4	253.0	5.8	11.46	16.6	246.3	5.8	13.99	20.6	237.9	5.8	17.08	25.4	227.8	5.8	20.64	31.3	215.4	5.8	24.80	38.3	200.7	5.8	29.44	280
315	7.7	300.2	6.6	7.62	12.1	290.9	6.6	11.78	15.0	284.9	6.6	14.40	18.7	276.6	6.6	17.72	23.2	267.6	6.6	21.64	28.6	256.3	6.6	26.13	35.2	242.4	6.6	31.38	43.0	226.1	6.6	37.16	315
355	8.7	338.2	7.5	9.69	13.6	327.9	7.5	14.89	16.9	321.0	7.5	18.28	21.1	312.1	7.5	22.55	26.1	301.6	7.5	27.43	32.2	288.8	7.5	33.16	39.6	273.3	7.5	39.76	48.5	254.6	7.5	47.24	355
400	9.8	380.0	8.4	12.28	15.3	369.5	8.4	18.88	19.1	361.5	8.4	23.31	23.7	351.9	8.4	28.50	29.4	339.9	8.4	34.79	36.3	325.4	8.4	42.10	44.7	307.8	8.4	50.55	54.6	287.0	8.4	59.92	400
450	11.0	428.9	9.6	15.49	17.2	415.8	9.6	23.87	21.5	406.8	9.6	29.48	26.7	395.9	9.6	36.11	33.1	382.4	9.6	44.07	40.9	366.1	9.6	53.31	50.2	346.5	9.6	63.90	61.5	322.8	9.6	75.92	450
500	12.3	476.3	10.8	19.28	19.1	462.0	10.8	29.45	23.9	452.0	10.8	36.37	29.6	439.9	10.8	44.48	36.8	424.9	10.8	54.38	45.4	406.8	10.8	65.78	55.8	385.0	10.8	80.86	68.6	358.0	10.8	98.93	500
560	13.7	533.6	11.9	24.00	21.4	517.4	11.9	36.91	26.7	506.4	11.9	45.52	33.2	492.7	11.9	55.89	41.2	475.8	11.9	68.22	50.8	455.8	11.9	82.40	62.5	430.3	11.9	98.93	74.0	403.0	11.9	125.20	560
630	15.4	600.4	12.9	30.37	24.1	582.1	12.9	46.77	30.0	569.8	12.9	57.50	37.3	554.4	12.9	70.62	46.3	535.5	12.9	86.23	57.2	512.6	12.9	104.42	70.3	484.1	12.9	125.20	90.0	448.1	12.9	159.13	630
710	17.4	676.5	14.9	38.65	27.2	655.9	14.9	59.45	33.9	641.9	14.9	73.22	42.1	624.6	14.9	89.82	52.2	603.4	14.9	109.55	64.5	577.6	14.9	132.64	79.3	546.5	14.9	159.13	100.0	591.3	14.9	201.90	710
800	19.6	762.3	16.4	49.01	30.6	739.2	16.4	75.29	38.1	723.4	16.4	92.80	47.4	703.9	16.4	113.89	58.8	680.0	16.4	138.96	72.5	651.0	16.4	168.11	89.3	615.9	16.4	201.90	120.0	710.0	16.4	280.00	800
900	22.0	857.8	18.8	61.81	34.4	831.7	18.8	95.23	42.9	813.9	18.8	117.42	53.5	791.7	18.8	144.55	66.2	764.9	18.8	176.04	81.7	732.4	18.8	212.91	100.0	670.0	18.8	280.00	140.0	900.0	18.8	360.00	900
1000	24.5	952.9	20.8	76.54	38.2	924.1	20.8	117.50	47.7	904.2	20.8	145.07	59.3	879.8	20.8	178.06	72.5	852.1	20.8	214.41	90.3	814.9	20.8	261.40	120.0	740.0	20.8	360.00	180.0	1000.0	20.8	480.00	1000
1200	29.4	1143.1	24.8	110.14	45.9	1108.5	24.8	169.18	57.2	1084.7	24.8	208.73	67.9	1062.7	24.8	245.17	88.2	1020.0	24.8	312.54	100.0	1000.0	24.8	350.00	140.0	900.0	24.8	480.00	200.0	1200.0	24.8	600.00	1200
1400	34.4	1332.6	29.6	150.19	53.2	1293.1	29.6	239.54	66.7	1266.1	29.6	283.64	82.4	1233.1	29.6	346.07	100.0	1200.0	29.6	360.00	120.0	1200.0	29.6	350.00	140.0	900.0	29.6	480.00	240.0	1400.0	29.6	560.00	1400
1600	39.3	1522.3	34.8	195.75	61.3	1476.1	34.8	300.95	76.2	1447.0	34.8	370.23	94.1	1409.4	34.8	451.49	100.0	1400.0	34.8	360.00	120.0	1400.0	34.8	350.00	140.0	900.0	34.8	480.00	280.0	1600.0	34.8	640.00	1600
1800	43.8	1716.0	40.8	245.95	69.1	1662.8	40.8	382.16	85.7	1628.0	40.8	468.94	100.0	1600.0	40.8	500.00	100.0	1600.0	40.8	360.00	120.0	1600.0	40.8	350.00	140.0	900.0	40.8	480.00	320.0	1800.0	40.8	720.00	1800
2000	48.8	1906.4	44.8	304.41	76.9	1847.4	44.8	472.24	95.2	1808.9	44.8	578.91	100.0	1800.0	44.8	600.00	100.0	1800.0	44.8	360.00	120.0	1800.0	44.8	350.00	140.0	900.0	44.8	480.00	360.0	2000.0	44.8	800.00	2000

Note:
1) All dimensions are in millimetres and mass in kg/m.
2) Nominal Diameter (DN) equals outside diameter.
3) These dimensions also apply to THERMAPIPE®.

3.2 Rural / Imperial Polyethylene Pipes

Iplex manufactures both Greenline and Redline imperial rural polyethylene pipe systems. Redline poly is made to AS 2698.2 dimensions and has a maximum operating pressure of 900kPa at 20°C.

Greenline, our economy polyethylene pipe for rural applications, is manufactured to Iplex's own in-house specifications and has a maximum pressure rating for water of 800kPa at 20 °C.

Both Greenline and Redline pipes use Iplex's rural range of compression fittings. Sizes range from 3/4 inch to 2 inch nominal inside diameter.

Iplex also supplies low-density polyethylene micro-irrigation tubing to AS 2698.1 dimensions.



Table 3.2 Greenline economy rural pipe dimensions

Nominal ID in (mm)(inch)	ID ave (mm)	Wall ave (mm)	OD ave (mm)
20 (3/4")	19.0	1.6	22.2
25 (1")	25.3	1.7	28.7
32 (1 ¼")	31.6	2.0	35.6
40 (1 ½")	38.0	2.4	42.8
50 (2")	50.9	3.2	57.3

Table 3.3 Redline rural rural pipe to AS 2698.2 dimensions

Nominal ID in (mm)(inch)	ID ave (mm)	Wall ave (mm)	OD ave (mm)
20 (3/4")	19.0	1.8	22.6
25 (1")	25.3	1.9	29.1
32 (1 ¼")	31.6	2.3	36.2
40 (1 ½")	38.0	2.7	43.4
50 (2")	50.9	3.5	57.9

Table 3.4 Micro irrigation pipe to AS 2698.1 dimensions

Nominal ID (mm)	Nominal wall thickness (mm)
13	1.25
20	1.35
25	1.55
32	2.05

3.3 THERMAPIPE®

By the use of a highly reflective white material on the external skin, THERMAPIPE® reduces the absorption of heat. The white material is extruded concurrently with the black pipe wall, forming an integral part of the pipe. Formulation of the white compound with HALS (Hindered Amine Light Stabilisers) and titanium dioxide increases the longevity of UV resistance in the outer layer.

Extensive testing has demonstrated that solar radiation has substantial and predictably less effect on THERMAPIPE® as opposed to conventional black polyethylene pipes under the same conditions.

In all respects, THERMAPIPE® matches or exceeds the performance requirements of AS/NZS 4130 pipes for pressure applications.

By limiting the surface temperature of above ground polyethylene pipelines, a thinner walled pipe can be used than would otherwise be required in a given application.

THERMAPIPE® achieves the following performance improvements relative to black pipe:

- Thinner walled pipes providing more efficient pipe design
- Lower pipe cost
- Lower pumping cost due to greater hydraulic capacity
- Reduced thermal expansion / contraction
- Less requirement to 'snake' pipelines
- Extra purchase length reduced to +2% to accommodate snaking (Versus 4% for black)
- Reduced pipe movements on tailings dam walls and pipe racks
- Lower anchorage loads
- Reduced thermal stresses in the pipe material
- Higher pipe stiffness
- Greater resistance to collapse under vacuum effect
- Contents in THERMAPIPE® remain cooler than in equivalent black pipes



Design for high temperature service

Above ground polyethylene pipes will absorb and disperse thermal energy via a number of mechanisms. Incoming solar radiation heats the pipe whilst re-radiation, convection and conduction to the fluid conveyed will act to cool the pipe. Variation in the incoming solar radiation intensity with time of day, cloud cover, latitude, altitude, season and pipeline orientation combine to be major determinants of pipe temperature. Wind velocity, ambient temperature, flow rate and nature of the conveyed fluid are also variables acting to influence pipe wall temperature.

Much of this complexity can be reduced by considering that any pipe design must accommodate the most arduous environmental conditions to be encountered. For polyethylene pipelines, this requires the estimation of long-term temperature conditions in the pipe, especially during summer.

Testing of conventional black polyethylene pipe and the white THERMAPIPE[®] material by an independent laboratory has confirmed lower radiation absorption, resulting in substantial reductions in temperature with this material.

Radiation absorption*	
POLiPLEX [®] Black PE	96%
THERMAPIPE [®]	42%

* Absorptance, the ratio of the amount of radiation absorbed by a surface to the amount of radiation incident upon it.

THERMAPIPE[®] maintains a lower operating temperature to reduce the thermal rating requirements of above ground pipelines.

4.0 Pipeline Design

4.1 Hydraulic Design

Iplex POLIplex® pipes are used in gravity drainage, gravity pressure and pumped pressure applications. AS 2200 nominates a Colebrook-White k-value for thermoplastics pipes in the range of 0.003 – 0.015mm. Iplex research suggests an average value of 0.007mm is appropriate for POLIplex® PE100 pipe.

In any hydraulic system, the choice of pipe diameter and pressure class will depend on the following factors including:

- The required flow rate including any planned future increases
- The friction losses caused by the pipes and fittings
- The fluid type
- The longitudinal section of the proposed pipeline route
- In the case of pressurised gravity systems, the available head differential
- The relative cost of different pipe diameters and classes
- Financial parameters such as expected interest rate and repayment terms
- For pumped systems – the cost of power and anticipated inflation rate for energy costs
- Estimated water hammer and surges caused during normal operation and due to power failure
- Specified field and test pressures
- Environmental factors including temperature, pressure and elevation

To assist designers in their pipe size and pressure class decision making, Iplex provides a web based Hydraulic Design Tool, which is free to use following registration at www.iplex.com.au.

4.2 Structural Design

In engineering terms, POLIplex® polyethylene pipes are considered to be flexible when buried with respect to surrounding embedment materials. Due to their comparatively thick walls, Iplex POLIplex® PE100 pipes are stiff when compared to other types of extruded thermoplastic piping. The Australian Standard for Buried Flexible Pipelines, AS/NZS 2566 details a comprehensive structural design process that considers embedment depth, pipe stiffness, native soil properties, embedment material, groundwater, hydraulic pressure both positive and negative, applied and traffic loads to predict long-term deflection, circumferential wall bending strain and safety with regard to buckling stability.

To assist designers in their pipe selection decision, Iplex provides a Structural Design Tool, which is free to download and use following registration at www.iplex.com.au.



5.0 Installation

5.1 Handling and storage

POLplex® polyethylene pipes and fittings are light in weight and easy to handle compared to many other materials. They have considerable resilience, flexibility and resistance to impact. However pipes and fittings can be scored by sharp edges and can be distorted under load, particularly at higher temperatures. Therefore, in general, pipes and fittings should not be dropped, indented, crushed or impacted and should not be subjected to rough handling during loading and unloading operations.

Pipes and fittings must not be stored or transported adjacent to heat sources, such as engine exhausts, boilers, naked flames or hot water or steam lines. While polyethylene is very resistant to low temperatures, as the temperature drops below 0°C the impact resistance will slowly reduce, and therefore more care should be taken to avoid damage by impact. Care should be taken in handling pipes and fittings in wet or frosty conditions as they may become slippery.

As with all pipe materials, contact with oils, petrol, solvents or chemicals that might have an adverse affect on future performance should be avoided.

Typically, scores or scratches to a depth of more than 10% of the wall thickness should be avoided for pressure applications.

During coiling care should be taken to maintain the coil diameter at or above the specified minimum to prevent kinks. In uncoiling or recoiling care should be taken that sharp objects do not score the pipe.

Generally, only webbing slings should be used to lift polyethylene pipes by crane. Vacuum lifting may be used, but chains, wire ropes and hooks should be avoided.

Pipes of colour other than black should be protected from elevated temperatures and direct sunlight during storage and transport, particularly if they are to be stored for more than 2 years.

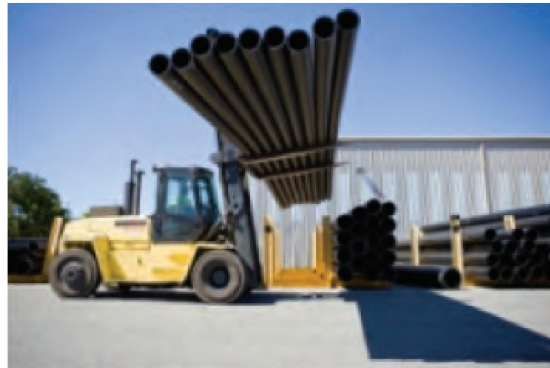
5.2 Lifting, handling, storage and transport of straight lengths

Lifting of individual pipes or packs up to 6m in length can be performed by a forklift. To prevent drooping of long packs or individual pipes and subsequent scuffing of pipe ends, two lifting points or spreader bars should be used for pipes or pipe packs exceeding 6 metres in length.

Appropriate personnel exclusion zones should apply when lifting pipes in order to avoid injury if the pipe slips.

Straight pipe lengths stacked for storage or transport should be continuously and evenly supported to minimise distortion.

Timber framed packs should be stacked with the frames close together and alternating evenly. Packs with widely differing frame spacing should not be stacked. Do not align the bearers vertically as the stacks are likely to be unstable.



In such load bearing stacks the maximum free height should be such that the pipe is not permanently deformed, having regard to sideways stability. For larger diameter pipes it may be necessary to brace the ends of the pipe with internal supports to prevent end distortion. Sharp sections bearing against the pipes should be avoided as these can cause indentations in, or scoring of, the pipe wall.

If different SDR's of pipe are kept in the same stacks then the lowest SDR (thickest wall) should always be at the bottom. Pipes may be nested inside each other for transport or storage provided distortion does not occur. When being transported, pipes should not be restrained in a manner likely to result in damage to them.

5.3 Lifting, handling, storage and transport of coils

Larger diameter coiled polyethylene pipes, for example those of diameters equal to or greater than 63mm can be very heavy and pose particular handling and storage risks. The consequences of coils falling or slipping should always be considered as serious injury can occur. This is particularly the case for coils stored in a vertical or near vertical position. For unloading heavier coils, delivery sites should be equipped with cranes or forklifts or crane-trucks should be used.

When lifting coils, slings must be placed around the entire coil. If coils are lifted by a fork truck, contact points must be protected and the lifting must be performed on the entire coil. Fork tines should not be inserted between windings in a coil.

Coiled pipe can be stored and transported by being laid flat on a continuous surface such as pallets but stored only to such a height that the bottom convolutions do not become distorted. Pipe coils can also be stored and transported in a near vertical position. Care must be exercised to ensure the support against which the coils are leant are strong enough to withstand the load. Care should also be taken to ensure the external loops of the vertically supported coil are not damaged or flattened in transport.



When releasing coils and uncoiling polyethylene pipe, it must be remembered that the coil is under tension and must be released in a controlled manner. The end of the coil should be restrained at all times, then the straps released steadily, one at a time. If the coil has bands at different layers of the coil, then they should be released sequentially starting from the outer layers.

The amount of energy locked up in the coil will depend on the size of pipe, the class of the pipe, and the size of the coil. The amount of energy can be substantial and cause significant injury or damage if released in an uncontrolled manner. The person releasing the restraining straps should stand in a safe position at the side of the coil.

Typical ovality of pipes stored as coils can be resolved with the use of re-rounding equipment. Refer to page 98 for a list of equipment available.

5.4 Lifting, handling and transport of drums

Where drums are available they should be used to transport pipe because their radius bearing surface is designed to protect the pipe from indentations. The same stored energy is found in drums as with coils, except that the pipe is under more control when it is restrained on a drum. It is therefore only necessary to restrain the end of the pipe to make sure it is under control, and to see that the drum is restrained so that it cannot turn freely, and allow the pipe to unravel. Drums are very heavy and must not be manhandled, but must always be handled with the appropriate equipment.

Drums must be stored on flat, stable ground to make sure they will not topple over, and should be controlled, e.g. by the use of chocks, to ensure they do not roll out of position.

When lifting drums from the vehicle, they should be lifted by use of a strap placed under the plate carrying the pipe, and not through the outer rim of the drum, as this may bend the rim inwards and damage both the drum and the pipe.

If lifted by a fork, the tines should be fitted inside the drum under the cross members, making sure the length of the tine is sufficient to fit through the drum to support both sides.

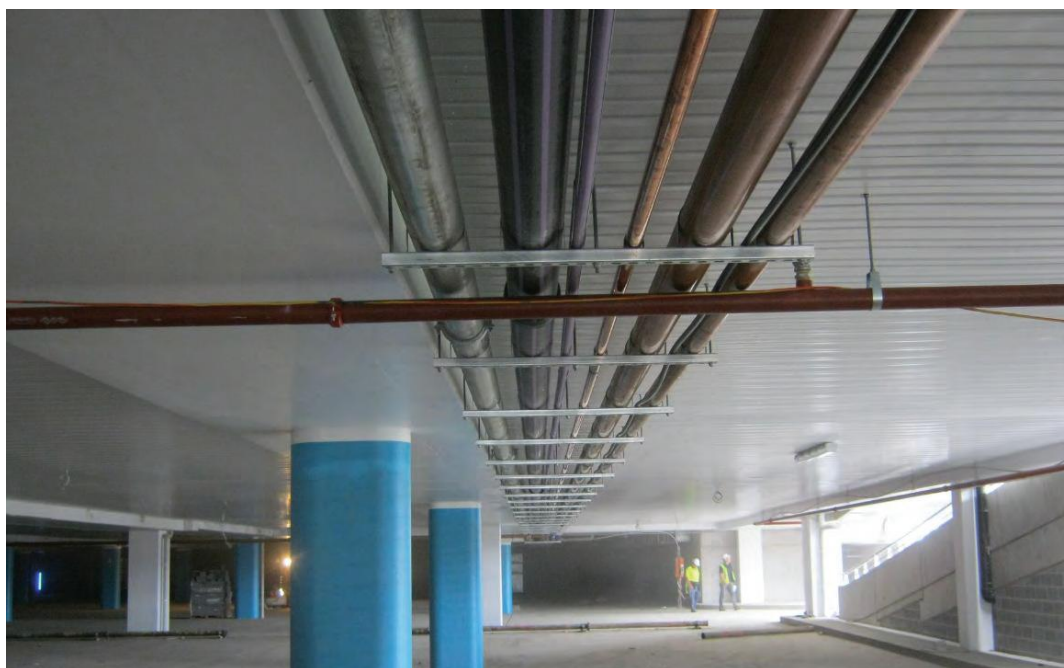
Under no circumstances should a drum be allowed to drop from the back of a vehicle on to the ground, or even on to a stack of tyres or other buffer system. When lifting steel drums, care must be taken to make sure they do not come in contact with overhead wires.

5.5 Above ground POLIplex® pipe support spans as per AS/NZS 2033

Table 8.0 Maximum spacing of supports for fixed installation

Nominal outside diameter of pipe (mm)	Recommended maximum spacing of supports (metres)	
	Horizontal or graded pipes	Vertical pipes
16	0.25	0.50
20	0.30	0.60
25	0.35	0.70
32	0.38	0.75
40	0.43	0.85
50	0.45	0.90
63	0.50	1.05
75	0.60	1.20
90	0.67	1.35
125	0.75	1.50
140	0.85	1.70
160	1.00	2.00
200	1.10	2.20
225	1.15	2.30
250	1.25	2.50
280	1.30	2.60
≥355	1.50	3.00

Note: Design of support brackets for polyethylene pipes should include allowance for expansion and contraction. For more information please refer to AS/NZS 2033.

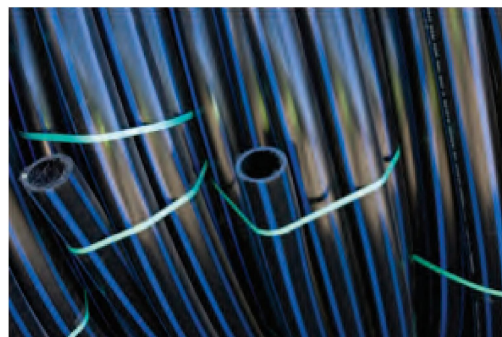
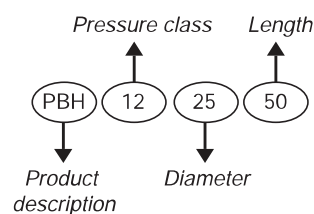


6.0 Iplex Product Codes

The product computer identification codes used by Iplex for POLIplex® pipe generally take the sequence of Product Type, Pressure Class, Diameter and Length as per the example below:

PBH122550

PE100 BlueLine PN12.5 DN25 50m coil



The tables below outline some of the available product code types, pressure class, diameter and lengths. For more information please contact an Iplex Representative.

Product type

Product description	Product code
PE100 POLIplex® Black	POH
PE100 POLIplex® BlueLine	PBH
PE100 POLIplex® Purple Stripe	PLH
PE100 POLIplex® Cream Stripe	PCH
PE100 POLIplex® Blue	PABH
PE100 THERMAPIPE® White Coex	PHX
PE100 Blue Coex	PHXB
PE100 Purple Coex	PHXL
PE100 POLIplex® Gas	PYLH
Economy Rural Greenline*	PICH
Redline Rural*	PICR
Micro Irrigation (Imperial)*	PICL

Note: *No pressure rating on these codes

Pressure class and diameter @ 20°C

Pressure class		Diameter	
PN	Code	DN	Code
6.3	06	16	16
8	08	20	20
10	10	25	25
12.5	12	32	32
16	16	40	40
20	20	50	50
		63	63
		75	75
		90	90
		110	110
		125	125
		140	140
		160	160
		180	180
		etc...	etc...
		2000	2000

Length (Coils and straight lengths)

Coils		Straight	
Meters	Code	Meters	Code
25	25	6	F
50	50	12	M
100	100	15	Q
150	150	20	QE
200	200		

Frequently Asked Questions

The following is a sample of commonly asked questions pertaining to POLIplex[®] pipe and fittings. Should additional information be required, please refer to our website www.iplex.com.au or contact Iplex Pipelines.

Are POLIplex[®] pipes resistant to ultra violet radiation?

Yes, POLIplex[®] pipes contain either carbon black or chemical stabilisers to protect them from the effects of ultra violet radiation. Black pipes are suitable for long-term external exposure to sunlight. Coloured pipe may be stored for up to 2-years in direct sunlight. For long-term exposure in above ground applications, Iplex recommends the use of white THERMAPIPE[®].

Do I need thrust blocks or other forms of restraint on POLIplex[®] pipelines?

Generally no, as POLIplex[®] pipes are fully welded or mechanically restrained, however it may be necessary to provide thrust restraint where POLIplex[®] pipelines connect to rubber ring jointed pipelines or other non restrained pipe or fittings. For more information, contact Iplex Pipelines.

How do I pressure test POLIplex[®] pipelines?

Polyethylene pipes require a different test procedure to PVC or ductile iron pipelines to compensate for the materials tendency to strain during pressure testing. If the correct test procedure is not used, the pipeline may appear to fail the test. Detailed information on the correct procedure is contained in Australian Standard AS/NZS 2033.

Can I use POLIplex[®] pipes to convey compressed air?

Yes, however they require rerating due to its elevated temperature and the stored energy contained in compressed air. Information is available in PIPA Industry Guideline POP002 "Polyethylene (PE) Pipes and Fittings for Compressed Air", which can be accessed at www.pipa.com.au.

What is the maximum temperature at which POLIplex[®] pipe can be used?

At temperature above 25°C, polyethylene pipes require pressure rerating. At very high temperatures as well as very low temperatures, the life of polyethylene pipes may be substantially reduced. For detailed information, refer to PIPA Industry Guideline POP013 "Temperature rerating of PE pipes", which can be accessed at www.pipa.com.au.

Are POLIplex[®] pipes affected by chemicals?

Whilst polyethylene is a highly chemical resistant material, there are some chemicals which are unsuitable for carriage in POLIplex[®] pipes, or may reduce their service life. For detailed information on most chemicals, refer to the Iplex Chemical Resistance Tool at www.iplex.com.au.

Do I need any special training to conduct butt-fusion or electrofusion welding?

Yes. Welding by untrained operators is the most common cause of joint failure in polyethylene pipelines. Australian Standard AS/NZS 2033 stipulates that polyethylene welders must be trained and certified by a Registered Training Organisation and that welding procedures must be in accordance with PIPA Industry Guidelines POP001 "Electrofusion Jointing of PE pipe and fittings for pressure applications" and/or POP003 "Butt Fusion Jointing of PE pipes and fittings - recommended parameters". More information can be accessed at www.pipa.com.au.



Frequently Asked Questions - Continued...

How do I store electrofusion fittings?

Fittings should be stored out of the direct sunlight and in their original boxes and sealed plastic bags until immediately before use. Ideally, couplings should be stored on their flat ends.

Can I use an electrofusion fitting which has been removed from its original plastic bag?

Contamination is the most prevalent cause of failure of electrofusion fittings. Failure to preserve the manufacturer's packaging of fittings increases the risk of UV oxidation or surface contamination possibly rendering the fitting useless or unsaleable.

What can I use to clean electrofusion fittings prior to welding?

Iplex Pipelines stock cleaning wipes that are ideal for installation preparation. Methylated spirits contain residual oils that will contaminate the welding surface and should not be used.

How do I weld coiled pipe that has become oval?

Coiled pipe will become oval due to the stress induced during coiling and must be rerounded using the correct tools prior to welding. Iplex stock a variety of rerounding equipment suitable for this purpose (Refer to page 100 for a list of available rerounding equipment).

What is the difference between SDR and PN ratings?

SDR is the Standard Dimensional Ratio of the pipe outside diameter to wall thickness. PN ratings are the nominal pressure rating of the pipe, but only at when it is carrying non-viscous fluids at 20°C. SDR is the preferred method for specifying the grade of pipe required.

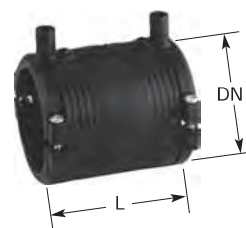
What is the expected life of POLIplex® pipelines?

There are many factors that may affect the life of polyethylene pipelines. They include temperature, fluid type, installation method, UV exposure and cyclic loading. When correctly installed in underground applications, POLIplex® pipes conveying water will have an anticipated service of in excess of 100 years.

+GF+ ELGEF Couplings

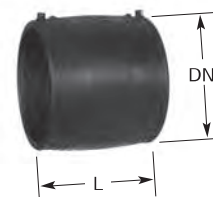
PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG0720	20	70
EG0725	25	70
EG0732	32	72
EG0740	40	80
EG0750	50	88
EG0763	63	96



Note: Comes with integral clamps for restraint whilst welding.

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG0775	75	110
EG0790	90	125
EG07110	110	145
EG07125	125	156
EG07140	140	166
EG07160	160	180
EG07180	180	192
EG07200	200	208
EG07225	225	225
EG07250	250	248
EG07280	280	252
EG07315	315	267
EG07355	355	290
EG07400	400	290
EG07450	450	310
EG07500*	500	594
EG07560*	560	640
EG07630*	630	420
EG07710*	710	420
EG07800*	800	500



*Where +GF+ EF couplings are not available other brands may be substituted.

Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

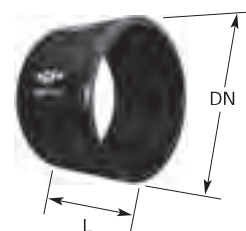
+GF+ ELGEF Couplings

PE100 SDR17:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG0710160	160	180
EG0710180	180	192
EG0710200	200	206
EG0710225	225	225
EG0710250	250	248
EG0710280	280	252
EG0710315	315	267
EG0710355	355	290
EG0710400	400	290
EG0710450	450	313
EG0710500	500	343



Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG0710560*	560	392
EG0710630*	630	442
EG0710710*	710	420
EG0710800*	800	500
EG0710900*	900	500
EG07101000*	1000	610
EG07101200*	1200	670

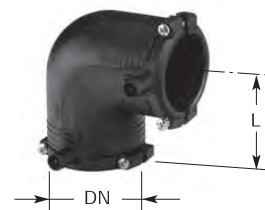


* Installation only with Pressure Pad Kit.
Contact Georg Fischer for hire rates.

+GF+ ELGEF Elbows

Elbows 90° PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG102090	20	54
EG102590	25	54
EG103290	32	53
EG104090	40	62
EG105090	50	71
EG106390	63	81



Note: Comes with integral clamps for restraint whilst welding.

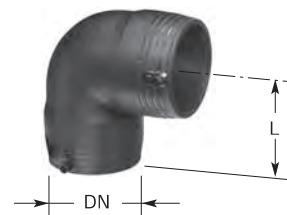
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Elbows

Elbows 90° PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG107590	75	94
EG109090	90	122
EG1011090	110	147
EG1012590	125	142
EG1016090	160	178
EG1018090	180	195

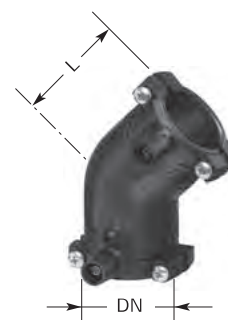


Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG1020090	200	265
EG1022590	225	305
EG1025090	250	335

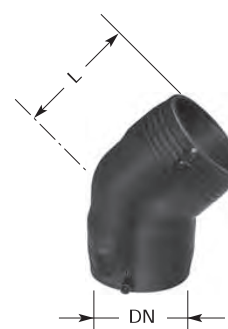


Elbows 45° PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG103245	32	-
EG104045	40	50
EG105045	50	56
EG106345	63	63



Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG107545	75	71
EG109045	90	91
EG1011045	110	112
EG1012545	125	127
EG1016045	160	134
EG1018045	180	142



Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG1020045	200	215
EG1022545	225	235
EG1025045	250	263



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Tees

Tees 90° - Equal PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
EG1920	20	88	92
EG1925	25	90	92
EG1932	32	102	100
EG1940	40	119	114
EG1950	50	135	126
EG1963	63	151	150



Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
EG1975	75	178	143
EG1990	90	205	161
EG19110	110	255	184
EG19125	125	276	207
EG19160	160	325	206
EG19180	180	344	250



Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
EG19200	200	560	250
EG19225	225	610	270
EG19250	250	667	288



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Tees

Tees 90° - Reducing PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L	Dim. (mm) L1
EG1916063	160	63	405	176
EG1916090	160	90	405	188
EG19160110	160	110	405	195
EG1920090	200	90	557	215
EG19200110	200	110	557	218
EG19200160	200	160	557	236
EG1922590	225	90	615	226
EG19225110	225	110	615	236
EG19225160	225	160	615	255
EG19250110	250	110	668	245
EG19250160	250	160	668	264



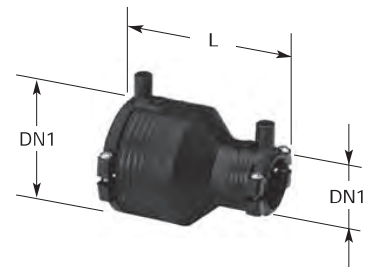
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

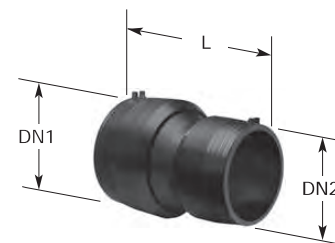
+GF+ ELGEF Reducers

Reducers PE100 SDR 11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG082520	25	20	74
EG083220	32	20	79
EG083225	32	25	79
EG084020	40	20	88
EG084025	40	25	88
EG084032	40	32	88
EG085032	50	32	96
EG085040	50	40	96
EG086332	63	32	105
EG086340	63	40	105
EG086350	63	50	105



Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG089063	90	63	146
EG0811090	110	90	173
EG0812590	125	90	180
EG08160110	160	110	226
EG08180125	180	125	247
EG08200160	200	160	311
EG08225160	225	160	331
EG08250160	250	160	362
EG08250200	250	200	380



Reducers (Kit) PE100 SDR 11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG087540KIT	75	40	265
EG087550KIT	75	50	269
EG087563KIT	75	63	273
EG089050KIT	90	50	297
EG089075KIT	90	75	308
EG0811063	110	63	326
EG0811075	110	75	333
EG0812563	125	63	314
EG08125110	125	110	367
EG0816090	160	90	370
EG08160125	160	125	414
EG08180110	180	110	413



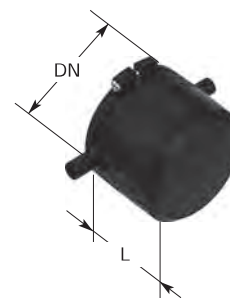
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

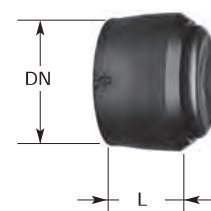
+GF+ ELGEF End Caps

End Caps PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG0620	20	52
EG0625	25	52
EG0632	32	52
EG0640	40	56
EG0650	50	60
EG0663	63	66



Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG06160	160	129
EG06200	200	147
EG06225	225	157
EG06250	250	173



End Caps (Kit) PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
EG0675*	75	110
EG0690*	90	125
EG06110	110	145
EG06125	125	158
EG06140	140	170
EG06180	180	194



* Item may be supplied as long spigot end cap plus EF Coupling

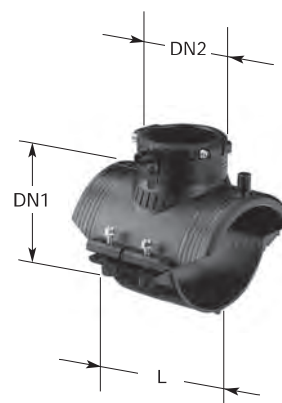
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Plus Branch Saddles

Electrofusion Branch Saddles PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG5106363	63	63	165
EG5107563	75	63	165
EG5109063	90	63	165
EG5111063	110	63	165
EG5112563	125	63	165
EG5114063	140	63	165
EG5116063	160	63	165
EG5118063	180	63	165
EG5120063	200	63	165
EG5122563	225	63	165
EG5125063	250	63	165
EG5128063*	280	63	165
EG5131563*	315-355	63	165

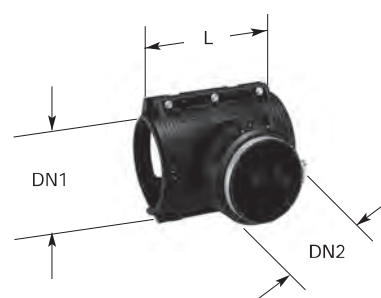


* Installation of this range of saddles requires the use of Topload tool (EG799350477), detailed instructions and specific training.

* In this fitting range, no underpart is supplied.

Saddles Branch Fitting PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG5111090	110	90	164
EG51110110	110	110	164
EG5112590	125	90	179
EG51125110	125	110	179
EG5114090	140	90	195
EG51140110	140	110	195
EG5116090	160	90	215
EG51160110	160	110	215
EG51160125	160	125	215
EG5118090	180	90	237
EG51180110	180	110	237
EG51180125	180	125	237
EG5120090	200	90	253
EG51200110	200	110	253
EG51200125	200	125	253
EG5122590	225	90	287
EG51225110	225	110	287
EG51225125	225	125	287
EG5125090	250	90	312
EG51250110	250	110	312
EG51250125	250	125	312



* Installation of this range of saddles requires the use of Topload tool (EG799350477), detailed instructions and specific training.

Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Plus Branch Saddles

Branch Fitting Topload PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG5128090	280	90	243
EG51280110	280	110	243
EG51280125	280	125	243
EG5135590	315-355	90	249
EG51355110	315-355	110	249
EG51355125	315-355	125	249
EG5140090	400-450	90	256
EG51400110	400-450	110	256
EG51400125	400-450	125	256
EG5150090	500-630	90	263
EG51500110	500-630	110	263
EG51500125	500-630	125	263



Note : Installation of this range of saddles requires the use of Topload tool (EG799350477), detailed instructions and specific training.

Tapping Tees PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG536320	63	20	130
EG536325	63	25	130
EG536332	63	32	130
EG536340	63	40	137
EG536363	63	63	160

Note: Suitable for branch saddles shown above. Both units combine to become a multi-directional EF tapping saddle.



Note:

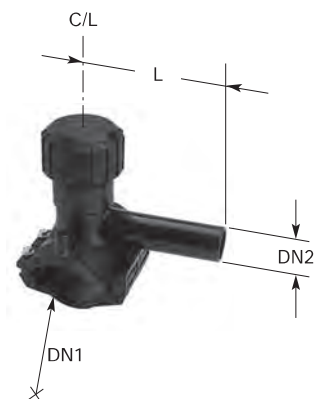
- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Tapping Saddles

Tapping Saddles Monobloc Version PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG553220*	32	20	90
EG554020	40	20	102
EG554025	40	25	102
EG554032	40	32	120
EG555020	50	20	102
EG555025	50	25	102
EG555032	50	32	120

* Delivery without underpart.



Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG556320	63	20	110
EG556325	63	25	110
EG556332	63	32	110
EG559020	90	20	115
EG559025	90	25	115
EG559032	90	32	115
EG5511020	110	20	115
EG5511025	110	25	115
EG5511032	110	32	125
EG5511063	110	63	160
EG5512520	125	20	120
EG5512525	125	25	120
EG5512532	125	32	120
EG5516020	160	20	120
EG5516025	160	25	125
EG5516032	160	32	130
EG5516063	160	63	170



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Tapping Saddles

Tapping Saddles with 360° Rotatable Outlet PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG506320	63	20	130
EG506325	63	25	130
EG506332	63	32	130
EG506340	63	40	137
EG506363	63	63	160
EG507520	75	20	130
EG507525	75	25	130
EG507532	75	32	130
EG507540	75	40	137
EG507563	75	63	160
EG509020	90	20	130
EG509025	90	25	130
EG509032	90	32	130
EG509040	90	40	137
EG509063	90	63	160
EG5011020	110	20	130
EG5011025	110	25	130
EG5011032	110	32	130
EG5011040	110	40	137
EG5011063	110	63	160
EG5012520	125	20	130
EG5012525	125	25	130
EG5012532	125	32	130
EG5012540	125	40	137
EG5012563	125	63	160
EG5014020	140	20	130
EG5014025	140	25	130
EG5014032	140	32	130

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
EG5014040	140	40	137
EG5014063	140	63	160
EG5016020	160	20	130
EG5016025	160	25	130
EG5016032	160	32	130
EG5016040	160	40	137
EG5016063	160	63	160
EG5018020	180	20	130
EG5018025	180	25	130
EG5018032	180	32	130
EG5018040	180	40	137
EG5018063	180	63	160
EG5020020	200	20	137
EG5020025	200	25	130
EG5020032	200	32	130
EG5020040	200	40	137
EG5020063	200	63	160
EG5022520	225	20	130
EG5022525	225	25	130
EG5022532	225	32	130
EG5022540	225	40	137
EG5022563	225	63	160
EG5025020	250	20	130
EG5025025	250	25	130
EG5025032	250	32	130
EG5025040	250	40	137
EG5025063	250	63	160
EG5028063*	280	63	160
EG5031563*	315-400	63	160



* Installation of this range of saddles requires the use of Topload tool (EG799350477), detailed instructions and specific training.

* In this fitting range, no underpart is supplied.

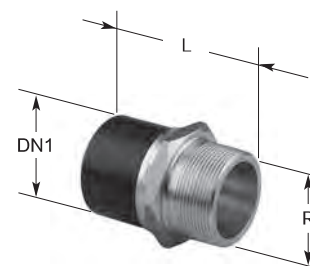
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Transition Adaptors

Transition Adaptors PE/Brass (Male Thread):

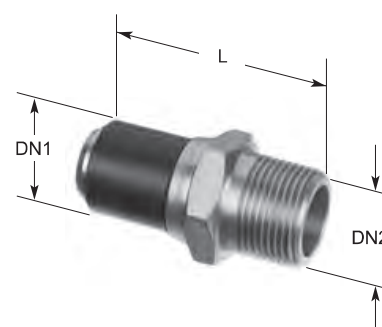
Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Dim. (inch) R	Dim. (mm) L
PEAMI020015	20	½	75
PEAMI025020	25	¾	76
PEAMI032025	32	1	80
PEAMI032032	32	1 ¼	82
PEAMI032040	32	1 ½	82
PEAMI040025	40	1	84
PEAMI040032	40	1 ¼	86
PEAMI040040	40	1 ½	86
PEAMI050025	50	1	88
PEAMI050032	50	1 ¼	90
PEAMI050040	50	1 ½	90
PEAMI063032	63	1 ¼	94
PEAMI063040	63	1 ½	94
PEAMI063050	63	2	98



Note: EF Coupling is required (EG07) for electrofusion to pipe.

Transition Adaptors PE/Stainless Steel (Male Thread):

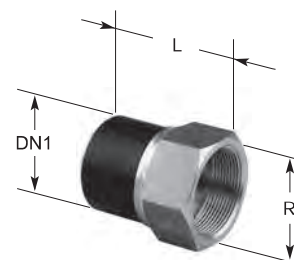
Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Dim. (inch) R	Dim. (mm) L
PEAMI020015SS	20	½	75
PEAMI025020SS	25	¾	76
PEAMI032025SS	32	1	80
PEAMI032032SS	32	1 ½	80
PEAMI040032SS	40	1 ¼	86
PEAMI040040SS	40	1 ½	86
PEAMI050040SS	50	1 ½	90
PEAMI063040SS	63	1 ½	98
PEAMI063050SS	63	2	98



Note: EF Coupling is required (EG07) for electrofusion to pipe.

Transition Adaptors PE/Brass (Female Thread):

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Dim. (inch) R	Dim. (mm) L
PEAFI032025	32	1	71
PEAFI040032	40	1 ¼	77
PEAFI050040	50	1 ½	81
PEAFI063025	63	1	89
PEAFI063032	63	1 ¼	89
PEAFI063040	63	1 ½	89
PEAFI063050	63	2	89



Note: EF Coupling is required (EG07) for electrofusion to pipe.

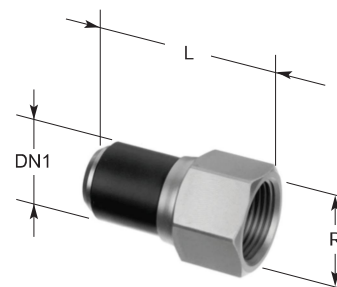
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ ELGEF Transition Adaptors

Transition Adaptors PE/Stainless Steel (Female Thread):

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Dim. (inch) R	Dim. (mm) L
PEAFI020015SS	20	½	65
PEAFI025020SS	25	¾	66
PEAFI032025SS	32	1	71
PEAFI040032SS	40	1 ¼	77
PEAFI050032SS	50	1 ¼	81
PEAFI063050SS	63	2	89



Note: EF Coupling is required (EG07) for electrofusion to pipe.

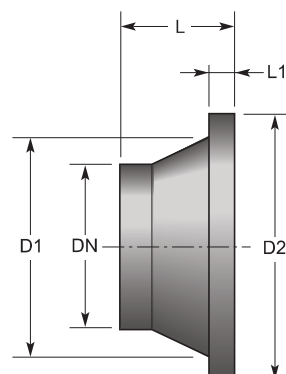
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Stub Flanges (Suitable for Butt Welding only):

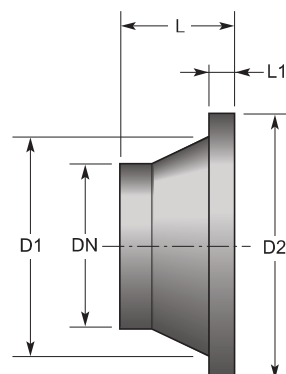
PE100 SDR17:

Iplex code	Typical dimensions				
	Nominal diameter DN (mm)	Dim. (mm) D1	Dim. (mm) D2	Dim. (mm) L	Dim. (mm) L1
PEST17063	63	75	95	50	15
PEST17075	75	88	108	50	15
PEST17090	90	103	129	80	17
PEST17110	110	124	158	80	18
PEST17125	125	128	158	80	25
PEST17140	140	151	187	80	25
PEST17160	160	168	213	80	25
PEST17180	180	190	213	80	30
PEST17200	200	225	270	95	30
PEST17225	225	230	270	95	30
PEST17250	250	284	322	100	35
PEST17280	280	294	334	100	35
PEST17315	315	335	380	105	35
PEST17355	355	366	442	110	40
PEST17400	400	420	495	110	45
PEST17450	450	470	545	110	45
PEST17500	500	520	596	125	60
PEST17560	560	580	657	125	60
PEST17630	630	650	710	130	60
PEST17710	710	735	800	130	60
PEST17800	800	825	940	130	60
PEST17900	900	940	1050	130	60
PEST171000	1000	1025	1125	130	60
PEST171200	1200	1230	1330	170	80



PE100 SDR11:

Iplex code	Typical dimensions				
	Nominal diameter DN (mm)	Dim. (mm) D1	Dim. (mm) D2	Dim. (mm) L	Dim. (mm) L1
PEST11063	63	75	95	50	15
PEST11075	75	88	108	50	15
PEST11090	90	103	129	80	17
PEST11110	110	124	158	80	18
PEST11125	125	128	158	80	25
PEST11140	140	151	187	80	25
PEST11160	160	168	213	80	25
PEST11180	180	190	213	80	30
PEST11200	200	225	270	95	30
PEST11225	225	230	270	95	30
PEST11250	250	284	322	100	35
PEST11280	280	294	334	100	35
PEST11315	315	335	380	105	35
PEST11355	355	366	442	110	40
PEST11400	400	420	495	110	45
PEST11450	450	470	545	110	45
PEST11500	500	520	596	125	60
PEST11560	560	580	657	125	60
PEST11630	630	650	710	130	60
PEST11710	710	735	800	130	60
PEST11800	800	825	940	130	60
PEST11900	900	940	1050	130	60
PEST111000	1000	1025	1125	130	60
PEST111200	1200	1230	1330	170	80



Note:

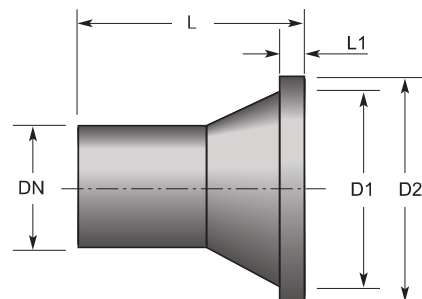
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Long Spigot Stub Flanges (Suitable for Electrofusion and Butt Welding)

PE100 SDR17:

Iplex code	Typical dimensions				
	Nominal diameter DN (mm)	Dim. (mm) D1	Dim. (mm) D2	Dim. (mm) L	Dim. (mm) L1
PEST17020LS	20	27	45	85	7
PEST17025LS	25	33	58	85	9
PEST17032LS	32	40	68	85	10
PEST17040LS	40	50	78	85	11
PEST17050LS	50	61	88	104	12
PEST17063LS	63	75	102	98	14
PEST17075LS	75	89	122	125	16
PEST17090LS	90	105	138	140	17
PEST17110LS	110	125	158	160	18
PEST17125LS	125	132	158	170	25
PEST17140LS	140	155	188	200	25
PEST17160LS	160	175	212	200	25
PEST17180LS	180	180	212	200	30
PEST17200LS	200	232	268	200	32
PEST17225LS	225	235	268	200	32
PEST17250LS	250	285	320	219	35
PEST17280LS	280	291	320	231	35
PEST17315LS	315	335	370	239	35
PEST17355LS	355	373	430	260	40
PEST17400LS	400	427	482	290	46
PEST17450LS	450	514	545	333	60
PEST17500LS	500	530	596	350	60
PEST17560LS	560	615	657	365	60
PEST17630LS	630	642	710	385	60
PEST17710LS	710	737	800	400	60
PEST17800LS	800	840	940	400	65

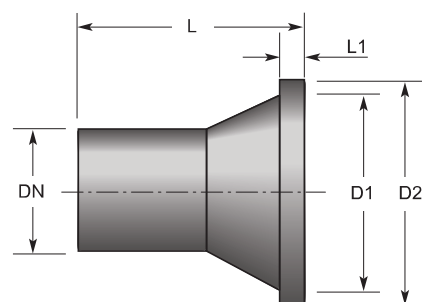
Note: EF Coupling (EG70) required for electrofusion



PE100 SDR11:

Iplex code	Typical dimensions				
	Nominal diameter DN (mm)	Dim. (mm) D1	Dim. (mm) D2	Dim. (mm) L	Dim. (mm) L1
PEST11020LS	20	27	45	85	7
PEST11025LS	25	33	58	85	9
PEST11032LS	32	40	68	85	10
PEST11040LS	40	50	78	85	11
PEST11050LS	50	61	88	104	12
PEST11063LS	63	75	102	98	14
PEST11075LS	75	89	122	125	16
PEST11090LS	90	105	138	140	17
PEST11110LS	110	125	158	160	18
PEST11125LS	125	132	158	170	25
PEST11140LS	140	155	188	200	25
PEST11160LS	160	175	212	200	25
PEST11180LS	180	180	212	200	30
PEST11200LS	200	232	268	200	32
PEST11225LS	225	235	268	200	32
PEST11250LS	250	285	320	219	35
PEST11280LS	280	291	320	231	35
PEST11315LS	315	335	370	239	35
PEST11355LS	355	373	430	260	40
PEST11400LS	400	427	482	290	46
PEST11450LS	450	514	545	333	46
PEST11500LS	500	530	596	350	60
PEST11560LS	560	615	657	365	60
PEST11630LS	630	642	710	385	60
PEST11710LS	710	737	800	400	60
PEST11800LS	800	840	940	400	65

Note: EF Coupling (EG70) required for electrofusion



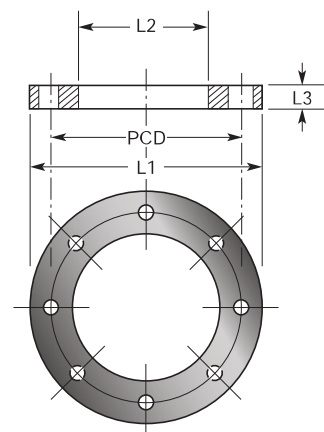
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Backing Rings

Galvanised Steel - Table D (In accordance with AS 2129):

Iplex code	Typical dimensions							
	Nominal diameter DN (mm)	Flange size (mm)	Dim. (mm) PCD	Dim.OD (mm) L1	Dim.ID (mm) L2	Dim. (mm) L3	Bolt holes No. x Dia	Bolt size
PEBRDE020	20	-	67	95	32	6	4x14	M12
PEBRDE025	25	-	73	100	37	6	4x14	M12
PEBRDE032	32	-	83	115	44	7	4x14	M12
PEBRDE040	40	-	87	120	52	8	4x14	M12
PEBRDE050	50	40	98	135	62	9	4x14	M12
PEBRDE063	63	50	114	150	78	10	4x18	M16
PEBRDE075	75	65	127	165	92	10	4x18	M16
PEBRDE090	90	80	146	185	108	10	4x18	M16
PEBRD110	110	100	178	215	128	10	4x18	M16
PEBRD125100	125	100	178	215	140	10	4x18	M16
PEBRD125	125	125	210	255	140	13	8x18	M16
PEBRD140	140	125	210	255	158	13	8x18	M16
PEBRD160	160	150	235	280	178	13	8x18	M16
PEBRD180	180	150	235	280	195	13	8x18	M16
PEBRD200	200	200	292	335	235	13	8x18	M16
PEBRD225	225	200	292	335	240	13	8x18	M16
PEBRD250	250	250	356	405	290	16	8x22	M20
PEBRD280	280	250	356	405	300	16	8x22	M20
PEBRD315	315	300	406	455	345	19	12x22	M20
PEBRD355	355	350	470	525	376	22	12x26	M24
PEBRD400	400	400	521	580	430	22	12x26	M24
PEBRD450	450	450	584	640	480	25	12x26	M24
PEBRD500	500	500	641	705	533	29	16x26	M24
PEBRD560	560	550	699	760	590	29	16x30	M27
PEBRD630	630	600	756	825	660	32	16x30	M27
PEBRD710	710	700	845	910	745	35	20x30	M27
PEBRD800	800	800	984	1060	835	41	20x36	M33
PEBRD900	900	900	1092	1175	950	48	24x36	M33
PEBRD1000	1000	1000	1175	1255	1035	51	24x36	M33
PEBRD1200	1200	1200	1410	1490	1240	60	32x36	M33
PEBRD1400*	1400	1400	1615	1700	1460	60	36x36	M33
PEBRD1600*	1600	1600	1825	1910	1660	64	40x39	M36
PEBRD1800*	1800	1800	2019	2110	1860	73	44x42	M39
PEBRD2000*	2000	2000	2250	2345	2060	76	44x42	M39



* Made to order products. Please contact an Iplex representative for more information.

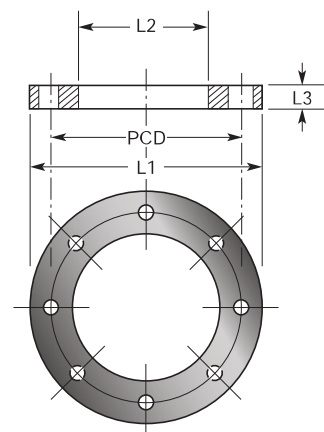
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Backing Rings

Stainless Steel - Table D (In accordance with AS 2129):

Iplex code	Typical dimensions							
	Nominal diameter DN (mm)	Flange size (mm)	Dim. (mm) PCD	Dim.OD (mm) L1	Dim.DD (mm) L2	Dim. (mm) L3	Bolt holes No. x Dia	Bolt size
PEBRDE020SS	20	-	67	95	32	6	4x14	M12
PEBRDE025SS	25	-	73	100	37	6	4x14	M12
PEBRDE032SS	32	-	83	115	44	7	4x14	M12
PEBRDE040SS	40	-	87	120	52	8	4x14	M12
PEBRDE050SS	50	40	98	135	62	9	4x14	M12
PEBRDE063SS	63	50	114	150	78	10	4x18	M16
PEBRDE075SS	75	65	127	165	92	10	4x18	M16
PEBRDE090SS	90	80	146	185	108	10	4x18	M16
PEBRD110SS	110	100	178	215	128	10	4x18	M16
PEBRD125SS	125	100	178	215	140	13	8x18	M16
PEBRD125100SS	125	125	210	255	140	10	4x18	M16
PEBRD140SS	140	125	210	255	158	13	8x18	M16
PEBRD160SS	160	150	235	280	178	13	8x18	M16
PEBRD180SS	180	150	235	280	195	13	8x18	M16
PEBRD200SS	200	200	292	335	235	13	8x18	M16
PEBRD225SS	225	200	292	335	240	13	8x18	M16
PEBRD250SS	250	250	356	405	290	16	8x22	M20
PEBRD280SS	280	250	356	405	300	16	8x22	M20
PEBRD315SS	315	300	406	455	345	19	12x22	M20
PEBRD355SS	355	350	470	525	376	22	12x26	M24
PEBRD400SS	400	400	521	580	430	22	12x26	M24
PEBRD450SS	450	450	584	640	480	25	12x26	M24
PEBRD500SS*	500	500	641	705	533	29	16x26	M24
PEBRD560SS*	560	550	699	760	590	29	16x30	M27
PEBRD630SS*	630	600	756	825	660	32	16x30	M27
PEBRD710SS*	710	700	845	910	745	35	20x30	M27
PEBRD800SS*	800	800	984	1060	835	41	20x36	M33
PEBRD900SS*	900	900	1092	1175	950	48	24x36	M33
PEBRD1000SS*	1000	1000	1175	1255	1035	51	24x36	M33
PEBRD1200SS*	1200	1200	1410	1490	1240	60	32x36	M33
PEBRD1400SS*	1400	1400	1615	1700	1460	60	36x36	M33
PEBRD1600SS*	1600	1600	1825	1910	1660	64	40x39	M36
PEBRD1800SS*	1800	1800	2019	2110	1860	73	44x42	M39
PEBRD2000SS*	2000	2000	2250	2345	2060	76	44x42	M39



* Made to order products. Please contact an Iplex representative for more information.

Note: Manufactured from 316 Grade Stainless Steel.

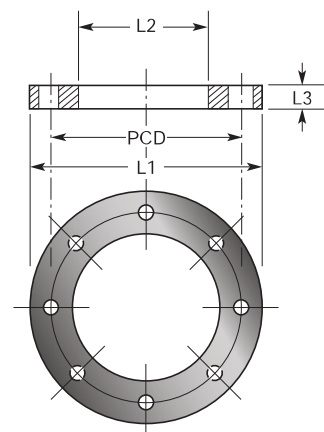
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Backing Rings

Galvanised Steel Table E (In accordance with AS 2129):

Iplex code	Typical dimensions							
	Nominal diameter DN (mm)	Flange size (mm)	Dim. (mm) PCD	Dim.OD (mm) L1	Dim.ID (mm) L2	Dim. (mm) L3	Bolt holes No. x Dia	Bolt size
PEBRDE020	20	-	67	95	32	6	4x14	M12
PEBRDE025	25	-	73	100	37	6	4x14	M12
PEBRDE032	32	-	83	115	44	7	4x14	M12
PEBRDE040	40	40	87	120	52	8	4x14	M12
PEBRDE050	50	50	98	135	62	9	4x14	M12
PEBRDE063	63	63	114	150	78	10	4x18	M16
PEBRDE075	75	75	127	165	92	10	4x18	M16
PEBRDE090	90	90	146	185	108	11	4x18	M16
PEBRE110	110	110	178	215	128	13	8x18	M16
PEBRE125	125	125	210	255	140	14	8x18	M16
PEBRE140	140	140	210	255	158	14	8x18	M16
PEBRE160	160	160	235	280	178	17	8x22	M20
PEBRE180	180	180	235	280	195	17	8x22	M20
PEBRE200	200	200	292	335	235	19	8x22	M20
PEBRE225	225	225	292	335	240	19	8x22	M20
PEBRE250	250	250	356	405	290	22	12x22	M20
PEBRE280	280	280	356	405	300	22	12x22	M20
PEBRE315	315	315	406	455	345	25	12x26	M24
PEBRE355	355	355	470	525	376	29	12x26	M24
PEBRE400	400	400	521	580	430	32	12x26	M24
PEBRE450	450	450	584	640	480	32	16x26	M24
PEBRE500	500	500	641	705	533	38	16x26	M24
PEBRE560	560	560	699	760	590	44	16x30	M27
PEBRE630	630	630	756	825	660	48	16x33	M30
PEBRE710*	710	710	845	910	745	51	20x33	M30
PEBRE800*	800	800	984	1060	835	54	20x36	M33
PEBRE1000*	1000	1000	1175	1255	1035	67	24x39	M36
PEBRE1200*	1200	1200	1410	1490	1240	79	32x39	M36



* Made to order products. Please contact an Iplex representative for more information.

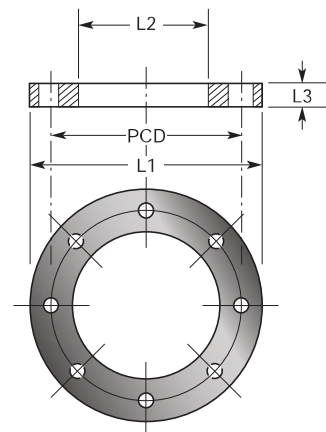
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Backing Rings

Stainless Steel Table E (In accordance with AS 2129):

Iplex code	Typical dimensions							
	Nominal diameter DN (mm)	Flange size (mm)	Dim. (mm) PCD	Dim.OD (mm) L1	Dim.ID (mm) L2	Dim. (mm) L3	Bolt holes No. x Dia	Bolt size
PEBRDE020SS	20	-	67	95	32	6	4x14	M12
PEBRDE025SS	25	-	73	100	37	6	4x14	M12
PEBRDE032SS	32	-	83	115	44	7	4x14	M12
PEBRDE040SS	40	40	87	120	52	8	4x14	M12
PEBRDE050SS	50	50	98	135	62	9	4x14	M12
PEBRDE063SS	63	63	114	150	78	10	4x18	M16
PEBRDE075SS	75	75	127	165	92	10	4x18	M16
PEBRDE090SS	90	90	146	185	108	11	4x18	M16
PEBRE110SS	110	110	178	215	128	13	8x18	M16
PEBRE125SS	125	125	210	255	140	14	8x18	M16
PEBRE140SS	140	140	210	255	158	14	8x18	M16
PEBRE160SS	160	160	235	280	178	17	8x22	M20
PEBRE180SS	180	180	235	280	195	17	8x22	M20
PEBRE200SS	200	200	292	335	235	19	8x22	M20
PEBRE225SS	225	225	292	335	240	19	8x22	M20
PEBRE250SS	250	250	356	405	290	22	12x22	M20
PEBRE280SS	280	280	356	405	300	22	12x22	M20
PEBRE315SS	315	315	406	455	345	25	12x26	M24
PEBRE355SS*	355	355	470	525	376	29	12x26	M24
PEBRE400SS*	400	400	521	580	430	32	12x26	M24
PEBRE450SS*	450	450	584	640	480	32	16x26	M24
PEBRE500SS*	500	500	641	705	533	38	16x26	M24
PEBRE560SS*	560	560	699	760	590	44	16x30	M27
PEBRE630SS*	630	630	756	825	660	48	16x33	M30
PEBRE710SS*	710	710	845	910	745	51	20x33	M30
PEBRE800SS*	800	800	984	1060	835	54	20x36	M33
PEBRE1000SS*	1000	1000	1175	1255	1035	67	24x39	M36
PEBRE1200SS*	1200	1200	1410	1490	1240	79	32x39	M36



* Made to order products. Please contact an Iplex representative for more information.

Note: Manufactured from 316 Grade Stainless Steel.

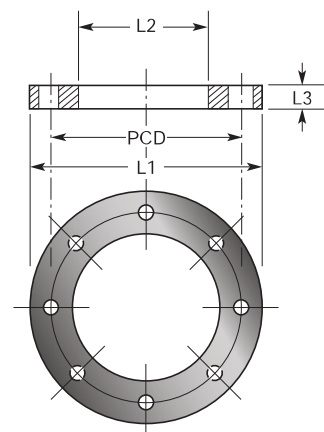
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Backing Rings

Galvanised Steel - Table ANSI 150 (In accordance with ASME B16.5):

Iplex code	Typical dimensions							
	Nominal diameter Imperial	Nominal diameter DN (mm)	Dim. (mm) PCD	Dim.OD (mm) L1	Dim.ID (mm) L2	Dim. (mm) L3	Bolt Holes No. x Dia	Bolt Size
PEBRA020	½"	20	60.5	90	32	11.2	4x16	M14
PEBRA025	¾"	25	70	98	37	12.8	4x16	M14
PEBRA032	1"	32	79.5	108	44	14.2	4x16	M14
PEBRA040	1 ¼"	40	89	117	52	15.7	4x16	M14
PEBRA050	1 ½"	50	98.5	127	62	17.5	4x16	M14
PEBRA063	2"	63	120.5	152	78	19.0	4x20	M18
PEBRA075	2 ½"	75	139.5	178	92	22.3	4x20	M18
PEBRA090	3"	90	152	191	108	23.9	4x20	M18
PEBRA110	4"	110	190.5	229	128	23.9	8x20	M18
PEBRA125	5"	125	216	254	140	23.9	8x23	M20
PEBRA140	5"	140	216	254	158	23.9	8x23	M20
PEBRA160	6"	160	241	279	178	25.4	8x23	M20
PEBRA180	6"	180	241	279	195	25.4	8x23	M20
PEBRA200	8"	200	298.5	343	235	28.4	8x23	M20
PEBRA225	8"	225	298.5	343	240	28.4	8x23	M20
PEBRA250	10"	250	362	406	290	30.2	12x26	M24
PEBRA280	10"	280	362	406	300	30.2	12x26	M24
PEBRA315	12"	315	432	483	345	31.8	12x26	M24
PEBRA355	14"	355	476	535	376	35.0	12x29	M27
PEBRA400	16"	400	540	600	430	46.6	16x29	M27
PEBRA450	18"	450	578	635	480	39.6	16x32	M30
PEBRA500	20"	500	635	700	533	43.0	20x32	M30
PEBRA560	22"	560	692	750	590	46.0	20x35	M33
PEBRA630	24"	630	749	813	660	47.8	20x35	M33
PEBRA710*	28"	710	863.5	927	745	71.0	28x35	M33
PEBRA800*	32"	800	978	1060	835	81.0	28x41	M38
PEBRA1000*	40"	1000	1124	1290	1030	90.0	36x41	M39
PEBRA1200*	48"	1200	1422.5	1510	1235	108.0	44x41	M39
PEBRA1400*	56"	1400	1594	1683	-	120.0	44x48	M46



* These sizes are in accordance with ASME B16.47. Sizes 1000mm and above are made to order products. Please contact Iplex Pipelines for more information.

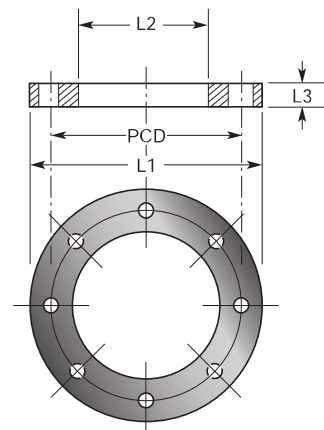
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Backing Rings

Stainless Steel - Table ANSI 150 (In accordance with ASME B16.5):

Iplex code	Typical dimensions							
	Nominal diameter Imperial	Nominal diameter DN (mm)	Dim. (mm) PCD	Dim.OD (mm) L1	Dim.ID (mm) L2	Dim. (mm) L3	Bolt holes No. x Dia	Bolt size
PEBRA020SS	½"	20	60.5	90	32	11.2	4x16	M14
PEBRA025SS	¾"	25	70	98	37	12.8	4x16	M14
PEBRA032SS	1"	32	79.5	108	44	14.2	4x16	M14
PEBRA040SS	1 ¼"	40	89	117	52	15.7	4x16	M14
PEBRA050SS	1 ½"	50	98.5	127	62	17.5	4x16	M14
PEBRA063SS	2"	63	120.5	152	78	19.0	4x20	M18
PEBRA075SS	2 ½"	75	139.5	178	92	22.3	4x20	M18
PEBRA090SS	3"	90	152	191	108	23.9	4x20	M18
PEBRA110SS	4"	110	190.5	229	128	23.9	8x20	M18
PEBRA125SS	5"	125	216	254	140	23.9	8x23	M20
PEBRA140SS	5"	140	216	254	158	23.9	8x23	M20
PEBRA160SS	6"	160	241	279	178	25.4	8x23	M20
PEBRA180SS	6"	180	241	279	195	25.4	8x23	M20
PEBRA200SS	8"	200	298.5	343	235	28.4	8x23	M20
PEBRA225SS	8"	225	298.5	343	240	28.4	8x23	M20
PEBRA250SS	10"	250	362	406	290	30.2	12x26	M24
PEBRA280SS	10"	280	362	406	300	30.2	12x26	M24
PEBRA315SS	12"	315	432	483	345	31.8	12x26	M24
PEBRA355SS	14"	355	476	535	376	35.0	12x29	M27
PEBRA400SS	16"	400	540	600	430	46.6	16x29	M27
PEBRA450SS	18"	450	578	635	480	39.6	16x32	M30
PEBRA500SS	20"	500	635	700	533	43.0	20x32	M30
PEBRA560SS	22"	560	692	750	590	46.0	20x35	M33
PEBRA630SS	24"	630	749	813	660	47.8	20x35	M33
PEBRA710SS*	28"	710	863.5	927	745	71.0	28x35	M33
PEBRA800SS*	32"	800	978	1060	835	81.0	28x41	M38
PEBRA1000SS*	40"	1000	1124	1290	1030	90.0	36x41	M39
PEBRA1200SS*	48"	1200	1422.5	1510	1235	108.0	44x41	M39
PEBRA1400SS*	56"	1400	1594	1683	-	120.0	44x48	M46



* These sizes are in accordance with ASME B16.47. Sizes 1000mm and above are made to order products.
Please contact Iplex Pipelines for more information.

Note: Manufactured from 316 Grade Stainless Steel.

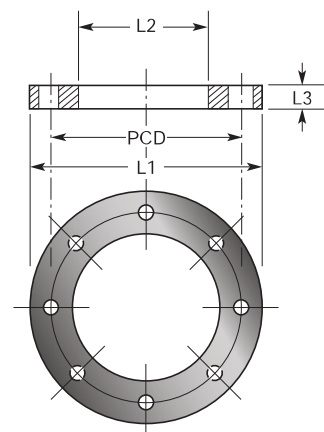
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Backing Rings

Galvanised Steel PN16 (In accordance with AS 4087 Figure B7):

Iplex code	Typical dimensions							
	Nominal diameter DN (mm)	Flange size (mm)	Dim. (mm) PCD	Dim.OD (mm) L1	Dim.ID (mm) L2	Dim. (mm) L3	Bolt holes No. x Dia	Bolt size
PEBR16020	20	-	67	95	32	6	4x14	M12
PEBR16025	25	-	73	100	37	6	4x14	M12
PEBR16032	32	-	83	115	44	7	4x14	M12
PEBR16040	40	-	87	120	52	8	4x14	M12
PEBR16050	50	40	98	135	62	9	4x14	M12
PEBR16563	63	50	114	150	78	11	4x18	M16
PEBR16075	75	65	127	165	92	11	4x18	M16
PEBR16090	90	80	146	185	108	11	4x18	M16
PEBR16110	110	100	178	215	128	13	4x18	M16
PEBR16125	125	125	210	255	140	13	8x18	M16
PEBR16125SP	125	100	178	215	140	13	8x18	M16
PEBR16140	140	125	210	255	158	13	8x18	M16
PEBR16160	160	150	235	280	178	13	8x18	M16
PEBR16180	180	150	235	280	195	13	8x18	M16
PEBR16200	200	200	292	335	235	19	8x18	M16
PEBR16225200	225	200	292	335	240	19	8x18	M16
PEBR16225	225	225	324	370	238	19	8x18	M16
PEBR16250	250	250	356	405	290	19	8x22	M20
PEBR16280	280	250	356	405	300	19	8x22	M20
PEBR16315	315	300	406	455	345	23	12x22	M20
PEBR16355	355	350	470	525	376	30	12x26	M24
PEBR16400	400	400	521	580	430	30	12x26	M24
PEBR16450	450	450	584	640	480	30	12x26	M24
PEBR16500	500	500	641	705	533	38	16x26	M24
PEBR16560	560	550	699	760	590	48	16x30	M27
PEBR16630	630	600	756	825	660	48	16x30	M27
PEBR16710*	710	700	845	910	745	56	20x30	M27
PEBR16800*	800	800	984	1060	835	56	20x36	M33
PEBR16900*	900	900	1092	1175	950	66	24x36	M33
PEBR161000*	1000	1000	1175	1255	1035	66	24x36	M33
PEBR161200*	1200	1200	1410	1490	1240	75	32x36	M33
PEBR161400*	1400	1400	1615	1700	1460	-	36x36	M33
PEBR161600*	1600	1600	1825	1910	1660	-	40x39	M36
PEBR161800*	1800	1800	2019	2110	1860	-	44x42	M39
PEBR162000*	2000	2000	2250	2345	2060	-	44x42	M39



* Made to order products. Please contact an Iplex Representative for more information.

Note: This table has bolting compatibility with AS 2129 Table D Flanges.

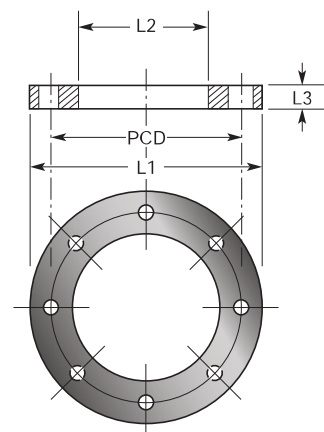
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Backing Rings

Stainless Steel PN16 (In accordance with AS 4087 Figure B7):

Iplex code	Typical dimensions							
	Nominal diameter DN (mm)	Flange size (mm)	Dim. (mm) PCD	Dim.OD (mm) L1	Dim.ID (mm) L2	Dim. (mm) L3	Bolt holes No. x Dia	Bolt size
PEBR16020SS	20	-	67	95	32	6	4x14	M12
PEBR16025SS	25	-	73	100	37	6	4x14	M12
PEBR16032SS	32	-	83	115	44	7	4x14	M12
PEBR16040SS	40	-	87	120	52	8	4x14	M12
PEBR16050SS	50	40	98	135	62	9	4x14	M12
PEBR16563SS	63	50	114	150	78	11	4x18	M16
PEBR16075SS	75	65	127	165	92	11	4x18	M16
PEBR16090SS	90	80	146	185	108	11	4x18	M16
PEBR16110SS	110	100	178	215	128	13	4x18	M16
PEBR16125SS	125	125	210	255	140	13	8x18	M16
PEBR16125100SS	125	100	178	215	140	13	8x18	M16
PEBR16140SS	140	125	210	255	158	13	8x18	M16
PEBR16160SS	160	150	235	280	178	13	8x18	M16
PEBR16180SS	180	150	235	280	195	13	8x18	M16
PEBR16200SS	200	200	292	335	235	19	8x18	M16
PEBR16225200SS	225	200	292	335	240	19	8x18	M16
PEBR16225SS	225	225	324	370	240	19	8x18	M16
PEBR16250SS	250	250	356	405	290	19	8x22	M20
PEBR16280SS	280	250	356	405	300	19	8x22	M20
PEBR16315SS	315	300	406	455	345	23	12x22	M20
PEBR16355SS	355	350	470	525	376	30	12x26	M24
PEBR16400SS	400	400	521	580	430	30	12x26	M24
PEBR16450SS	450	450	584	640	480	30	12x26	M24
PEBR16500SS*	500	500	641	705	533	38	16x26	M24
PEBR16560SS*	560	550	699	760	590	48	16x30	M27
PEBR16630SS*	630	600	756	825	660	48	16x30	M27
PEBR16710SS*	710	700	845	910	745	56	20x30	M27
PEBR16800SS*	800	800	984	1060	835	56	20x36	M33
PEBR16900SS*	900	900	1092	1175	950	66	24x36	M33
PEBR161000SS*	1000	1000	1175	1255	1035	66	24x36	M33
PEBR161200SS*	1200	1200	1410	1490	1240	75	32x36	M33
PEBR161400SS*	1400	1400	1615	1700	1450	-	36x36	M33
PEBR161600SS*	1600	1600	1825	1910	1660	-	40x39	M36
PEBR161800SS*	1800	1800	2019	2110	1860	-	44x42	M39
PEBR162000SS*	2000	2000	2250	2345	2060	-	44x42	M39



* Made to order products. Please contact an Iplex representative for more information

Note: This table has bolting compatibility with AS 2129 Table D Flanges
Manufactured from 316 Grade Stainless Steel

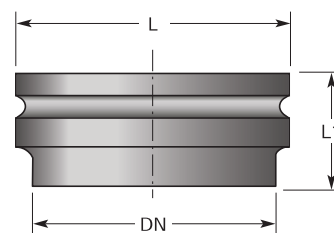
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Shouldered Ends (Suitable for Butt Welding only)

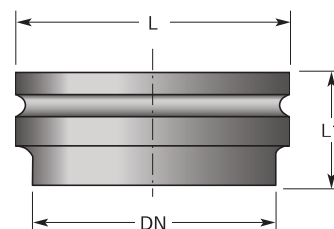
PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Coupling size
PESE17063	63	68	55	2 3/8"
PESE17075	75	97	70	3 1/2"
PESE17090	90	97	85	3 1/2"
PESE17110	110	122	85	4 1/2"
PESE17125	125	176	80	6 1/2"
PESE17140	140	176	80	6 1/2"
PESE17160	160	176	85	6 1/2"
PESE17200	200	235	90	8 5/8"
PESE17225	225	235	90	8 5/8"
PESE17250	250	287	95	10 3/4"
PESE17280	280	338	105	12 3/4"
PESE17315	315	338	95	12 3/4"
PESE17355	355	370	100	14"
PESE17400	400	420	100	16"
PESE17450	450	472	100	18"
PESE17500	500	522	100	20"



PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Coupling size
PESE11063	63	68	55	2 3/8"
PESE11075	75	97	70	3 1/2"
PESE11090	90	97	85	3 1/2"
PESE11110	110	122	85	4 1/2"
PESE11125	125	176	80	6 1/2"
PESE11140	140	176	80	6 1/2"
PESE11160	160	176	85	6 1/2"
PESE11200	200	235	90	8 5/8"
PESE11225	225	235	90	8 5/8"
PESE11250	250	287	95	10 3/4"
PESE11280	280	338	105	12 3/4"
PESE11315	315	338	95	12 3/4"
PESE11355	355	370	100	14"
PESE11400	400	420	100	16"
PESE11450	450	472	100	18"
PESE11500	500	522	100	20"



Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Shouldered End Couplings (Victaulic Coupling)

Iplex code	Typical Dimensions	
	Shouldered end OD	Coupling size
PEVC063	63	2 3/8"
PEVC075090	75 + 90	3 1/2"
PEVC110	110	4 1/2"
PEVC125140160	125 + 140 + 160	6 1/2"
PEVC200225	200 + 225	8 5/8"
PEVC250	250	10 3/4"
PEVC280315	280 + 315	12 3/4"
PEVC355	355	14"
PEVC400	400	16"
PEVC450	450	18"



Note: Covers all PN ratings

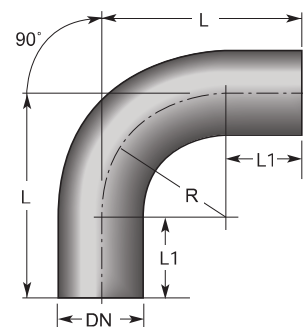
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Sweep Bends (Suitable for Butt Welding only)

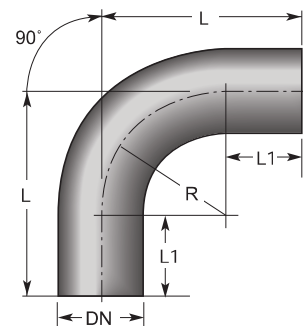
Bends 90° - PE100 SDR17:

Iplex code	Nominal diameter DN (mm)	Typical dimensions		
		Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESW1702590	25	200	100	100
PESW1703290	32	228	100	128
PESW1704090	40	260	100	160
PESW1705090	50	275	100	175
PESW1706390	63	325	100	225
PESW1707590	75	455	150	305
PESW1709090	90	455	247	207.5
PESW1711090	110	582	247	335
PESW1712590	125	585	235	350
PESW1714090	140	678	313	365
PESW1716090	160	696	249	447
PESW1718090	180	816	276	447
PESW1720090	200	818	268	550
PESW1722590	225	933	313	620
PESW1725090	250	987	352	635
PESW1728090	280	1038	398	640
PESW1731590	315	1363	603	760
PESW1735590	355	1499	574	925
PESW1740090	400	1717	707	1010
PESW1745090	450	1787	687	1100
PESW1750090	500	1908	708	1200
PESW1756090	560	2206	908	1298
PESW1763090	630	2281	981	1300
PESW1771090	710	6269	1129	1500
PESW1780090	800	3172	1322	1850
PESW1790090	900	2800	1000	1900
PESW17100090	1000	3847	1548	2100



Bends 90° - PE100 SDR11:

Iplex code	Nominal diameter DN (mm)	Typical dimensions		
		Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESW1702590	25	200	100	100
PESW1703290	32	228	100	128
PESW1704090	40	260	100	160
PESW1705090	50	275	100	175
PESW1706390	63	325	100	225
PESW1707590	75	455	150	305
PESW1709090	90	455	247	207.5
PESW1711090	110	582	247	335
PESW1712590	125	585	235	350
PESW1714090	140	678	313	365
PESW1716090	160	696	249	447
PESW1718090	180	816	276	447
PESW1720090	200	818	268	550
PESW1722590	225	933	313	620
PESW1725090	250	987	352	635
PESW1728090	280	1038	398	640
PESW1731590	315	1363	603	760
PESW1735590	355	1499	574	925
PESW1740090	400	1717	707	1010
PESW1745090	450	1787	687	1100
PESW1750090	500	1908	708	1200
PESW1756090	560	2206	908	1298
PESW1763090	630	2281	981	1300
PESW1771090	710	6269	1129	1500
PESW1780090	800	3172	1322	1850
PESW1790090	900	2800	1000	1900
PESW17100090	1000	3847	1548	2100



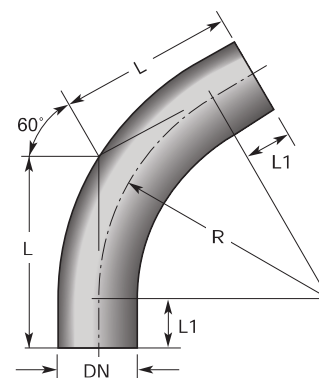
Note:

- Sweep bends suitable for electrofusion can be specially ordered.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Sweep Bends (Suitable for Butt Welding only)

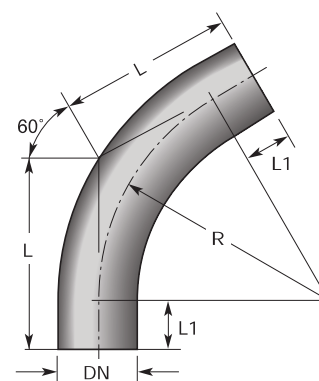
Bends 60° - PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESW1702560	25	155	100	100
PESW1703260	32	170	100	128
PESW1704060	40	190	100	160
PESW1705060	50	200	100	175
PESW1706360	63	230	100	225
PESW1707560	75	320	150	305
PESW1709060	90	346	226	207.5
PESW1711060	110	418	225	335
PESW1712560	125	519	317	350
PESW1714060	140	520	309	365
PESW1716060	160	524	266	447
PESW1718060	180	629	317	447
PESW1720060	200	629	312	550
PESW1722560	225	683	326	620
PESW1725060	250	684	318	635
PESW1728060	280	835	465	640
PESW1731560	315	841	402	760
PESW1735560	355	1150	616	925
PESW1740060	400	1255	671	1010
PESW1745060	450	1359	724	1100
PESW1750060	500	1365	672	1200
PESW1756060	560	1721	972	1298
PESW1763060	630	1671	921	1300
PESW1771060	710	1986	1120	1500
PESW1780060	800	2583	1515	1850
PESW1790060	900	2065	900	1930
PESW17100060	1000	3160	1832	2100



Bends 60° - PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESW1702560	25	155	100	100
PESW1703260	32	170	100	128
PESW1704060	40	190	100	160
PESW1705060	50	200	100	175
PESW1706360	63	230	100	225
PESW1707560	75	320	150	305
PESW1709060	90	346	226	207.5
PESW1711060	110	418	225	335
PESW1712560	125	519	317	350
PESW1714060	140	520	309	365
PESW1716060	160	524	266	447
PESW1718060	180	629	317	447
PESW1720060	200	629	312	550
PESW1722560	225	683	326	620
PESW1725060	250	684	318	635
PESW1728060	280	835	465	640
PESW1731560	315	841	402	760
PESW1735560	355	1150	616	925
PESW1740060	400	1255	671	1010
PESW1745060	450	1359	724	1100
PESW1750060	500	1365	672	1200
PESW1756060	560	1721	972	1298
PESW1763060	630	1671	921	1300
PESW1771060	710	1986	1120	1500
PESW1780060	800	2583	1515	1850
PESW1790060	900	2065	900	1930
PESW17100060	1000	3160	1832	2100



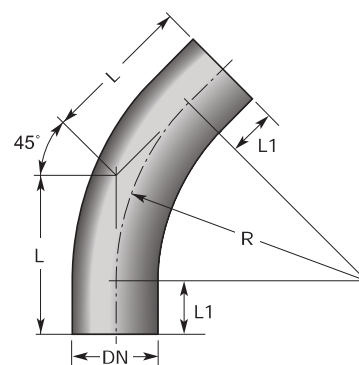
Note: • Sweep bends suitable for electrofusion can be specially ordered.

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- 60° bends are a made to order items only.

Sweep Bends (Suitable for Butt Welding only)

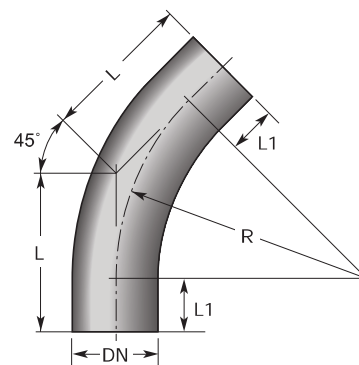
Bends 45° - PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESW1703245	32	150	100	128
PESW1704045	40	165	100	160
PESW1705045	50	170	100	175
PESW1706345	63	190	100	225
PESW1707545	75	270	150	305
PESW1709045	90	340	254	207.5
PESW1711045	110	417	279	335
PESW1712545	125	458	313	350
PESW1714045	140	508	357	365
PESW1716045	160	510	325	447
PESW1718045	180	562	338	447
PESW1720045	200	562	334	550
PESW1722545	225	613	357	620
PESW1725045	250	714	451	635
PESW1728045	280	764	499	640
PESW1731545	315	766	452	760
PESW1735545	355	970	587	925
PESW1740045	400	1122	704	1010
PESW1745045	450	1124	668	1100
PESW1750045	500	1226	729	1200
PESW1756045	560	1367	829	1298
PESW1763045	630	1429	891	1300
PESW1771045	710	1761	1140	1500
PESW1780045	800	2228	1461	1850
PESW1790045	900	1750	1000	1900
PESW17100045	1000	2827	1874	2100



Bends 45° - PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESW1103245	32	150	100	128
PESW1104045	40	165	100	160
PESW1105045	50	170	100	175
PESW1106345	63	190	100	225
PESW1107545	75	270	150	305
PESW1109045	90	340	254	207.5
PESW1111045	110	417	279	335
PESW1112545	125	458	313	350
PESW1114045	140	508	357	365
PESW1116045	160	510	325	447
PESW1118045	180	562	338	447
PESW1120045	200	562	334	550
PESW1122545	225	613	357	620
PESW1125045	250	714	451	635
PESW1128045	280	764	499	640
PESW1131545	315	766	452	760
PESW1135545	355	970	587	925
PESW1140045	400	1122	704	1010
PESW1145045	450	1124	668	1100
PESW1150045	500	1226	729	1200
PESW1156045	560	1367	829	1298
PESW1163045	630	1429	891	1300
PESW1171045	710	1761	1140	1500
PESW1180045	800	2228	1461	1850
PESW1190045	900	1750	1000	1900
PESW11100045	1000	2827	1874	2100



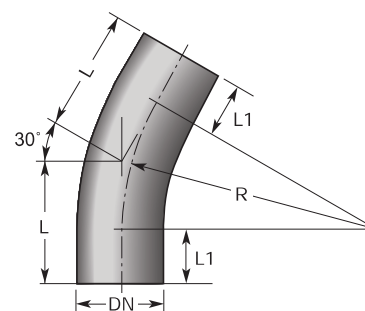
Note:

- Sweep bends suitable for electrofusion can be specially ordered.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Sweep Bends (Suitable for Butt Welding only)

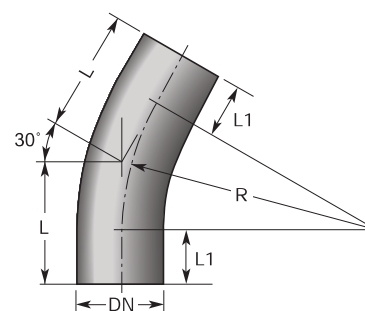
Bends 30° - PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESW1703230	32	134	100	128
PESW1704030	40	140	100	160
PESW1705030	50	146	100	175
PESW1706330	63	160	100	225
PESW1707530	75	230	150	305
PESW1709030	90	326	271	207.5
PESW1711030	110	402	312	335
PESW1712530	125	452	358	350
PESW1714030	140	452	354	365
PESW1716030	160	453	333	447
PESW1718030	180	503	359	447
PESW1720030	200	503	356	550
PESW1722530	225	554	388	620
PESW1725030	250	554	384	635
PESW1728030	280	654	483	640
PESW1731530	315	655	451	760
PESW1735530	355	856	608	925
PESW1740030	400	1006	736	1010
PESW1745030	450	1007	712	1100
PESW1750030	500	1108	786	1200
PESW1756030	560	1234	886	1298
PESW1763030	630	1309	960	1300
PESW1771030	710	1662	1260	1500
PESW1780030	800	2103	1607	1850
PESW1790030	900	1430	900	1930
PESW17100030	1000	2482	1866	2100



Bends 30° - PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESW1103230	32	134	100	128
PESW1104030	40	140	100	160
PESW1105030	50	146	100	175
PESW1106330	63	160	100	225
PESW1107530	75	230	150	305
PESW1109030	90	326	271	207.5
PESW1111030	110	402	312	335
PESW1112530	125	452	358	350
PESW1114030	140	452	354	365
PESW1116030	160	453	333	447
PESW1118030	180	503	359	447
PESW1120030	200	503	356	550
PESW1122530	225	554	388	620
PESW1125030	250	554	384	635
PESW1128030	280	654	483	640
PESW1131530	315	655	451	760
PESW1135530	355	856	608	925
PESW1140030	400	1006	736	1010
PESW1145030	450	1007	712	1100
PESW1150030	500	1108	786	1200
PESW1156030	560	1234	886	1298
PESW1163030	630	1309	960	1300
PESW1171030	710	1662	1260	1500
PESW1180030	800	2103	1607	1850
PESW1190030	900	1430	900	1930
PESW11100030	1000	2482	1866	2100



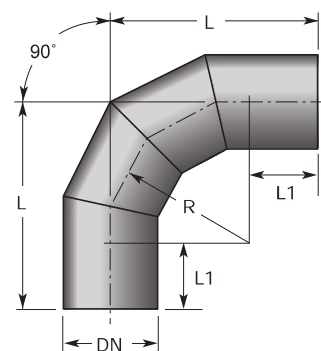
Note:

- Sweep bends suitable for electrofusion can be specially ordered.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- 30° bends are made to order items only.

Segmented Bends (Suitable for Butt Welding only)

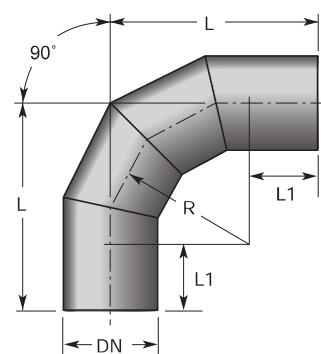
Bends 90° - PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESB1709090	90	235	100	135
PESB1711090	110	265	100	165
PESB1712590	125	338	150	188
PESB1714090	140	360	150	210
PESB1716090	160	390	150	240
PESB1718090	180	425	150	270
PESB1720090	200	450	150	300
PESB1722590	225	488	150	338
PESB1725090	250	625	250	375
PESB1728090	280	670	250	420
PESB1731590	315	777	300	477
PESB1735590	355	833	300	533
PESB1740090	400	900	300	600
PESB1745090	450	975	300	675
PESB1750090	500	1100	350	750
PESB1756090	560	1190	350	840
PESB1763090	630	1295	350	945
PESB1771090	710	1415	350	1065
PESB1780090	800	1550	350	1200
PESB1790090	900	-	-	-
PESB17100090	1000	1900	400	1500
PESB17120090	1200	2200	400	1800



Bends 90° - PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESB1109090	90	235	100	135
PESB1111090	110	265	100	165
PESB1112590	125	338	150	188
PESB1114090	140	360	150	210
PESB1116090	160	390	150	240
PESB1118090	180	425	150	270
PESB1120090	200	450	150	300
PESB1122590	225	488	150	338
PESB1125090	250	625	250	375
PESB1128090	280	670	250	420
PESB1131590	315	777	300	477
PESB1135590	355	833	300	533
PESB1140090	400	900	300	600
PESB1145090	450	975	300	675
PESB1150090	500	1100	350	750
PESB1156090	560	1190	350	840
PESB1163090	630	1295	350	945
PESB1171090	710	1415	350	1065
PESB1180090	800	1550	350	1200
PESB1190090	900	-	-	-
PESB11100090	1000	1900	400	1500
PESB11120090	1200	2200	400	1800



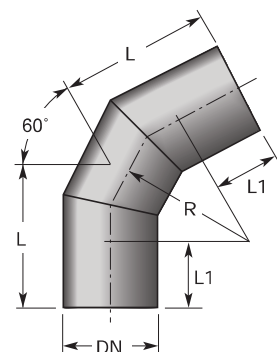
Note:

- Segmented bends are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Segmented Bends (Suitable for Butt Welding only)

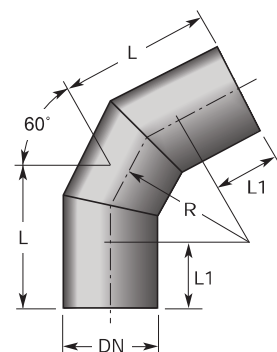
Bends 60° - PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESB1709060	90	178	100	135
PESB1711060	110	195	100	165
PESB1712560	125	258	150	188
PESB1714060	140	275	150	210
PESB1716060	160	288	150	240
PESB1718060	180	301	150	270
PESB1720060	200	323	150	300
PESB1722560	225	345	150	338
PESB1725060	250	466	250	375
PESB1728060	280	492	250	420
PESB1731560	315	576	300	477
PESB1735560	355	608	300	533
PESB1740060	400	646	300	600
PESB1745060	450	689	300	675
PESB1750060	500	783	350	750
PESB1756060	560	835	350	840
PESB1763060	630	896	350	945
PESB1771060	710	965	350	1065
PESB1780060	800	1043	350	1200
PESB1790060	900	-	-	-
PESB17100060	1000	1267	400	1500
PESB17120060	1200	1440	400	1800



Bends 60° - PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESB1109060	90	178	100	135
PESB1111060	110	195	100	165
PESB1112560	125	258	150	188
PESB1114060	140	275	150	210
PESB1116060	160	288	150	240
PESB1118060	180	301	150	270
PESB1120060	200	323	150	300
PESB1122560	225	345	150	338
PESB1125060	250	466	250	375
PESB1128060	280	492	250	420
PESB1131560	315	576	300	477
PESB1135560	355	608	300	533
PESB1140060	400	646	300	600
PESB1145060	450	689	300	675
PESB1150060	500	783	350	750
PESB1156060	560	835	350	840
PESB1163060	630	896	350	945
PESB1171060	710	965	350	1065
PESB1180060	800	1043	350	1200
PESB1190060	900	-	-	-
PESB11100060	1000	1267	400	1500
PESB11120060	1200	1440	400	1800



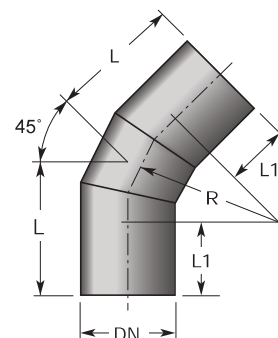
Note:

- Segmented bends are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Segmented Bends (Suitable for Butt Welding only)

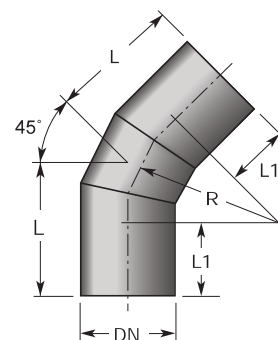
Bends 45° - PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESB1709045	90	156	100	135
PESB1711045	110	168	100	165
PESB1712545	125	227	150	188
PESB1714045	140	237	150	210
PESB1716045	160	249	150	240
PESB1718045	180	261	150	270
PESB1720045	200	274	150	300
PESB1722545	225	290	150	338
PESB1725045	250	412	250	375
PESB1728045	280	474	250	420
PESB1731545	315	498	300	477
PESB1735545	355	520	300	533
PESB1740045	400	548	300	600
PESB1745045	450	580	300	675
PESB1750045	500	665	350	750
PESB1756045	560	698	350	840
PESB1763045	630	741	350	945
PESB1771045	710	791	350	1065
PESB1780045	800	847	350	1200
PESB1790045	900	-	-	-
PESB17100045	1000	1022	400	1500
PESB17120045	1200	1146	400	1800



Bends 45° - PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESB1109045	90	156	100	135
PESB1111045	110	168	100	165
PESB1112545	125	227	150	188
PESB1114045	140	237	150	210
PESB1116045	160	249	150	240
PESB1118045	180	261	150	270
PESB1120045	200	274	150	300
PESB1122545	225	290	150	338
PESB1125045	250	412	250	375
PESB1128045	280	474	250	420
PESB1131545	315	498	300	477
PESB1135545	355	520	300	533
PESB1140045	400	548	300	600
PESB1145045	450	580	300	675
PESB1150045	500	665	350	750
PESB1156045	560	698	350	840
PESB1163045	630	741	350	945
PESB1171045	710	791	350	1065
PESB1180045	800	847	350	1200
PESB1190045	900	-	-	-
PESB11100045	1000	1022	400	1500
PESB11120045	1200	1146	400	1800



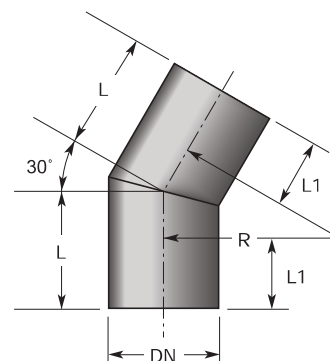
Note:

- Segmented bends are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Segmented Bends (Suitable for Butt Welding only)

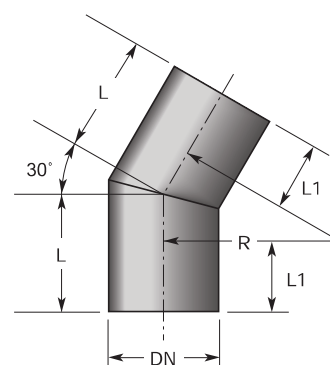
Bends 30° - PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESB1709030	90	135	100	135
PESB1711030	110	143	150	165
PESB1712530	125	199	150	188
PESB1714030	140	205	150	210
PESB1716030	160	213	150	240
PESB1718030	180	220	150	270
PESB1720030	200	230	150	300
PESB1722530	225	241	150	338
PESB1725030	250	350	250	375
PESB1728030	280	362	250	420
PESB1731530	315	428	300	477
PESB1735530	355	443	300	533
PESB1740030	400	461	300	600
PESB1745030	450	481	300	675
PESB1750030	500	551	350	750
PESB1756030	560	575	350	840
PESB1763030	630	603	350	945
PESB1771030	710	631	350	1065
PESB1780030	800	666	350	1200
PESB1790030	900	-	-	-
PESB17100030	1000	795	400	1500
PESB17120030	1200	875	400	1800



Bends 30° - PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) R
PESB1109030	90	135	100	135
PESB1111030	110	143	150	165
PESB1112530	125	199	150	188
PESB1114030	140	205	150	210
PESB1116030	160	213	150	240
PESB1118030	180	220	150	270
PESB1120030	200	230	150	300
PESB1122530	225	241	150	338
PESB1125030	250	350	250	375
PESB1128030	280	362	250	420
PESB1131530	315	428	300	477
PESB1135530	355	443	300	533
PESB1140030	400	461	300	600
PESB1145030	450	481	300	675
PESB1150030	500	551	350	750
PESB1156030	560	575	350	840
PESB1163030	630	603	350	945
PESB1171030	710	631	350	1065
PESB1180030	800	666	350	1200
PESB1190030	900	-	-	-
PESB11100030	1000	795	400	1500
PESB11120030	1200	875	400	1800



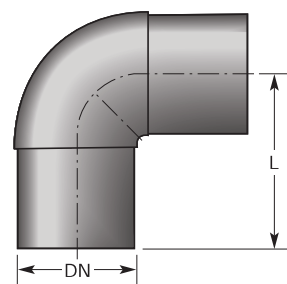
Note:

- Segmented bends are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Long Spigot Short Radius Elbows (Suitable for Electrofusion and Butt Welding)

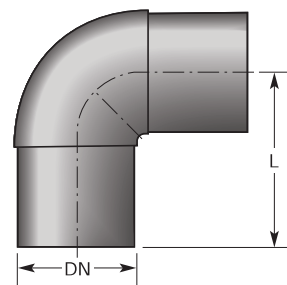
Bends 90° - PE100 SDR17:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
PEE1702090LS	20	75
PEE1702590LS	25	80
PEE1703290LS	32	85
PEE1704090LS	40	95
PEE1705090LS	50	105
PEE1706390LS	63	115
PEE1707590LS	75	130
PEE1709090LS	90	150
PEE1711090LS	110	165
PEE1712590LS	125	180
PEE1714090LS	140	194
PEE1716090LS	160	210
PEE1718090LS	180	232
PEE1720090LS	200	253
PEE1722590LS	225	270
PEE1725090LS	250	292
PEE1728090LS	280	320
PEE1731590LS	315	370



Bends 90° - PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
PEE1102090LS	20	75
PEE1102590LS	25	80
PEE1103290LS	32	85
PEE1104090LS	40	95
PEE1105090LS	50	105
PEE1106390LS	63	115
PEE1107590LS	75	130
PEE1109090LS	90	150
PEE1111090LS	110	165
PEE1112590LS	125	180
PEE1114090LS	140	194
PEE1116090LS	160	210
PEE1118090LS	180	232
PEE1120090LS	200	253
PEE1122590LS	225	270
PEE1125090LS	250	292
PEE1128090LS	280	320
PEE1131590LS	315	370



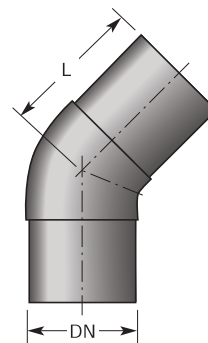
Note:

- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.
- Fittings may be supplied with welded spigots to enable the use of electrofusion couplings.

Long Spigot Short Radius Elbows (Suitable for Electrofusion and Butt Welding)

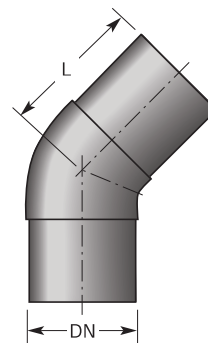
Bends 45° - PE100 SDR17:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
PEE1702045LS	20	70
PEE1702545LS	25	75
PEE1703245LS	32	80
PEE1704045LS	40	85
PEE1705045LS	50	90
PEE1706345LS	63	95
PEE1707545LS	75	105
PEE1709045LS	90	120
PEE1711045LS	110	130
PEE1712545LS	125	140
PEE1714045LS	140	164
PEE1716045LS	160	162
PEE1718045LS	180	170
PEE1720045LS	200	186
PEE1722545LS	225	200
PEE1725045LS	250	220
PEE1728045LS	280	230
PEE1731545LS	315	250



Bends 45° - PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
PEE1102045LS	20	70
PEE1102545LS	25	75
PEE1103245LS	32	80
PEE1104045LS	40	85
PEE1105045LS	50	90
PEE1106345LS	63	95
PEE1107545LS	75	105
PEE1109045LS	90	120
PEE1111045LS	110	130
PEE1112545LS	125	140
PEE1114045LS	140	164
PEE1116045LS	160	162
PEE1118045LS	180	170
PEE1120045LS	200	186
PEE1122545LS	225	200
PEE1125045LS	250	220
PEE1128045LS	280	230
PEE1131545LS	315	250



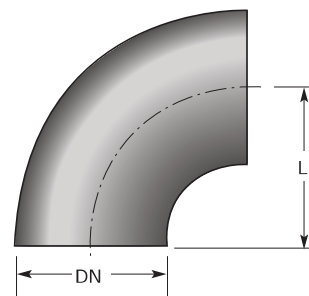
Note:

- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.
- Fittings may be supplied with welded spigots to enable the use of electrofusion couplings.

Short Radius Moulded Elbows (Suitable for Butt Welding only)

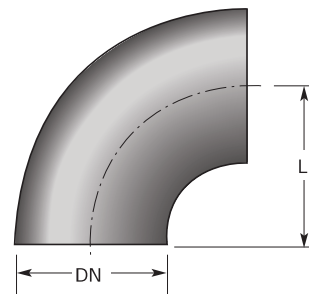
Bends 90° - PE100 SDR17:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
PEE1706390	63	66
PEE1707590	75	100
PEE1709090	90	100
PEE1711090	110	141
PEE1712590	125	140
PEE1714090	140	155
PEE1716090	160	175
PEE1718090	180	195
PEE1720090	200	215
PEE1722590	225	245
PEE1725090	250	256
PEE1728090	280	286
PEE1731590	315	321
PEE1735590	355	380
PEE1740090	400	434
PEE1745090	450	445
PEE1750090	500	450



Bends 90° - PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
PEE1106390	63	66
PEE1107590	75	100
PEE1109090	90	100
PEE1111090	110	141
PEE1112590	125	140
PEE1114090	140	155
PEE1116090	160	175
PEE1118090	180	195
PEE1120090	200	215
PEE1122590	225	245
PEE1125090	250	256
PEE1128090	280	286
PEE1131590	315	321
PEE1135590	355	380
PEE1140090	400	434
PEE1145090	450	445
PEE1150090	500	450



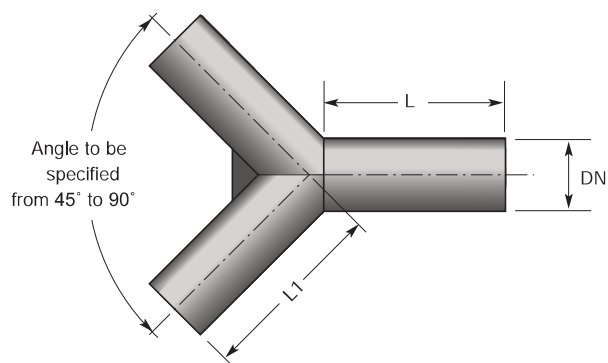
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

CNC Welded "Y" Pieces (Suitable for Electrofusion and Butt Welding)

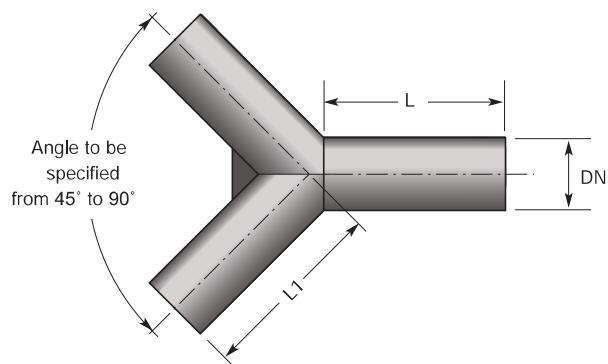
90° - PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
PEY17090LS	90	200	450
PEY17110LS	110	250	450
PEY17125LS	125	250	450
PEY17140LS	140	500	600
PEY17160LS	160	500	600
PEY17180LS	180	500	750
PEY17200LS	200	500	750
PEY17225LS	225	550	750
PEY17250LS	250	650	900
PEY17280LS	280	650	900
PEY17315LS	315	700	1050
PEY17355LS	355	700	1180
PEY17400LS	400	1100	1250
PEY17450LS	450	1100	1300
PEY17500LS	500	1200	1400
PEY17560LS	560	1200	1400
PEY17630LS	630	1200	1440
PEY17710LS	710	1700	1500
PEY17800LS	800	1700	1500
PEY171000LS	1000	1700	1500



90° - PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
PEY11090LS	90	200	450
PEY11110LS	110	250	450
PEY11125LS	125	250	450
PEY11140LS	140	500	600
PEY11160LS	160	500	600
PEY11180LS	180	500	750
PEY11200LS	200	500	750
PEY11225LS	225	550	750
PEY11250LS	250	650	900
PEY11280LS	280	650	900
PEY11315LS	315	700	1050
PEY11355LS	355	700	1180
PEY11400LS	400	1100	1250
PEY11450LS	450	1100	1300
PEY11500LS	500	1200	1400
PEY11560LS	560	1200	1400
PEY11630LS	630	1200	1440
PEY11710LS	710	1700	1500
PEY11800LS	800	1700	1500
PEY111000LS	1000	1700	1500



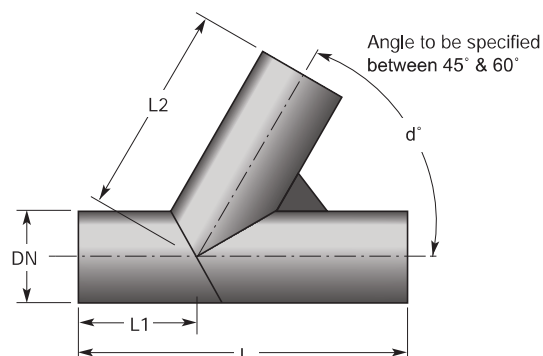
Note:

- These fittings are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

CNC Welded Junctions (Suitable for Electrofusion and Butt Welding)

45° - PE100 SDR17:

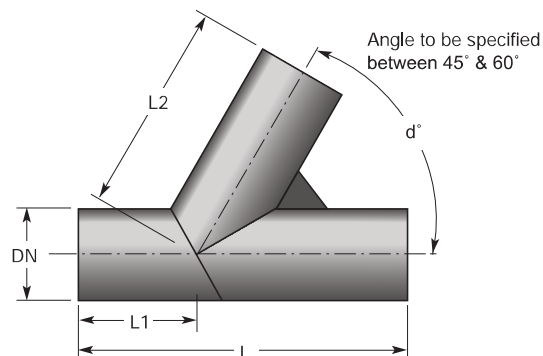
Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) L2
PEYJ1709045LS	90	700	270	430
PEYJ1711045LS	110	700	270	430
PEYJ1712545LS	125	750	300	450
PEYJ1714045LS	140	780	300	480
PEYJ1716045LS	160	850	330	520
PEYJ1718045LS	180	950	360	590
PEYJ1720045LS	200	960	370	590
PEYJ1722545LS	225	1080	420	660
PEYJ1725045LS	250	1150	450	710
PEYJ1728045LS	280	1250	500	750
PEYJ1731545LS	315	1350	530	820
PEYJ1735545LS	355	1450	570	880
PEYJ1740045LS	400	1550	600	950
PEYJ1745045LS	450	1850	650	1200
PEYJ1750045LS	500	2100	700	1400
PEYJ1756045LS	560	2200	800	1400
PEYJ1763045LS	630	2300	800	1500
PEYJ1771045LS	710	2600	900	1700
PEYJ1780045LS	800	2800	1000	1800
PEYJ17100045LS	1000	3400	1200	2200



CNC Welded Junctions (Suitable for Electrofusion and Butt Welding)

45° - PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) L2
PEYJ1109045LS	90	700	270	430
PEYJ1111045LS	110	700	270	430
PEYJ1112545LS	125	750	300	450
PEYJ1114045LS	140	780	300	480
PEYJ1116045LS	160	850	330	520
PEYJ1118045LS	180	950	360	590
PEYJ1120045LS	200	960	370	590
PEYJ1122545LS	225	1080	420	660
PEYJ1125045LS	250	1150	450	710
PEYJ1128045LS	280	1250	500	750
PEYJ1131545LS	315	1350	530	820
PEYJ1135545LS	355	1450	570	880
PEYJ1140045LS	400	1550	600	950
PEYJ1145045LS	450	1850	650	1200
PEYJ1150045LS	500	2100	700	1400
PEYJ1156045LS	560	2200	800	1400
PEYJ1163045LS	630	2300	800	1500
PEYJ1171045LS	710	2600	900	1700
PEYJ1180045LS	800	2800	1000	1800
PEYJ11100045LS	1000	3400	1200	2200



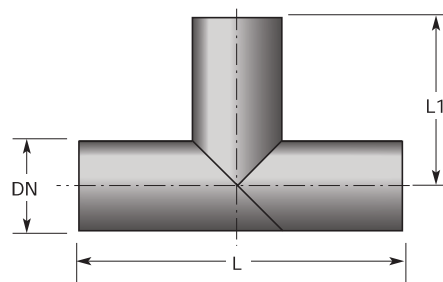
Note:

- These fittings are manufactured from SDR11 pipe and are subjected to pressure de-rating. Please refer to www.pipa.com.au for details.
- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

CNC Tees (Suitable for Electrofusion and Butt Welding)

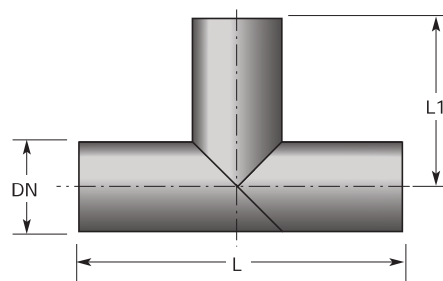
PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
PETF17090LS	90	400	200
PETF17110LS	110	500	250
PETF17125LS	125	500	250
PETF17140LS	140	500	500
PETF17160LS	160	600	500
PETF17180LS	180	620	500
PETF17200LS	200	650	500
PETF17225LS	225	650	550
PETF17250LS	250	700	650
PETF17280LS	280	700	650
PETF17315LS	315	800	700
PETF17355LS	355	800	700
PETF17400LS	400	1000	1100
PETF17450LS	450	1100	1100
PETF17500LS	500	1200	1200
PETF17560LS	560	1200	1200
PETF17630LS	630	1200	1200
PETF17710LS	710	1500	1700
PETF17800LS	800	1600	1700
PETF171000LS	1000	1800	1700



PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
PETF11090LS	90	400	200
PETF11110LS	110	500	250
PETF11125LS	125	500	250
PETF11140LS	140	500	500
PETF11160LS	160	600	500
PETF11180LS	180	620	500
PETF11200LS	200	650	500
PETF11225LS	225	650	550
PETF11250LS	250	700	650
PETF11280LS	280	700	650
PETF11315LS	315	800	700
PETF11355LS	355	800	700
PETF11400LS	400	1000	1100
PETF11450LS	450	1100	1100
PETF11500LS	500	1200	1200
PETF11560LS	560	1200	1200
PETF11630LS	630	1200	1200
PETF11710LS	710	1500	1700
PETF11800LS	800	1600	1700
PETF111000LS	1000	1800	1700



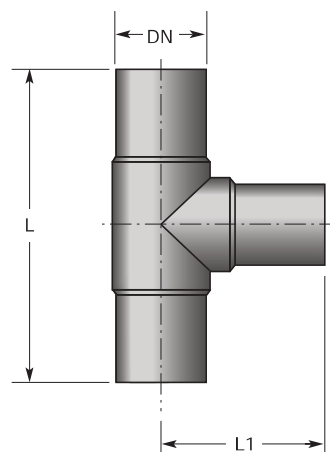
Note:

- These fittings are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Long Spigot Moulded Tees (Suitable for Electrofusion and Butt Welding)

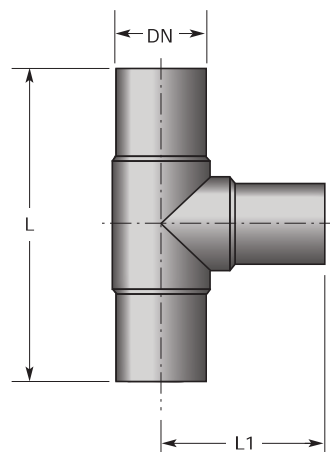
PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
PET17020LS	20	150	75
PET17025LS	25	160	80
PET17032LS	32	170	85
PET17040LS	40	190	95
PET17050LS	50	210	105
PET17063LS	63	230	115
PET17075LS	75	264	132
PET17090LS	90	300	150
PET17110LS	110	330	165
PET17125LS	125	366	183
PET17140LS	140	393	193
PET17160LS	160	420	210
PET17180LS	180	460	230
PET17200LS	200	500	250
PET17225LS	225	540	270
PET17250LS	250	575	288
PET17280LS	280	615	308
PET17315LS	315	695	346
PET17355LS	355	818	410
PET17400LS	400	910	455
PET17450LS	450	970	485
PET17500LS	500	1060	530
PET17560LS	560	1510	755
PET17630LS	630	1630	815
PET17710LS	710	1720	860
PET17800LS	800	1780	890



PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
PET11025LS	25	160	80
PET11032LS	32	170	85
PET11040LS	40	190	95
PET11050LS	50	210	105
PET11063LS	63	230	115
PET11075LS	75	264	132
PET11090LS	90	300	150
PET11110LS	110	330	165
PET11125LS	125	366	183
PET11140LS	140	393	193
PET11160LS	160	420	210
PET11180LS	180	460	230
PET11200LS	200	500	250
PET11225LS	225	540	270
PET11250LS	250	575	288
PET11280LS	280	615	308
PET11315LS	315	695	346
PET11355LS	355	818	410
PET11400LS	400	910	455
PET11450LS	450	970	485
PET11500LS	500	1060	530
PET11560LS	560	1510	755
PET11630LS	630	1630	815
PET11710LS	710	1720	860
PET11800LS	800	1780	890



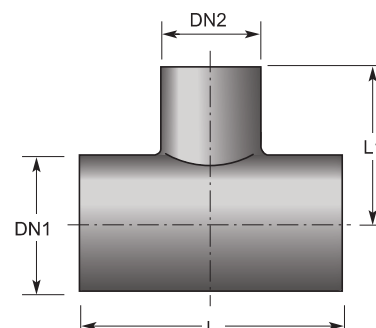
Note:

- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Fittings may be supplied with welded spigots to make suitable for electrofusion.

Fabricated Reducing Tees
(Electrofusion and Butt Welding suitable on branch only, Mainline Butt Weld only)

PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L	Dim. (mm) L1
PETFR17200090	200	90	600	550
PETFR17200110	200	110	600	550
PETFR17225090	225	90	600	550
PETFR17225110	225	110	600	550
PETFR17250090	250	90	600	650
PETFR17250110	250	110	600	650
PETFR17250160	250	160	600	650
PETFR17280090	280	90	600	650
PETFR17280110	280	110	600	650
PETFR17280160	280	160	600	650
PETFR17280200	280	200	600	650
PETFR17315090	315	90	600	700
PETFR17315110	315	110	600	700
PETFR17315160	315	160	650	700
PETFR17315200	315	200	650	700
PETFR17355090	355	90	650	700
PETFR17355110	355	110	650	700
PETFR17355160	355	160	650	700
PETFR17355200	355	200	700	700
PETFR17355225	355	225	700	700
PETFR17355250	355	250	700	700
PETFR17400090	400	90	800	750
PETFR17400110	400	110	800	750
PETFR17400160	400	160	800	750
PETFR17400200	400	200	900	750
PETFR17400225	400	225	900	750
PETFR17400250	400	250	900	750
PETFR17400280	400	280	900	750
PETFR17450090	450	90	900	750
PETFR17450110	450	110	900	750
PETFR17450160	450	160	900	750
PETFR17450200	450	200	1000	750
PETFR17450225	450	225	1000	750
PETFR17450250	450	250	1000	800
PETFR17450280	450	280	1000	800
PETFR17450315	450	315	1000	800
PETFR17500160	500	160	1000	800
PETFR17500200	500	200	1000	800
PETFR17500225	500	225	1000	800
PETFR17500250	500	250	1000	900
PETFR17500280	500	280	1000	900
PETFR17500315	500	315	1000	900
PETFR17500355	500	355	1000	900
PETFR17560200	560	200	1000	900
PETFR17560225	560	225	1000	900
PETFR17560250	560	250	1000	900
PETFR17560280	560	280	1000	1200
PETFR17560315	560	315	1000	1200
PETFR17560355	560	355	1000	1200
PETFR17630160	630	160	1000	1200
PETFR17630200	630	200	1000	1200
PETFR17630225	630	225	1000	1200
PETFR17630250	630	250	1000	1200
PETFR17630280	630	280	1000	1200
PETFR17630315	630	315	1100	1200
PETFR17630355	630	355	1100	1200
PETFR17630400	630	400	1200	1200
PETFR17630450	630	450	1200	1200



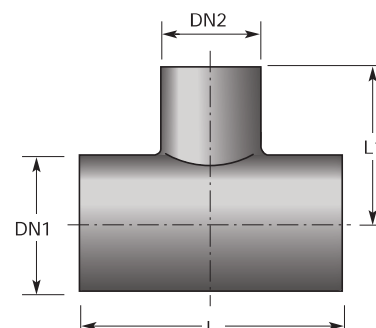
Note:

- Sizes from DN1200mm to 2000mm are made to order. Please contact Iplex Pipelines.
- These fittings are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- EF coupling (EG07) required for electrofusion for branch only if required.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Main branches can be manufactured to suit electrofusion at a higher cost and with different dimensions.

Fabricated Reducing Tees
(Electrofusion and Butt Welding suitable on branch only, Mainline Butt Weld only) Continued...

PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L	Dim. (mm) L1
PETFR17710200	710	200	1100	1200
PETFR17710225	710	225	1100	1200
PETFR17710250	710	250	1100	1200
PETFR17710280	710	280	1200	1200
PETFR17710315	710	315	1200	1200
PETFR17710355	710	355	1200	1200
PETFR17710400	710	400	1300	1500
PETFR17710450	710	450	1300	1500
PETFR17710500	710	500	1300	1500
PETFR17800200	800	200	1100	1200
PETFR17800225	800	225	1100	1200
PETFR17800250	800	250	1200	1200
PETFR17800280	800	280	1200	1200
PETFR17800315	800	315	1200	1200
PETFR17800355	800	355	1300	1200
PETFR17800400	800	400	1300	1600
PETFR17800450	800	450	1400	1600
PETFR17800500	800	500	1400	1600
PETFR17800560	800	560	1500	1600
PETFR17800630	800	630	1500	1600
PETFR171000200	1000	200	1400	1200
PETFR171000225	1000	225	1400	1200
PETFR171000250	1000	250	1400	1200
PETFR171000280	1000	280	1400	1200
PETFR171000315	1000	315	1500	1200
PETFR171000355	1000	355	1500	1200
PETFR171000400	1000	400	1500	1700
PETFR171000450	1000	450	1600	1700
PETFR171000500	1000	500	1600	1700
PETFR171000560	1000	560	1700	1700
PETFR171000630	1000	630	1700	1700
PETFR171200250	1200	250	1500	1300
PETFR171200280	1200	280	1500	1300
PETFR171200315	1200	315	1600	1300
PETFR171200355	1200	355	1600	1300
PETFR171200400	1200	400	1700	1800
PETFR171200450	1200	450	1700	1800
PETFR171200500	1200	500	1800	1800
PETFR171200560	1200	560	1800	1800
PETFR171200630	1200	630	1800	1800



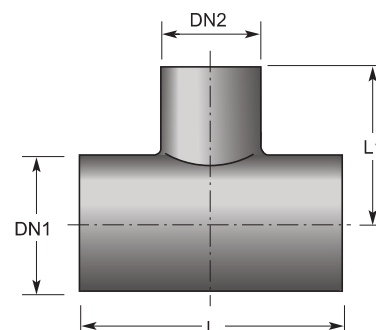
Note:

- Sizes from DN1200mm to 2000mm are made to order. Please contact Iplex Pipelines.
- These fittings are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- EF coupling (EG07) required for electrofusion for branch only if required.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Main branches can be manufactured to suit electrofusion at a higher cost and with different dimensions.

Fabricated Reducing Tees
(Electrofusion and Butt Welding suitable on branch only, Mainline Butt Weld only)

PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L	Dim. (mm) L1
PETFR11200090	200	90	600	550
PETFR11200110	200	110	600	550
PETFR11225090	225	90	600	550
PETFR11225110	225	110	600	550
PETFR11250090	250	90	600	650
PETFR11250110	250	110	600	650
PETFR11250160	250	160	600	650
PETFR11280090	280	90	600	650
PETFR11280110	280	110	600	650
PETFR11280160	280	160	600	650
PETFR11280200	280	200	600	650
PETFR11315090	315	90	600	700
PETFR11315110	315	110	600	700
PETFR11315160	315	160	650	700
PETFR11315200	315	200	650	700
PETFR11355090	355	90	650	700
PETFR11355110	355	110	650	700
PETFR11355160	355	160	650	700
PETFR11355200	355	200	700	700
PETFR11355225	355	225	700	700
PETFR11355250	355	250	700	700
PETFR11400090	400	90	800	750
PETFR11400110	400	110	800	750
PETFR11400160	400	160	800	750
PETFR11400200	400	200	900	750
PETFR11400225	400	225	900	750
PETFR11400250	400	250	900	750
PETFR11400280	400	280	900	750
PETFR11450090	450	90	900	750
PETFR11450110	450	110	900	750
PETFR11450160	450	160	900	750
PETFR11450200	450	200	1000	750
PETFR11450225	450	225	1000	750
PETFR11450250	450	250	1000	800
PETFR11450280	450	280	1000	800
PETFR11450315	450	315	1000	800
PETFR11500160	500	160	1000	800
PETFR11500200	500	200	1000	800
PETFR11500225	500	225	1000	800
PETFR11500250	500	250	1000	900
PETFR11500280	500	280	1000	900
PETFR11500315	500	315	1000	900
PETFR11500355	500	355	1000	900
PETFR11560200	560	200	1000	900
PETFR11560225	560	225	1000	900
PETFR11560250	560	250	1000	900
PETFR11560280	560	280	1000	1200
PETFR11560315	560	315	1000	1200
PETFR11560355	560	355	1000	1200
PETFR11630160	630	160	1000	1200
PETFR11630200	630	200	1000	1200
PETFR11630225	630	225	1000	1200
PETFR11630250	630	250	1000	1200
PETFR11630280	630	280	1000	1200
PETFR11630315	630	315	1100	1200
PETFR11630355	630	355	1100	1200
PETFR11630400	630	400	1200	1200
PETFR11630450	630	450	1200	1200



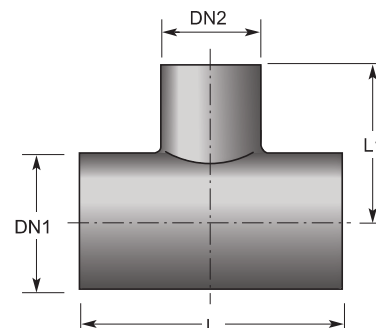
Note:

- Sizes from DN1200mm to 2000mm are made to order. Please contact Iplex Pipelines.
- These fittings are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- EF coupling (EG07) required for electrofusion for branch only if required.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Main branches can be manufactured to suit electrofusion at a higher cost and with different dimensions.

Fabricated Reducing Tees
(Electrofusion and Butt Welding suitable on branch only, Mainline Butt Weld only) Continued...

PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L	Dim. (mm) L1
PETFR11710200	710	200	1100	1200
PETFR11710225	710	225	1100	1200
PETFR11710250	710	250	1100	1200
PETFR11710280	710	280	1200	1200
PETFR11710315	710	315	1200	1200
PETFR11710355	710	355	1200	1200
PETFR11710400	710	400	1300	1500
PETFR11710450	710	450	1300	1500
PETFR11710500	710	500	1300	1500
PETFR11800200	800	200	1100	1200
PETFR11800225	800	225	1100	1200
PETFR11800250	800	250	1200	1200
PETFR11800280	800	280	1200	1200
PETFR11800315	800	315	1200	1200
PETFR11800355	800	355	1300	1200
PETFR11800400	800	400	1300	1600
PETFR11800450	800	450	1400	1600
PETFR11800500	800	500	1400	1600
PETFR11800560	800	560	1500	1600
PETFR11800630	800	630	1500	1600
PETFR111000200	1000	200	1400	1200
PETFR111000225	1000	225	1400	1200
PETFR111000250	1000	250	1400	1200
PETFR111000280	1000	280	1400	1200
PETFR111000315	1000	315	1500	1200
PETFR111000355	1000	355	1500	1200
PETFR111000400	1000	400	1500	1700
PETFR111000450	1000	450	1600	1700
PETFR111000500	1000	500	1600	1700
PETFR111000560	1000	560	1700	1700
PETFR111000630	1000	630	1700	1700
PETFR111200250	1200	250	1500	1300
PETFR111200280	1200	280	1500	1300
PETFR111200315	1200	315	1600	1300
PETFR111200355	1200	355	1600	1300
PETFR111200400	1200	400	1700	1800
PETFR111200450	1200	450	1700	1800
PETFR111200500	1200	500	1800	1800
PETFR111200560	1200	560	1800	1800
PETFR111200630	1200	630	1800	1800



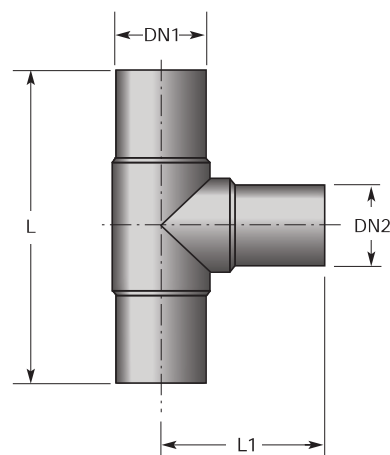
Note:

- Sizes from DN1200mm to 2000mm are made to order. Please contact Iplex Pipelines.
- These fittings are subject to pressure de-rating. Please refer to www.pipa.com.au for details.
- EF coupling (EG07) required for electrofusion for branch only if required.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Main branches can be manufactured to suit electrofusion at a higher cost and with different dimensions.

Long Spigot Reduced Moulded Tees (Suitable for Electrofusion and Butt Welding)

PE100 SDR17:

Iplex code	Typical dimensions			
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L	Dim. (mm) L1
PETR17063050LS	63	50	215	103
PETR17075032LS	75	32	256	108
PETR17075050LS	75	50	253	113
PETR17075063LS	75	63	255	117
PETR17090050LS	90	50	280	117
PETR17090063LS	90	63	280	123
PETR17090075LS	90	75	272	138
PETR17110063LS	110	63	320	147
PETR17110075LS	110	75	309	151
PETR17110090LS	110	90	320	158
PETR17125090LS	125	90	340	170
PETR17125110LS	125	110	341	170
PETR17160063LS	160	63	343	176
PETR17160075LS	160	75	343	180
PETR17160090LS	160	90	412	188
PETR17160110LS	160	110	412	195
PETR17180090LS	180	90	420	200
PETR17180110LS	180	110	430	206
PETR17180160LS	180	160	411	205
PETR17200063LS	200	63	500	190
PETR17200090LS	200	90	500	207
PETR17200110LS	200	110	500	215
PETR17200160LS	200	160	500	234
PETR17225075LS	225	75	555	215
PETR17225090LS	225	90	558	226
PETR17225110LS	225	110	558	235
PETR17225160LS	225	160	560	253
PETR17225180LS	225	180	560	280
PETR17250110LS	250	110	575	242
PETR17250160LS	250	160	575	261
PETR17315110LS	315	110	695	277
PETR17315160LS	315	160	695	296
PETR17315225LS	315	225	650	335
PETR17315250LS	315	250	695	325



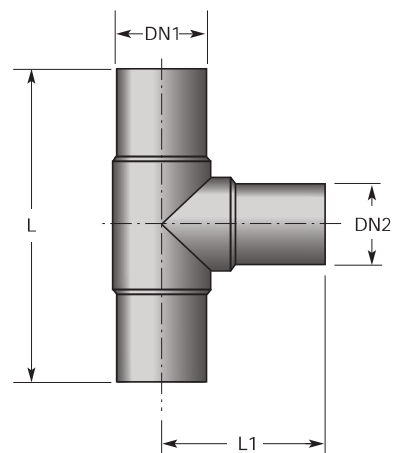
Note:

- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Long Spigot Reduced Moulded Tees (Suitable for Electrofusion and Butt Welding)

PE100 SDR11:

Iplex code	Typical dimensions			
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L	Dim. (mm) L1
PETR11063050LS	63	50	215	103
PETR11075032LS	75	32	256	108
PETR11075050LS	75	50	253	113
PETR11075063LS	75	63	255	117
PETR11090050LS	90	50	280	117
PETR11090063LS	90	63	280	123
PETR11090075LS	90	75	272	138
PETR11110063LS	110	63	320	147
PETR11110075LS	110	75	309	151
PETR11110090LS	110	90	320	158
PETR11125090LS	125	90	340	170
PETR11125110LS	125	110	341	170
PETR11160063LS	160	63	343	176
PETR11160075LS	160	75	343	180
PETR11160090LS	160	90	412	188
PETR11160110LS	160	110	412	195
PETR11180090LS	180	90	420	200
PETR11180110LS	180	110	430	206
PETR11180160LS	180	160	411	205
PETR11200063LS	200	63	500	190
PETR11200090LS	200	90	500	207
PETR11200110LS	200	110	500	215
PETR11200160LS	200	160	500	234
PETR11225075LS	225	75	555	215
PETR11225090LS	225	90	558	226
PETR11225110LS	225	110	558	235
PETR11225160LS	225	160	560	253
PETR11225180LS	225	180	560	280
PETR11250110LS	250	110	575	242
PETR11250160LS	250	160	575	261
PETR11315110LS	315	110	695	277
PETR11315160LS	315	160	695	296
PETR11315225LS	315	225	650	335
PETR11315250LS	315	250	695	325



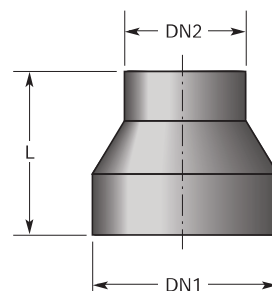
Note:

- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Concentric Reducers (Suitable for Butt Welding only)

PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER17050032	50	32	50
PER17050040	50	40	50
PER17063032	63	32	60
PER17063040	63	40	60
PER17063050	63	50	60
PER17075032	75	40	70
PER17075040	75	50	70
PER17075050	75	63	85
PER17075063	90	40	100
PER17090050	90	50	75
PER17090063	90	63	75
PER17090075	90	75	75
PER17110050	110	50	90
PER17110063	110	63	105
PER17110075	110	75	95
PER17110090	110	90	100
PER17125063	125	63	120
PER17125075	125	75	100
PER17125090	125	90	110
PER17125110	125	110	102
PER17140075	140	75	110
PER17140090	140	90	110
PER17140110	140	110	110
PER17140125	140	125	110
PER17160090	160	90	140
PER17160110	160	110	128
PER17160125	160	125	122
PER17160140	160	140	120
PER17180090	180	90	143
PER17180110	180	110	130
PER17180125	180	125	143
PER17180140	180	140	130
PER17180160	180	160	130
PER17200090	200	90	120
PER17200110	200	110	120
PER17200125	200	125	120
PER17200140	200	140	120
PER17200160	200	160	120
PER17200180	200	180	120
PER17225090	225	90	120
PER17225110	225	110	120
PER17225125	225	125	120
PER17225140	225	140	115
PER17225160	225	160	115
PER17225180	225	180	115
PER17225200	225	200	115
PER17250090	250	90	120
PER17250110	250	110	120
PER17250125	250	125	120
PER17250140	250	140	115
PER17250160	250	160	115
PER17250180	250	180	115
PER17250200	250	200	115
PER17250225	250	225	115
PER17280090	280	90	120
PER17280110	280	110	120
PER17280125	280	125	120
PER17280140	280	140	115
PER17280160	280	160	115



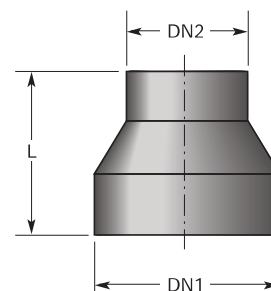
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Concentric Reducers (Suitable for Butt Welding only) Continued...

PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER17280180	280	180	115
PER17280200	280	200	115
PER17280225	280	225	115
PER17280250	280	250	115
PER17315090	315	90	120
PER17315110	315	110	120
PER17315125	315	125	120
PER17315140	315	140	120
PER17315160	315	160	120
PER17315180	315	180	120
PER17315200	315	200	120
PER17315225	315	225	120
PER17315250	315	250	120
PER17315280	315	280	120
PER17355090	355	90	120
PER17355110	355	110	120
PER17355125	355	125	120
PER17355140	355	140	120
PER17355160	355	160	120
PER17355180	355	180	120
PER17355200	355	200	120
PER17355225	355	225	120
PER17355250	355	250	120
PER17355280	355	280	120
PER17355315	355	315	120
PER17400160	400	160	125
PER17400180	400	180	125
PER17400225	400	225	125
PER17400250	400	250	125
PER17400280	400	280	125
PER17400315	400	315	125
PER17400355	400	355	125
PER17450160	450	160	125
PER17450180	450	180	125
PER17450200	450	200	125
PER17450225	450	225	125
PER17450250	450	250	125
PER17450280	450	280	125
PER17450315	450	315	125
PER17450355	450	355	125
PER17450400	450	400	125
PER17500200	500	200	125
PER17500225	500	225	125
PER17500250	500	250	125
PER17500280	500	280	125
PER17500315	500	315	125
PER17500355	500	355	125
PER17500400	500	400	125
PER17500450	500	450	125
PER17560250	560	250	125
PER17560280	560	280	125
PER17560315	560	315	125
PER17560355	560	355	125
PER17560400	560	400	125
PER17560450	560	450	125
PER17560500	560	500	125
PER17630250	630	250	125
PER17630280	630	280	125
PER17630315	630	315	125



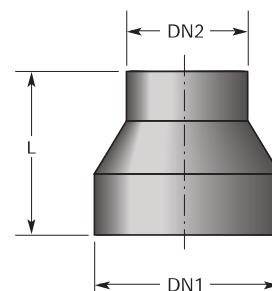
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Concentric Reducers (Suitable for Butt Welding only) Continued...

PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER17630355	630	355	125
PER17630400	630	400	125
PER17630450	630	450	125
PER17630500	630	500	125
PER17630560	630	560	125
PER17710355	710	355	125
PER17710400	710	400	125
PER17710450	710	450	125
PER17710500	710	500	125
PER17710560	710	560	125
PER17710630	710	630	125
PER17800400	800	400	125
PER17800450	800	450	125
PER17800500	800	500	125
PER17800560	800	560	125
PER17800630	800	630	125
PER17800710	800	710	125
PER171000500	1000	500	125
PER171000560	1000	560	125
PER171000630	1000	630	125
PER171000710	1000	710	125
PER171000800	1000	800	125
PER171000900	1000	900	125
PER171200630	1200	630	130
PER171200710	1200	710	130
PER171200800	1200	800	130
PER171200900	1200	900	130
PER1712001000	1200	1000	130



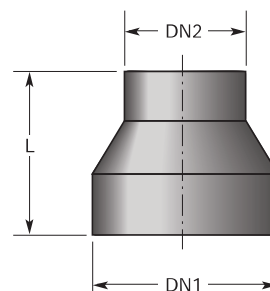
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Concentric Reducers (Suitable for Butt Welding only)

PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER11050032	50	32	50
PER11050040	50	40	50
PER11063032	63	32	60
PER11063040	63	40	60
PER11063050	63	50	60
PER11075032	75	40	70
PER11075040	75	50	70
PER11075050	75	63	85
PER11075063	90	40	100
PER11090050	90	50	75
PER11090063	90	63	75
PER11090075	90	75	75
PER11110050	110	50	90
PER11110063	110	63	105
PER11110075	110	75	95
PER11110090	110	90	100
PER11125063	125	63	120
PER11125075	125	75	100
PER11125090	125	90	110
PER11125110	125	110	102
PER11140075	140	75	110
PER11140090	140	90	110
PER11140110	140	110	110
PER11140125	140	125	110
PER11160090	160	90	140
PER11160110	160	110	128
PER11160125	160	125	122
PER11160140	160	140	120
PER11180090	180	90	143
PER11180110	180	110	130
PER11180125	180	125	143
PER11180140	180	140	130
PER11180160	180	160	130
PER11200090	200	90	120
PER11200110	200	110	120
PER11200125	200	125	120
PER11200140	200	140	120
PER11200160	200	160	120
PER11200180	200	180	120
PER11225090	225	90	120
PER11225110	225	110	120
PER11225125	225	125	120
PER11225140	225	140	115
PER11225160	225	160	115
PER11225180	225	180	115
PER11225200	225	200	115
PER11250090	250	90	120
PER11250110	250	110	120
PER11250125	250	125	120
PER11250140	250	140	115
PER11250160	250	160	115
PER11250180	250	180	115
PER11250200	250	200	115
PER11250225	250	225	115
PER11280090	280	90	120
PER11280110	280	110	120
PER11280125	280	125	120
PER11280140	280	140	115
PER11280160	280	160	115



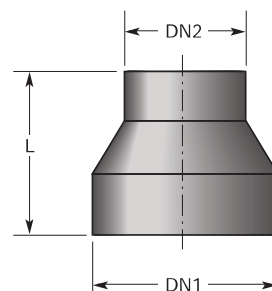
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Concentric Reducers (Suitable for Butt Welding only) Continued...

PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER11280180	280	180	115
PER11280200	280	200	115
PER11280225	280	225	115
PER11280250	280	250	115
PER11315090	315	90	120
PER11315110	315	110	120
PER11315125	315	125	120
PER11315140	315	140	120
PER11315160	315	160	120
PER11315180	315	180	120
PER11315200	315	200	120
PER11315225	315	225	120
PER11315250	315	250	120
PER11315280	315	280	120
PER11355090	355	90	120
PER11355110	355	110	120
PER11355125	355	125	120
PER11355140	355	140	120
PER11355160	355	160	120
PER11355180	355	180	120
PER11355200	355	200	120
PER11355225	355	225	120
PER11355250	355	250	120
PER11355280	355	280	120
PER11355315	355	315	120
PER11400160	400	160	125
PER11400180	400	180	125
PER11400225	400	225	125
PER11400250	400	250	125
PER11400280	400	280	125
PER11400315	400	315	125
PER11400355	400	355	125
PER11450160	450	160	125
PER11450180	450	180	125
PER11450200	450	200	125
PER11450225	450	225	125
PER11450250	450	250	125
PER11450280	450	280	125
PER11450315	450	315	125
PER11450355	450	355	125
PER11450400	450	400	125
PER11500200	500	200	125
PER11500225	500	225	125
PER11500250	500	250	125
PER11500280	500	280	125
PER11500315	500	315	125
PER11500355	500	355	125
PER11500400	500	400	125
PER11500450	500	450	125
PER11560250	560	250	125
PER11560280	560	280	125
PER11560315	560	315	125
PER11560355	560	355	125
PER11560400	560	400	125
PER11560450	560	450	125
PER11560500	560	500	125
PER11630250	630	250	125
PER11630280	630	280	125
PER11630315	630	315	125



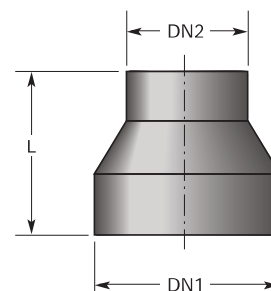
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Concentric Reducers (Suitable for Butt Welding only) Continued...

PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER11630355	630	355	125
PER11630400	630	400	125
PER11630450	630	450	125
PER11630500	630	500	125
PER11630560	630	560	125
PER11710355	710	355	125
PER11710400	710	400	125
PER11710450	710	450	125
PER11710500	710	500	125
PER11710560	710	560	125
PER11710630	710	630	125
PER11800400	800	400	125
PER11800450	800	450	125
PER11800500	800	500	125
PER11800560	800	560	125
PER11800630	800	630	125
PER11800710	800	710	125
PER111000500	1000	500	125
PER111000560	1000	560	125
PER111000630	1000	630	125
PER111000710	1000	710	125
PER111000800	1000	800	125
PER111000900	1000	900	125
PER111200630	1200	630	130
PER111200710	1200	710	130
PER111200800	1200	800	130
PER111200900	1200	900	130
PER1112001000	1200	1000	130



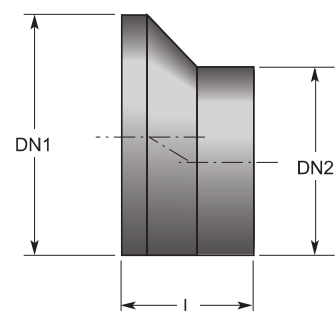
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Eccentric Reducers (Suitable for Butt Welding only)

PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PEER17050025	50	25	100
PEER17050032	50	32	100
PEER17050040	50	40	100
PEER17063032	63	32	100
PEER17063040	63	40	100
PEER17063050	63	50	100
PEER17075040	75	40	100
PEER17075050	75	50	100
PEER17075063	75	63	100
PEER17090040	90	40	100
PEER17090050	90	50	100
PEER17090063	90	63	100
PEER17090075	90	75	100
PEER17110050	110	50	100
PEER17110063	110	63	100
PEER17110075	110	75	100
PEER17110090	110	90	100
PEER17125050	125	50	100
PEER17125063	125	63	100
PEER17125075	125	75	100
PEER17125090	125	90	100
PEER17125110	125	110	100
PEER17140050	140	50	100
PEER17140063	140	63	100
PEER17140075	140	75	100
PEER17140090	140	90	100
PEER17140110	140	110	100
PEER17140125	140	125	100
PEER17160050	160	50	110
PEER17160063	160	63	110
PEER17160075	160	75	110
PEER17160090	160	90	110
PEER17160110	160	110	110
PEER17160125	160	125	110
PEER17160140	160	140	110
PEER17180090	180	90	110
PEER17180110	180	110	110
PEER17180125	180	125	110
PEER17180140	180	140	110
PEER17180160	180	160	110
PEER17200050	200	50	115
PEER17200063	200	63	115
PEER17200075	200	75	115
PEER17200090	200	90	115
PEER17200110	200	110	115
PEER17200125	200	125	115
PEER17200140	200	140	115
PEER17200160	200	160	115
PEER17200180	200	180	115
PEER17225090	225	90	115
PEER17225110	225	110	115
PEER17225125	225	125	115
PEER17225140	225	140	115
PEER17225160	225	160	115
PEER17225180	225	180	115
PEER17225200	225	200	115



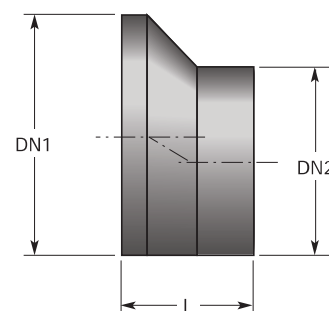
Note:

- These fittings require specialist welding techniques.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Fittings can be supplied spigotted for electrofusion upon request.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Eccentric Reducers (Suitable for Butt Welding only) Continued...

PE100 SDR17:

Iplex Code	Typical Dimensions		
	Nominal Diameter DN1 (mm)	Nominal Diameter DN2 (mm)	Dim. (mm) L
PEER17250090	250	90	115
PEER17250110	250	110	115
PEER17250125	250	125	120
PEER17250140	250	140	120
PEER17250160	250	160	120
PEER17250180	250	180	120
PEER17250200	250	200	120
PEER17250225	250	225	120
PEER17280090	280	90	120
PEER17280110	280	110	120
PEER17280125	280	125	120
PEER17280140	280	140	120
PEER17280160	280	160	120
PEER17280180	280	180	120
PEER17280200	280	200	120
PEER17280225	280	225	120
PEER17280250	280	250	120
PEER17315090	315	90	120
PEER17315110	315	110	120
PEER17315125	315	125	120
PEER17315140	315	140	120
PEER17315160	315	160	120
PEER17315180	315	180	120
PEER17315200	315	200	120
PEER17315225	315	225	120
PEER17315250	315	250	120
PEER17315280	315	280	120
PEER17355090	355	90	125
PEER17355110	355	110	125
PEER17355125	355	125	125
PEER17355140	355	140	125
PEER17355160	355	160	125
PEER17355180	355	180	125
PEER17355200	355	200	125
PEER17355225	355	225	125
PEER17355250	355	250	125
PEER17355280	355	280	125
PEER17355315	355	315	125
PEER17400090	400	90	130
PEER17400110	400	110	130
PEER17400125	400	125	130
PEER17400140	400	140	130
PEER17400160	400	160	130
PEER17400180	400	180	130
PEER17400200	400	200	130
PEER17400225	400	225	130
PEER17400250	400	250	130
PEER17400280	400	280	130
PEER17400315	400	315	130
PEER17400355	400	355	130
PEER17450200	450	200	135
PEER17450225	450	225	135
PEER17450250	450	250	135
PEER17450280	450	280	135
PEER17450315	450	315	135
PEER17450355	450	355	135



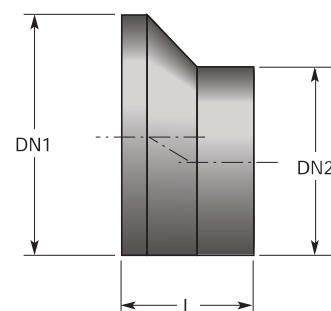
Note:

- These fittings require specialist welding techniques.
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- Fittings can be supplied spigotted for electrofusion upon request.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Eccentric Reducers (Suitable for Butt Welding only) Continued...

PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PEER17500250	500	250	145
PEER17500280	500	280	145
PEER17500315	500	315	145
PEER17500355	500	355	145
PEER17500400	500	400	145
PEER17500450	500	450	145
PEER17560250	560	250	145
PEER17560280	560	280	145
PEER17560315	560	315	145
PEER17560355	560	355	145
PEER17560400	560	400	145
PEER17560450	560	450	145
PEER17560500	560	500	145
PEER17630250	630	250	145
PEER17630280	630	280	145
PEER17630315	630	315	145
PEER17630355	630	355	145
PEER17630400	630	400	145
PEER17630450	630	450	145
PEER17630500	630	500	145
PEER17630560	630	560	145
PEER17710355	710	355	145
PEER17710400	710	400	145
PEER17710450	710	450	145
PEER17710500	710	500	145
PEER17710560	710	560	145
PEER17710630	710	630	145
PEER17800400	800	400	145
PEER17800450	800	450	145
PEER17800500	800	500	145
PEER17800560	800	560	145
PEER17800630	800	630	145
PEER17800710	800	710	145
PEER171000500	1000	500	145
PEER171000560	1000	560	145
PEER171000630	1000	630	145
PEER171000710	1000	710	145
PEER171000800	1000	800	145
PEER171000900	1000	900	145
PEER171200630	1200	630	150
PEER171200710	1200	710	150
PEER171200800	1200	800	150
PEER171200900	1200	900	150
PEER1712001000	1200	1000	150



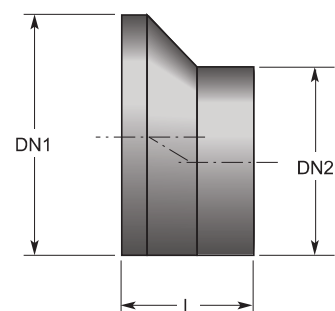
Note:

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Eccentric Reducers (Suitable for Butt Welding only)

PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PEER11050025	50	25	100
PEER11050032	50	32	100
PEER11050040	50	40	100
PEER11063032	63	32	100
PEER11063040	63	40	100
PEER11063050	63	50	100
PEER11075040	75	40	100
PEER11075050	75	50	100
PEER11075063	75	63	100
PEER11090040	90	40	100
PEER11090050	90	50	100
PEER11090063	90	63	100
PEER11090075	90	75	100
PEER11110050	110	50	100
PEER11110063	110	63	100
PEER11110075	110	75	100
PEER11110090	110	90	100
PEER11125050	125	50	100
PEER11125063	125	63	100
PEER11125075	125	75	100
PEER11125090	125	90	100
PEER11125110	125	110	100
PEER11140050	140	50	100
PEER11140063	140	63	100
PEER11140075	140	75	100
PEER11140090	140	90	100
PEER11140110	140	110	100
PEER11140125	140	125	100
PEER11160050	160	50	110
PEER11160063	160	63	110
PEER11160075	160	75	110
PEER11160090	160	90	110
PEER11160110	160	110	110
PEER11160125	160	125	110
PEER11160140	160	140	110
PEER11180090	180	90	110
PEER11180110	180	110	110
PEER11180125	180	125	110
PEER11180140	180	140	110
PEER11180160	180	160	110
PEER11200050	200	50	115
PEER11200063	200	63	115
PEER11200075	200	75	115
PEER11200090	200	90	115
PEER11200110	200	110	115
PEER11200125	200	125	115
PEER11200140	200	140	115
PEER11200160	200	160	115
PEER11200180	200	180	115
PEER11225090	225	90	115
PEER11225110	225	110	115
PEER11225125	225	125	115
PEER11225140	225	140	115
PEER11225160	225	160	115
PEER11225180	225	180	115
PEER11225200	225	200	115



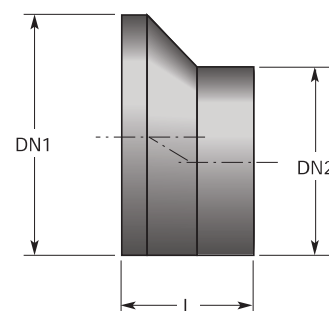
Note:

- These fittings require specialist welding techniques.
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- Fittings can be supplied spigotted for electrofusion upon request.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Eccentric Reducers (Suitable for Butt Welding only) Continued...

PE100 SDR11:

Iplex Code	Typical Dimensions		
	Nominal Diameter DN1 (mm)	Nominal Diameter DN2 (mm)	Dim. (mm) L
PEER11250090	250	90	115
PEER11250110	250	110	115
PEER11250125	250	125	120
PEER11250140	250	140	120
PEER11250160	250	160	120
PEER11250180	250	180	120
PEER11250200	250	200	120
PEER11250225	250	225	120
PEER11280090	280	90	120
PEER11280110	280	110	120
PEER11280125	280	125	120
PEER11280140	280	140	120
PEER11280160	280	160	120
PEER11280180	280	180	120
PEER11280200	280	200	120
PEER11280225	280	225	120
PEER11280250	280	250	120
PEER11315090	315	90	120
PEER11315110	315	110	120
PEER11315125	315	125	120
PEER11315140	315	140	120
PEER11315160	315	160	120
PEER11315180	315	180	120
PEER11315200	315	200	120
PEER11315225	315	225	120
PEER11315250	315	250	120
PEER11315280	315	280	120
PEER11355090	355	90	125
PEER11355110	355	110	125
PEER11355125	355	125	125
PEER11355140	355	140	125
PEER11355160	355	160	125
PEER11355180	355	180	125
PEER11355200	355	200	125
PEER11355225	355	225	125
PEER11355250	355	250	125
PEER11355280	355	280	125
PEER11355315	355	315	125
PEER11400090	400	90	130
PEER11400110	400	110	130
PEER11400125	400	125	130
PEER11400140	400	140	130
PEER11400160	400	160	130
PEER11400180	400	180	130
PEER11400200	400	200	130
PEER11400225	400	225	130
PEER11400250	400	250	130
PEER11400280	400	280	130
PEER11400315	400	315	130
PEER11400355	400	355	130
PEER11450200	450	200	135
PEER11450225	450	225	135
PEER11450250	450	250	135
PEER11450280	450	280	135
PEER11450315	450	315	135
PEER11450355	450	355	135



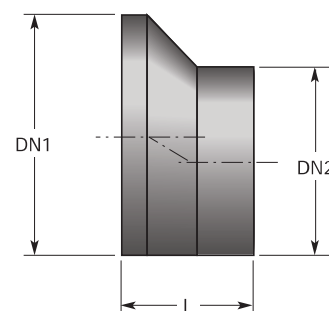
Note:

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- Fittings can be supplied spigotted for electrofusion upon request.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Eccentric Reducers (Suitable for Butt Welding only) Continued...

PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PEER11500250	500	250	145
PEER11500280	500	280	145
PEER11500315	500	315	145
PEER11500355	500	355	145
PEER11500400	500	400	145
PEER11500450	500	450	145
PEER11560250	560	250	145
PEER11560280	560	280	145
PEER11560315	560	315	145
PEER11560355	560	355	145
PEER11560400	560	400	145
PEER11560450	560	450	145
PEER11560500	560	500	145
PEER11630250	630	250	145
PEER11630280	630	280	145
PEER11630315	630	315	145
PEER11630355	630	355	145
PEER11630400	630	400	145
PEER11630450	630	450	145
PEER11630500	630	500	145
PEER11630560	630	560	145
PEER11710355	710	355	145
PEER11710400	710	400	145
PEER11710450	710	450	145
PEER11710500	710	500	145
PEER11710560	710	560	145
PEER11710630	710	630	145
PEER11800400	800	400	145
PEER11800450	800	450	145
PEER11800500	800	500	145
PEER11800560	800	560	145
PEER11800630	800	630	145
PEER11800710	800	710	145
PEER111000500	1000	500	145
PEER111000560	1000	560	145
PEER111000630	1000	630	145
PEER111000710	1000	710	145
PEER111000800	1000	800	145
PEER111000900	1000	900	145
PEER111200630	1200	630	150
PEER111200710	1200	710	150
PEER111200800	1200	800	150
PEER111200900	1200	900	150
PEER1112001000	1200	1000	150



Note:

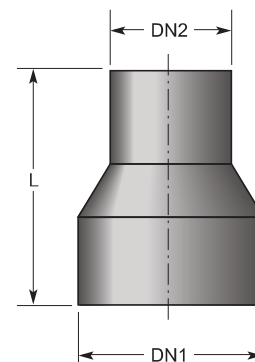
- These fittings require specialist welding techniques.
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- Fittings can be supplied spigotted for electrofusion upon request.
- Other sizes and SDR's are available and can be made to order, subject to minimum order quantities.

Long Spigot Concentric Reducers (Suitable for Electrofusion and Butt Welding)

PE100 SDR17:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER17025020LS	25	20	115
PER17032020LS	32	20	120
PER17032025LS	32	25	120
PER17040020LS	40	20	129
PER17040025LS	40	25	129
PER17040032LS	40	32	129
PER17050020LS	50	20	149
PER17050025LS	50	25	139
PER17050032LS	50	32	140
PER17050040LS	50	40	139
PER17063032LS	63	32	149
PER17063040LS	63	40	150
PER17063050LS	63	50	150
PER17075040LS	75	40	170
PER17075050LS	75	50	170
PER17075063LS	75	63	170
PER17090050LS	90	50	190
PER17090063LS	90	63	190
PER17090075LS	90	75	190
PER17110063LS	110	63	205
PER17110075LS	110	75	205
PER17110090LS	110	90	205
PER17125063LS	125	63	214
PER17125075LS	125	75	210
PER17125090LS	125	90	212
PER17125110LS	125	110	212
PER17140075LS	140	75	230
PER17140090LS	140	90	230
PER17140110LS	140	110	234
PER17140125LS	140	125	235
PER17160090LS	160	90	244
PER17160110LS	160	110	244
PER17160125LS	160	125	245
PER17160140LS	160	140	260
PER17180090LS	180	90	245
PER17180110LS	180	110	270
PER17180125LS	180	125	258
PER17180140LS	180	140	270
PER17180160LS	180	160	255
PER17200140LS	200	140	275
PER17200160LS	200	160	265
PER17200180LS	200	180	265

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER17225140LS	225	140	295
PER17225160LS	225	160	279
PER17225180LS	225	180	280
PER17225200LS	225	200	280
PER17250160LS	250	160	300
PER17250180LS	250	180	295
PER17250200LS	250	200	315
PER17250225LS	250	225	332
PER17280200LS	280	200	333
PER17280225LS	280	225	335
PER17280250LS	280	250	340
PER17315200LS	315	200	380
PER17315225LS	315	225	365
PER17315250LS	315	250	365
PER17315280LS	315	280	365
PER17355250LS	355	250	390
PER17355280LS	355	280	390
PER17355315LS	355	315	390
PER17400280LS	400	280	415
PER17400315LS	400	315	415
PER17400355LS	400	355	420
PER17450280LS	450	280	389
PER17450315LS	450	315	390
PER17450355LS	450	355	393
PER17450400LS	450	400	395
PER17500315LS	500	315	422
PER17500355LS	500	355	424
PER17500400LS	500	400	426
PER17500450LS	500	450	428
PER17560355LS	560	355	459
PER17560400LS	560	400	461
PER17560450LS	560	450	463
PER17560500LS	560	500	466
PER17630400LS	630	400	502
PER17630450LS	630	450	503
PER17630500LS	630	500	506
PER17630560LS	630	560	506



Note:

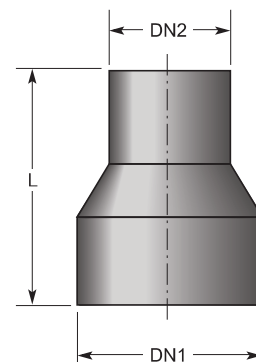
- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes (up to 1200mm) and SDR's are available and can be made to order, subject to minimum order quantities.

Long Spigot Concentric Reducers (Suitable for Electrofusion and Butt Welding)

PE100 SDR11:

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER11025020LS	25	20	115
PER11032020LS	32	20	120
PER11032025LS	32	25	120
PER11040020LS	40	20	129
PER11040025LS	40	25	129
PER11040032LS	40	32	129
PER11050020LS	50	20	149
PER11050025LS	50	25	139
PER11050032LS	50	32	140
PER11050040LS	50	40	139
PER11063032LS	63	32	149
PER11063040LS	63	40	150
PER11063050LS	63	50	150
PER11075040LS	75	40	170
PER11075050LS	75	50	170
PER11075063LS	75	63	170
PER11090050LS	90	50	190
PER11090063LS	90	63	190
PER11090075LS	90	75	190
PER11110063LS	110	63	205
PER11110075LS	110	75	205
PER11110090LS	110	90	205
PER11125063LS	125	63	214
PER11125075LS	125	75	210
PER11125090LS	125	90	212
PER11125110LS	125	110	212
PER11140075LS	140	75	230
PER11140090LS	140	90	230
PER11140110LS	140	110	234
PER11140125LS	140	125	235
PER11160090LS	160	90	244
PER11160110LS	160	110	244
PER11160125LS	160	125	245
PER11160140LS	160	140	260
PER11180090LS	180	90	245
PER11180110LS	180	110	270
PER11180125LS	180	125	258
PER11180140LS	180	140	270
PER11180160LS	180	160	255
PER11200140LS	200	140	275
PER11200160LS	200	160	265
PER11200180LS	200	180	265

Iplex code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
PER11225140LS	225	140	295
PER11225160LS	225	160	279
PER11225180LS	225	180	280
PER11225200LS	225	200	280
PER11250160LS	250	160	300
PER11250180LS	250	180	295
PER11250200LS	250	200	315
PER11250225LS	250	225	332
PER11280200LS	280	200	333
PER11280225LS	280	225	335
PER11280250LS	280	250	340
PER11315200LS	315	200	380
PER11315225LS	315	225	365
PER11315250LS	315	250	365
PER11315280LS	315	280	365
PER11355250LS	355	250	390
PER11355280LS	355	280	390
PER11355315LS	355	315	390
PER11400280LS	400	280	415
PER11400315LS	400	315	415
PER11400355LS	400	355	420
PER11450280LS	450	280	389
PER11450315LS	450	315	390
PER11450355LS	450	355	393
PER11450400LS	450	400	395
PER11500315LS	500	315	422
PER11500355LS	500	355	424
PER11500400LS	500	400	426
PER11500450LS	500	450	428
PER11560355LS	560	355	459
PER11560400LS	560	400	461
PER11560450LS	560	450	463
PER11560500LS	560	500	466
PER11630400LS	630	400	502
PER11630450LS	630	450	503
PER11630500LS	630	500	506
PER11630560LS	630	560	506



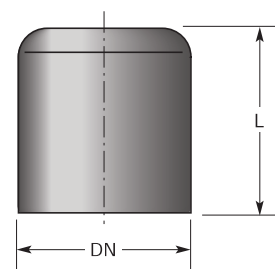
Note:

- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes (up to 1200mm) and SDR's are available and can be made to order, subject to minimum order quantities.

End Caps Moulded (Suitable for Electrofusion and Butt Welding)

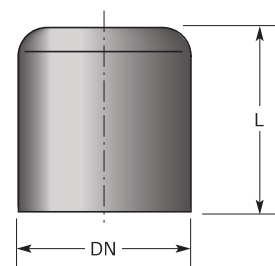
PE100 SDR17:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
PEC17020LS	20	52
PEC17025LS	25	52
PEC17032LS	32	54
PEC17040LS	40	57
PEC17050LS	50	63
PEC17063LS	63	65
PEC17075LS	75	80
PEC17090LS	90	90
PEC17110LS	110	98
PEC17125LS	125	105
PEC17140LS	140	136
PEC17160LS	160	120
PEC17180LS	180	128
PEC17200LS	200	138
PEC17225LS	225	148
PEC17250LS	250	205
PEC17280LS	280	235
PEC17315LS	315	255
PEC17355LS	355	280
PEC17400LS	400	310



PE100 SDR11:

Iplex code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
PEC11020LS	20	52
PEC11025LS	25	52
PEC11032LS	32	54
PEC11040LS	40	57
PEC11050LS	50	63
PEC11063LS	63	65
PEC11075LS	75	80
PEC11090LS	90	90
PEC11110LS	110	98
PEC11125LS	125	105
PEC11140LS	140	136
PEC11160LS	160	120
PEC11180LS	180	128
PEC11200LS	200	138
PEC11225LS	225	148
PEC11250LS	250	205
PEC11280LS	280	235
PEC11315LS	315	255
PEC11355LS	355	280
PEC11400LS	400	310



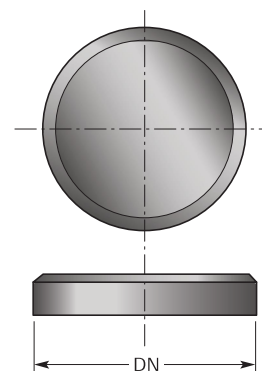
Note:

- EF coupling (EG07) required for electrofusion.
- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available and can be made to order, subject to minimum order quantities.

End Caps (Suitable for Butt Welding only)

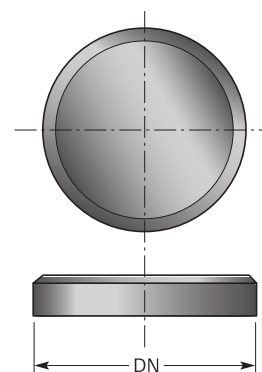
PE100 SDR17:

Iplex code	Typical dimensions
	Nominal diameter DN (mm)
PEC17032	32
PEC17040	40
PEC17050	50
PEC17063	63
PEC17075	75
PEC17090	90
PEC17110	110
PEC17125	125
PEC17140	140
PEC17160	160
PEC17180	180
PEC17200	200
PEC17225	225
PEC17250	250
PEC17280	280
PEC17315	315
PEC17355	355
PEC17400	400
PEC17450	450
PEC17500	500
PEC17560	560
PEC17630	630
PEC17710	710
PEC17800	800
PEC17900	900
PEC171000	1000
PEC171200	1200



PE100 SDR11:

Iplex code	Typical dimensions
	Nominal diameter DN (mm)
PEC11032	32
PEC11040	40
PEC11050	50
PEC11063	63
PEC11075	75
PEC11090	90
PEC11110	110
PEC11125	125
PEC11140	140
PEC11160	160
PEC11180	180
PEC11200	200
PEC11225	225
PEC11250	250
PEC11280	280
PEC11315	315
PEC11355	355
PEC11400	400
PEC11450	450
PEC11500	500
PEC11560	560
PEC11630	630
PEC11710	710
PEC11800	800
PEC11900	900
PEC111000	1000
PEC111200	1200



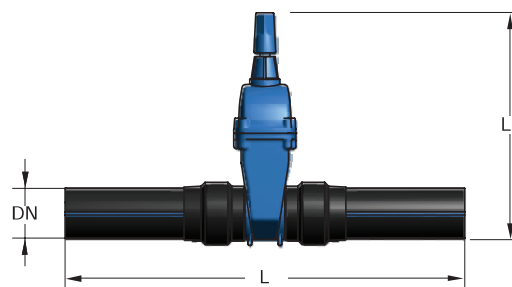
Note:

- Multiple suppliers products can be stocked, all dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

AVK Gate Valves

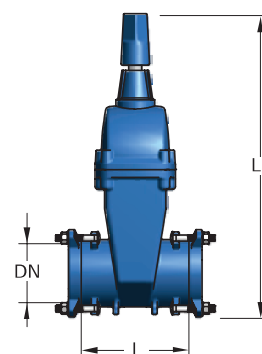
AVK Gate Valves Series 36/80:

Product code anti-clockwise closing	Product code clockwise closing	Typical dimensions		
		Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
C527.75PE	C527.75PEC	75	865	271
C527.90PE	C527.90PEC	90	950	342
C527.110PE	C527.110PEC	110	975	334
C527.125PE	C527.125PEC	125	1100	376
C527.140PE	C527.140PEC	140	1100	376
C527.160PE	C527.160PEC	160	1100	448
C527.180PE	C527.180PEC	180	1100	448
C527.200PE	C527.200PEC	200	1120	562
C527.225PE	C527.225PEC	225	1200	562
C527.250PE	C527.250PEC	250	1262	664
C527.280PE	C527.280PEC	280	1262	664
C527.315PE	C527.315PEC	315	1316	740



AVK Gate Valves Series 01/71:

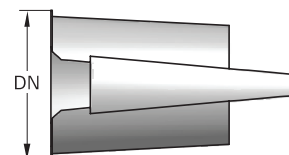
Product code anti-clockwise closing	Product code clockwise closing	Typical dimensions		
		Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
C5261.90PE	C5261.90PEC	90	200	297
C5261.110PE	C5261.110PEC	110	208	334
C5261.125PE	C5261.125PEC	125	208	375
C5261.140PE	C5261.140PEC	140	220	375
C5261.160PE	C5261.160PEC	160	260	448
C5261.180PE	C5261.180PEC	180	260	448
C5261.200PE	C5261.200PEC	200	309	562
C5261.225PE	C5261.225PEC	225	309	562
C5261.250PE	C5261.250PEC	250	339	664
C5261.280PE	C5261.280PEC	280	339	664
C5261.315PE	C5261.315PEC	315	380	740



Note: Series 05 AVK Support Bushes to be used with these valves.

AVK Support Bushes Series 05

Product code	Nominal diameter DN (mm)
C05090	90
C050110	110
C050125	125
C050140	140
C050160	160
C050180	180
C050200	200
C050225	225
C050250	250
C050280	280
C050315	315



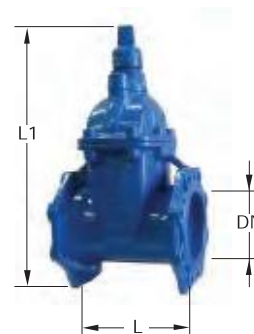
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

AVK Gate Valves

AVK Gate Valves Series 57/90:

Product code anti-clockwise closing	Product code clockwise closing	Typical dimensions		
		Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
C523.05	C523.05C	50	178	329
C523.06	C523.06C	65	190	335
C523.08	C523.08C	80	203	345
C523.10	C523.10C	100	229	380
C523.15	C523.15C	150	267	474
C523.20	C523.20C	200	292	574
C523.22	C523.22C	225	305	651
C523.25	C523.25C	250	330	662
C523.30	C523.30C	300	356	730
C523.37	C523.37C	375	381	905
C523.40	C523.40C	400	406	930



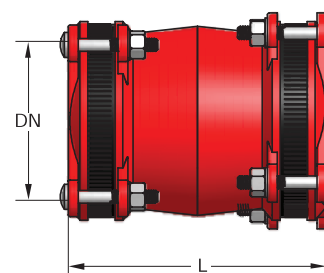
AVK Double Flanged Butterfly Valve Series 813/82:

Product code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
C5858.08L	80	114	286
C5858.100L	100	127	323
C5858.150L	150	140	375



+GF+ WAGA Multi Joint Restraint 3007 Plus Wide Range Coupling

Product code	Typical dimensions		
	Nominal diameter DN (mm)	Suit DN	Dim. (mm) L1
EG709305214	90	84-105	234-262
EG709305216	110/125	104-132	230-268
EG709305218	140	132-155	246-282
EG709305220	160/180	154-192	242-298
EG709305224	220/225	192-232	297-351
EG709305226	250	232-257	342-404
EG709305228	280	267-310	354-424
EG709305232*	315	315-356	356-426
EG709305236*	355	352-393	-
EG709305240*	400	392-433	-



Note: * Rated at PN10

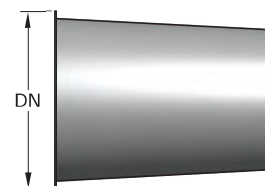
Support bushes must be used with these fittings

Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

+GF+ Multi Joint Inserts Stainless Steel 316

Product code	Typical dimensions	
	Nominal diameter DN (mm)	SDR
EG709026233	90	17
EG709026230	90	11
EG709026245	110	17
EG709026242	110	11
EG709026257	125	17
EG709026254	125	11
EG709026269	140	17
EG709026266	140	11
EG709026281	160	17
EG709026278	160	11
EG709026408	180	17
EG709026290	180	11
EG709026409	200	17
EG709026302	200	11
EG709026410	225	17
EG709026314	225	11
EG709026411	250	17
EG709026326	250	11
EG709026340	280	17
EG709026338	280	11
EG709026413	315	17
EG709026350	315	11
EG709026414	355	17
EG709026362	355	11



+GF+ ELGEF Plus Ball Valve

Product code	Typical dimensions				
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1	Dim. (mm) L2	Dim. (mm) L3
EG193103206	20	264	72	134	96
EG193103207	25	264	72	134	96
EG193103208	32	274	76	134	96
EG193103209	40	301	85	142	100
EG193103210	50	327	92	156	107
EG193103211	63	350	101	173	114
EG193103212	75	376	114	173	114
EG193103213	90	439	128	240	158
EG193103214	110	497	148	267	171
EG193103040	125	405	112	365	280
EG193103042	160	540	123	481	364
EG193103043	180	540	123	481	364
EG193103044	200	540	123	481	364
EG193103045	225	877	240	755	540



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.

Poly Plus Metric Compression Fittings

Plain Couplings:

Product code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
M4116	16	114
M4120	20	144
M4125	25	124
M4132	32	136
M4140	40	176
M4150	50	195
M4163	63	248
M4175	75	278
M4190	90	336
M41110	110	381



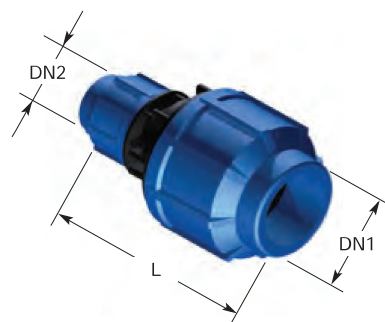
Repair Couplings (without pipe stop):

Product Code	Typical Dimensions	
	Nominal Diameter DN (mm)	Dim. (mm) L
M4220	20	114
M4225	25	126
M4232	32	131
M4240	40	188
M4250	50	207
M4263	63	248
M4275	75	290
M4290	90	322
M42110	110	362



Reducing Couplings:

Product code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
M512520	25	20	133
M513220	32	20	130
M513225	32	25	130
M514025	40	25	160
M514032	40	32	164
M515032	50	32	175
M515040	50	40	204
M516332	63	32	210
M516340	63	40	216
M516350	63	50	216
M517550	75	50	237
M517563	75	63	249
M519063	90	63	292
M519075	90	75	366
M5111090	110	90	363



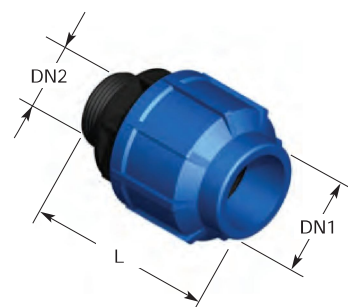
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Poly Plus Metric Compression Fittings

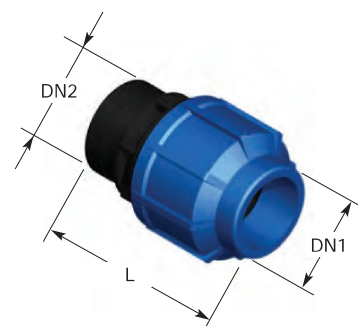
Male Adaptors:

Product code	Typical dimensions		
	Nominal diameter DN1 (mm)	Diameter (inch) R	Dim. (mm) L
M211615	16	½"	76
M212015	20	½"	76
M212020	20	¾"	77
M212025	20	1"	79
M212515	25	½"	80
M212520	25	¾"	82
M212525	25	1"	86
M213220	32	¾"	89
M213225	32	1"	92
M213232	32	1 ¼"	94
M213240	32	1 ½"	93
M214025	40	1"	113
M214032	40	1 ¼"	115
M214040	40	1 ½"	115
M214050	40	2"	115
M215025	50	1"	125
M215032	50	1 ¼"	127
M215040	50	1 ½"	126
M215050	50	2"	132
M216340	63	1 ½"	154
M216350	63	2"	156
M216363	63	2 ½"	160
M217550	75	2"	177
M217563	75	2 ½"	178
M217575	75	3"	178
M219050	90	2"	205
M219063	90	2 ½"	210
M219075	90	3"	210
M2190100	90	4"	216
M2111075	110	3"	226
M21110100	110	4"	231



Female Adaptors:

Product code	Typical dimensions		
	Nominal diameter DN1 (mm)	Diameter (inch) R	Dim. (mm) L
M311615	16	½"	78
M311620	16	¾"	78
M312015	20	½"	78
M312020	20	¾"	78
M312520	25	¾"	86
M312525	25	1"	86
M313220	32	¾"	95
M313225	32	1"	95
M313232	32	1 ¼"	96
M314025	40	1"	111
M314032	40	1 ¼"	116
M314040	40	1 ½"	116
M315025	50	1"	123
M315032	50	1 ¼"	129
M315040	50	1 ½"	128
M315050	50	2"	133
M316340	63	1 ½"	158
M316350	63	2"	161
M316363	63	2 ½"	162
M317550	75	2"	169
M317563	75	2 ½"	174
M317575	75	3"	174
M319050	90	2"	196
M319063	90	2 ½"	210
M319075	90	3"	196
M3111075	110	3"	215
M31110100	110	4"	215



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Poly Plus Metric Compression Fittings

90° Tees:

Product code	Typical dimensions		
	Nominal diameter DN (mm)	Dim. (mm) L	Dim. (mm) L1
M6116	16	138	55
M6120	20	138	55
M6125	25	153	77
M6132	32	175	87
M6140	40	238	118
M6150	50	259	128
M6163	63	317	160
M6175	75	360	180
M6190	90	472	140
M61110	110	512	260



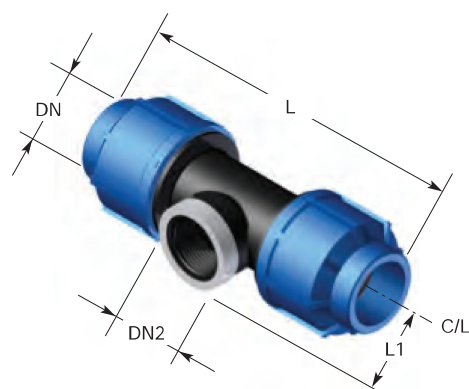
Reducing Tees:

Product code	Typical dimensions		
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
M812520	25	20	153
M813225	32	25	173
M814032	40	32	238
M815032	50	32	259
M815040	50	40	259
M816332	63	32	317
M816350	63	50	317
M817563	75	63	360
M819075	90	75	472
M8111090	110	90	512



Tee with Treaded Female Offtakes:

Product code	Typical dimensions			
	Nominal diameter DN1 (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L	Dim. (mm) L1
M711615	16	½"	142	48
M712015	20	½"	143	48
M712020	20	¾"	143	53
M712515	25	½"	153	52
M712520	25	¾"	153	37
M712525	25	1"	153	59
M713220	32	¾"	175	41
M713225	32	1"	175	43
M713232	32	1 ¼"	175	46
M714025	40	1"	238	53
M714032	40	1 ¼"	238	53
M714040	40	1 ½"	238	53
M715025	50	1"	260	63
M715040	50	1 ½"	260	63
M715050	50	2"	260	75
M716340	63	1 ½"	317	70
M716350	63	2"	317	70
M717550	75	2"	360	75
M717563	75	2 ½"	360	75
M717575	75	3"	360	75
M719075	90	3"	472	101
M71110100	110	4"	512	115



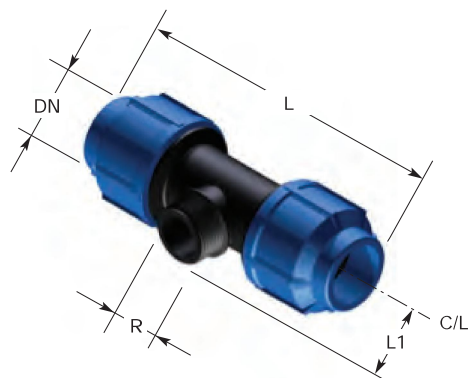
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Poly Plus Metric Compression Fittings

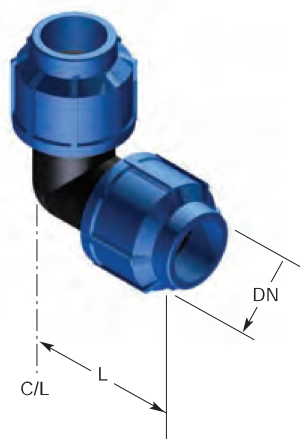
Tee with Threaded Male Offtakes:

Product Code	Typical Dimensions			
	Nominal Diameter DN (mm)	Diameter (inch) R	Dim. (mm) L	Dim. (mm) L1
M1022515	25	½"	153	52
M1022520	25	¾"	153	54
M1022525	25	1"	153	52
M1023215	32	¾"	175	60
M1023225	32	1"	175	60
M1024032	40	1¼"	238	73
M1024040	40	1½"	238	73
M1025040	50	1½"	259	80
M1026350	63	2"	317	82
M1027575	75	3"	360	105
M1029075	90	3"	472	132
M102110100	110	4"	512	145



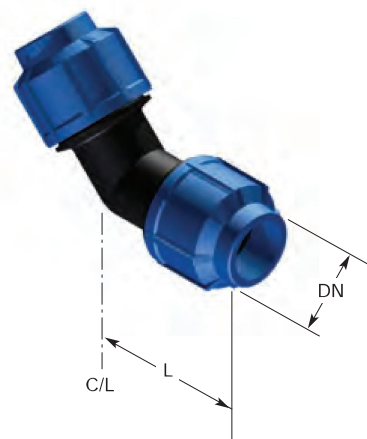
90° Elbows:

Product code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
M9116	16	71
M9120	20	71
M9125	25	77
M9132	32	88
M9140	40	117
M9150	50	128
M9163	63	160
M9175	75	178
M9190	90	235
M91110	110	250



45° Elbows:

Product code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
M9320	20	65
M9325	25	74
M9332	32	82
M9340	40	108
M9350	50	128
M9363	63	150



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Poly Plus Metric Compression Fittings

90° Elbow with Treaded Female Offtakes:

Product code	Typical dimensions		
	Nominal diameter DN (mm)	Diameter (inch) R	Dim. (mm) L
M1011615	16	½"	71
M1012015	20	½"	71
M1012020	20	¾"	71
M1012515	25	½"	76
M1012520	25	¾"	77
M1012525	25	1"	77
M1013220	32	¾"	87
M1013225	32	1"	87
M1013232	32	1 ¼"	87
M1014025	40	1"	120
M1014032	40	1 ¼"	120
M1014040	40	1 ½"	120
M1015025	50	1"	130
M1015040	50	1 ½"	130
M1015050	50	2"	130
M1016340	63	1 ½"	160
M1016350	63	2"	160
M1017550	75	2"	178
M1017563	75	2 ½"	178
M1017575	75	3"	178
M1019075	90	3"	235
M101110100	110	4"	250



90° Elbow with Treaded Male Offtakes:

Product code	Typical dimensions		
	Nominal diameter DN (mm)	Diameter (inch) R	Dim. (mm) L
M1032015	20	½"	71
M1032020	20	¾"	71
M1032520	25	¾"	77
M1032525	25	1"	77
M1033225	32	1"	88
M1034025	40	1"	115
M1034032	40	1 ¼"	117
M1034040	40	1 ½"	117
M1035040	50	1 ½"	128
M1036350	63	2"	160
M1037563	75	2 ½"	178
M1037575	75	3"	178
M1039075	90	3"	240
M10390100	90	4"	245
M10311075	110	3"	245
M103110100	110	4"	256



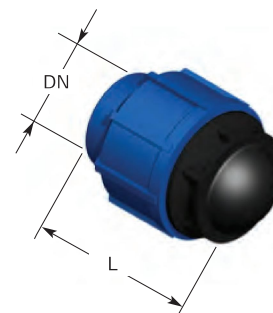
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Poly Plus Metric Compression Fittings

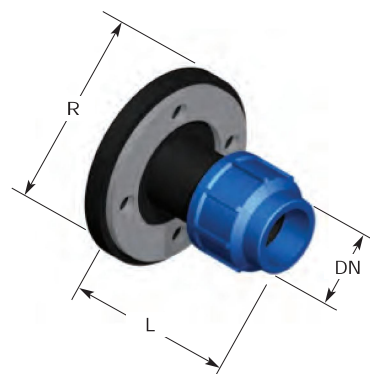
End Caps:

Product code	Typical dimensions	
	Nominal diameter DN (mm)	Dim. (mm) L
M17120	20	69
M17125	25	76
M17132	32	90
M17140	40	112
M17150	50	129
M17163	63	160
M17175	75	180
M17190	90	220
M171110	110	234



Flanged Joints with Metal Flange AS 2129 Table E:

Product code	Typical dimensions		
	Nominal diameter DN (mm)	Diameter (inch) R	Dim. (mm) L1
M235050	50	2"	170
M236350	63	2"	193
M236363	63	2 ½"	195
M237563	75	2 ½"	197
M237575	75	3"	197
M239075	90	3"	232
M2390100	90	4"	232
M23110100	110	4"	239



Polyethylene Universal Adaptors:

Product code	Typical dimensions		
	Nominal diameter DN (mm)	Nominal diameter DN2 (mm)	Dim. (mm) L
M36251521	25	15-21	119
M36252127	25	21-27	127
M36252735	25	27-35	151
M36322127	32	21-27	159
M36322735	32	27-35	174

Note: Rated at PN10



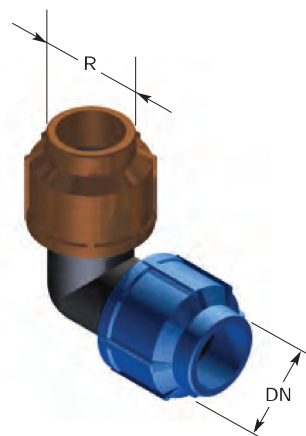
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Poly Plus Metric Compression Fittings

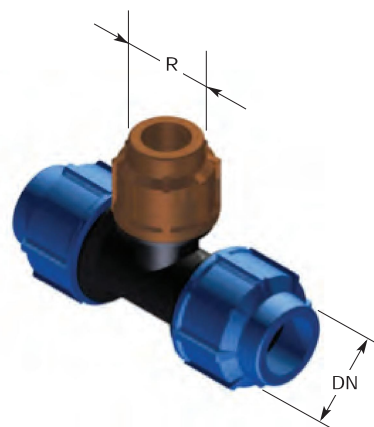
Polyethylene to Copper Elbows:

Product code	Typical dimensions	
	Nominal diameter DN (mm)	Nominal diameter R (inch)
M352520	25	¾"Cu



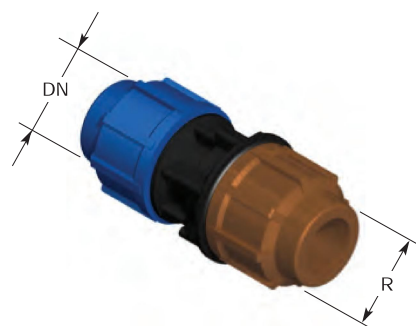
Polyethylene to Copper Tees:

Product code	Typical dimensions	
	Nominal diameter DN (mm)	Nominal diameter R (inch)
M722515	25	½"Cu
M722520	25	¾"Cu



Polyethylene to Copper Adaptors:

Product code	Typical dimensions	
	Nominal diameter DN (mm)	Nominal diameter R (inch)
M321615	16	½"Cu
M322015	20	½"Cu
M322020	20	¾"Cu
M322525	25	1"Cu
M323220	32	¾"Cu
M322520	25	¾"Cu



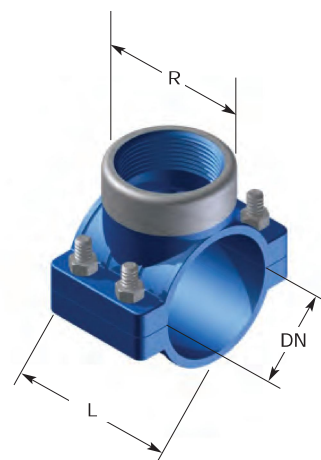
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Poly Plus Metric Compression Fittings

Tapping Saddles with Stainless Steel Bolts:

Product code	Typical dimensions					
	Nominal diameter DN (mm)	Diameter (inch) R	PN	No bolts	Bolt type	Dim. (mm) L1
M0762515	25	½"	16	2	M8X30	49
M0763215	32	½"	16	2	M8X30	49
M0763220*	32	¾"	16	2	M8X30	49
M0763225	32	1"	16	2	M8X40	62
M0764020	40	¾"	16	2	M8X40	62
M0764025	40	1"	16	2	M8X40	62
M0765015	50	½"	16	4	M8X40	62
M0765020	50	¾"	16	4	M8X40	62
M0765032	50	1 ¼"	16	4	M8X40	62
M0766320	63	¾"	16	4	M8X40	62
M0766325	63	1"	16	4	M8X40	62
M0766332	63	1 ¼"	16	4	M8X40	62
M0766340	63	1 ½"	16	4	M8X40	62
M0767520	75	¾"	16	4	M8X60	79
M0767525	75	1"	16	4	M8X60	79
M0767550	75	2"	16	4	M8X60	79
M0769025	90	1"	16	4	M8X60	87
M0769040	90	1 ½"	16	4	M8X60	87
M0769050	90	2"	16	4	M8X60	87
M07611025	110	1"	16	6	M8X50	99
M07611040	110	1 ½"	16	6	M8X50	99
M07611050	110	2"	16	6	M8X50	99
M07611075*	110	3"	6	6	M8X70	99
M07612525	125	1"	16	6	M8X50	101
M07612550	125	2"	16	6	M8X50	101
M07612575*	125	3"	6	6	M8X70	139
M076125100*	125	4"	6	6	M8X70	139
M07614025	140	1"	16	6	M8X70	114
M07614075*	140	3"	10	6	M8X70	142
M07616025	160	1"	16	6	M8X70	114
M07616050	160	2"	16	6	M8X70	114
M07616075*	160	3"	10	6	M8X70	142
M07618025*	180	1"	10	6	M10X80	169
M07618050*	180	2"	10	6	M10X80	169
M076180100*	180	4"	10	6	M10X80	169
M07620050*	200	2"	10	6	M10X80	169
M07622550*	225	2"	10	6	M10X80	287
M07622575*	225	3"	10	6	M10X80	287
M076225100*	225	4"	10	6	M10X80	287
M07625050	250	2"	10	6	M10X80	310
M07625075*	250	3"	10	6	M10X80	310
M076250100*	250	4"	10	6	M10X80	310
M07628050*	280	2"	10	6	M10X160	335
M07628075*	280	3"	10	6	M10X160	335
M076280100*	280	4"	10	6	M10X160	335
M07631550	315	2"	10	6	M10X110	390
M07631575*	315	3"	10	6	M10X110	390
M076315100*	315	4"	10	6	M10X110	390



* Includes O-ring gasket

Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Rural Compression Fittings

Plain Couplings:

Product code	Typical dimensions Nominal diameter DN (inch)
701320	¾"
701325	1"
701332	1 ¼"
701340	1 ½"
701350	2"



Reducing Couplings:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Nominal diameter DN2 (inch)
71132520	1"	¾"
71133225	1 ¼"	1"
71334032	1 ½"	1 ¼"
71335040	2"	1 ½"



Male Adaptors:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Diameter (inch) R
70232015	¾"	½"
70232020	¾"	¾"
70232520	1"	¾"
70232525	1"	1"
70233225	1 ¼"	1"
70233232	1 ¼"	1 ½"
70234032	1 ½"	1 ¼"
70234040	1 ½"	1 ½"
70235040	2"	1 ½"
70235050	2"	2"



Female Adaptors:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Diameter (inch) R
70332020	¾"	¾"
70332520	1"	¾"
70332525	1"	1"
70333232	1 ¼"	1 ¼"
70334032	1 ½"	1 ¼"
70334040	1 ½"	1 ½"
70335040	2"	1 ½"
70335050	2"	2"



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Rural Compression Fittings

Equal Tees:

Product code	Typical dimensions Nominal diameter DN (inch)
704320	¾"
704325	1"
704332	1 ½"
704340	1 ½"
704350	2"



Reducing Tees:

Product code	Typical dimensions Nominal diameter DN1 (inch)	Typical dimensions Nominal diameter DN2 (inch)
73432520	1"	¾"
73433225	1 ¼"	1"
73435040	2"	1 ½"



Tee with Thread Female Offtakes:

Product code	Typical dimensions Nominal diameter DN1 (inch)	Typical dimensions Diameter (inch) R
71432020	¾"	¾"
71432515	1"	½"
71432520	1"	¾"
71432525	1"	1"
71433220	1 ¼"	¾"
71433225	1 ¼"	1"
71434032	1 ½"	1 ¼"
71434040	1 ½"	1 ½"
71435040	2"	1 ½"
71435050	2"	2"



90° Elbows:

Product code	Typical dimensions Nominal diameter DN1 (inch)
705320	¾"
705325	1"
705332	1 ½"
705340	1 ½"
705350	2"



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Rural Compression Fittings

90° Elbow with Threaded Female Offtakes:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Diameter (inch) R
71532015	3/4"	1/2"
71532020	3/4"	3/4"
71532515	1"	1/2"
71532520	1"	3/4"
71532525	1"	1"
71533225	1 1/4"	1"
71534032	1 1/2"	1 1/4"
71534040	1 1/2"	1 1/2"
71535040	2"	1 1/2"
71535050	2"	2"



90° Elbow with Threaded Male Offtakes:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Nominal diameter DN2 (inch)
78532520	1"	3/4"
78533225	1 1/4"	1"
78534032	1 1/2"	1 1/4"



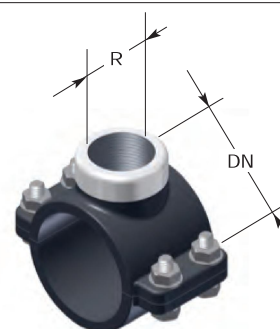
End Plugs:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	
712320	3/4"	
712325	1"	
712332	1 1/4"	
712340	1 1/2"	
712350	2"	



Tapping Saddles:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Diameter (inch) R
R0763220	1 1/4"	3/4"
R0763225	1 1/4"	1"
R0764020	1 1/2"	3/4"
R0764025	1 1/2"	1"
R0765020	2"	3/4"
R0765025	2"	1"



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Threaded Fittings

Sockets Female - BSP Threaded PP:

Product code	Typical dimensions
	Nominal diameter DN (inch)
501715	1/2"
501720	3/4"
501725	1"
501732	1 1/4"
501740	1 1/2"
501750	2"



Reducing Bushes - BSP Threaded PP:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Nominal diameter DN2 (inch)
50272015	3/4"	1/2"
50272515	1"	1/2"
50272520	1"	3/4"
50273215	1 1/4"	1/2"
50273220	1 1/4"	3/4"
50273225	1 1/4"	1"
50274015	1 1/2"	1/2"
50274020	1 1/2"	3/4"
50274025	1 1/2"	1"
50274032	1 1/2"	1 1/4"
50275020	2"	3/4"
50275025	2"	1"
50275032	2"	1 1/4"
50275040	2"	1 1/2"
50276550	2 1/2"	2"
50277550	3"	2"
50277565	3"	2 1/2"
502710050	4"	2"



Tees Female - BSP Threaded PP:

Product code	Typical dimensions
	Nominal diameter DN (inch)
504715	1/2"
504720	3/4"
504725	1"
504732	1 1/4"
504740	1 1/2"
504750	2"



Elbows Female - BSP Threaded PP:

Product code	Typical dimensions
	Nominal diameter DN (inch)
505715	1/2"
505720	3/4"
505725	1"
505732	1 1/4"
505740	1 1/2"
505750	2"



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Threaded Fittings

Reducing Nipples - BSP Threaded PP:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Nominal diameter DN2 (inch)
50652015	¾"	½"
50652515	1"	½"
50652520	1"	¾"
50653220	1 ¼"	¾"
50653225	1 ¼"	1"
50654020	1 ½"	¾"
50654025	1 ½"	1"
50654032	1 ½"	1 ¼"
50655025	2"	1"
50655032	2"	1 ¼"
50655040	2"	1 ½"



Nipples - BSP Threaded PP:

Product code	Typical dimensions	
	Nominal diameter DN (inch)	
506715	½"	
506720	¾"	
506725	1"	
506732	1 ¼"	
506740	1 ½"	
506750	2"	
506765	2 ½"	
506780	3"	
5067100	4"	



Reducing Sockets Female & Female - BSP Threaded PP:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Nominal diameter DN2 (inch)
51172015	¾"	½"
51172520	1"	¾"
51173225	1 ¼"	½"
51174032	1 ½"	1 ¼"



Plugs Male - BSP Threaded PP:

Product code	Typical dimensions	
	Nominal diameter DN (inch)	
517715	½"	
517720	¾"	
517725	1"	
517732	1 ¼"	
517740	1 ½"	
517750	2"	



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Threaded Fittings

Couplings Male & Female - BSP Threaded PP:

Product code	Typical dimensions	
	Nominal diameter DN1 (inch)	Nominal diameter DN2 (inch)
52272025	3/4"	1"
52272520	1"	3/4"



Quick Coupling Valves PP:

Product code	Typical dimensions	
	Nominal diameter DN (inch)	
303920	3/4"	
303925	1"	



Risers for Quick Couplings PP:

Product code	Typical dimensions	
	Nominal diameter DN (inch)	
313920	3/4"	



Two Way Valves PP:

Product code	Typical dimensions	
	Nominal diameter DN (inch)	
340520	3/4"	
340525	1"	



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Other sizes are available. Contact Iplex Pipelines for more information.

Machines and Tools & Installation Aids

MSA 210 Monovalent Manual Electrofusion Unit:

Iplex code
EG790128001



MSA Plus 250 Polyvalent Automatic Electrofusion Unit:

Iplex code
EG799350550



MSA 330 Electrofusion Unit with Jointing Data Recording:

Iplex code	Type
EG790160004	Barcode reader pen, transport case
EG790160005	Barcode scanner, transport case



MSA 340 Traceability Electrofusion Unit with GPS Function:

Iplex code	Type
EG790160007	Barcode scanner, transport case



Electrofusion Unit Adaptor Pins:

Iplex code	Type
EG799350340	4.0mm Angle Adaptor Black
EG799350341	4.0mm-4.7mm Angle Adaptor
EG200060276	4.7mm-4.00m Straight Adaptor Pin



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Unless otherwise stated all dimensions are in mm.

Machines and Tools & Installation Aids

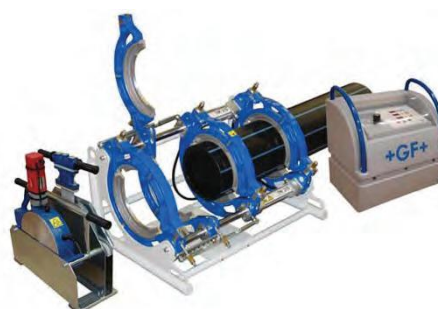
TM 160-215-315 ECO Butt Fusion Machine:

Iplex code	d (mm)	Description
EG790150017	40 - 160	TM 160 ECO
EG790151017	75 - 250	TM 250 ECO
EG790152017	90 - 315	TM 315 ECO



TM 160-250-315 TOP Butt Fusion Machine:

Iplex code	d (mm)	Description
EG790150011	40 - 160	TM 160 TOP
EG790151011	75 - 250	TM 250 TOP
EG790152026	90 - 315	TM 315 TOP



Reduction Clamping Inserts:

Iplex code	d-d (mm)
EG790114156	40-140
EG790115156	75-225
EG790112156	90-280



Note: - 4 wide and 4 narrow clamping inserts for each dimension
- Suitable for TM 160-250-315 ECO and TM 160-250-315 TOP butt fusion machines

TM 160-250-315 Flange Adaptor Clamping Units:

Iplex code	d-d (mm)
EG790319007	40-160
EG790115044	75-250
EG790112073	90-315

Note: Suitable for TM 160-250-315 ECO and
TM 160-250-315 TOP butt fusion machines



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Unless otherwise stated all dimensions are in mm.

Machines and Tools & Installation Aids

KL 500 TOP1 Butt Fusion Machine:

Iplex code	d-d (mm)
EG790340000	200-500



KL 500 Reduction Clamp Inserts:

Iplex code	d-d (mm)
EG790116156	250-450

Note: 4 wide and 4 narrow clamping inserts for each dimension



KL 630 TOP1 Butt Fusion Machine:

Iplex code	d-d (mm)
EG790350000	315-630



KL 630 Reduction Clamp Inserts:

Iplex code	d-d (mm)
EG790117021	315-560

Note: 4 wide and 4 narrow clamping inserts d 315, d 355, d 400, d 450
8 wide reduction inserts d 500, d 560



PPC Plastic Pipe Cutter:

Iplex code	d-d (mm)
EG790109001	10-63
EG790109002	50-110
EG790109003	110-160



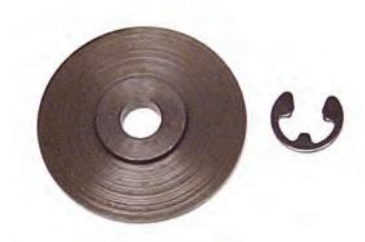
Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Unless otherwise stated all dimensions are in mm.

Machines and Tools & Installation Aids

Replacement Cutting Wheels for PPC:

Iplex code	d-d (mm)
EG790109011	10-63
EG790109012	50-110
EG790109013	110-160



KL 355 Plastic Pipe Cutter:

Iplex code	d-d (mm)
EG790202001	160-355



Replacement Saw Blade ø180x30 KS 355:

Iplex code
EG790202011



Peeling Tool PT 2 Adjustable for a Range of Pipe Sizes:

Iplex code	d (mm)	Peeling length (mm)
EG799300753	90-250	140
EG799300755	110-400	150
EG799300756	110-500	175



Replacement Blade for PT 2 Peeling Tool:

Iplex code	d (mm)	Piece
EG799150355	90-500	1

Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Unless otherwise stated all dimensions are in mm.

Machines and Tools & Installation Aids

Rotary Peeler RS:

Iplex code	d (mm)	Article
EG790136001	40	RS 40
EG790136002	50	RS 50
EG790136003	63	RS 63
EG790136004	75	RS 75
EG790136005	90	RS 90
EG790136006	110	RS 110
EG790136007	125	RS 125
EG790136008	140	RS 140
EG790136009	160	RS 160
EG790136010	180	RS 180
EG790136011	200	RS 200
EG790136012	225	RS 225
EG790136013	250	RS 250
EG790136014	280	RS 280
EG790136015	315	RS 315



Replacement Blade for Rotary Peeler:

Iplex code	d-d (mm)
EG790136112	40-315



Double Clamp:

Iplex code	d-d (mm)
EG799301484	63-125
EG799301486	110-225
EG799301488	225-500



Quadruple Clamp:

Iplex code	d-d (mm)
EG799301459	63-125
EG799301461	110-225
EG799301463	225-500



Swivel Clamp:

Iplex code	d-d (mm)
EG799350358	63 - 180



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Unless otherwise stated all dimensions are in mm.

Machines and Tools & Installation Aids

Clamping Device Topload 630:

Iplex code	d-d (mm)
EG799350477	280-630



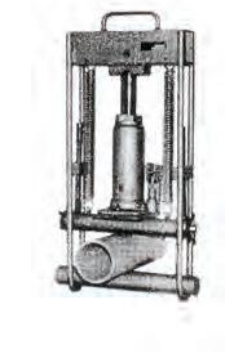
Squeeze-off Tool Type 1:

Iplex code	d-d (mm)
EG799350107	20 - 63



Squeeze-off Tool Type 2:

Iplex code	d-d (mm)
EG799350108	63 - 180



Re-rounding Tool:

Iplex code	d (mm)
EG799199127	25
EG799199128	32
EG799199129	40
EG799199130	50
EG799199131	63
EG799199132	75
EG799199133	90
EG799199134	110
EG799199135	125
EG799199137	160
EG799199138	180
EG799199139	200
EG799199140	225
EG799199141	250



Note: • Larger sizes are available upon request
• Heavy duty hydraulic versions also available upon request

Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Unless otherwise stated all dimensions are in mm.

Machines and Tools & Installation Aids

Assembly & Tapping Key for ELGEF Plus Saddles:

Iplex code	Type
EG799198047	8/10/17

Note: Suitable for all saddles



Accessories

Isopropanol Tissue:

Iplex code	Per Pack
EG799496011	100



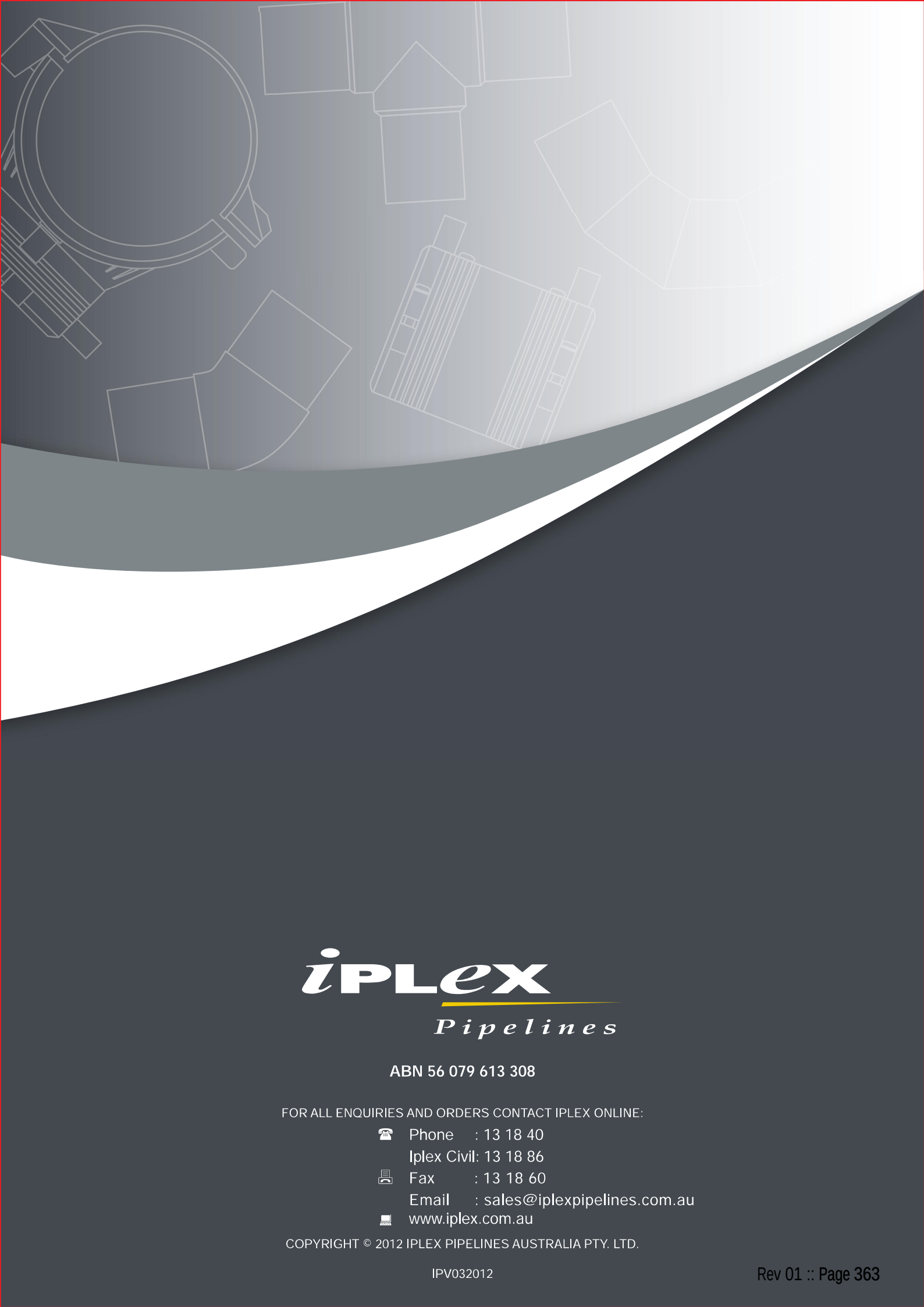
Tangit Tissue Container:

Iplex code	Piece
EG799298024	1



Note:

- All dimensions, masses & volumes are approximate only. If critical contact Iplex Pipelines.
- Unless otherwise stated all dimensions are in mm.



iplex

Pipelines

ABN 56 079 613 308

FOR ALL ENQUIRIES AND ORDERS CONTACT IPLEX ONLINE:

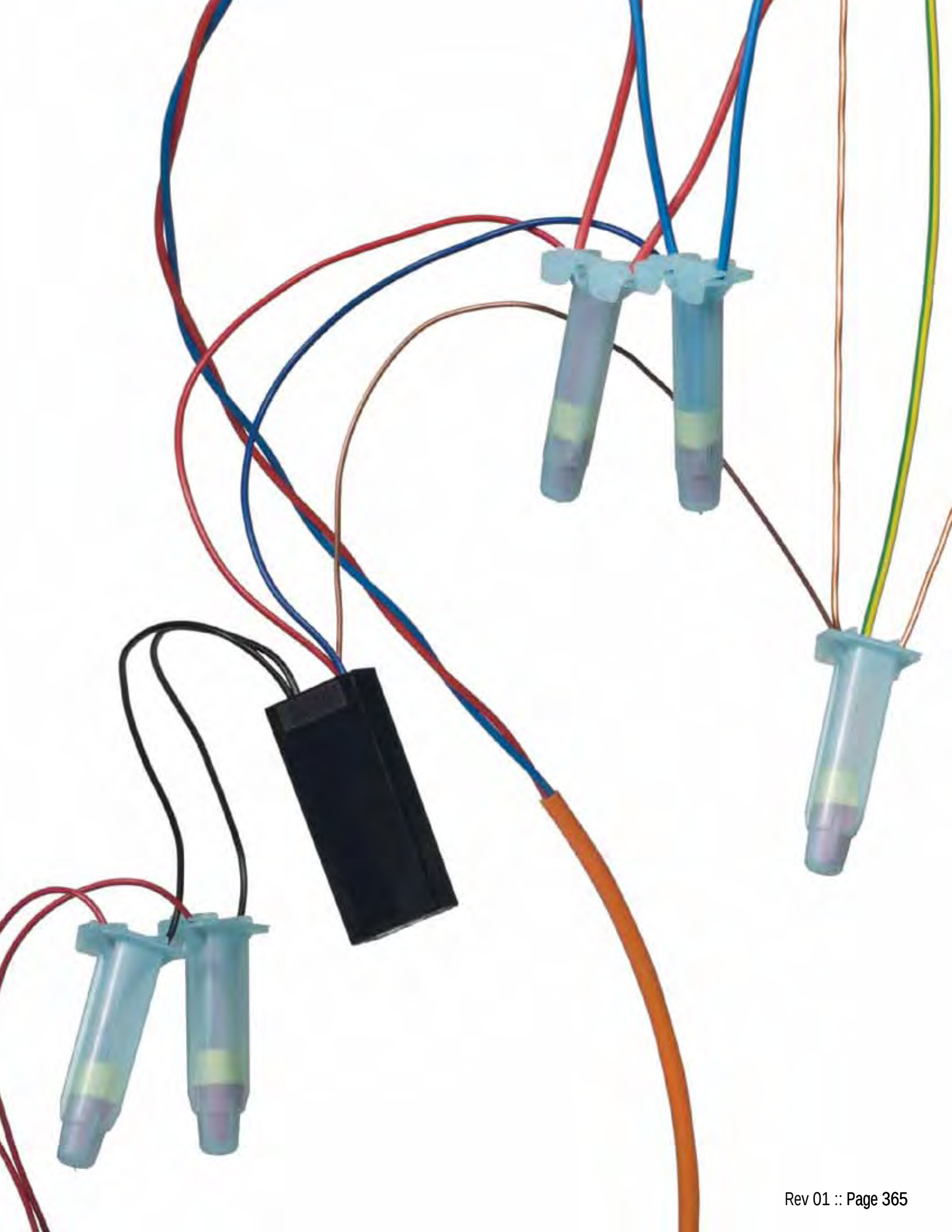
 Phone : 13 18 40
Iplex Civil: 13 18 86
 Fax : 13 18 60
Email : sales@iplexpipelines.com.au
 www.iplex.com.au

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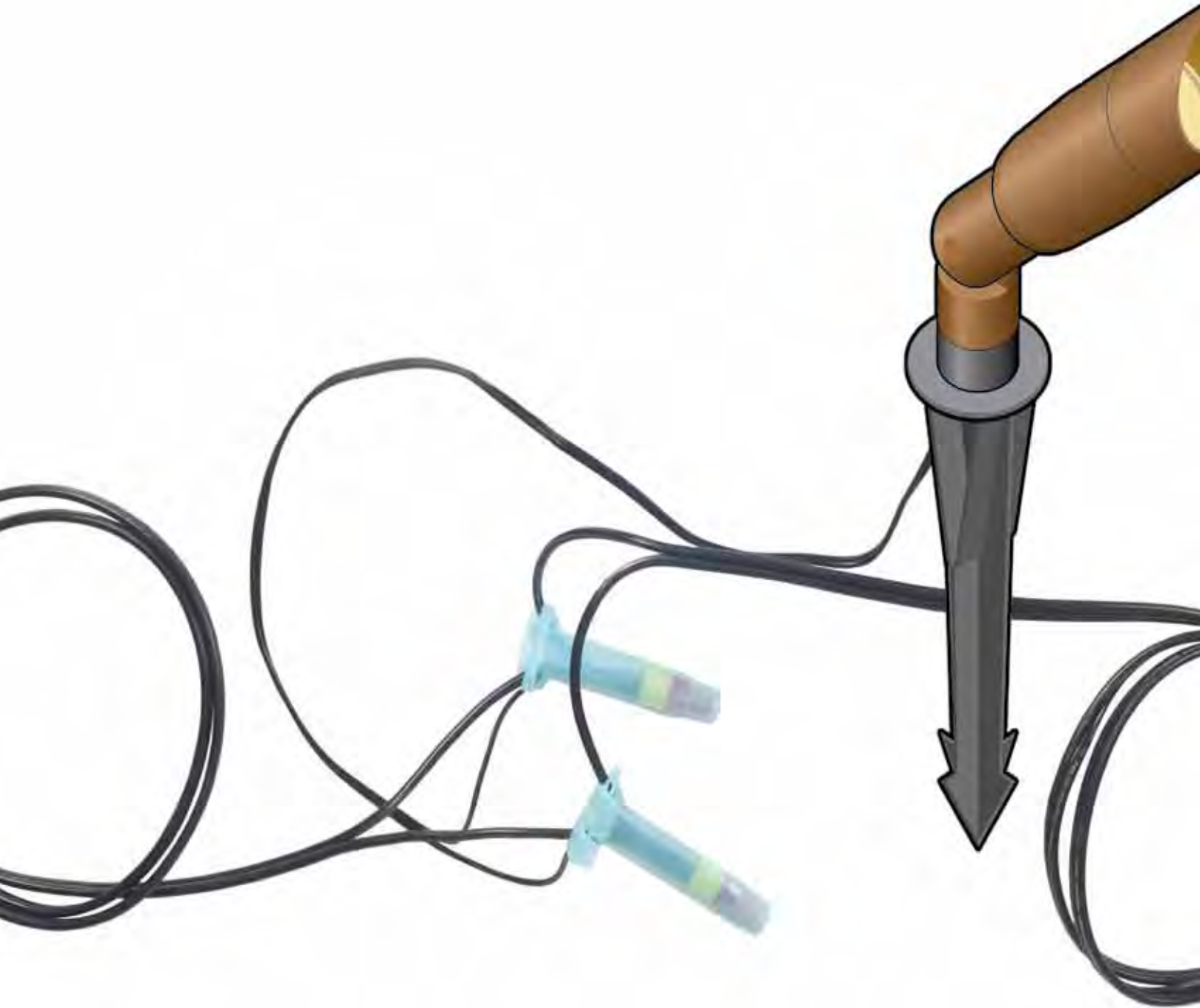
CATALOG & WIRING GUIDE





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Why Paige® ?

Because you need irrigation and lighting wires and cables made for professional use from a company:

Who understands where you're coming from

Who covers the total spectrum of your cable and accessory needs

Who can talk-the-talk with your people

Who from coast-to-coast maintains the industry's largest, most comprehensive stock so your customers' needs are met promptly



Because you need one-to-one service:

From someone who answers the phone when you call.

Who's obsessed with personal, immediate response, and service.

Someone who delivers the hard-to-find items.

Someone who will develop new wires & cables to meet your needs.

Someone who will stock a cable, when others won't.

Someone with fast, same-day shipping.

Who's easy to do business with – your  **Paige®** ally.

Who takes your business personally.



INSTALLATION TIPS FOR WIRE & CABLE

Wire and cable burial depth is dictated by the National Electrical Code®. Temperature changes cause wires and cables to expand and contract as much as 1% of the length. And high voltage power lines create large electro-magnetic fields that cause interference and corrupt signals in communication lines. It is therefore necessary to take certain precautions when installing these products.

Wires and cables carrying up to 30 volts should be installed at a minimum burial depth of 6". If mechanical equipment, such as aerifiers and shovels, is expected to disturb the area, then the wires and cables should be installed at a minimum depth of 12". For wires and cables carrying more than 30 volts and less than 600 volts, the minimum burial should be 24".

For irrigation controller output cables carrying more than 30 volts, where the controller is listed as a "Power Limited Power Source" (Class 2 or Class 3), the burial depth is elective, although a minimum of 12" is recommended.

When installing wires and cables in a trench, they must be "snaked" so that some slack is created. At points along the trench where there are sharp bends, a loop of 12" to 24" shall be created to allow shrinkage. When communication cables are in the same trench as power wires, there shall be a minimum separation between them of 12".

POWER WIRES for 120 VAC or 240 VAC Single Phase power sources to irrigation controllers (choose one of the following):

SINGLE CONDUCTORS, TYPE UF – This type of wire is a general purpose, direct burial, product that is widely used on all kinds of irrigation systems. Available from 14 AWG up to 1/0 AWG. See specification number P7001D for available colors and stripes. Detailed color code requirements are available from the American Society of Irrigation Consultants, ASIC Guideline 102-2004 (www.asic.org, "Design Guides".)



All branch circuit wires shall be type UF and sized according to the irrigation system plans. They are to be UL® listed for direct burial, and rated at 600 volts. The copper conductors shall be insulated with PVC and colored as follows:

120-volt system		240-volt system	
Hot	Black	Hot (Line 1)	Black
Neutral	White	Hot (Line 2)	Red
Equipment ground	Green	Equipment ground	Green

Paige Electric Co., LP specification number P7001D (<http://www.paigewire.com/specs/P7001D.htm>)

SINGLE CONDUCTORS, TYPE THWN – This type of wire is used in applications where the end user requires a high degree of safety and it must be installed in conduit. Available from 14 AWG up to 1000MCM AWG. See specification number P7316 for available colors. Detailed color code requirements are available from the American Society of Irrigation Consultants, ASIC Guideline 102-2004 (www.asic.org, "Design Guides".)



All branch circuit wires shall be type THWN and sized according to the irrigation system plans. These wires must be installed in conduit. The wires shall not occupy more than 40% of the cross-sectional area of the inner diameter of the conduit. They are to be UL® listed for in-conduit installations in wet applications, and rated at 600 volts. The copper conductors shall be insulated with PVC/Nylon and colored as follows:

120-volt system	
Hot	Black
Neutral	White
Equipment ground	Green

240-volt system	
Hot (Line 1)	Black
Hot (Line 2)	Red
Equipment ground	Green

Paige Electric Co., LP specification number P7316 (<http://www.paigewire.com/specs/P7316.htm>)

TYPE UF-B CABLE (120 VAC SYSTEMS ONLY) – This type of cable facilitates installation since the three conductors are installed within an outer jacket, which gives the cable more robust qualities. Available from 14 AWG/2c-with ground up to 6 AWG/2c-with ground.



All branch circuit power cables shall be type UF-B. They are to be UL® listed for direct burial, and rated at 600 volts. The cable shall include "three conductors". The inner copper conductors shall be insulated with high dielectric PVC and Nylon. The outer jacket will be gray PVC and is to be sunlight resistant. The inner conductors are colored black, white, and bare copper.

Paige Electric Co., LP specification number P7295D
(<http://www.paigewire.com/specs/P7295D.htm>)

TYPE TRAY CABLE – This type of cable is widely used on large projects such as golf courses, parks, schools, commercial and industrial sites, cemeteries, etc., because of its ease of installation and toughness at a reasonable price. Available from 14 AWG/3c up to 4/0 AWG/3c. Detailed color code requirements are available from the American Society of Irrigation Consultants, ASIC Guideline 102-2004 (www.asic.org, “Design Guides”).



All branch circuit power cables shall be type Tray Cable. They are to be UL® listed for direct burial, and rated at 600 volts. The cable shall include “three conductors” (for 120 or 240 volt circuits.) The inner copper conductors shall be insulated with high dielectric PVC and Nylon. The outer jacket will be black PVC and is to be sunlight resistant. The inner conductors are colored (usually blue, red and black) or numbered (1, 2, and 3.) Inner conductors shall be color-coded at every splice and termination using Vinyl Electrical Color Coding Tape (3M #35) to National Electrical Code® and electrical industry standards, as per the chart below:

Conductor Color	Branch Circuit	
	120-volt	240-volt
	Tape Color	
Black	none	none
Red	white	none
Blue	green	green

For cables with colored inner conductors, color coding shall be executed as follows (note that color coding is different for 120-volt and 240-volt systems):

Conductor Color	Branch Circuit	
	120-volt	240-volt
	Tape Color	
Black (1)	none	none
Red (2)	white	red
Blue (3)	green	green

For cables with numbered inner conductors, color coding shall be executed as follows (note that color coding is different for 120-volt and 240-volt systems):

Paige Electric Co., LP specification number P7266D (<http://www.paigewire.com/specs/P7266D.htm>) for 10 AWG and smaller and specification number P7267D (<http://www.paigewire.com/specs/P7267D.htm>) for 8 AWG and larger.

CONTROL VALVE WIRES for 24 VAC (nominal) circuits (choose one of the following):

SINGLE CONDUCTORS, TYPE UF – This type of wire is a general purpose, direct burial, product that is widely used on all kinds of irrigation systems. Available from 14 AWG up to 1/0 AWG. See specification number P7001D for available colors and stripes.



Wires connecting the remote control valves to the irrigation controller shall be single conductors, type UF. Its construction incorporates a solid copper conductor and PVC insulation. The wires shall be UL® listed for direct burial in irrigation systems and be rated at a minimum of 30 VAC. Wire sizes and colors are defined in the irrigation plans and other specifications.

Paige Electric Co., LP specification number P7001D (<http://www.paigewire.com/specs/P7001D.htm>)

Note: White wires (or white with different color stripes) should be used only as the "common". Green wire should not be used since this color is strictly reserved for the "equipment ground" of the power source. All other colors can be used as common or hot.

SINGLE CONDUCTORS, TYPE PE – This type of wire was specifically designed for the harsh conditions of landscape projects where chemicals such as fertilizers, herbicides, pesticides, and fungicides are frequently applied. This product is excellent for these applications. See specification number P7079D for available colors and stripes.



Wires connecting the remote control valves to the irrigation controller shall be single conductors, type PE. Its construction incorporates a solid copper conductor and polyethylene (PE) insulation. The wires shall be UL® listed for direct burial in irrigation systems and be rated at a minimum of 30 VAC. Wire sizes and colors are defined in the irrigation plans and other specifications.

Paige Electric Co., LP specification number P7079D (<http://www.paigewire.com/specs/P7079D.htm>)

Note: White wires (or white with different color stripes) should be used only as the "common". Green wire should not be used since this color is strictly reserved for the "equipment ground" of the power source. All other colors can be used as common or hot.



"18-MULTI" – This is a cable with varying numbers of 18 AWG conductors, ranging from 2 to 25. It is used primarily in residential and small commercial irrigation projects.

The irrigation cable shall incorporate enough wires to accommodate all the valves it is designed to control, plus some spares for future expansion. For example, if the cable will activate 6 valves, then the number of wires needed is: 6 hot + 1 common + 2 spares = 9 wires. This cable would be called out as 18 AWG/9c. The construction shall include insulated solid copper conductors and an overall PE jacket. The cable shall be UL® listed for direct burial.

Paige Electric Co., LP specification number P7183D (<http://www.paigewire.com/specs/P7183D.htm>)

COMMUNICATION CABLES (choose one of the following):



Compatible with **Toro SYSTEMS** – Typically uses a 16 AWG/1-pair cable. It is available as shielded or shielded/armored. The latter is rodent and lightning resistant. (Choose one of the following):

SHIELDED – The communication cable shall be 16 AWG/1-pair. The construction shall include tin coated copper conductors, an aluminum shield to prevent cross-talk, a drain wire for grounding the cable, and an overall PE jacket. The cable shall be UL® listed for direct burial.

Paige Electric Co., LP specification number P7162D (<http://www.paigewire.com/specs/P7162D.htm>)

SHIELDED AND ARMORED - The communication cable shall be 16 AWG/1-pair. The construction shall include tin coated copper conductors, an aluminum shield to prevent cross-talk, a drain wire for grounding the cable, a stainless steel tape (also to be grounded) helically wrapped around the pair of wires, and an overall PVC jacket. The cable shall be UL® listed for direct burial.

Paige Electric Co., LP specification number P7162D-A (<http://www.paigewire.com/specs/P7162D-A.htm>)



Compatible with **RAIN BIRD SYSTEMS** – Typically uses a 14 AWG/2c or 12 AWG/2c “Maxi” cable, or 19 AWG/multi-pair cable for “Maxicom” systems. Rain Bird allows Maxicom cable to be any of the following types: PE-39, PE-54, or PE-89. See specification number P7072D for available outer jacket colors of Maxi cable.

MAXI CABLE - The communication cable shall be 14 AWG/2c or 12 AWG/2c “Maxi” cable as shown on the irrigation plans and specifications. The cable shall include two type UF wires with a PE outer jacket. The colors of the outer jacket shall be as called-for in the irrigation plans and specifications.

Paige Electric Co., LP specification number P7072D (<http://www.paigewire.com/specs/P7072D.htm>)

MAXICOM CABLE - The communication cable shall be 19 AWG with a minimum of 3-pairs (or 6-pairs or 12-pairs, etc.) The cable construction shall be type PE-39 or PE-54 or PE-89. Paige Electric Co., LP specification number P7073D (for PE-89) or P7315D (for PE-39 & PE-54)

(<http://www.paigewire.com/specs/P7073D.htm> and <http://www.paigewire.com/specs/P7315D.htm>)



Compatible with **HUNTER SYSTEMS, WEATHER STATIONS, SENSORS, TELEPHONE LINES, ETC** – Typically use an 18 AWG/2-pair cable. It is available as shielded or shielded/armored. The latter is rodent and lightning resistant. (Choose one of the following):

SHIELDED – The communication cable shall be 18 AWG/2-pair. The construction shall include tin coated copper conductors, an aluminum shield to prevent cross-talk, a drain wire for grounding the cable, and an overall PE jacket. The cable shall be UL® listed for direct burial.

Paige Electric Co., LP specification number P7171D (<http://www.paigewire.com/specs/P7171D.htm>)

SHIELDED AND ARMORED - The communication cable shall be 18 AWG/2-pair. The construction shall include tin coated copper conductors, an aluminum shield to prevent cross-talk, a drain wire for grounding the cable, a stainless steel tape (also to be grounded) helically wrapped around the pairs of wires, and an overall PVC jacket. The cable shall be UL® listed for direct burial.

Paige Electric Co., LP specification number P7171D-A (<http://www.paigewire.com/specs/P7171D-A.htm>)

Rain Bird, Maxi and Maxicom are trademarks of Rain Bird Corporation; Toro is a trademark of The Toro Company; Hunter is a trademark of Hunter Industries Inc.

DECODER AND 2-WIRE/2-CORE CABLES – Custom cables have been designed by Paige Electric for various manufacturers of decoder systems, each somewhat different. (choose one of the following):



Compatible with **TORO SYSTEMS** – This is a cable with 2 twisted wires, so that they stay together during the installation process and offer some opposition to electrical flow during lightning strikes. It includes a tough High Density Polyethylene red outer jacket for additional mechanical strength. The outer jacket is a loose tube that slides off easily when being removed and is available with several colors of stripes to facilitate circuit identification. This cable is specifically designed for the harsh conditions of landscape projects where chemicals such as fertilizers, herbicides, pesticides, and fungicides are frequently applied. Available in 14 AWG/2c construction.

The decoder cable shall consist of 2 wires, twisted together. Its construction shall incorporate solid copper conductors with PE insulation. A loose tube-High Density Polyethylene jacket shall cover the twisted wires. The jacket color/stripes shall be such as to facilitate the identification of the various zones. The wires shall be UL® listed for direct burial in irrigation systems and be rated at a minimum of 600 VAC. Wire sizes are defined in the irrigation plans and other specifications. Paige Electric Co., LP specification number P7350 (<http://www.paigewire.com/specs/P7350D.htm>)



Compatible with **RAIN BIRD, BASELINE, AND UNDERHILL SYSTEMS** – These decoder systems utilize 14 AWG/2c or 12 AWG/2c “Maxi” cable. See specification number P7072D for available outer jacket colors of Maxi cable. The decoder cable shall be 14 AWG/2c or 12 AWG/2c “Maxi” cable as shown on the irrigation plans and specifications. The cable shall include two type UF wires with a PE outer jacket. The colors of the outer jacket shall be as called-for in the irrigation plans and specifications. Paige Electric Co., LP specification number P7072D (<http://www.paigewire.com/specs/P7072D.htm>)



Compatible with **HUNTER SYSTEMS** – These cables feature 2 twisted wires, so that they stay together during the installation process and offer some opposition to electrical flow during lightning strikes. They are also available with a tough High Density Polyethylene outer jacket for additional mechanical strength. The outer jacket is a loose tube that slides off easily when being removed and is available in 6 different colors per size to facilitate circuit identification. This cable is specifically designed for the harsh conditions of landscape projects where chemicals such as fertilizers, herbicides, pesticides, and fungicides are frequently applied. Available in 14 AWG/2c and 12AWG/2c constructions.

WITHOUT OUTER JACKET: The decoder cable shall consist of 2 wires, twisted together. Its construction shall incorporate solid copper conductors with an extra-thick PE insulation with a minimum wall thickness of 0.060”. Paige Electric Co., LP specification number P7313 (<http://www.paigewire.com/specs/P7313.htm>)

WITH OUTER JACKET: The decoder cable shall consist of 2 wires, twisted together. Its construction shall incorporate solid copper conductors with PE insulation. A loose tube-High Density Polyethylene jacket shall cover the twisted wires. The jacket colors shall be such as to facilitate the identification of the various zones. Paige Electric Co., LP specification number P7354D (<http://www.paigewire.com/specs/P7354D.htm>)



Compatible with **TUCOR BASELINE, AND UNDERHILL SYSTEMS** – These decoder systems utilize 18 AWG/2c or 16 AWG/2c or 14 AWG/2c cable, with a green outer jacket.

The decoder cable shall be 18 AWG/2c or 16 AWG/2c or 14 AWG/2c cable as shown on the irrigation plans and specifications. The cable shall include two type LE wires with a PE outer jacket. Paige Electric Co., LP specification number P7296D (<http://www.paigewire.com/specs/P7296D.htm>)

NOTE: John Deere and Signature allow any of the above. Decoder cables for other manufacturers are also available.

Rain Bird, Maxi and Maxicom are trademarks of Rain Bird Corporation; Toro is a trademark of The Toro Company; Hunter is a trademark of Hunter Industries Inc; Tucor is a trademark of Tucor, Inc.; Baseline is a trademark of Baseline, Inc.; Underhill is a trademark of Underhill International Corp.

DECODER-TO-SOLENOID (DTS) CABLE™

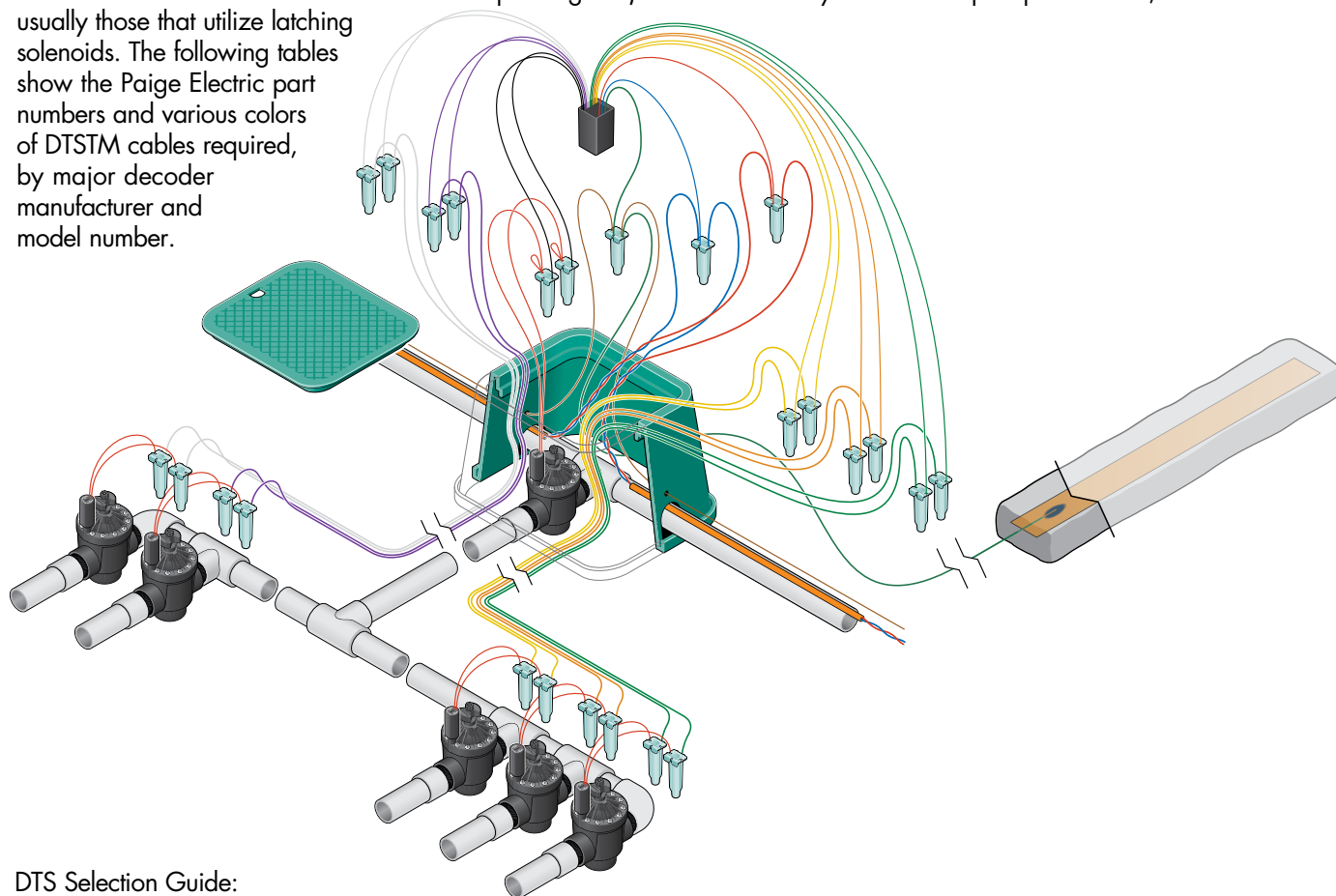
The decoder wiring inside valve boxes can be complicated, especially with multiple output decoders. Each decoder has uniquely colored pairs of output wires. Paige Electric offers ten colors of DTS™ cables to allow the user to match them to the decoder wires, which saves time and ensures the job is done right the first time.

These cables feature a two conductor parallel design, held together by a thin web during the installation process.



The two conductors can be easily separated when making splices. The insulation of one wire is ridged while the other is smooth (with a print legend.) This is ideal for systems that require polarization,

usually those that utilize latching solenoids. The following tables show the Paige Electric part numbers and various colors of DTSTM cables required, by major decoder manufacturer and model number.



DTS Selection Guide:

Hunter	No of Outputs	Green 170803GN	Orange 170803OG	Black 170803BK	Yellow 170803YL	White 170803WT	Purple 170803PR
ICD-100	1			•			
ICD-200	2			•	•		
ICD-300	4	•		•	•	•	
ICD-400	6	•	•	•	•	•	•

Rain Bird	No of Outputs	Red 170803RD	Brown 170803BN	Gray 170803GY	Orange 170803OG	Black 170803BK	White 170803WT
FD-101	1						•
FD-102							•
FD-202	2		•				•
FD-401	4	•	•		•	•	
FD-601	6	•	•	•	•	•	•

Toro	No of Outputs	Red 170803RD	Blue 170803BU	Green 170803GN	Orange 170803OG
DEC-1	1	•			
CDEC-1					
DEC-2	2			•	•
CDEC-2					
DEC-4	4	•	•	•	•
CDEC-4					

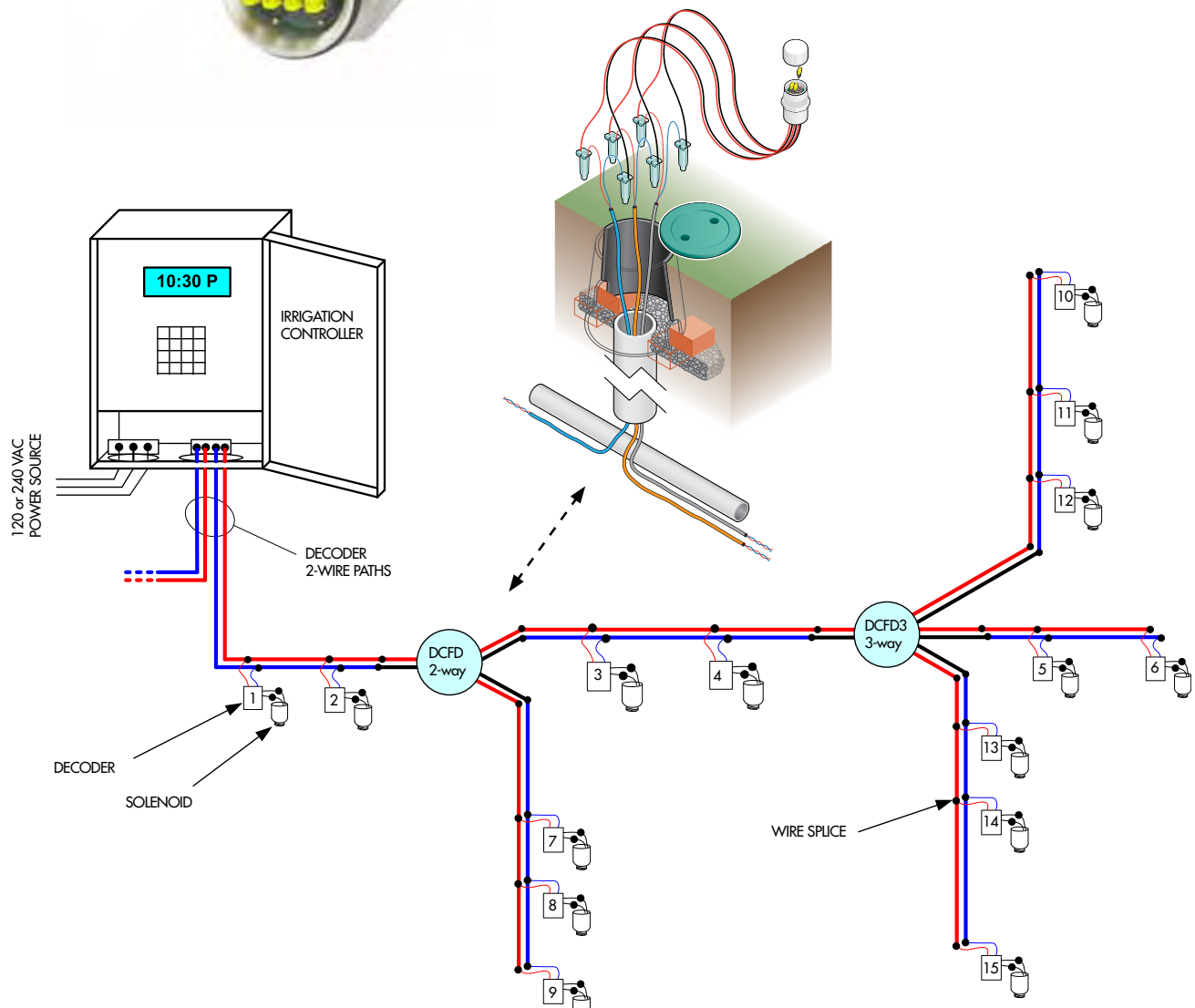
Hunter is a trademark of Hunter Industries Inc.
Rain Bird is a trademark of Rain Bird Corporation.
Toro is a trademark of The Toro Company.

Paige Electric Co. LP specification number P7351D (<http://www.paigewire.com/specs/p7351D.htm>)

DECODER CABLE FUSE DEVICES (DCFD)TM



These products were specifically designed as electrical isolation devices to help with troubleshooting of damaged or non-functioning 2-Wire irrigation systems. Single or multiple sections of the electrical circuit can be disconnected or isolated by simply removing a fuse, without cutting wires or undoing splices/joints. Patent Pending.



Paige® grounding systems

PROTECTING ELECTRONIC EQUIPMENT FROM LIGHTNING AND POWER SURGES

Electronic irrigation equipment should be grounded to the earth, and bonded, in accordance with the requirements of the NEC®. Bonding wires should be installed so that they act as a shield to protect the wires in the trench from lightning strikes. Lightning arresters should be incorporated into the electronic equipment if not already supplied by its manufacturer. Below are specific details and recommendations from Paige Electric.



LIGHTNING ARRESTERS

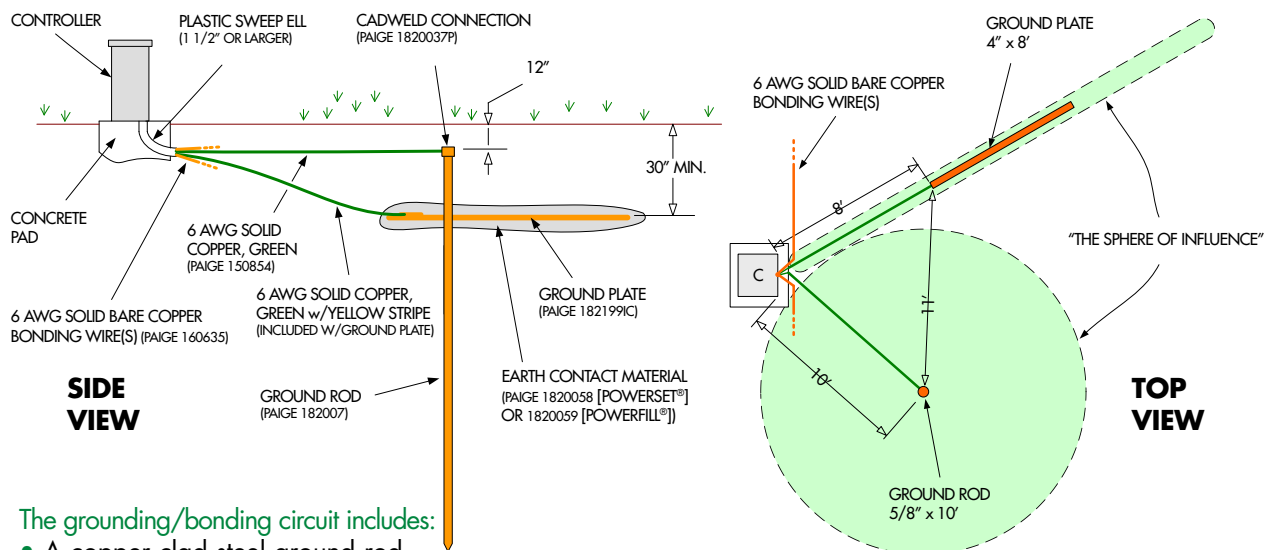
Most irrigation controllers are supplied with lightning protection on the secondary circuits, but not on the incoming power wires.

The Paige Electric 250090LED arrester can be used to protect the controller from surges coming from the 120 or 240 Vac wires. This arrester incorporate a visible green LED to indicate that the unit is ready to fire in case of a power or lightning surge. It should be replaced when the LED is not lit.

http://www.paigewire.com/Specs/lightning_arresters.htm

GROUNDING CONTROLLERS

The following details are the minimum requirement for supplementary grounding and bonding of any irrigation controller, weather station, interface, etc. Other details, for a multitude of field situations, are available from the American Society of Irrigation Consultants, ASIC Guideline 100-2002 (www.asic.org, "Design Guides".)



The grounding/bonding circuit includes:

- A copper clad steel ground rod
- A solid copper ground plate
- Two 50-pound bags of Earth Contact Material [PowerSet® for loose soils or PowerFill® (lower cost) for clay soils]
- 6 AWG solid bare copper Bonding wires
- "Cadweld" connectors for the ground rod and bonding wire joints

The grounding of an irrigation controller is referred to by NEC® as "Supplementary or Auxiliary grounding." And for safety reasons, the NEC® requires that all supplementary grounds be "bonded" to each other and to the service entrance ground (power source) as shown below.

The diagram illustrates the correct wiring for a bonding jumper between a service entrance and an irrigation controller. On the left, a grey box represents the 'SERVICE ENTRANCE'. It contains a 'POWER SOURCE FROM UTILITY COMPANY' (indicated by a vertical line with three dots) and a 'BONDING JUMPER' (a black rectangle). A green wire (equipment ground) runs from the power source, through the bonding jumper, to the irrigation controller. A black wire (line or hot) and a white wire (grounded conductor or neutral) also run from the service entrance to the controller. On the right, a green vertical cylinder represents the 'IRRIGATION CONTROLLER (120 VAC SOURCE)'. It is connected to the black and white wires. A green wire (equipment ground) runs from the controller back to the service entrance. An orange wire (bonding conductor) runs from the controller's base to a 'SUPPLEMENTARY GROUND' (indicated by a ground symbol). A label 'TO OTHER CONTROLLERS' with an arrow points to the right, indicating the path for other wiring. The bottom of the diagram is labeled 'EARTH GROUND BY THE UTILITY COMPANY' and 'SUPPLEMENTARY GROUND'.

SHIELDING UNDERGROUND WIRES AND CABLES

TRENCH CROSS SECTION

Diagram illustrating the cross-section of a trench. The trench is filled with a material (likely sand or gravel) and contains a large blue circular object labeled **PIPE**. The trench is lined with a material (likely concrete or steel) and has a depth of approximately 12 inches (~12"). The trench is also labeled **SEE SPEC** (See Specification). The trench is filled with a material (likely sand or gravel) and contains a large blue circular object labeled **PIPE**. The trench is lined with a material (likely concrete or steel) and has a depth of approximately 12 inches (~12"). The trench is also labeled **SEE SPEC** (See Specification).

Labels and components shown in the diagram:

- TRENCH CROSS SECTION** (Title)
- ~12"** (Trench depth)
- SEE SPEC** (Reference to specification)
- PIPE** (Large blue circular object)
- BOND/SHIELD WIRE** (Orange dot)
- COMMUNICATION CABLE** (Cable with two conductors)
- VALVE WIRES** (Cluster of wires)
- POWER CABLE** (Cable with three conductors)

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GROUNDING DECODER CIRCUITS

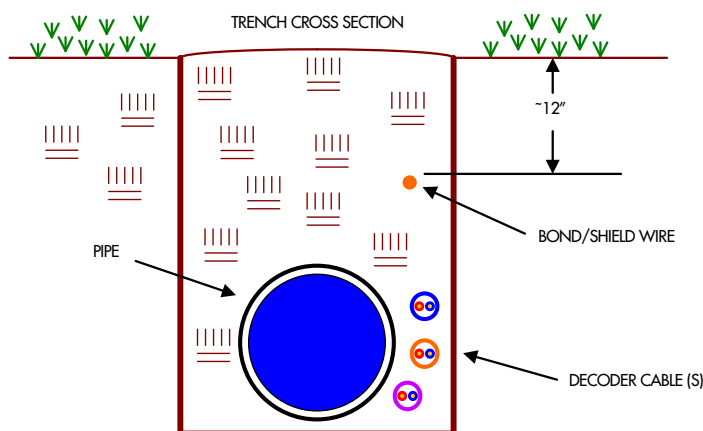
In decoder systems, the lightning protection/arresters are either built into the decoder or they are wired externally, depending on the manufacturer. Without lightning arresters, the decoders are vulnerable to lightning damage. In order for these arresters to discharge lightning energy efficiently, they must be grounded.

BONDING & SHIELDING DECODER CIRCUITS

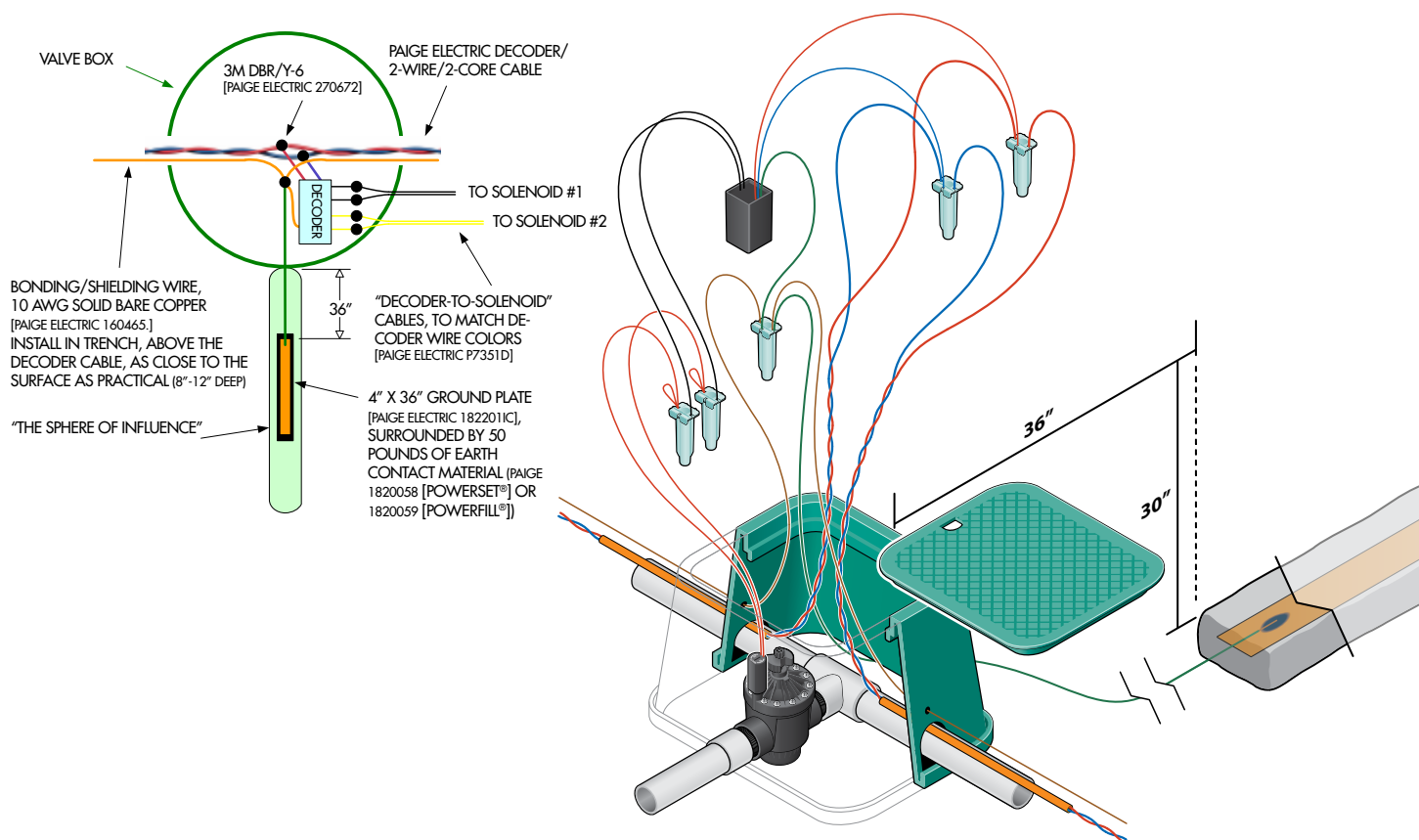
It is important to maintain the same voltage at all points of the two wire path in order to minimize lightning damage.

The technique known as “bonding” is used to accomplish this by using a 10 AWG solid bare copper wire to interconnect all the decoder ground grids. This bonding wire can be used to “shield” the two wire paths from lightning energy by placing it directly (and-centered) above all the cables in the trench.

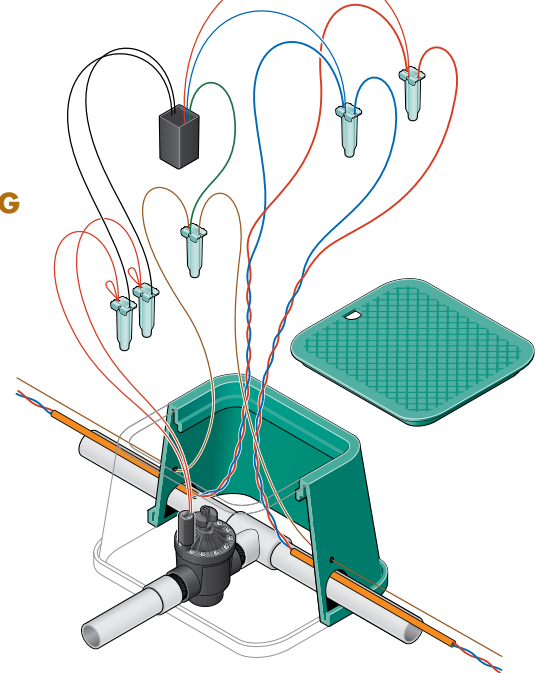
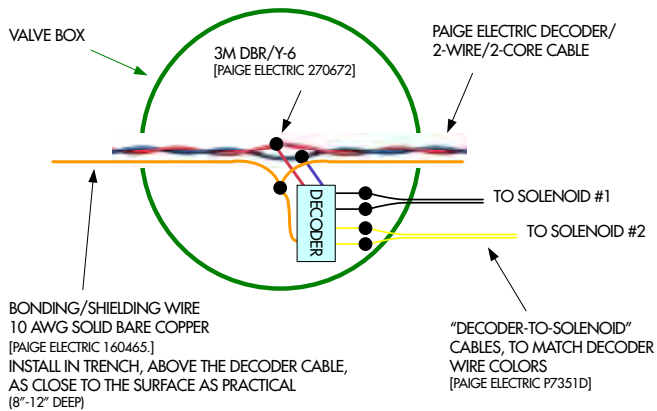
Here are typical recommended grounding grids for decoder and 2-Wire/2-Core systems, with internal and external lightning arresters:



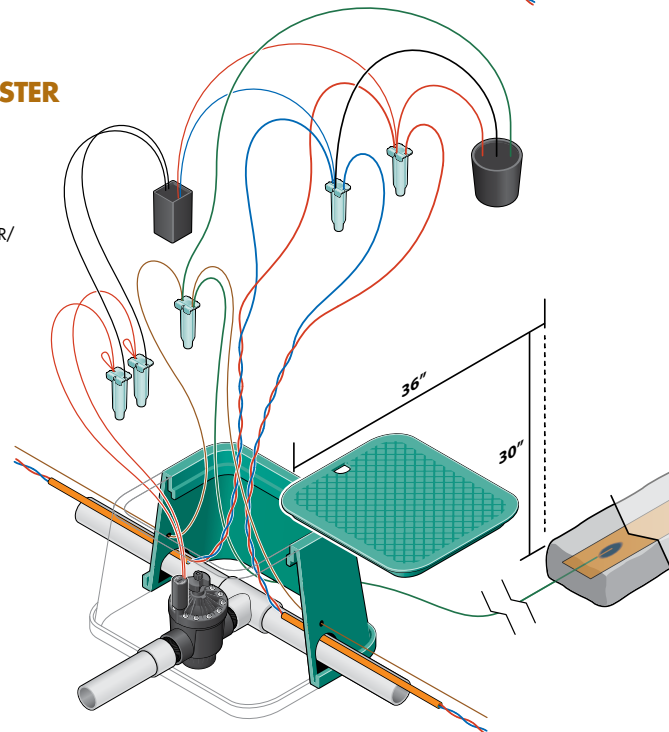
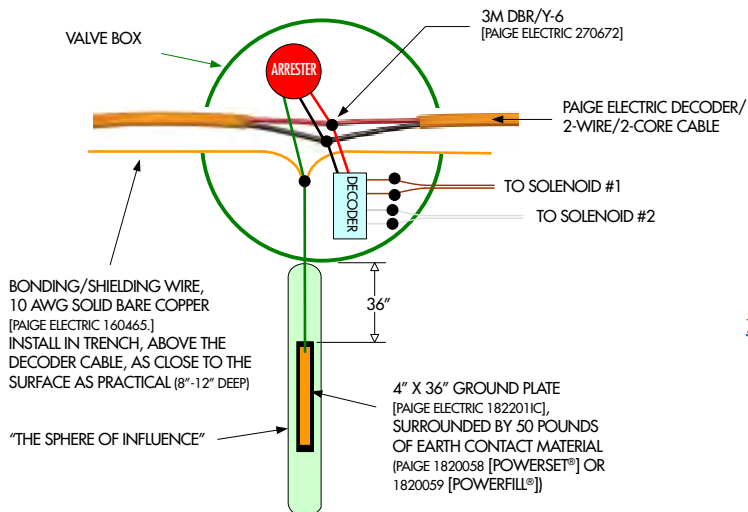
DECODERS WITH GROUND WIRES & INTERNAL LIGHTNING ARRESTER, GROUNDED:



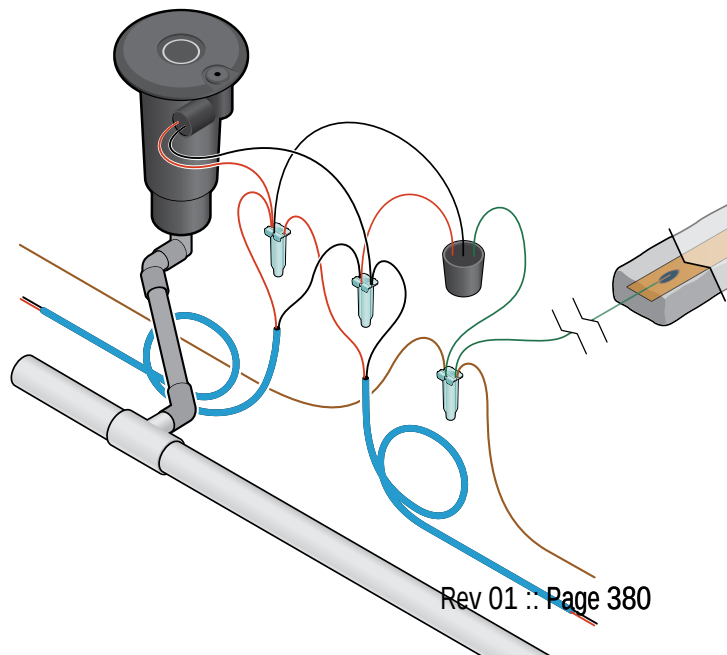
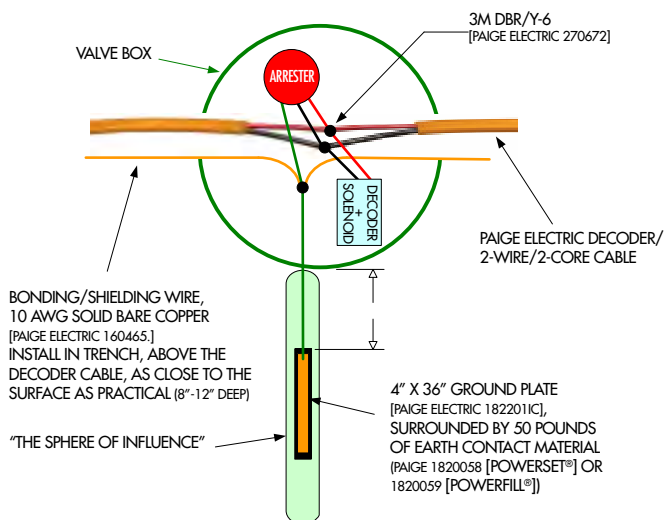
DECODERS WITH GROUND WIRES & INTERNAL LIGHTNING ARRESTER, NOT GROUNDED:



DECODERS PROTECTED BY EXTERNAL LIGHTNING ARRESTER



2-WIRE/2-CORE SYSTEMS WITH INTEGRATED DECODER & SOLENOID



GROUNDING/BONDING/SHIELDING COMPONENTS

Paige Part No.	Description
250090LED	Lightning Arrester with LED indicator
182199IC	4" x 96" x 0.064" Ground plate for controllers
182201IC	4" x 36" x 0.064" Ground plate for 2-Wire/2-Core circuits
182000	5/8" Diameter x 8' Long Ground rod
182007	5/8" Diameter x 10' Long Ground rod
182005	5/8" Ground rod clamp
160465	10 AWG solid bare copper wire
160635	6 AWG solid bare copper wire
150854	6 AWG solid copper, green ground wire
1820058	PowerSet™ Earth Contact Material
1820059	PowerFill™ Earth Contact Material
1820037P	Cadweld connector for one 6 or 8 AWG joint to a ground rod
1820074P	Cadweld connector for up to four 6 or 8 AWG bonding wires
1820040CU	Control Unit for igniting Cadweld



A more extensive list of available components can be viewed at:

Paige Electric Co., LP specification number DCFD (<http://www.paigewire.com/specs/P7345D.htm>)

INSTALLATION TIPS FOR GROUNDING, BONDING, AND SHIELDING

Proper installation and maintenance of grounding, bonding, and shielding components is a critical part of the effectiveness of the grid in order to protect electronic equipment from lightning and power surges.

The ground grid components shall be installed with the dimensional relationships shown in the details above. WIRES, CABLES, AND ELECTRONIC EQUIPMENT MUST BE INSTALLED OUTSIDE "THE SPHERE OF INFLUENCE" OF THE GROUNDING ELECTRODES.

All underground splices to ground rods and bonding conductors are to be made using Cadweld "One-Shot" kits.

The ground rod has a minimum diameter of 5/8" (16 mm) and a minimum length of 10 feet (3.05 m.) These are to be driven into the ground in a vertical position. Or at a angle of up to 45 degrees. [Paige Electric part number 182007.]

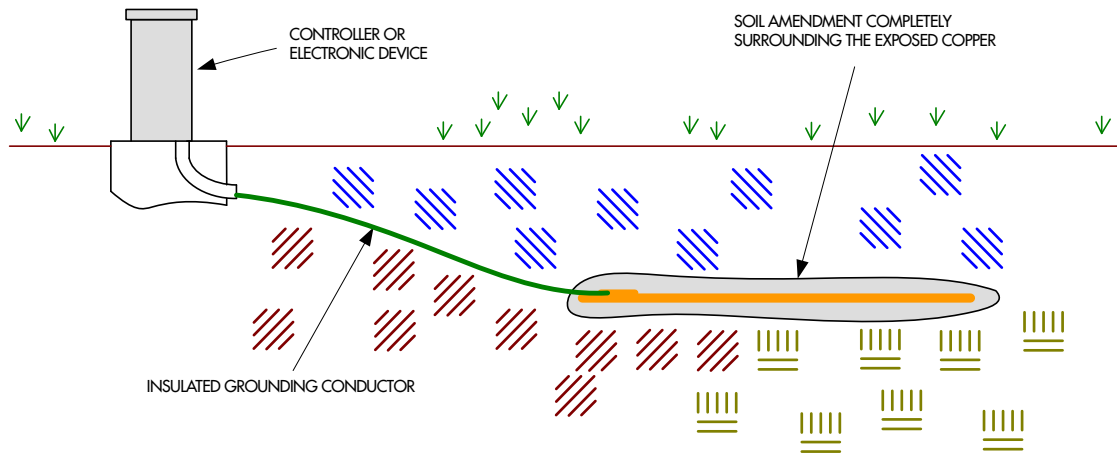
Copper ground plates are made of a copper alloy intended for grounding applications and have minimum dimensions as follows:

- **For grounding controllers** - 4" x 8' x 0.0625" (101.6 mm x 2.44 m x 1.6 mm.) A 25-foot (7.62 m) continuous length of 6 AWG, green insulated, with extruded yellow stripe, solid bare copper wire is welded to the plate. [Paige Electric part number 182199IC]
- **For grounding decoders and 2-Wire/2-Core circuits** - 4" x 3' x 0.0625" (101.6 mm x 2.44 m x 0.9 mm.) A 10-foot (3.05 m) continuous length of 10 AWG, green insulated, with extruded yellow stripe, solid bare copper wire is welded to the plate. [Paige Electric part number 182201IC]

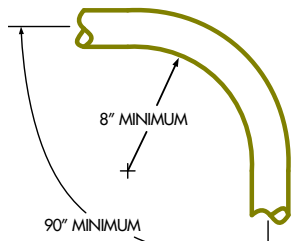
The ground plates are to be installed to a minimum depth of 30" (76 cm), or below the frost line if it is lower than 30".

A 6 AWG, green insulated, solid bare copper wire [Paige Electric part number 150854], about 12 feet (3.66 m) long (and continuous) is to be connected to the ground rod using a Cadweld GR1161GPLUS "One-Shot" welding kit [Paige Electric part number 1820037P.] This wire shall be brought into the electronic equipment for connection. Mechanical ground rod clamps may be used temporarily during the resistance test process, but are to be replaced with Cadweld connections immediately thereafter.

Two 50-pound bags of PowerSet® [Paige Electric part number 1820058] "Earth Contact Material" must be spread so that it surrounds and the 8-foot copper plate evenly along its length within a 6" (152 mm) wide trench. Use one bag only for the installation of 3-foot ground plates. Salts, fertilizers, bentonite clay, cement, coke, carbon, and other chemicals are not to be used to improve soil conductivity because these materials are corrosive and will cause the copper electrodes to erode and become less effective with time. It is important that the Earth Contact Material completely surrounds the ground plate and 6" (152 mm) of the insulation of the green wire, as shown in the detail, in order to minimize corrosion.



Install all grounding circuit components in straight lines and simple geometry. When necessary to bend wires, make sweeping turns as shown. All grounding and bonding wires of electronic equipment must be fed through a **dedicated 1.5" (38.1 mm) plastic sweep ell**. "Sweep bends" must follow the guidelines shown here.

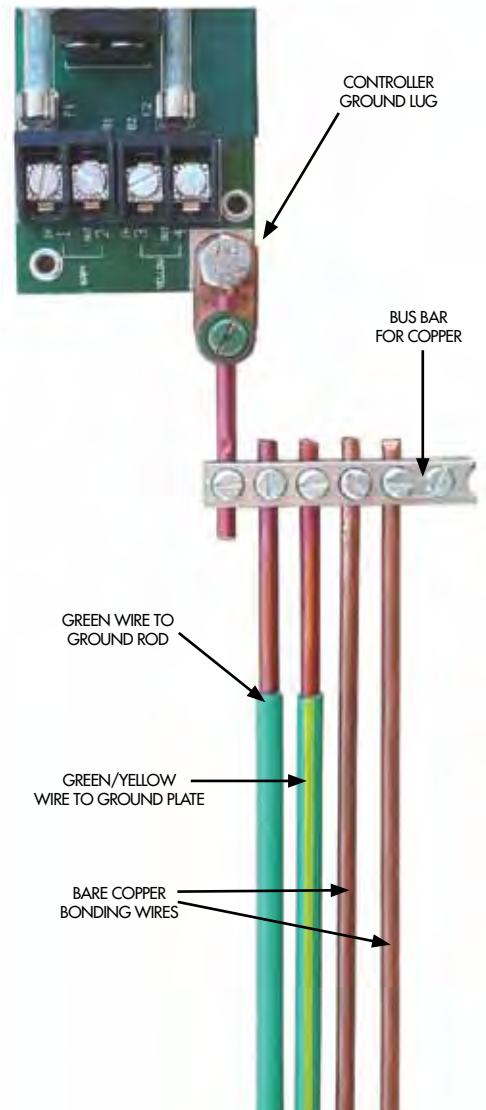


The 6 AWG bare copper wires are to be installed in as straight a line as possible, and if it is necessary to make a turn or a bend it shall be done in a sweeping curve with a minimum radius of 8" (203.2 mm) and a minimum included angle of 90°.

A convenient way to make connections to the controller ground lug is shown here. This type of installation, which utilizes a multi-position bus bar, allows for rapid connecting and disconnecting of desired wires in order to periodically take earth resistance readings of the individual grounding electrodes.

The earth-to-ground resistance should be measured at the time of installation using a "Megger", or other similar instrument, and the reading is to be no more than 10 Ohms. If the resistance is more than 10 ohms, additional ground plates and PowerSet® are to be installed using ASIC Guidelines 100-2002 (www.asic.org, "Design Guides".) It is required that the soil surrounding copper electrodes, within the Sphere of Influence, be kept at a minimum moisture level of 15% (by weight) at all times as dry soil does not conduct electricity.

ALL GROUNDING COMPONENTS MUST BE CONNECTED TO THE EQUIPMENT BEFORE ANY OTHER CONNECTION IS MADE.



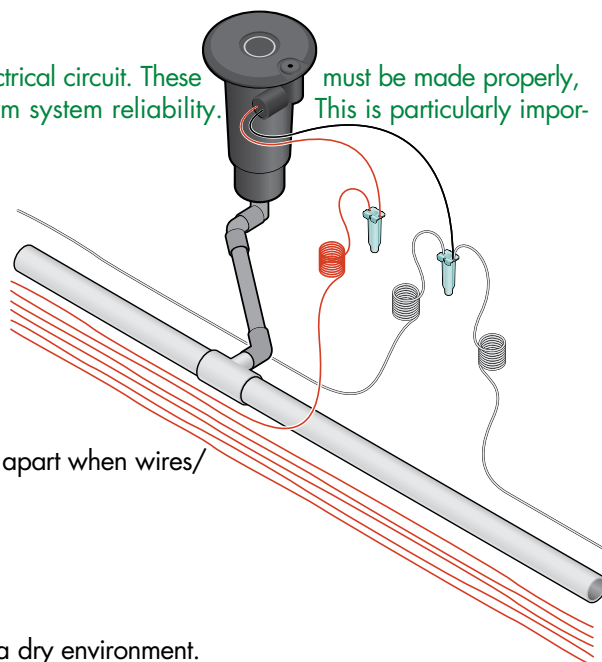


IRRIGATION WIRE & CABLE SPLICES

Connections (splices/joints) are the weak link of any electrical circuit. These with appropriate products, in order to ensure long term system reliability. must be made properly, This is particularly important in Decoder, 2-Wire, and 2-Core systems.

All electrical connections should incorporate:

1. A solid mechanical connection of the copper conductors using a UL-listed device (twist-on connector, split bolt, butt connector, insulation displacement connector, etc.)
2. Electrical insulation of the mechanical connection, if not part of the mechanical connector
3. A means to waterproof the insulated connection
4. "Strain relief" to prevent the connection from coming apart when wires/cables are pulled-upon
5. A design that is forgiving of human error



MECHANICAL CONNECTORS

These connectors are for above ground installations, in a dry environment. They can also be immersed in waterproof resins or gels for underground installations.



Twist-on connectors (aka wire nuts) – The new 3M "Performance Plus" connectors have an incredible bite. They grab the wires quickly and twist them together with ease. The wings make it easy on the fingers!

Split bolts – This type of connector is usually used when making electrical connections for irrigation power wires.

They are then wrapped with electrical or rubber tape before immersion into a waterproof resin bag (3M #4) or resin-filled plastic tube (3M 82A Series.)

Paige Electric Co., LP specifications (http://www.paigewire.com/Specs/wire_connectors.htm)



WATERPROOF CONNECTORS

These gel-filled connectors are used for above or below grade applications, in damp or wet environments.

DBR/Y-6 – This new connector from 3M incorporates the great features of a “Performance Plus” wire nut with the proven reliability of the DBY/DBR series that was the backbone of the irrigation industry for over 20 years. This UL-listed product (Direct Burial, file E102356) can be used with confidence on any irrigation system, especially 2-Wire/2-Core.



DB144 – This product was the recipient of the 2006 Irrigation Association Product of the Year Award. It utilizes a 3-position bus bar, where each position will accept a wide range of wire size combinations from 14 to 4 AWG.

316IR & MGC - These UL-listed products (Wire Connectors and Soldering Lugs, file E23438) are a low cost solution for reliable connections/joints of “valve wires” to the solenoids of conventional irrigation systems. There is no stripping of the wires required, which means lower labor costs.



Paige Electric Co., LP specifications (http://www.paigewire.com/pb_category.aspx?cat=16)

RESINS

Resin kits use a two-part epoxy especially designed to waterproof wires that have been mechanically joined using wire nuts, split bolts, etc.

3570G AND 4 SERIES

This 3M Scotchcast resin is a two-part epoxy insulating and encapsulating resin packaged in several sizes

82-A SERIES AND 82-B1

Use the 3M Scotchcast 82-A and 82-B1 series kits to insulate and seal single wire and cable splices. The 82-A Series is for inline splices and the 82-B1 is for “wye” splices. Each kit contains:

- A snap-together mold body
- 2 Funnels
- Rubber tape for sealing mold ends and connector area
- Scotchcast 4 electrical insulating resin

Paige Electric Co., LP specifications (http://www.paigewire.com/pb_category.aspx?cat=16)





Low Voltage Lighting systems utilize a number of products. These include transformers, light fixtures, cables, timers, photo Paige Electric offers many of these products to: Original Equipment and lighting equipment suppliers.

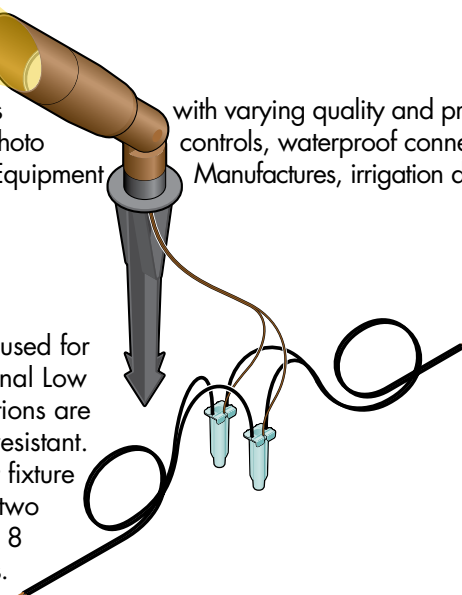
with varying quality and price points. controls, waterproof connectors, etc. Manufactures, irrigation distributors,

LOW VOLTAGE LIGHTING CABLES



Voltage Lighting designed for direct burial and are sunlight resistant. Paige Electric offers many types of constructions for light fixture manufacturing and system installations. Available in a two conductor zip cord construction from 18 AWG/2c to 8 AWG/2c. For incandescent bulb or LED type light fixtures.

Cables used for Professional Low applications are sunlight resistant.



Paige Electric Co., LP specification P7190D (<http://www.paigewire.com/specs/P7190D.htm>)

TIMERS

Mechanical timers are used in conjunction with Photo Controls. The photo control ensures that the lights only come on when it's dark, while the timer determines the on and off time. Paige Electric offers the only known UL-recognized timer for this specific application.



Paige Electric Co., LP specification Mechanical Timers (<http://www.paigewire.com/specs/TN111RM.htm>)

Digital "Astronomic" timers have the ability to determine sunrise and sunset for every day of the year. And, once you program the timer with information on your location, they can turn the lights on and off using any combination of sunrise, sunset, and specific on-off times. For example, the timer can be set to turn on the lights at sunset and turn them off at 11:00 PM. It could also be programmed to come back on at 5:00 AM and off at sunrise. These are available in indoor and outdoor models and are UL-listed for those applications.



Paige Electric Co., LP specification Digital Timers (http://www.paigewire.com/specs/digital_timers.htm)

PHOTO CONTROLS

These devices are used in conjunction with Low Voltage Lighting transformers and timers to ensure lights are only on when it's dark. Paige Electric photo controls feature extra long wire leads to facilitate wiring in virtually all situations.

Paige Electric Co., LP specification Photo Controls (http://www.paigewire.com/specs/photo_controls.htm)



WATERPROOF CONNECTORS

Wire splices/joints are the weak link of any electrical circuit. Paige Electric offers professional grade connectors for both conventional and hub/spider lighting systems.

MOISTURE GUARD CONNECTORS (MGC)

The MGC is an Insulation Displacement Connector (IDC.) It is ideal for splicing wires and cables in Low Voltage Lighting systems. The proven 3M concept allows the splices to be made without stripping the insulation from the wires. Just insert the unstripped wires into the holes and squeeze!



DBR/Y-6 CONNECTORS

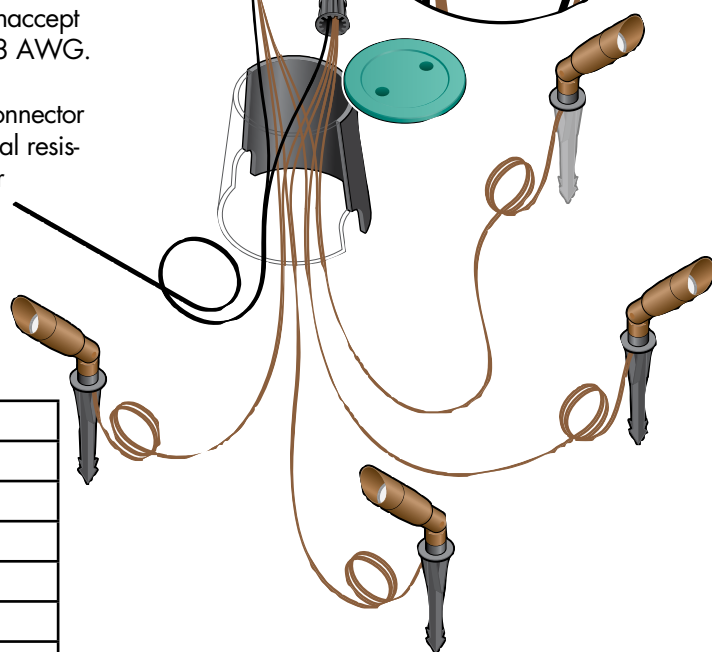
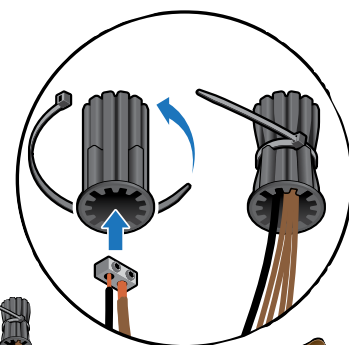
The 3M™ Direct Bury Splice Kit DBR/Y-6 is used to electrically connect two or more pre-stripped copper wires and moisture seal the connection for direct burial. It is ideal for splicing a wide range of wires and cables in Low Voltage Lighting systems, from 18 to 8 AWG.

BC2 CONNECTORS

These connectors were designed to allow the splicing of a multitude of wires in lighting hub and spider systems. The aluminum connector, with hex-head set screws, ensures a reliable mechanical connection. The set screws are tightened with the provided hex "allen" wrench.

Each of the two 1/4" holes in the aluminum connector can accept several combinations of cables ranging from 18AWG to 8 AWG.

The gel-filled tube encapsulates the wires and aluminum connector to create a waterproof connection. A weather and chemical resistant cable tie is used to squeeze the gel towards the center of the tube and between the wires, which also prevents the connection from slipping out.



LOW VOLTAGE LIGHTING COMPONENTS

Paige Part No.	Description
180xxx	Low Voltage Landscape Lighting Cable
270TN111RM	Mechanical Timer, UL listed
270DT620CL	Digital "Astronomic"l Timer, indoor, UL listed
270H800RC	Digital "Astronomic"l, outdoor, UL listed
270K4021	Photo Control, fixed mount
270K4221	Photo Control, swivel mount
270672	DBR/Y-6 waterproof connector, 18 to 10 AWG
270MGC	MGC waterproof connector, 14 to 12 AWG
270BC2	BC2 waterproof connector, hub and spider systems

Paige Electric Co., LP Waterproof connectors (http://www.paigewire.com/pb_category.aspx?cat=28)

FOR TECHNICAL ASSISTANCE,
OR HELP IN LOCATING OUR NEAREST WORLDWIDE DISTRIBUTOR(S),
PLEASE CONTACT US AT THE LOCATIONS BELOW:

Name(s)	Location	Phone	Fax	E-mail
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Larry Thull				lthull@paigeelectric.com
Katrina Nolletti				knolletti@paigeelectric.com
Joe Di Rienzo	Union, NJ	(800) 327-2443	(908) 687-2722	jdirienzo@paigeelectric.com
Dave Teed				daveteed@paigeelectric.com
Nancy Di Rienzo				ndirienzo@paigeelectric.com
Dave Di Rienzo				ddirienzo@paigeelectric.com
Mark Haas	Anaheim, CA	(800) 228-7137	(562) 633-9532	mhaas@paigeelectric.com

DISCLAIMER

Paige Electric has made every effort to ensure that the information and recommendations contained within are correct. However, neither Paige Electric nor any of its employees warrants nor accepts any liability for the use of this information. National and local electrical codes should always be followed. Wiring, grounding, shielding, and bonding irrigation system components often require competent engineering judgement on a case-by-case basis. Competent engineering assistance should be sought from firms specializing in this field.

PAIGE ELECTRIC WARRANTY

The Company warrants its title to the products sold by it and warrants to the Purchaser that its products are free of defects of workmanship or material and are in conformity with applicable specifications and descriptions referred to or set out herein. No claim shall be maintained hereunder unless the facts giving rise to it are discovered within 12 months of shipment and written notice thereof given to the Company within 30 days of discovery. The warranties stated in this paragraph are exclusive of all other warranties, written or oral, statutory, express or implied, none of which shall apply to the sale of the Company's products hereunder. Lengths of cable, which are replaced by the Company in accordance with the foregoing, shall become the property of the Company and shall be returned to it by the Purchaser f.o.b. point of shipment.

The warranty for products produced by companies other than Paige Electric (3M, Intermatic, LORESCO International, ERICO, etc.) is usually stated in their Product Literature, which is usually available on their representative websites. For assistance in this matter, please contact Paige Electric.

Quality irrigation cables, accesories and service since 1958.

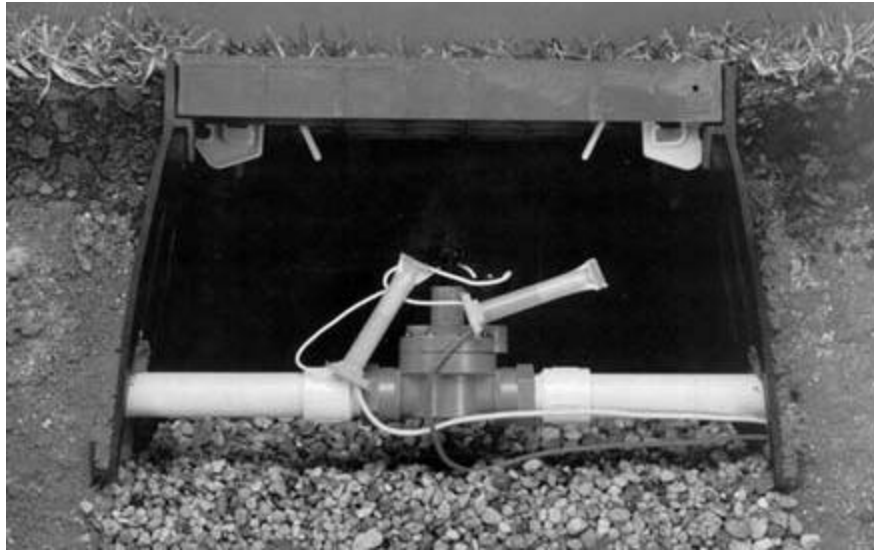


Data Sheet



DBY/DBR and DBY-6/DBR/6

Direct Bury Splice Kits



3M Has Your Wiring Needs Covered

3M DBY/DBR Direct Bury Splice Kits are real time savers when installing underground electrical systems. Every component for the splice is included in the kit. The insulator tube is pre-filled, eliminating the chance of the installer using too much or too little sealant.

No crimping tools, no waste, no mess. Just quick, reliable underground splices for irrigation and sprinkler systems, landscape lighting and other underground projects. The splice may be re-entered without cutting the wires (new tube required)

Flexibility

- The DBY and DBY-6 splice kit connects a wire range of 2-5 #18 AWG through 2 #12 plus 1 #16 AWG solid or stranded copper wire.
- The DBR and DBR-6 splice kit connects a wire range of 5 #16 AWG through 3 #10 AWG solid or stranded copper wire.

- Sealant does not set up hard, allowing splice to be reworked without cutting wires (new tube required).
- Application temperature range: 32° - 120°F (0° - 49°C).
- Storage Temperature: 120°F (49°C) maximum.
- Non-U.V. Stable

Economy

- Insulating gel is already contained in the tube.
- Long-term electrical properties reduce callbacks and rework.

Dependability

- Locking fingers in the tube ensure that the Scotchlok™ connector (wire nut) stays in position.
- The closed tube cover provides strain relief
- Design protects against corrosion failure.

The Scotchlok™ Y and R connectors (wire nuts) are UL listed. When assembled in the tubes of the DBY-6 and DBR-6 products, the splices are UL listed for 600 volts maximum as a wire connector system for use with underground conductors.

Product	Wire Range	Voltage Rating	Agency Listing
DBY	18-12 AWG	30V	-
DBR	16-10 AWG		-
DBY-6	18-12 AWG	600V	UL, CSA
DBR-6	16-10 AWG		UL, CSA

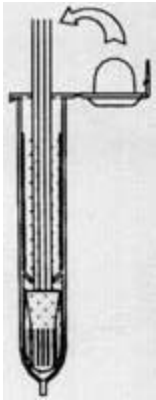
For Use In:

- Sprinkler Systems
- Outdoor Lighting
(Decks, driveways, lamp posts, landscape)
- Septic Systems
- Golf Courses
- Other underground electrical wiring applications

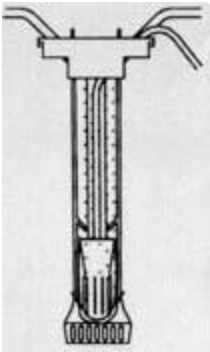
Easy as 1, 2, 3



1. Strip wires, apply the Scotchlok electrical connector and twist in a clockwise direction.



2. Insert the splice into the gel-filled insulator tube. Push past the locking fingers to hold the Scotchlok connector in place.



3. Position wire channels and snap insulator tube cover closed.

3M and Scotchlok are trademarks of 3M.



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All statements, technical information and recommendations related to the Seller's products are based on information believed to be reliable, but the accuracy or completeness thereof is not guaranteed. Before utilizing the product, the user should determine the suitability of the product for its intended use. The user assumes all risks and liability whatsoever in connection with such use.

All statements or recommendations of the Seller which are not contained in the Seller's current publications shall have no force or effect unless contained in an agreement signed by an authorized officer of the Seller. The statements contained herein are made in lieu of all warranties expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose which warranties are hereby expressly disclaimed.

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3M Electrical Products Division

6801 River Place Blvd.
Austin, Texas 78726 - 9000

3M



3M SLiC™ COMMUNICATION CABLE WATERPROOFING KIT

Compatible with all splice connectors such as twist-on wire connectors, butt connectors, insulation displacement connectors, etc. Use the following type of connector for the corresponding cable:



Connector	Communication Cable	Application
3M #316IR (3 EA.)	Paige P7162D, 16AWG/1 pair + drain. Tuf-hide®, unarmored	Toro Systems
3M #316IR (3EA.) & #10 split bolt	Paige P7162D-A, 16AWG/1 pair + drain. Tuf-hide®, armored	
3M #316IR (5 EA.)	Paige P7171D, 18AWG/2 pair + drain, unarmored	Buckner/Legacy/Hunter systems
3M #316IR (5EA.) & #10 split bolt	Paige P7171D-A, 18AWG/2 pair + drain, armored	Telephone Lines Weather Stations Sensing Equipment
3M #316IR (6 EA.)	Paige Type PE-39/PE-54/PE-89, 19AWG/3 pair	Rain Bird Maxicom
3M #UR-2 (12 EA.)	Paige Type PE-39/PE-54/PE-89, 19AWG/6 pair	

- Resists water penetration at point of contact
- Built-in strain relief
- Cable aluminum shield is automatically re-connected during assembly.
- Paige Electric part numbers:

Description	Part Number
SLiC	273211 (includes 2 kits.)
UR-2	270286
316IR	270228R
#10 split bolt	181994

Rain Bird, Maxi and Maxicom are trademarks of Rain Bird Corporation



TORO 16/2 SHIELDED CABLE, PAIGE P7162D UNARMORED OR P7162DA ARMORED

1.0 MATERIALS NEEDED:

Paige Splice Kit 273210

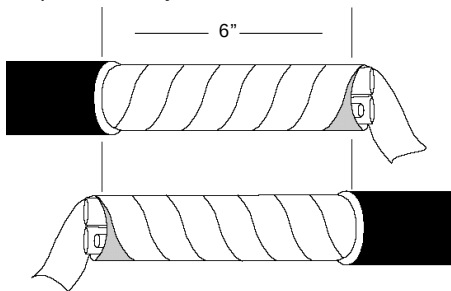
2.0 CONSISTS OF:

2 Pcs. 16-14 Insulated Butt Connector-270030
1 Pc. 22-18 Butt Splice-270015
1 Pc. 3M 82 Al Splice Kit-270293 overlap.

3.0 METHOD:

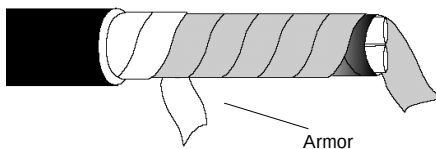
Step 1:

Strip back outer jacket 6" on each side.



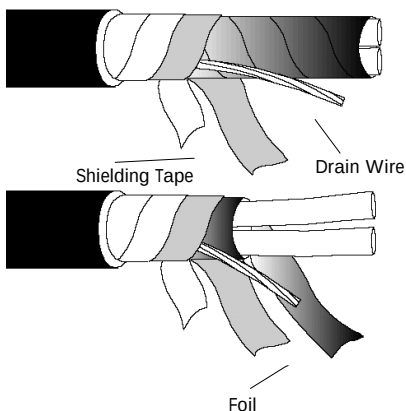
Step 2A:

If armored, unravel from both sides and lay back.



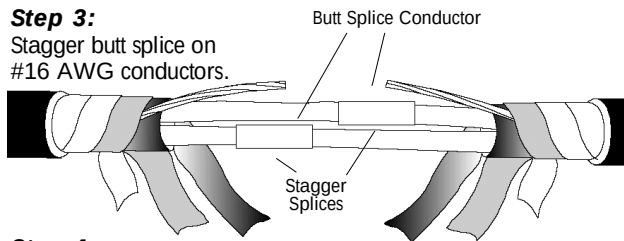
Step 2B, 2C:

Unravel shielding tape and foil.



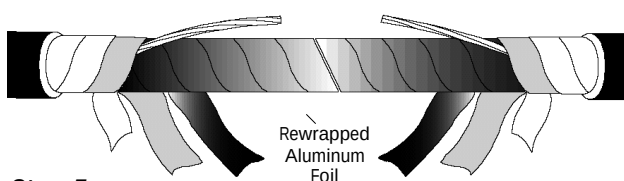
Step 3:

Stagger butt splice on #16 AWG conductors.



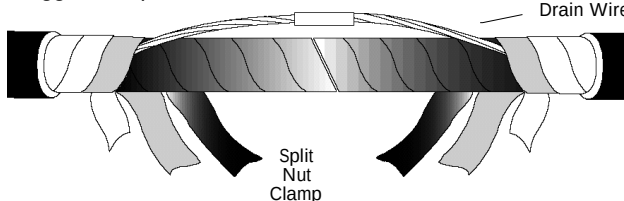
Step 4:

Rewrap aluminum foil shielding tape. Add foil if necessary.



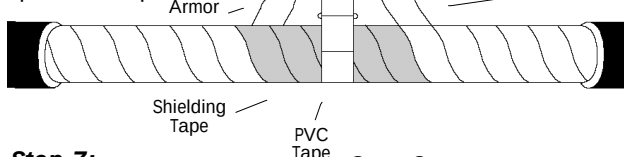
Step 5:

Stagger butt splice on #18 AWG shield drain wire.



Step 6:

If armored, rewrap armor over spliced conductors and use split bolt clamp.

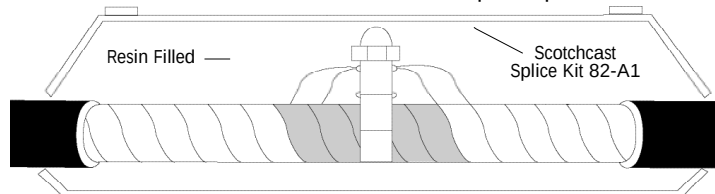


Step 7:

Lay into bottom half of mold.

Step 8:

Snap on top half of mold.



Step 9:

Tape each end of mold to prevent resin from leaking out.

Step 10:

Insert funnels and pour resin to fill.

Step 11:

Remove funnels.

Step 12:

Place tape over each funnel hole.

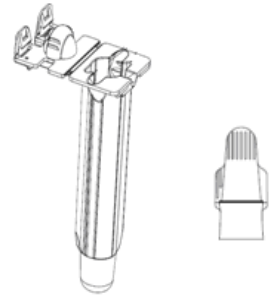
Step 13:

Will set-up in less than 1 hour.

Step 14:

Hardens fully in 24 hours.

3M™ Direct Bury Splice Kit DBR/Y-6



Data Sheet

May 2011

Applications The 3M™ Direct Bury Splice Kit DBR/Y-6 is used to electrically connect two or more pre-stripped copper wires and moisture seal the connection for direct burial.

The kit includes a 3M™ Performance Plus Wire Connector R/Y+ and a high impact, UV-resistant polypropylene tube prefilled with moisture-resistant grease.

**Agency
Approvals
& Self
Certifications**

C UL US Listed, UL Standard 486D, File No. E102356

Listed for use in wet, damp, direct bury and submersible locations with UF type cable.



Meets European Standard EN 61984

Applicable ratings under this standard: IP68, Pollution Degree 3

RoHS 2002/95/EC



RoHS Compliant 2002/95/EC" means that the product or part ("Product") does not contain any of the substances in excess of the maximum concentration values in EU Directive 2002/95/EC, as amended by Commission Decision 2005/618/EC, unless the substance is in an application that is exempt under RoHS. This information represents 3M's knowledge and belief, which may be based in whole or in part on information provided by third party suppliers to 3M.

Specifications

Maximum Voltage Rating: 600 V
Application Temperature: 32°F to 120°F (0°C to 49°C)
Operating Temperature: -40°F to 221°F (-40°C to 105°C)

Construction:

Tube : Impact and UV Resistant Light Blue Polypropylene
Dimensions: Length: 3.7in., Cover: 1.5in.x 1.1in., Diameter: 1in.
Grease: 711B
R/Y+ Connector: Steel Spring, Flame Retardant Insulator

Wire Combinations Copper wire only Solid or Stranded

see chart for all combinations

2 - 7 #18	1-3 #12 w/ 1 #18
2 - 6 #16	1-2 #10 w/ 1 #18
2 - 4 #14	1-3 #12 w/ 1 #16
2 - 4 #12	1-2 #10 w/ 1 #12
2 - 3 #10	1-2 #14 w/ 1 #18

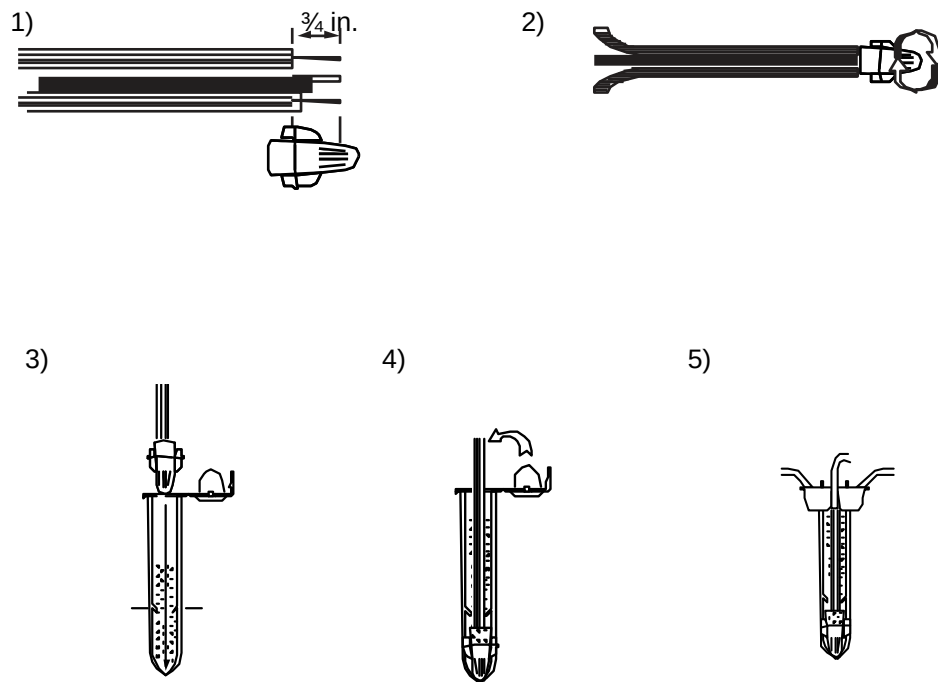
3M™ Direct Bury Splice Kit DBR/Y-6

Installation Instructions



Warning

Turn power off before installing or removing connector. All electrical work should be done according to appropriate electrical codes.



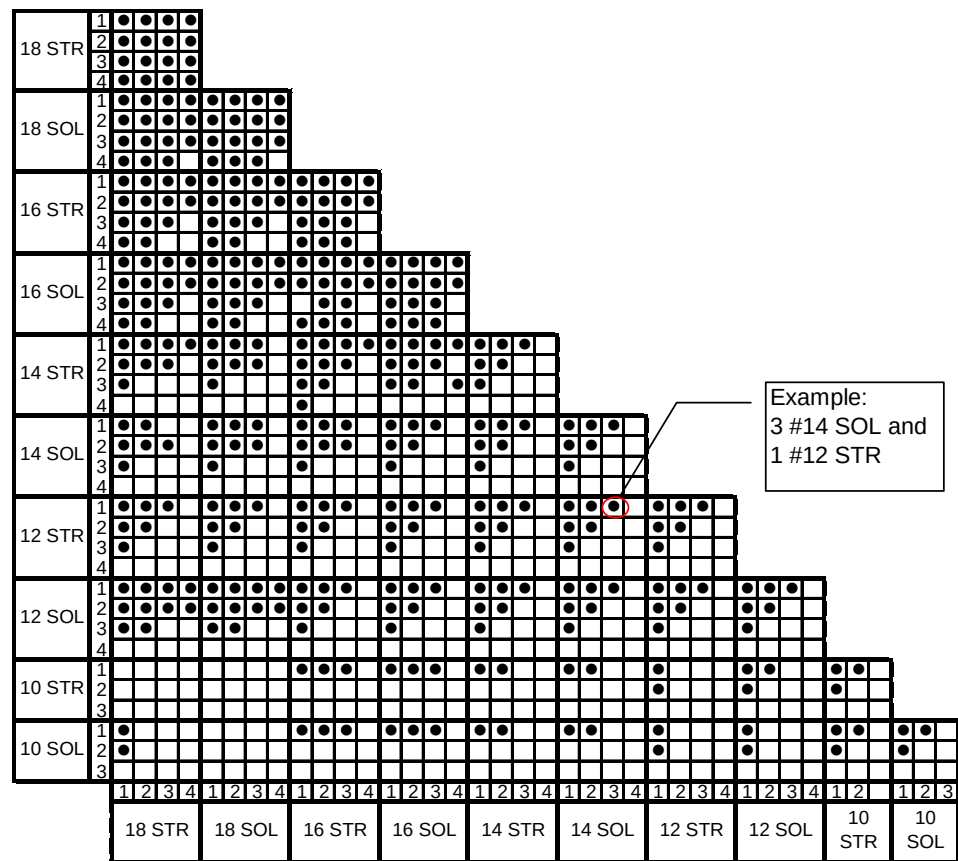
- 1) Strip insulation $\frac{3}{4}$ in.
- 2) With wire ends even, insert wires into the connector and tighten until secure.
- 3) Insert the connector all the way into the tube until the connector rests on the bottom.
- 4) Fold the wire into the channels.
- 5) Close the cap.

Installation Tip:

If having difficulty getting the twist-on connector down into the tube when using small gauge wires, use a thin non-conductive object to push the connector to the bottom of the tube. Upon removal of the object, ensure that no voids or water paths remain in the grease.

3M™ Direct Bury Splice Kit DBR/Y-6

Combination Chart



Shelf Life & Storage	This product has a 5-year shelf life from date of manufacture when stored in a humidity controlled storage (10°C/50°F to 27°C/80°F and <75% relative humidity).
Availability	From your local distributor; or from 3M.com/electrical [Where to Buy] or call 1.800.245.3573.
Important Notice	All statements, technical information, and recommendations related to 3M's products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product, which are not contained in 3M's current publications, or any contrary statements contained on your purchase order, shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.
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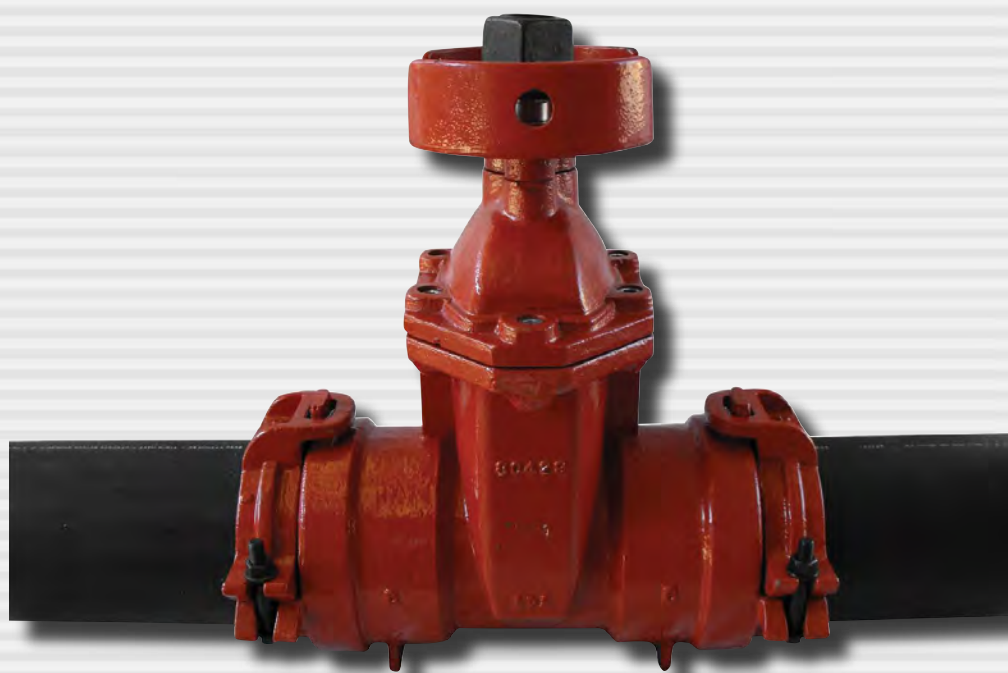


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78-8129-9255-6 B



Saddles, Fittings and Valves for HDPE



HDPE System Components

HDPE Connections That Make Sense

SB-300RC



LGV-300BB



**L90-33SB
W/ LGV-300SB**



**L90-200SB
W/ LF90-220**



All Leemco, Inc. fittings are completely compatible with HDPE. HDPE can be beveled just like PVC and inserted into any Leemco fitting. It is highly recommended that joint restraints be used on each bell end fitting where HDPE pipe is inserted. HDPE's natural tendency to expand and contract slightly in normal conditions makes it customary to use restraints. Leemco restraints and fittings have been used for years as a transition from HDPE to PVC or vice versa. Leemco fittings and repair couplings have also been used when the repair or addition to existing HDPE lines becomes necessary.

Leemco, Inc. resilient wedge gate valves can also be used on HDPE lines. The bell-by-bell model (LMV-BB) with the joint restraints built into the valve makes isolation of the mainline simple and easy

The Leemco Lateral Connection system has been altered to provide lateral transitions simply and cost effective. The use of the Leemco LTDS double strap saddle is designed specifically for use with HDPE. The saddle has a built in Anti-Movement Lug for added stability. All Leemco Lateral Connection components are compatible with this and our other saddles.

Transitions from mainline to lateral line can be made using the Leemco LV series valves; Leemco even offers a connection system for DR-17, or the use of our L90-200/250/300 series. This L90 allows the transition from the mainline to be made directly to the lateral system or permits the use of many variables, including the transition to an automatic valve or other threaded components.

L90 2" Spigot x Bell Adapters (For LT Series T's & Saddles)

L90-200SB	2 x2 Spig x Bell 90
L90-250SB	2 x2 Spig x Bell 90
L90-300SB	2 x2 Spig x Bell 90

Easy Connections... Infinite Possibilities

Mainline Gate Valve, Bell x Bell

Model No.	Description
LMV-11BB	2 x 2 Bell x Bell
LMV-22BB	2.5 x 2.5 Bell x Bell
LMV-33BB	3 x 3 Bell x Bell
LMV-34BB	3 x 4 Bell x Bell
LMV-44BB	4 x 4 Bell x Bell
LMV-66BB	6 x 6 Bell x Bell
LMV-88BB	8 x 8 Bell x Bell
LMV-1010BB	10 x 10 Bell x Bell
LMV-1212BB	12 x 12 Bell x Bell



LMV-66BB



LMV-33BB

Mainline Gate Valve, Spigot x Bell

Model No.	Description
LMV-11SB	2 x 2 Spigot x Bell
LMV-13SB	2 x 3 Spigot x Bell
LMV-22SB	2.5 x 2.5 Spigot x Bell
LMV-23SB	2.5 x 3 Spigot x Bell
LMV-33SB	3 x 3 Spigot x Bell
LMV-34SB	3 x 4 Spigot x Bell
LMV-44SB	4 x 4 Spigot x Bell
LMV-66SB	6 x 6 Spigot x Bell
LMV-88SB	8 x 8 Spigot x Bell
LMV-1010SB	10 x 10 Spigot x Bell
LMV-1212SB	12 x 12 Spigot x Bell

LV-Series Angle Valve Connections

Model No.	Description
LV-212HD17	LV-212 for DR 17 HDPE
LV-218HD17	LV-218 for DR 17 HDPE
LV-300HD17	LV-300 for DR 17 HDPE
LV--212HD	LV-212 for 9-15 DR HDPE
LV--218HD	LV-218 for 9-15 DR HDPE
LV--250HD	LV-250 for 9-15 DR HDPE
LV--300HD	LV-300 for 9-15 DR HDPE

Leemco LV series valves come in a number of configurations. All are fused epoxy coated ductile iron, with stainless steel internals. They range in height from 12" to 18" (212-218). Outlet sizes are 2", 2.5" and 3". All valves come with a 1" FPT "hot" tap (plugged) for connection to a QC Assembly. The HD17 model comes with a stiffener included.

LTDS-Series, Double-Strap, Lateral Saddles, 2" IPS Bell Outlet with Anti-Movement lugs

Model No.	Description
LTDS-400	4 x 2 LAT Saddle
LTDS-600	6 x 2 LAT Saddle
LTDS-800	8 x 2 LAT Saddle
LTDS-1000	10 x 2 LAT Saddle
LTDS-1200	12 x 2 LAT Saddle



LV-212 W/ LMN-20



LV-212HD

LTDS W/ L90-200SB



LTDS-SERIES Double-Strap, Lateral Saddles 2" IPS Bell Outlet... with Anti-Movement Lugs



The Leemco Lateral Connection System does not use threaded or glued joints.

The system consist of a ductile iron, swivel based valves and 90's that plug into a leemco proprietary saddle, tee or lateral tee. These units are mechanically held in place, yet can swivel about its base 360 degrees to orient its outlet towards a desired direction. The valve also includes Leemco's exclusive ability to connect a quick coupler assembly to the valve without any additional fitting on the main or lateral line. The entire connection from the mainline to the lateral line is sturdy, solid and durable epoxy coated ductile iron.

L-300T W/ L90-200SB



LV-212HD17



TS SADDLE & LTS SADDLE



L90 2" Spigot x Bell Adapters (For LT Series T's & Saddles)

L90-200SB	2 x2 Spig x Bell 90
L90-250SB	2 x2.5 Spig x Bell 90
L90-300SB	2 x3 Spig x Bell 90

SUBMITTAL SHEET

LMV-BBHDSS-Series

Resilient Wedge Mainline Gate Valves For IPS HDPE Plastic Pipe

LMV-BBHDSS (IPS) SERIES (BELL X BELL)				
MODEL	BELL	BELL	SHROUD	DESCRIPTION
LMV-11BBHDSS	2"	2"	4" IPS	2x2 Bell x Bell, includes double C-Clamps, pipe stiffeners
LMV-33BBHDSS	3"	3"	6" IPS	3x3 Bell x Bell, includes double C-Clamps, pipe stiffeners
LMV-44BBHDSS	4"	4"	6" IPS	4x4 Bell x Bell, includes double C-Clamps, pipe stiffeners
LMV-66BBHDSS	6"	6"	6" IPS	6x6 Bell x Bell, includes double C-Clamps, pipe stiffeners
LMV-88BBHDSS	8"	8"	6" IPS	8x8 Bell x Bell, includes double C-Clamps, pipe stiffeners
LMV-1010BBHDSS	10"	10"	6" IPS	10x10 Bell x Bell, includes double C-Clamps, pipe stiffeners
LMV-1212BBHDSS	12"	12"	6" IPS	12x12 Bell x Bell, includes double C-Clamps, pipe stiffeners



Features and Benefits:

Class 350 Ductile Iron Body Gate Valves

- Bolted Bonnet
- Non-Rising Stem
- Resilient Wedge
- Conforms to AWWA C509 Standards
- 5-Year Standard Warranty (Parts and Labor Replacement Fees)
- Optional 10-Year Warranty Available (ask for details)
- Includes Double C-Clamps and Pipe Stiffeners (pictured left)

Valve kit includes double C-Clamps, hardware and pipe stiffeners

NOTE: HDPE Pipe is not included

MATERIAL:
PRESSURE RATING:
EPOXY COATING:
GASKETS/O-RINGS:
PIPE STIFFENERS:
INSTALLATION:

Class 350 Ductile Iron per ASTM A-536, Grade 65-45-12, AWWA C-515
250 PSI
ANSI/AWWA C116/A21.16-09, NSF 61 & CSA Z245.20-98, 12-14 MIL
High grade EPDM rubber ANSI/AWWA C111/A21.11
High Grade 304 Stainless Steel
Per IPS HDPE Plastic Pipe Standards

Specification:

All mainline valves shall be resilient wedge and conform to AWWA C509 standards. Material shall be ductile iron per ASTM A-536, Grade 65-45-12. Epoxy coating on all interior and exterior surfaces shall be fusion bonded epoxy, 12-14 mil thickness. The epoxy coating shall pass 90-Day immersion tests per CSA Z245.20-98. Valves shall have a shroud around the 2" operating nut to accept IPS PVC sleeve which provides dirt-free access to actuate the valve. Pipe stiffeners are constructed of 304 stainless steel. All mainline valves shall be as manufactured by Leemco, Inc., U.S.A.



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Leemco has a large variety of Valve Accessories...
Please refer to our IPS and DIN Price Lists for available Models and Sizes.

F-2072S



S A D D L E S

SADDLES FOR IPS/DPS/DIN PVC & HDPE



A Full Line Of Stainless Steel And Ductile Iron Saddles

All Leemco, Inc., stainless steel saddles are compatible with all PVC and HDPE piping. Leemco, Inc., stainless steel saddles are manufactured in two styles and several models. Our stainless steel and ductile iron saddles come in both single strap and double strap models. All Leemco, Inc., saddles have an epoxy coated ductile iron upper housing as per ASTM A536. The RDLS Series fits pipe sizes from 3" through 12" and the RSLs fits pipe sizes 3" through 16".



RDLS SERIES

Model	Description	Pipe Size	Outlet
RDLS-300	3 x 2 LAT SADDLE	3"	2" Bell for LV Series Valves
RDLS-400	4 x 2 LAT SADDLE	4"	2" Bell for LV Series Valves
RDLS-600	6 x 2 LAT SADDLE	6"	2" Bell for LV Series Valves
RDLS-800	8 x 2 LAT SADDLE	8"	2" Bell for LV Series Valves
RDLS-1000	10 x 2 LAT SADDLE	10"	2" Bell for LV Series Valves
RDLS-1200	12 x 2 LAT SADDLE	12"	2" Bell for LV Series Valves



RSLs SERIES

Model	Description	Pipe Size	Outlet
RSLs-300	3 x 2 LAT SADDLE	3"	2" Bell for LV Series Valves
RSLs-400	4 x 2 LAT SADDLE	4"	2" Bell for LV Series Valves
RSLs-600	6 x 2 LAT SADDLE	6"	2" Bell for LV Series Valves
RSLs-800	8 x 2 LAT SADDLE	8"	2" Bell for LV Series Valves
RSLs-1000	10 x 2 LAT SADDLE	10"	2" Bell for LV Series Valves
RSLs-1200	12 x 2 LAT SADDLE	12"	2" Bell for LV Series Valves
RSLs-1400	14 x 2 LAT SADDLE	14"	2" Bell for LV Series Valves
RSLs-1600	16 x 2 LAT SADDLE	16"	2" Bell for LV Series Valves

Model	Description	Pipe Size	Outlet
RSTS-304	3 x 2 FPT SADDLE	3"	2" FPT
RSTS-404	4 x 2 FPT SADDLE	4"	2" FPT
RSTS-604	6 x 2 FPT SADDLE	6"	2" FPT
RSTS-804	8 x 2 FPT SADDLE	8"	2" FPT
RSTS-1004	10 x 2 FPT SADDLE	10"	2" FPT
RSTS-1204	12 x 2 FPT SADDLE	12"	2" FPT

The Leemco, Inc., stainless steel RSTS and RDTS saddles are made of 304 Stainless Steel and use an EPDM saddle gasket as do the RDLS and RSLs Series. The RSTS Series fits pipe sizes from 3" through 12" with a 2" female pipe thread (FPT) outlet. The double strap RDLS Series fits pipe sizes from 3" through 16" with both 2" female pipe thread and 3" female pipe thread on pipe sizes 10" through 16". See the back cover for a complete listing of part numbers and descriptions.



RSTS SERIES



Easy Connections... Infinite Possibilities

The Leemco, Inc., LTS, LTDS, TS, DLS and DTS series saddles are made of 100% ductile iron per ASTM A536. The hinged lower saddle strap is hinged on one side for ease of installation. This hinged design distributes the load evenly around the pipe. All LTS series Leemco, Inc., saddles are epoxy coated. Leemco, Inc., epoxy coating is applied by a

fusion process that involves heating raw and etched castings to an elevated temperature; the casting is immediately sprayed with an epoxy resin followed by a high temperature oven curing. This coating will embed into and adhere to the ductile iron surfaces of the saddle inside and out.



LTS SERIES

Model	Description	Pipe Size	Outlet
LTS-300	3 x 2 LAT SADDLE	3"	2" Bell for LV Series Valves
LTS-400	4 x 2 LAT SADDLE	4"	2" Bell for LV Series Valves
LTS-600	6 x 2 LAT SADDLE	6"	2" Bell for LV Series Valves
LTS-800	8 x 2 LAT SADDLE	8"	2" Bell for LV Series Valves
LTS-1000	10 x 2 LAT SADDLE	10"	2" Bell for LV Series Valves
LTS-1200	12 x 2 LAT SADDLE	12"	2" Bell for LV Series Valves

TS SERIES



Model	Description	Pipe Size	Outlet
TS-307	3 x .75 NPT Saddle	3"	0.75" FPT
TS-310	3 x 1 NPT Saddle	3"	1" FPT
TS-315	3 x 1.5 NPT Saddle	3"	1.5" FPT
TS-320	3 x 2 NPT Saddle	3"	2" FPT
TS-407	4 x .75 NPT Saddle	4"	0.75" FPT
TS-410	4 x 1 NPT Saddle	4"	1" FPT
TS-415	4 x 1.5 NPT Saddle	4"	1.5" FPT
TS-420	4 x 2 NPT Saddle	4"	2" FPT
TS-607	6 x .75 NPT Saddle	6"	0.75" FPT
TS-610	6 x 1 NPT Saddle	6"	1" FPT
TS-615	6 x 1.5 NPT Saddle	6"	1.5" FPT
TS-620	6 x 2 NPT Saddle	6"	2" FPT
TS-807	8 x .75 NPT Saddle	8"	0.75" FPT
TS-810	8 x 1 NPT Saddle	8"	1" FPT
TS-815	8 x 1.5 NPT Saddle	8"	1.5" FPT
TS-820	8 x 2 NPT Saddle	8"	2" FPT
TS-1007	10 x .75 NPT Saddle	10"	0.75" FPT
TS-1010	10 x 1 NPT Saddle	10"	1" FPT
TS-1015	10 x 1.5 NPT Saddle	10"	1.5" FPT
TS-1020	10 x 2 NPT Saddle	10"	2" FPT
TS-1207	12 x .75 NPT Saddle	12"	0.75" FPT
TS-1210	12 x 1 NPT Saddle	12"	1" FPT
TS-1215	12 x 1.5 NPT Saddle	12"	1.5" FPT
TS-1220	12 x 2 NPT Saddle	12"	2" FPT

The Leemco, Inc., Lateral Connection System does not use threads. The weakest point in an irrigation system is the threaded ductile iron, brass, galvanized or PVC nipple that connects valves to a saddle or service tee. The full line of Leemco, Inc., ductile iron and stainless steel/ductile iron saddles uses a proprietary Leemco, Inc., system that allows the valves and adapters installed into the LTS, LTDS, RSLs and RDLs to permanently rotate a full 360 degrees. Because lateral lines run at varying angles to the main-line, orientation is a major problem. No other lateral connection system uses this technology. The Leemco, Inc., system is the only lateral connection system that can be epoxy coated inside and out.





The Leemco, Inc. RSLs and RDLS saddles are range saddles. The lower saddle strap is made of pacified, 304 Stainless steel.

These stainless straps are sized as to accommodate various pipe standards such as IPS, DIN, BSP, JIS, Australian and others. These saddles fit both PVC and HDPE. The stainless steel straps are constructed as to avoid butt-welded joints. Welded studs, washes and nuts are 304 stainless steel.

Model	Description	Pipe Size	Outlet
RST-963	90 x 63 FPT	90	63 MM FPT
RST-1163	110 x 63 FPT	110	63 MM FPT
RST-1663	160 x 63 FPT	160	63 MM FPT
RST-2063	200 x 63 FPT	200	63 MM FPT
RST-2563	250 x 63 FPT	250	63 MM FPT
RST-3263	315 x 63 FPT	322	63 MM FPT

Model	Description	Pipe Size	Outlet
RST-963	90 x 63 FPT	90	63 MM FPT
RST-1163	110 x 63 FPT	110	63 MM FPT
RST-1663	160 x 63 FPT	160	63 MM FPT
RST-2063	200 x 63 FPT	200	63 MM FPT
RST-2563	250 x 63 FPT	250	63 MM FPT
RST-3263	315 x 63 FPT	322	63 MM FPT

Model	Description	Pipe Size	Outlet
DLS-9	90 X 2 LAT SADDLE	90	2" Bell for LV Series Valves
DLS-11	110 X 2 LAT SADDLE	110	2" Bell for LV Series Valves
DLS-16	160 X 2 LAT SADDLE	160	2" Bell for LV Series Valves
DLS-20	200 X 2 LAT SADDLE	200	2" Bell for LV Series Valves
DLS-22	225 X 2 LAT SADDLE	225	2" Bell for LV Series Valves
DLS-25	250 X 2 LAT SADDLE	250	2" Bell for LV Series Valves
DLS-28	280 X 2 LAT SADDLE	280	2" Bell for LV Series Valves
DLS-32	315 X 2 LAT SADDLE	315	2" Bell for LV Series Valves



Model	Description	Pipe Size (MM)	Outlet
DTS-95	90 x 50 Saddle	90	50 MM FPT
DTS-115	110 x 50 Saddle	110	50 MM FPT
DTS-165	160 x 50 Saddle	160	50 MM FPT
DTS-205	200 x 50 Saddle	200	50 MM FPT
DTS-225	225 x 50 Saddle	225	50 MM FPT
DTS-255	250 x 50 Saddle	250	50 MM FPT
DTS-285	280 x 50 Saddle	280	50 MM FPT
DTS-325	315 x 50 Saddle	315	50 MM FPT
DTS-96	90 x 63 Saddle	90	63 MM FPT
DTS-116	110 x 63 Saddle	110	63 MM FPT
DTS-166	160 x 63 Saddle	160	63 MM FPT
DTS-206	200 x 63 Saddle	200	63 MM FPT
DTS-226	225 x 63 Saddle	225	63 MM FPT
DTS-256	250 x 63 Saddle	250	63 MM FPT
DTS-286	280 x 63 Saddle	280	63 MM FPT
DTS-326	315 x 63 Saddle	315	63 MM FPT



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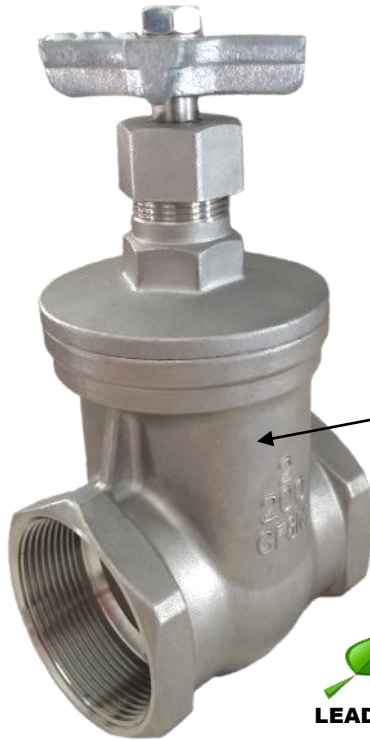
SUBMITTAL SHEET

LGT-XXSS Gate Valve

Screw-in Bonnet - Non-Rising Stem - Stainless Steel



Round wheel handle
available upon request



**Class 125
304 Stainless Steel**

PLEASE NOTE:
316 series stainless steel is
available upon request and
is a special order.


LEAD FREE

SIZES:	1" - 1-1/2" - 2" - 2-1/2" - 3" - 4"
VALVE BODY:	Class 125, 304 Stainless Steel (316 Series - Special Order)
VALVE BONNETT:	Class 125, 304 Stainless Steel (316 Series - Special Order)
VALVE STEM:	304 Stainless Steel (316 Series - Special Order)
HANDLE:	304 Stainless Steel (316 Series - Special Order)
WEDGE:	304 Stainless Steel (316 Series - Special Order)
PACKING:	High Grade Aramid Fibers with Graphite
PRESSURE RATING:	200 PSI
INSTALLATION:	Per IPS Pipe Standards

Specification:

All gate valves shall be constructed of 304 or 316 stainless steel. Bronze or brass gate valves will not be allowed. Valve cross handle shall be constructed of 304 or 316 stainless steel. All gate valves shall be manufactured by Leemco, Inc., U.S.A.



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Leemco has a large variety of products...
Please refer to our IPS and DPS Price Lists for available Models and Sizes.

F-2049S

SUBMITTAL SHEET

Stainless Steel Saddles For IPS & METRIC PVC & HDPE Plastic Pipe



IPS MODELS

<u>MODEL NO.</u>	<u>DESCRIPTION</u>
RSST-215	2 x 1-1/2" FPT SS Saddle
RSST-215A	2 x 1-1/2" ACME SS Saddle
RSST-2515	2-1/2" x 1-1/2" FPT SS Saddle
RSST-2515A	2-1/2" x 1-1/2" ACME SS Saddle
RSST-315	3 x 1-1/2" FPT SS Saddle
RSST-315A	3 x 1-1/2" ACME SS Saddle

METRIC MODELS

<u>MODEL NO.</u>	<u>DESCRIPTION</u>
RSST-6315	63mm x 1-1/2" FPT SS Saddle
RSST-6315A	63mm x 1-1/2" ACME SS Saddle
RSST-6315B	63mm x 1-1/2" BSP SS Saddle
RSST-9015	90mm x 1-1/2" FPT SS Saddle
RSST-9015A	90mm x 1-1/2" ACME SS Saddle
RSST-9015B	90mm x 1-1/2" BSP SS Saddle

SADDLE SPECIFICATIONS... (includes all models)

SADDLE CONSTRUCTION
HARDWARE:
PRESSURE RATING:
GASKET:
SIZES:.....
SIZES:.....
INSTALLATION:

316 Stainless Steel per ASTM A240, Pacified for corrosion resistance
316 Stainless Steel per ASTM A240, Pacified for corrosion resistance
200 PSI
High grade EPDM rubber per ANSI/AWWA C111/A21.11
2", 2-1/2", 3" IPS Sizes (1-1/2" FPT or 1-1/2" ACME Outlets)
63mm & 90mm Sizes (1-1/2" FPT, ACME or BSP Outlets)
Per IPS & METRIC Pipe Standards

Specification:

Saddle construction shall be made of 316 stainless steel. Saddle shall have a round anti-rotation device that is built within the saddle and made to insert into a 1-1/2" cored out hole. Saddles shall have a built-on joint restraint system. Gasket seal shall be made of high grade EPDM rubber per ANSI/AWWA C111/A21.11. All saddles shall be manufactured by Leemco, Inc., U.S.A.



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Leemco has a large variety of Saddles & Accessories...
Please refer to our IPS and DIN Price Lists for available Models and Sizes.



INSTALLATION GUIDE

(English Version)

Included in this “Installation Guide” are the required torque settings, information tables and correct procedures for installing Leemco products.

Thank you for using Leemco products!

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Before you begin...

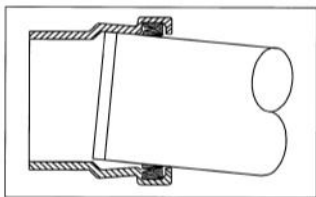
- Inspect all products to insure rubber gaskets are installed properly
- Inspect all products to insure correct amount of bolts, nuts and washers are included
- Inspect all products for any noticeable cracks, pinholes or visual defects before installing

Tools required...

- Torque wrench
- Socket wrenches and open end wrenches
- Pipe beveller
- Seal Lube or gasket lubricant
- W-D 40 or steel thread lubricant

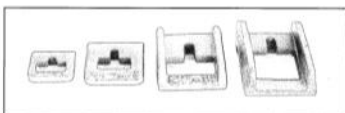


Fittings...



Joining

Small diameter pipe can be inserted by pushing the plain end into bell socket with a long bar. Larger diameter pipe require the use of a backhoe, jack or come-a-long.



Links furnished with Spigot end products:
SB-LK1 (2", 2.5") fittings, SB-LK2 (3"-8")
SB-LK3 (10", 12"), SB-LK4 (14", 16").

Gasket Insertion

Leemco gaskets are ribbed (U-Cup) design. The gasket nests in the recess (gasket groove) of the bell end with the front of the gasket smooth. The back of the gasket has series of notches.

Field Cut Pipe

The outside edge of cut pipe must be beveled and smoothed as any sharp corner may cause gasket damage. Straight alignment is especially important when assembling field cut pipe.

Spigot x Bell Joints

Lubricant must be applied to the installed gasket to reduce friction and avoid gasket damage. Also apply a thin coat of lubricant to the beveled portion of the plain end of pipe or the spigot end of a fitting. Commercially available push-on joint lubricants are non-toxic, odorless, tasteless, and will not support bacteria. "Seal Lube", SK#87710, offered by IPS Weldon Corp. is one such lubricant.

Joint Restraint - Hardware Size and Torque Requirements							LPP-Series Restraints Only			
Pipe Size	Pipe OD IPS	Pipe OD DPS	No. of Bolts	Bolt Size	Torque Ft-Lb	LB-Series OD (Inches)	LPP-Series OD (Inches)	LPP-Series No. of Bolts	LPP-Series Bolt Size	Torque Ft-Lb
2"	2.38		2	3/8 - 16 x 2.5	20	5.0	5.0	2	3/8 - 16 x 2.5	20
2.5"	2.88		2	3/8 - 16 x 2.5	20	5.5	5.5	2	3/8 - 16 x 2.5	20
3"	3.50		2	3/8 - 16 x 2.5	20	6.5	6.5	2	3/8 - 16 x 2.5	20
4"	4.50	4.80	2	1/2 - 13 x 3.5	50	7.5	7.5	2	1/2 - 13 x 3.5	50
6"	6.63	6.90	2	1/2 - 13 x 3.5	50	10.0	10.5	2	1/2 - 13 x 3.5	50
8"	8.63	9.05	4	1/2 - 13 x 4.0	50	12.5	15.0	2	1/2 - 13 x 4.0	50
10"	10.75	11.10	4	5/8 - 11 x 5.5	100	15.0	17.0	2	1/2 - 13 x 4.0	50
								2	5/8 - 11 x 5.5	100
12"	12.75	13.20	4	5/8 - 11 x 5.5	100	17.0	19.5	2	1/2 - 13 x 4.0	50
								4	5/8 - 11 x 5.5	100
14"		15.30	4	5/8 - 11 x 5.5	100	29.0				
16"		17.40	4	5/8 - 11 x 5.5	100	31.0				
18"		19.50	2	1/2 - 13 x 4.0	50					
			4	5/8 - 11 x 5.5	100					
20"		21.60	2	1/2 - 13 x 4.0	50					
			4	5/8 - 11 x 5.5	100					
24"		25.80	2	1/2 - 11 x 4.0	50					
			4	5/8 - 11 x 5.5	100					

Parts...



LTB-Bars

LTB-100... used with 2" - 8" LB-Series (9"L x 1"H)
LTB-200... used with 10" - 24" LB-Series (16"L x 1"H)
LTB-224... used with 2" - 4" LGK/LG-Series (18"L x 3.5"H)
LTB-228... used with 6" - 8" LGK/LG-Series (24"L x 3.5"H)
LTB-1012... used with 10" - 12" LGK/LG-Series (32"L x 3.5"H)



SB-LK6 and SB-LK7

SB-LK6... used with 2" - 8" LGK-Series
SB-LK7... used with 10" - 12" LGK-Series



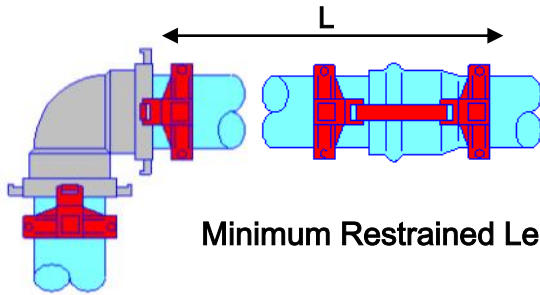
LS-MJ

LS-MJ... used with 2" - 12" LMJ-Series

Design Criteria...

All tees, Bends, Reducers and End Caps should be restrained using LH-Series restraints. A certain number of joints before and after a restrained fitting may also require joint restraints as set forth in Tables below.

Below Tables establish values for the minimum length of pipe ("L") within which other joints must be restrained. Values (in feet) are based on 125 PSI line pressure, 24" of cover, Sandy-Clay type soil, and a safety factor of 2. For other line pressures, multiply the "L" values by 125.



Minimum Restrained Length (L) in feet

NOTE: Step Reduction Example:

1 Step (8x6), 2 Step (8x4), 3 Step (8x3)

Pipe-Pipe Restraints for IPS & DPS pipe... minimum restrained length ("L") in feet

Pipe Size	Pipe OD IPS	Pipe OD DPS	Bends				Step Reduction			Dead End	Gate Valve
			11	22	45	90	1	2	3		
2"	2.38		1	1	2	6				19	10
2.5"	2.88		1	2	4	9	4			23	12
3"	3.50		2	3	6	11	8	10		30	15
4"	4.50	4.80	2	4	9	20	14	20	31	45	23
6"	6.63	6.90	3	6	13	29	30	40	53	63	31
8"	8.63	9.05	4	8	15	38	33	55	63	75	38
10"	10.75	11.10	5	9	19	45	36	56	75	96	48
12"	12.75	13.20	5	10	21	53	38	60	83	112	56
14"		15.30	6	11	24	58	40	62	86	130	62
16"		17.40	6	13	27	65	42	64	88	146	73
18"		19.50	7	14	29	69	44	70	90	162	81
20"		21.60	8	15	32	76	46	80	92	178	89
24"		25.80	9	18	37	88	63	90	114	209	105

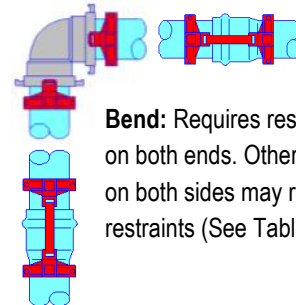
Pipe-Pipe Restraints for DIN pipe... minimum restrained length ("L") in meters

Pipe Size	Pipe OD Max MM	Pipe OD Inches	Bends				Step Reduction			Dead End	Gate Valve
			11	22	45	90	1	2	3		
63	64	2.48	0.3	0.3	0.6	1.8				5.8	3.0
75	76	2.95	0.3	0.6	1.2	2.7	1.2			7.0	3.7
90	91	3.54	0.6	0.9	1.8	3.4	2.4	3.0		9.1	4.6
110	111	4.33	0.6	1.2	2.7	6.1	4.3	6.0	9.4	13.7	7.0
160	162	6.30	0.9	1.8	3.7	8.7	8.9	12.0	15.0	18.9	9.5
200	202	7.87	1.0	2.0	3.9	9.5	9.0	13.7	15.7	20.7	10.5
225	228	8.86	1.5	2.4	4.6	11.6	10.1	16.8	19.2	22.9	11.6
250	253	9.84	1.6	3.0	6.2	14.8	10.2	17.4	24.6	31.5	15.8
280	283	11.02	1.8	3.3	7.2	17.4	10.5	18.0	26.2	35.4	17.4
312	319	12.28	1.8	3.5	8.1	19.5	10.7	18.5	27.0	39.0	19.5
400	406	15.75	2.1	3.6	8.7	20.7	10.9	18.9	28.4	48.6	24.3

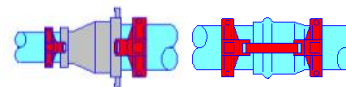
Joint Restraint - Quick Selection Guide

Based on 125 PSI pressure and 20 - foot length of pipe

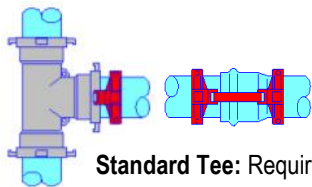
Pipe-Pipe Restraints											
Table below shows the number of adjacent joints to restrain...based on 20 foot length											
Pipe Size	Pipe OD IPS	Pipe OD DPS	Bends				Step Reduction			Dead End	Gate Valve
			11	22	45	90	1	2	3		
2"	2.38										
2.5"	2.88									1	
3"	3.50									1	
4"	4.50	4.80				1		1	1	2	1
6"	6.63	6.90				1	1	2	2	3	1
8"	8.63	9.05				1	1	2	3	3	2
10"	10.75	11.10			1	2	1	2	3	4	2
12"	12.75	13.20			1	2	2	3	4	5	2
14"		15.30			1	3	2	3	4	6	3
16"		17.40			1	3	2	3	4	7	3
18"		19.50			1	3	2	3	4	8	4
20"		21.60			1	3	2	4	4	9	4
24"		25.80			1	3	2	4	5	10	5



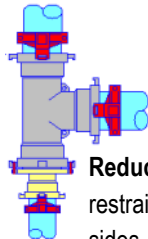
Bend: Requires restraints on both ends. Other joints on both sides may require restraints (See Tables).



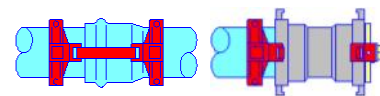
Reducers: Must be restrained on both ends. Additional joints on the larger end are required. (See Tables)



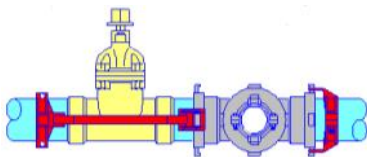
Standard Tee: Requires restraint on branch side only. Use 90-degree bend for additional joints. (See Tables)



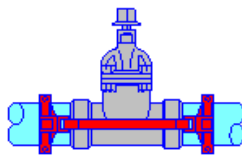
Reducing Tee: Requires restraints on all three sides. (See Tables)



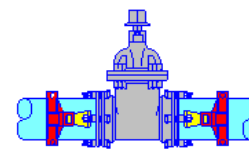
Dead End: Adjacent joint restraints are required on upstream joints. (See Tables)



LGK-Series: Additional joints require restraints. (See Tables)

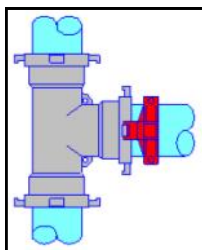


LG-Series: Additional joints on both sides require restraints.



LMJ-Series: Additional joints on both sides require restraints.

Product Information... Please refer to IPS, DPS & DIN Price Lists for Models & Sizes

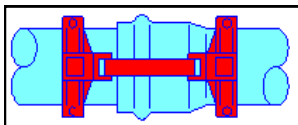


LH-Series... 2" - 12" IPS Sizes

LHD-Series... 4" - 24" DPS Sizes

DLH-Series... 63 - 400MM DIN Sizes

Set consists of two half clamps and hardware that attaches PVC pipe to Leemco ductile iron fittings.

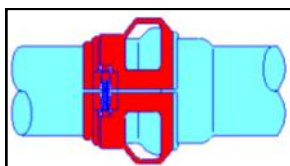


LB-Series... 2" - 12" IPS Sizes

LBD-Series... 4" - 24" DPS Sizes

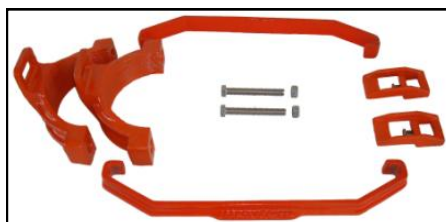
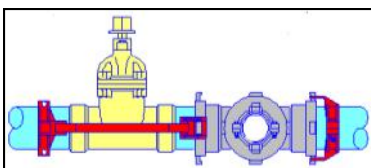
DLB-Series... 63 - 400MM DIN Sizes

Set consists of four half clamps, two tie-bars and hardware that restrains a bell-spigot PVC pipe connection.



LPP-Series... 2" - 12" IPS Sizes

Set consists of two half clamps and hardware that restrains a bell-spigot PVC pipe connection.

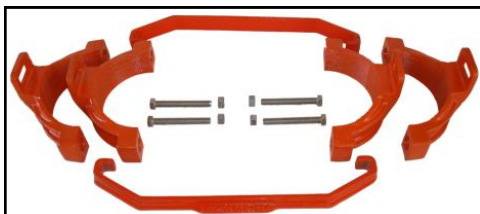
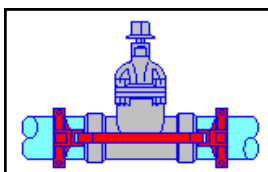


LGK-Series... 2" - 12" IPS Sizes

LGKD-Series... 4" - 12" DPS Sizes

DLGK-Series... 63 - 400MM DIN Sizes

Set consists of two half clamps, two tie-bars and two SB-Links that attach to a Leemco fitting and on the opposite end to the PVC pipe to restrain a gate valve in between.

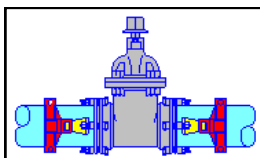


LG-Series... 2" - 12" IPS Sizes

LGD-Series... 4" - 12" DPS Sizes

DLG-Series... 63 - 400MM DIN Sizes

Set consists of four half clamps, two tie-bars and hardware that attach to pipes on the opposite sides of a bell x bell gate valve.



LMJ-Series... 2" - 12" IPS Sizes

LMJD-Series... 4" - 12" DPS Sizes

DLMJ-Series... 63 - 400MM DIN Sizes

Set consists of two half clamps, two LS-MJ links that attach the LH-Clamp to a flange or MJ style valve. Hardware for LH-Clamps are included.

Estimating & Installing Leemco Joint Restraints

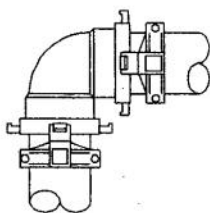
Based on 125 PSI pressure, Sandy-Clay soil mixture, 20 feet distance between the restrained fitting and the next joint

6/2000

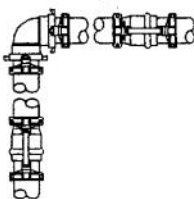
F-2026A

For estimating purposes, it is best to first make a schedule (Table) of all ductile iron fittings on the project. Then next to each fitting jot down the number and type of joint restraints required using the following simplified guide. Think of joint restraints the same way as with thrust blocks. Thrust forces are created by changes in direction (bends) and pipe diameter changes. Direction of flow plays no significant role...static pressure plays a key role. Long runs of pipe that encounter no significant bend (say less than 15 degrees) and encounter no reducers do not require joint restraints.

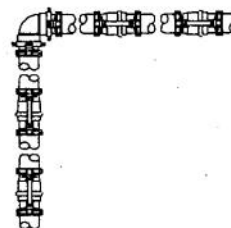
1. Bends: 90, 45 & 22



2", 2.5" and 3" Sizes:
Use two LH-Series Restraints;
one for each end of the 90.

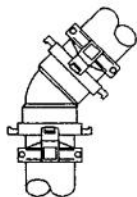


4", 6" and 8" Sizes:
Use two LH-series for the 90 and two
LB-Series for pipe-to-pipe joints.



10" - 12" Sizes:
Use two LH-Series for the 90 and four
LB-Series for pipe-to-pipe joints.
14" - 24" Sizes:
Use two LH-Series for the 90 and six
LB-Series for the pipe-to-pipe joints.

45-degree



2" - 8" Sizes:
Use two LH-Series for the 45 Bend.

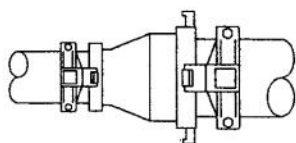


10" - 24" Sizes:
Use two LH-Series for the 45 and two
LB-Series for the pipe-to-pipe joints.

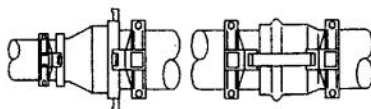


All Sizes:
**22-degree Bends require two LH-Series. No
restraints required for the next joints.**

2. Reducers



For reasons of economy, it is best to avoid reducers...instead reduce at a tee or a bend. Both ends of reducers must be restrained using LH-Series.



In addition to the reducer, the next joint on the larger diameter needs one LB-Series for the following reductions:

4 x 2, 4 x 2.5, 6 X 3, 6 X 4, 8 X 6,
10 x 8



In addition to the reducer, the next two joints on the larger diameter side need LB-Series for the following reductions:
6x2, 6x2.5, 8x4, 8x3, 10x6, 12x10, 12x8,
14x12, 16x14, 18x16, 20x18
Use three LB-Series for:
10x4, 10x3, 12x6, 14x10, 16x12, 18x14

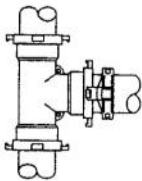
Estimating & Installing Leemco Joint Restraints

Based on 125 PSI pressure, Sandy-Clay soil mixture, 20 feet distance between the restrained fitting and the next joint

6/2000

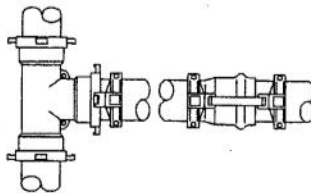
F-2026B

3. Tee



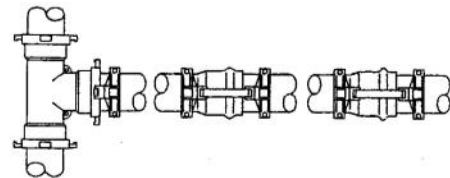
When pipe along the run does not change in size, only the branch end needs a LH-Series restraint.

2", 2.5", 3" Branch Size:
One LH-Series on the branch end.



4", 6", 8" Branch Size:

One LH-Series on the branch end and one LB-Series on the next joint.



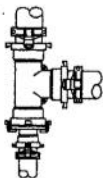
10" - 12" Sizes:

One LH-Series on the branch end and two LB-Series on the next two joints.

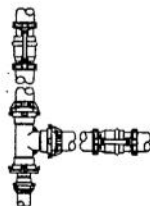
14" - 24" Sizes:

One LH-Series on the branch end and three LB-Series on the next three joints.

Reducing Tee's



When pipe along the run changes in size, all sides of Tee must be restrained using LH-Series. For the branch end, use the same rules as outlined above.

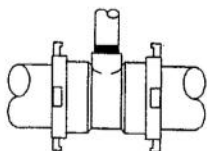


Along the run, additional joint restraints may be needed on the larger diameter side, using the same rules as for 90-degree bends.

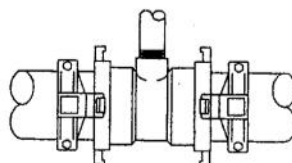
The next joint after a restrained fitting could be another ductile iron fitting...such as a Service Tee...

When the next joint is another fitting, simply restrain the ductile iron fitting using LH-Series restraints instead of LB-Series that are made for pipe-to-pipe connections as illustrated below.

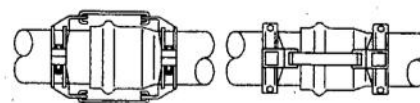
4. Service Tee's...normally do not require restraints.



Service Tee provides threaded outlet for connection to a lateral line. It does not require restraints unless it is the next joint to a fitting that requires it to be restrained.



To restrain a Service Tee, use two LH-Series restraints, one for each end.



Side View

Top View

Pipe to Pipe restraint (LB-Series) consists of two LH-Series clamps sets and two LTB-100 (for 8" and smaller) or two LTB-200 (for 10" - 24") tie bars

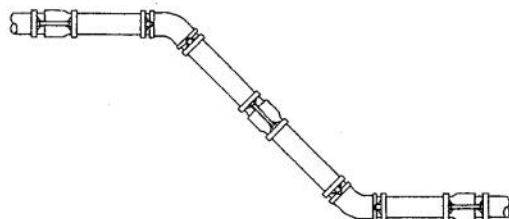
Estimating & Installing Leemco Joint Restraints

Based on 125 PSI pressure, Sandy-Clay soil mixture, 20 feet distance between the restrained fitting and the next joint

6/2000

F-2026C

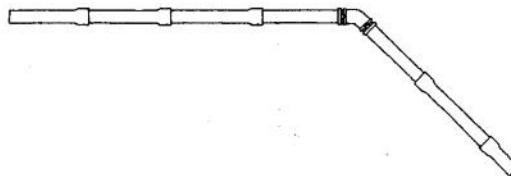
5. Vertical Offsets...slopes



Elevation View

Use LH-Series restraints on both bends and LB-Series on all joints between the two bends. Use LB-series on the next joint to the bends as shown above.

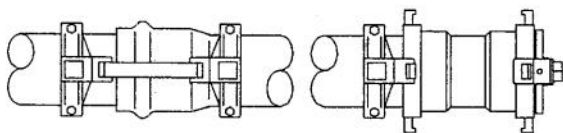
6. Long Runs of Pipe



Plan View

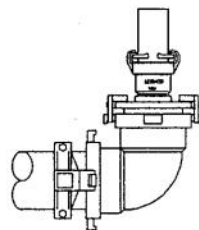
Pipe joints on relatively straight runs of pipe that do not encounter a major change in direction (larger than 15 degrees) or a reducer do not require joint restraints.

7. Dead Ends



Use LH-Series on the cap and the following LB-Series for the joints upstream of the Cap

Size	LB-Series	Size	LB-Series
2" - 3"	1	14"	6
4"	2	16"	7
6" - 8"	3	18" - 20"	8
10"	4	24"	10
12"	5		

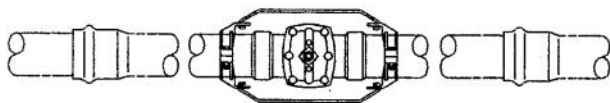


Service EL

An EL at the end of a mainline that connects to a lateral line requires one LH-Series for the EL and as many LB-Series restraints on the upstream joints as recommended below.

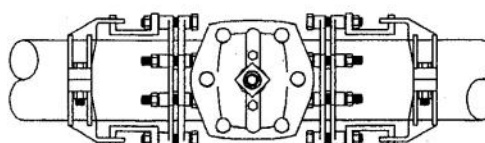
Size	LB-Series	Size	LB-Series
2" - 3"	1	14"	6
4"	2	16"	7
6" - 8"	3	18" - 20"	8
10"	4	24"	10
12"	5		

8. Push-On, In-Line Gate Valves



LG-Series consists of two LH-Series and two Tie-Bars and is used to restrain a push on gate valve installed on a main. Adjacent joints need restraints when the gate valve is installed close to a bend or a reducer.

9. MJ & Flanged Gate Valves



LMJ-Series consists of one LH-Series and two MJ-LK links to secure one end of an MJ or Flanged gate or automatic valve. In the illustration above, two LMJ-Series restraints are used.

Installation Guide - (LH-Series Joint Restraint)



LH-Series 2" - 6" (2 bolts & nuts)



LH-Series 8" - 16" (4 bolts & nuts)

LH-Series 18" - 24" (6-bolts & nuts)

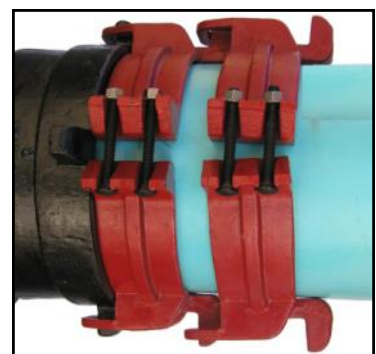
1. Install Leemco fitting onto pipe.
(Refer to Fitting Installation Guide)
2. Inspect LH Restraint to insure all parts are included as pictured at upper right.
2" - 6" restraints have 2 bolts/nuts, 8" - 16" restraints have 4 bolts/nuts and
18" - 24" restraints have 6 bolts/nuts.
3. Check the model number of the LH Restraint to insure you are installing the
correct size onto the Leemco fitting.
4. **IMPORTANT:** Leemco fittings have 4-ears. The link of the restraint is
designed to attach to the flat (**vertical**) ear of the fitting, as pictured to the
right.
5. Position the lower and upper half clamps around the pipe while hooking the
link of the restraint to the flat vertical ear of the fitting.
6. **IMPORTANT!** Lubricate carriage bolt threads with W-D 40 lubricant to
prevent the possibility of galling or seizing of the steel threads.
7. Finger tighten each nut onto the threaded bolts. Slide the LH Restraint back
until the links are tight against the ear of the fitting. Tighten all nuts evenly in
5 ft-lb increments using a torque wrench. Use the torque setting chart below.
Do not over tighten because when the pipe is pressurized, it will expand and
increase torque significantly. Larger pipes expand more.

Torque Settings for Bolts:

2", 2.5" & 3"... 20 ft-lbs

4", 6", 8"... 50 ft-lbs

10" - 24"... 100 ft-lbs



Tandem LH restraints can be used on 14" - 24" in
size for pressures that exceed 125PSI.

Installation Guide - (LB-Series Joint Restraint)



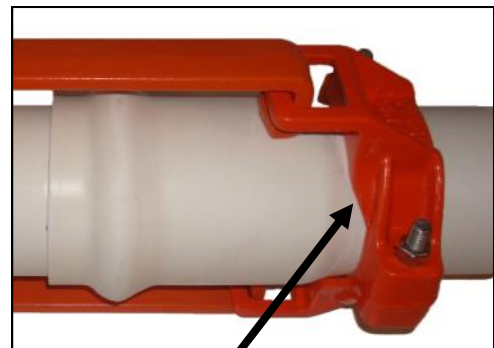
Installation of LB, LBD & DLB-Series Joint Restraint (Pipe to Pipe)

LB-Series 2" - 6" (2 bolts & nuts)

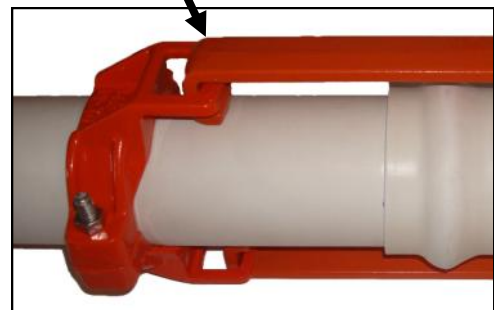
LB-Series 8" - 16" (4 bolts & nuts)

LB-Series 18" - 24" (6 bolts & nuts)

1. Inspect LB Restraint to insure all parts are included as pictured upper right. 2" - 6" restraints have 2 bolts/nuts, 8" - 16" restraints have 4 bolts/nuts and 18" - 24" have 6 bolts/nuts.
2. Check the model number of the LB Restraint to insure you are installing the correct size onto the pipe.
3. Position the lower and upper half clamps around the pipe with the LH links pointing towards the pipe bell as pictured to the right.
4. **IMPORTANT!** Lubricate carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the steel threads.
5. Finger tighten each nut onto the threaded bolts. Slide the LH restraint towards the pipe bell until it stops. Tighten all nuts evenly in 5 ft-lb increments using a torque wrench. Use the torque setting chart below. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly. Larger pipes expand more.
6. Hook one end of the LTB tie bars to the LH links.
7. Install the other LH restraint as described above with the links pointing towards the pipe bell. Hook the other end of the LTB tie bars to the LH links as pictured to the right. Tighten all nuts evenly in 5 ft-lb increments using a torque wrench. Use torque setting chart below.
8. **IMPORTANT!** make sure tie bars are tight and will not fall off or unhook.



Slide LH restraint towards the pipe bell until it stops. Then tighten bolts to proper torque setting. Hook LTB tie bar ends to LH links.



Torque Settings for LH Restraint bolts:

2", 2.5" & 3" ... 20 ft-lbs

4", 6", 8" ... 50 ft-lbs

10" - 24" ... 100 ft-lbs



Installation Guide - (LPP-Series Joint Restraint)



Installation of LPP-Series Joint Restraint (Pipe to Pipe)

1. Inspect LPP Restraint to insure all parts are included as pictured at upper right.
2. Check the model number of the LPP Restraint to insure you are installing the correct size onto the pipe.
3. Position the two clamps around the bell end and spigot end of the pipe. The larger diameter of the clamp goes around the bell end of the pipe and the smaller diameter restrains to the spigot end of the pipe.
4. **IMPORTANT!** Lubricate carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the steel threads.
5. Install one washer under each nut and hex head of bolt. Finger tighten the nuts onto the threaded bolts. Tighten all nuts evenly in 5 ft-lb increments using a torque wrench. Use the torque setting chart below. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly. Larger pipes expand more.

Torque Settings for bolts:

2", 2.5" & 3"...	20 ft-lbs
4", 6", 8"...	50 ft-lbs
10" & 12"...	100 ft-lbs

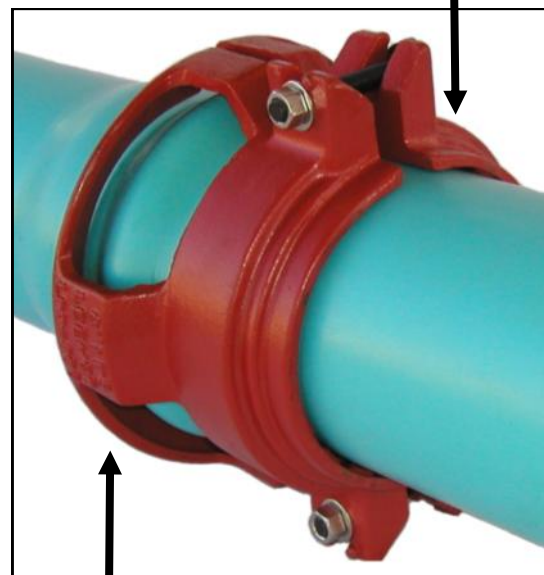


LPP-Series 2" - 8" (2 bolts & nuts)

LPP-Series 10" (4 bolts & nuts)

LPP-Series 12" (6 bolts & nuts)

Smaller diameter of the restraint
restrains to spigot end of pipe.

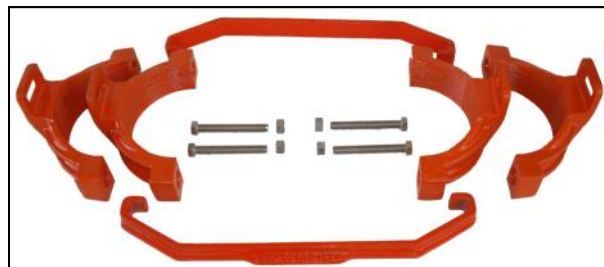


Larger diameter of the restraint wraps
around the bell end of the pipe

Installation Guide - (LG-Series Joint Restraint)



Installation of LG, LGD & DLG-Series Joint Restraint (Pipe to Pipe)



LG-Series 2" - 6" (2 bolts & nuts)

LG-Series 8" - 12" (4 bolts & nuts)

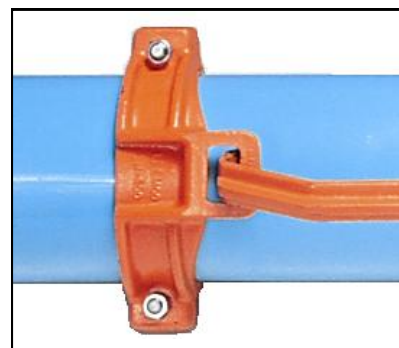
1. Inspect LG Restraint to insure all parts are included as pictured upper right. 2" - 6" restraints have 2 bolts/nuts & 8" - 12" restraints have 4 bolts/nuts.
2. Check the model number of the LG Restraint to insure you are installing the correct size onto the pipe.
3. Position the lower and upper half clamps around the pipe with the LH links pointing towards the gate valve.
4. **IMPORTANT!** Lubricate the carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the steel threads.
5. Tighten all nuts evenly in 5 ft-lb increments using a torque wrench. Use the torque setting chart below. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly. Larger pipes expand more.
6. Hook the ends of the tie bars through the LH links.
7. Install other LH restraint as described above with the links pointing towards the gate valve. Hook the other ends of the tie bars through the LH links. Slide the LH restraint until tie bars are tight. Tighten all nuts evenly in 5 ft-lb increments using a torque wrench. Use torque setting chart below.
8. **IMPORTANT!** make sure tie bars are tight and will not fall off or unhook.

LH Links point towards the valve



Hook tie bar ends to LH links.

Slide LH Restraint until tie bar is tight.



Torque Settings for LH Restraint bolts:

2", 2.5" & 3"... 20 ft-lbs

4", 6", 8"... 50 ft-lbs

10" & 12"... 100 ft-lbs



Installation Guide - (LGK-Series Joint Restraint)



Installation of LGK, LGKD & DLGK-Series Joint Restraint (Pipe to Fitting)

1. Inspect LGK Restraint to insure all parts are included as pictured at upper right. 2" - 6" restraints have 2 bolts/nuts and 8" - 12" restraints have 4 bolts/nuts.
2. Check the model number of the LGK Restraint to insure you are installing the correct size onto the pipe.
3. Position the lower and upper half clamps around the pipe with LH links pointing towards the gate valve. Hand tighten the nuts on the bolts so the LH restraint can slide for adjustment.
4. **IMPORTANT!** Lubricate carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the steel threads.
5. Attach SB-LK links to **(horizontal)** thick ears on fitting. Hook the end of the LTB tie bars to the SB-LK links.
6. Hook other end of tie bars to the LH links and slide the LH restraint until both tie bars are tight and will not fall off.
7. Tighten all nuts on the LH restraint evenly in 5 ft-lbs increments using a torque wrench. Use the torque setting chart below. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly. Larger pipes expand more.
8. **IMPORTANT!** make sure tie bars are tight and will not fall off or unhook.

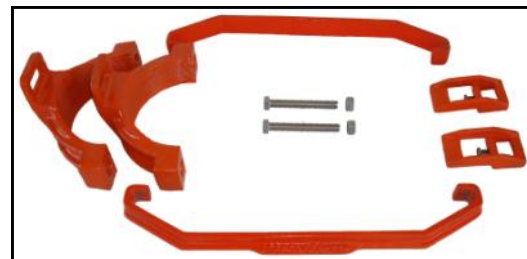
Torque Settings for LH Restraint bolts:

2", 2.5" & 3"... 20 ft-lbs

4", 6", 8"... 50 ft-lbs

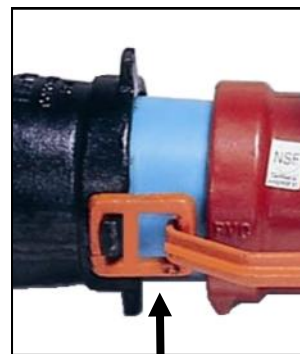
10" & 12"... 100 ft-lbs

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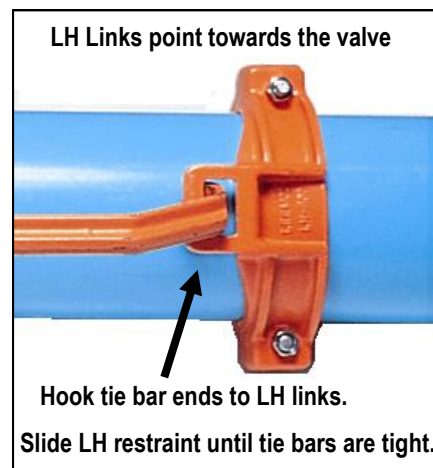


LGK-Series 2" - 6" (2 bolts & nuts)

LGK-Series 8" - 12" (4 bolts & nuts)



Attach SB-LK links to horizontal ears of fitting



Installation Guide - (LMJ-Series Joint Restraint)

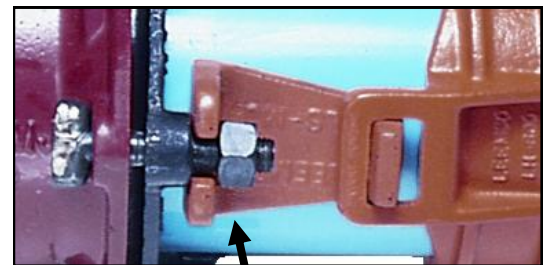


LMJ-Series 2" - 6" (2 bolts & nuts)

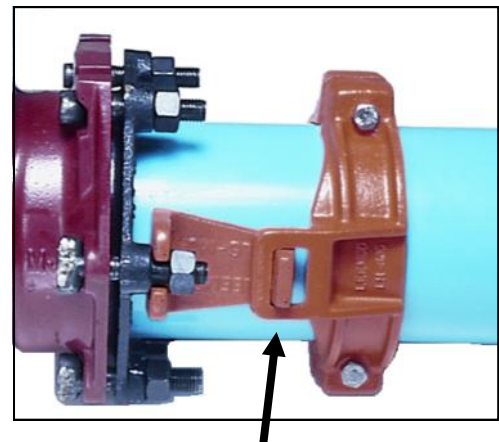
LMJ-Series 8" - 12" (4 bolts & nuts)

Installation of LMJ, LMJD & DLMJ-Series Joint Restraint (Pipe to MJ or Flange Valve)

1. Inspect the LMJ Restraint to insure all parts are included as pictured at upper right. 2" - 6" restraints have 2 bolts/nuts and 8" - 12" restraints have 4 bolts/nuts.
2. Check the model number of the LMJ Restraint to insure you are installing the correct size onto the pipe.
3. Install MJ or Flanged gate valve per manufactures recommendations.
4. Position the lower and upper half clamps around the pipe with LH links pointing towards the gate valve. Hand tighten the nuts on the bolts so the LH restraint can slide for adjustment.
5. **IMPORTANT!** Lubricate carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the steel threads.
6. Attach LS-MJ links to the valve bolt as shown in picture at right. Hook the end of LS-MJ links to the LH restraint links.
7. Slide the LH restraint until tight and tighten bolts on restraint evenly in 5 ft-lb increments using a torque wrench. Use the torque setting chart below. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly. Larger pipes expand more.
8. Install other LS-MJ links on opposite side of valve as described above.
9. **IMPORTANT!** make sure LS-MJ links are tight and will not fall off or unhook from LH restraint links.



Attach LS-MJ links to valve bolt as shown.



Hook LS-MJ ears to LH restraint links.
Slide LH restraint until tight.

Torque Settings for LH Restraint bolts:

2", 2.5" & 3"...	20 ft-lbs
4", 6", 8"...	50 ft-lbs
10" & 12"...	100 ft-lbs

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Installation Guide - (Self-Restrained Fitting)



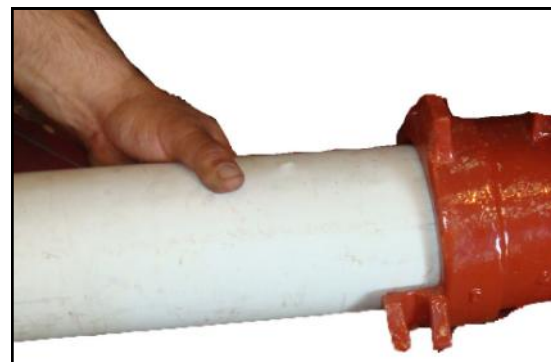
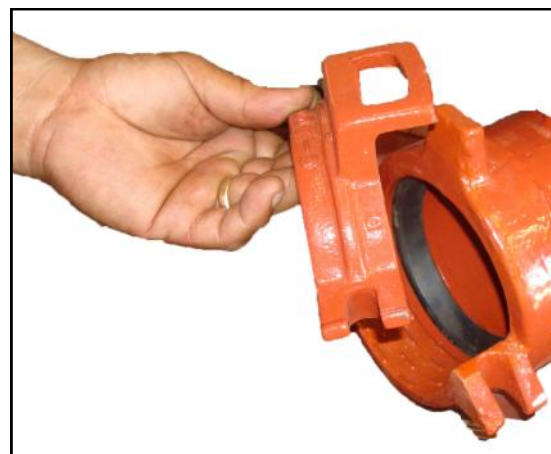
Installation of pipe into a Self-Restrained Fitting

1. Bevel the end of the pipe to avoid damaging the rubber gasket inside fitting.
2. Remove the bolts and top half clamp from each side of the fitting.
3. Apply a suitable gasket lubricant to the gasket inside the fitting.
4. Insert the beveled end of the pipe into the gasket outlet of the valve until it reaches the stop inside fitting.
5. **IMPORTANT!** Lubricate the carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of steel threads.
6. Reinstall bolts and the top of the half clamp on each side of the fitting. Install one washer under the nut and one washer under the bolt head. Finger tighten each nut onto the threaded bolts. Tighten all nuts evenly in 5 ft-lb increments using a torque wrench. Use the torque setting chart below. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly. Larger pipes expand more.

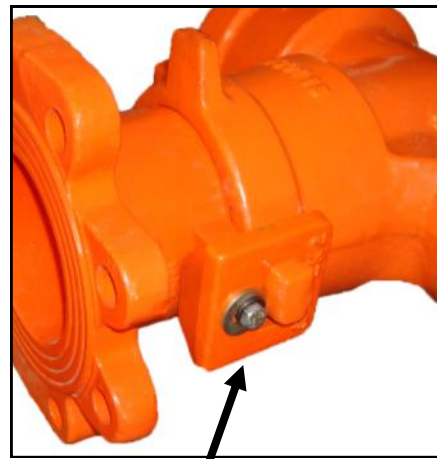
Torque Settings for Bolts:

2", 2.5" & 3"...	20 ft-lbs
4", 6", 8"...	50 ft-lbs
10" & 12"...	100 ft-lbs

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Installation Guide - (Spigot End Fitting)



Installation of Spigot End Fitting Into a Gasket Fitting

1. Apply a suitable gasket lubricant to the gasket in the fitting.
2. Remove the two SB-LK links and bolts from the spigot end of the fitting.
3. Insert the spigot end of the fitting into the gasket outlet of the fitting until it stops.
4. **IMPORTANT!** The SB-LK links do not require a torque wrench. Do not over tighten.
5. **IMPORTANT!** Leemco fittings have 4-ears. The SB-LK link is designed to attach to thicker (**Horizontal**) ear of the fitting, as pictured to the right.
6. Attach the SB-LK links over the horizontal thick ears of the fitting. Install washers underneath the hex head of the carriage bolts and tighten the bolts with a socket wrench until tight.

**Picture of properly installed
SB-LK link**

Installation Guide - Saddles (Ductile Strap)



Installing TS, DTS, LTS, DLS, LTDS-Series Saddles: (Ductile Strap)

1. Inspect the saddle to insure all parts are included as pictured at upper right.
2. Inspect the saddle to insure the saddle gasket is properly positioned within the gasket groove inside the saddle.
3. Check the diameter of the pipe and the model number of the saddle to insure you are using the correct sized saddle.
4. Thoroughly clean the pipe surface that will be covered by the saddle. Apply a suitable gasket lubricant to the gasket and pipe surface.
5. Mount the saddle body onto the pipe.
6. Position the lower saddle clamp beneath the pipe and hook the hinged end into the slot of the saddle body. Make sure the nut and washer are positioned on top of the saddle and the carriage bolt hex head is located in the notched area of the bottom saddle clamp.
7. **IMPORTANT!** Lubricate carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the steel threads.
8. Finger tighten the nut (use washer under nut) onto the carriage bolt. Proceed to tighten to **25-30 ft-lbs** using a torque wrench. Do not over tighten because when the pipe is pressurized, it will expand and increase the torque significantly. Larger pipes expand more.
9. Drill a hole through the pipe (access is through the saddle outlet). The port size is typically recommended by the Irrigation Consultant or the pipe manufacture. With 2" outlet saddles, the port size is usually 1" to 1.25" in diameter. With smaller diameter pipe (3" - 4"), larger port sizes will take away too much material and weaken the pipe at the port location.



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**TORQUE TO:
25-30 ft-lbs**

Installation Guide - Saddles (Stainless Steel Strap)



Installing RSST, RSDT, RSLS & RDLS-Series Saddles: (Stainless Steel Strap)

1. Inspect the saddle to insure all parts are included as pictured at upper right.
2. Inspect the saddle to insure the saddle gasket is properly secured to the saddle body.
3. Check the diameter of the pipe and the model number of the saddle to insure you are using the correct sized saddle.
4. Thoroughly clean the pipe surface that will be covered by the saddle. Apply a suitable gasket lubricant to the gasket and pipe surface.
5. Mount the saddle body onto the pipe.
6. Position the lower saddle strap beneath the pipe.
7. **IMPORTANT!** Lubricate strap bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the stainless steel material.
8. Finger tighten the nuts (use washer under the nuts) onto the strap thread bolts. Tighten all nuts evenly in 5 ft-lb increments using a torque wrench. Tighten all nuts to **25-30 ft-lbs** of torque. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly. Larger pipes expand more.
9. Drill a hole through the pipe (access is through the saddle outlet). The port size is typically recommended by the Irrigation Consultant or the pipe manufacture. With 2" outlet saddles, the port size is usually 1" to 1.25" in diameter. With smaller diameter pipe (3" - 4"), larger port sizes will take away too much material and weaken the pipe at the port location.



**TORQUE TO:
25-30 ft-lbs**

Installation Guide - (LV-Series Lateral Valve)



Inserting the LV-Series Valve into a Lateral Saddle or Lateral Tee outlet

1. Install the Lateral Saddle or Lateral Tee onto the mainline pipe.
(Refer to Saddle or Fitting Installation Guide)
2. Inspect the valve to insure all parts are included.
3. Apply a suitable gasket lubricant to the gasket inside the outlet before inserting the valve.
4. Insert spigot end of the valve inlet into the lateral saddle or lateral tee gasket outlet. Notches in the valve inlet will pass through the tabs on the saddle or tee outlet.
5. Rotate the valve 360 degrees to desired position.
6. If the valve alignment cannot be rotated and remains in the original installed position, two LV-Clips are needed to secure the valve in place.
7. **IMPORTANT!** LV-Clips are sold separately. The LV-Clips are not needed if the valve can be rotated to where the outlet tabs secure the valve from coming out under pressure.



**Picture of installed LV-Clips.
(Sold separately)**

Installation Guide - (Lateral Valve Outlet)



Installing lateral piping into outlet of LV & LGV-Series Valves

1. Loosen the half clamp on valve outlet by loosening the two bolts and nuts. Nuts do not need to be removed completely.
2. Apply a suitable gasket lubricant to the gasket inside the valve outlet before inserting the lateral pipe.
3. **IMPORTANT!** Make sure lateral pipe is beveled at the end, so it doesn't damage the valve outlet gasket.
4. Insert the lateral pipe until the beveled end reaches the stop inside the valve.
5. **IMPORTANT!** Lubricate the carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the stainless steel threads.
6. Finger tighten the nuts onto the carriage bolts.
7. For 2" outlets proceed to tighten to **5-10 ft-lbs** using a torque wrench. For 2.5" & 3" outlets proceed to tighten to **10-15 ft-lbs**. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly.



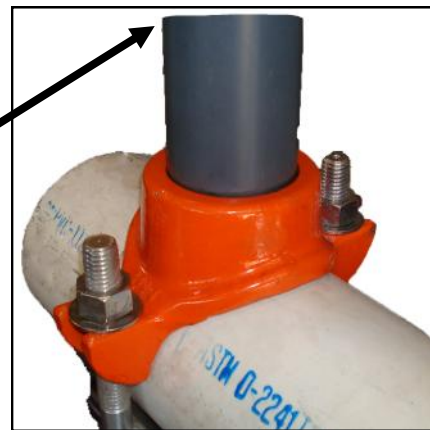
2" Outlets: Torque 5-10 ft-lbs

2.5" & 3" Outlets: Torque 10-15 ft-lbs

Installation Guide - (LV-220 Lateral Valve)



Beveled Plain-End
of Nipple or Pipe



Installing the LV-220 Valve into a Service Saddle or Service Tee

1. Install Service Saddle or Service Tee onto mainline pipe.
(Refer to Saddle or Fitting Installation Guides)
2. Inspect the LV-220 valve to insure all parts are included.
3. Please note: Bottom inlet of the valve accepts 2" IPS plain end pipe size.
4. Install the desired length 2" TOE nipple or pipe into the mainline service fittings 2" outlet. Be sure to use an appropriate thread sealant per pipe manufactures recommendation. (IE; Teflon paste or pipe sealant.)
5. **IMPORTANT!** Make sure the TOE nipple or pipe plain end is beveled so it won't damage the valve gasket inside the bottom inlet.
6. Widen the restraints on the valve inlet by loosening the nuts and bolts. Nuts do not need to be removed completely.
7. Apply a suitable gasket lubricant to the gasket inside the valve inlet before installing the valve.
8. Install valve over the beveled TOE nipple or pipe until it reaches the stop inside the valve.
9. Rotate the valve 360 degrees to desired position.
10. Using a torque wrench, tighten the bolts and nuts on the bottom inlet of the valve to **5-10 ft-lbs** of torque.
11. Use an appropriate thread sealant on the threads of the Nipple or threaded fitting. Install desired length TOE nipple or threaded fitting into the valves 2" outlet.



Valve Inlet Bolts:
5-10 ft-lbs of torque



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Installation Guide - (Lateral Fittings)



Inserting lateral fittings into a Lateral Saddle or Lateral Tee outlet

1. Install the Lateral Saddle or Lateral Tee onto the mainline pipe.
(Refer to Saddle or Fitting Installation Guide)
2. Apply a suitable gasket lubricant to the gasket inside the outlet before inserting the lateral fitting.
3. Insert spigot end of the lateral fitting inlet into the lateral saddle or lateral tee gasket outlet. Notches in the lateral fitting inlet will pass through the tabs on the saddle or tee outlet.
4. Rotate the fitting 360 degrees to desired position.
5. If the lateral fitting alignment cannot be rotated and remains in the original installed position, two LV-Clips are needed to secure the valve in place.
6. **IMPORTANT!** LV-Clips are sold separately. The LV-Clips are not needed if the lateral fitting can be rotated to where the outlet tabs secure the lateral fitting from coming out under pressure.



**Picture of installed LV-Clips.
(Sold separately)**

Installation Guide - (LMV-SB Mainline Valve)



Installation of LMV-SB Series Mainline Gate Valve into a Gasket tee

1. Install the tee onto the mainline pipe.
2. Inspect the valve to insure all parts are included.
3. Apply a suitable gasket lubricant to the gasket inside the tee.
4. Remove the two SB-LK links and bolts from the spigot end of the valve.
5. Insert the spigot end of the valve into the gasket outlet of the tee until it stops.
6. **IMPORTANT!** Leemco fittings have 4-ears. The SB-LK link is designed to attach to the thicker (**Horizontal**) ear of the fitting, as pictured to the right.
7. **IMPORTANT!** The SB-LK links do not require a torque wrench. Do not over tighten bolts.
8. Attach the SB-LK links over the horizontal thick ears of the fitting. Install washers underneath the hex head of carriage bolts and tighten the bolts with a socket wrench until tight.
9. Refer to LMV-BB Mainline Valve Installation Guide for installing pipe into the bell end of the valve.



**Picture of properly installed
SB-LK link**

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Installation Guide - (LMV-BB Mainline Valve)



Installation of pipe into a LMV-BB Series Mainline Gate Valve

1. Bevel the end of the pipe to avoid damaging the rubber gasket inside the valve.
2. Remove the bolts and top half clamp from each side of the valve.
3. Apply a suitable gasket lubricant to the gasket inside the valve.
4. Insert the beveled end of the pipe into the gasket outlet of the valve until it stops.
5. **IMPORTANT!** Lubricate the carriage bolt threads with W-D 40 lubricant to prevent the possibility of galling or seizing of the steel threads.
6. Reinstall the bolts and top of the half clamp on each side of valve. Install one washer under the nut and one washer under the bolt head. Finger tighten each nut onto the threaded bolts. Tighten all nuts evenly in 5 ft-lb increments using a torque wrench. Use the torque setting chart below. Do not over tighten because when the pipe is pressurized, it will expand and increase torque significantly. Larger pipes expand more.

Torque Settings for Valves:

2", 2.5" & 3"...	20 ft-lbs
4", 6", 8"...	50 ft-lbs
10" & 12"...	100 ft-lbs



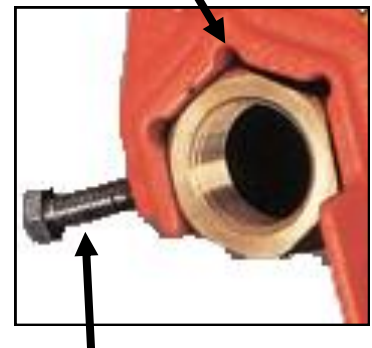
Installation Guide - (Quick Coupler Stabilizer)



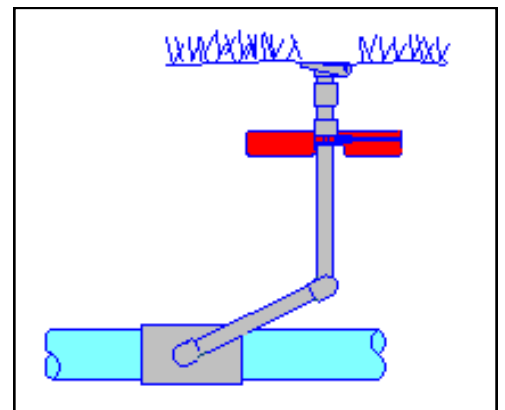
Installation of LS-120 & LS-150 Quick Coupler Stabilizer

1. Inspect the stabilizer to insure set bolt is included as pictured above.
2. Check the model number of the stabilizer to insure you are installing the correct size onto the quick coupler. The LS-120 is designed for 3/4" or 1" quick coupling valves. The LS-150 is designed for 1.5" quick coupling valves.
3. Loosen bolt on stabilizer, but do not remove it.
4. Position the stabilizer around the bottom base of the quick coupling valve as shown in the picture to the right.
5. **IMPORTANT!** Do not over tighten bolt. Over tightening can damage bolt threads.
6. Tighten the bolt against the quick coupler's bottom base to secure the stabilizer in place.

Position the stabilizer around the bottom base of the quick coupling valve.



Tighten the bolt to secure the stabilizer.



The UL Series Universal Air Release Valves

Compound Lever System
NPT Screwed or ANSI Class Flanges Available



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UL SERIES

Universal Air Release Valves

Universal Air Release Valve

Valve Function

- Allows air to escape a pipeline as it is being filled
- Allows air to enter a pipeline as it is being emptied
- Allows accumulating air to escape while a line is in operation and under pressure

Features Include

- Meets AWWA C-512
- Compound lever system
- NPT screwed or ANSI Class Flanges

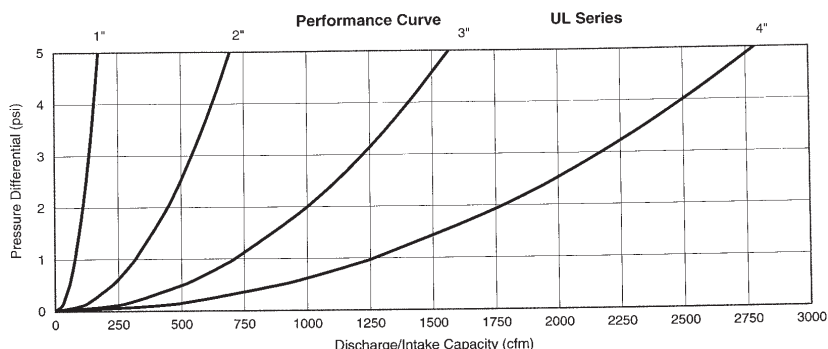
With Stainless Steel Trim or Bronze and Stainless Steel Trim

The Universal Air Valve is designed to permit the automatic escape of large quantities of air from a pipeline when the line is being filled, and to permit air to enter the pipeline when the line is being emptied. It also allows accumulating air to escape while the line is in operation and under pressure. This is accomplished with a compound lever system functioning in conjunction with a large and small orifice in one integral body casting.

As the liquid rises into the valve, air escapes through the large orifice to the atmosphere. Liquid entering the valve raises the float and lever system, carrying with it the pressure plunger and the main valve.

When the liquid has raised the float to its limit, the stainless steel main valve rests against the seat. The pressure plunger also rests against its seat, which is the main valve. In this position, the valve is closed and no liquid can escape.

Air & Vacuum Orifice Performance Curves

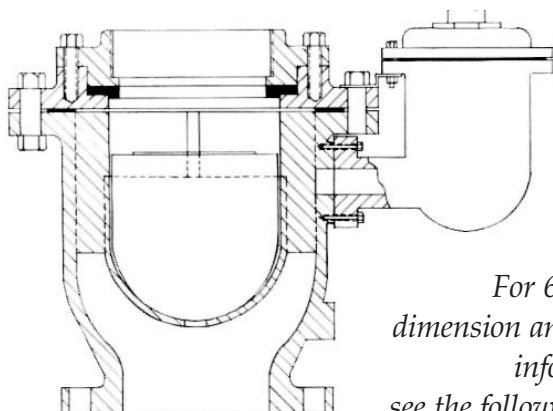


Universal Air Release Valve



UL SERIES

6" and 8" Combination Valve Detail



For 6" and 8" dimension and weight information, see the following page.

Model Information

Size of Valve	1"	2"	3"	4"	6"	8"
Model No. Screwed Inlet	UL10.1 UL10	UL20.1 UL20	UL30.1 UL30	UL40.1 UL40		
125# Flanged Inlet		UL21.1 UL21	UL31.1 UL31	UL41.1 UL41	C61	C81
250# Flanged Inlet		UL22.1 UL22	UL32.1 UL32	UL42.1 UL42	C62	C82

Discharge in SCFM

Operating Pressure (PSIG)	ORIFICE SIZE				
	3/32"	1/8"	5/32"	3/16"	1/4"
150	13.8	24.4	37.9	54.6	98
200	17.9	31.9	49.5	72	127
250	22.1	39.2	61.1	88	157
300	26.4	46.7	73	105	187

Orifice Sizing Information

Valve Size	MAXIMUM OPERATING PRESSURE IN PSI			
	Max. 150	Max. 200	Max. 250	Max. 300
1"	3/16"	3/32"	3/32"	3/32"
2"	1/4"	3/16"	3/16"	1/8"
3"	1/4"	3/16"	3/16"	1/8"
4"	1/4"	3/16"	3/16"	1/8"
6"	1/4"	3/16"	3/16"	1/8"
8"	1/4"	3/16"	3/16"	1/8"

If accumulating air rises into the valve while the line is in operation and under pressure, it will displace the liquid at the top of the valve body and the float will drop as the liquid recedes. As this occurs, the pressure valve will open, permitting the escape of the accumulated air, after which the liquid level will rise and the valve will close.

Should the pipeline be drained through natural processes or should a large break develop, the float will drop all the way down as the liquid level drains from the valve body. The valve will then stay in the full open position permitting the entrance of air and eliminating the danger of pipeline collapse due to vacuum.

These cycles will repeat automatically as each condition presents itself, and the valve will function satisfactorily with hot or cold water, and in the presence of many chemicals and oil-base liquids.



UL SERIES

Universal Air Release Valves

Universal Air Release Valve

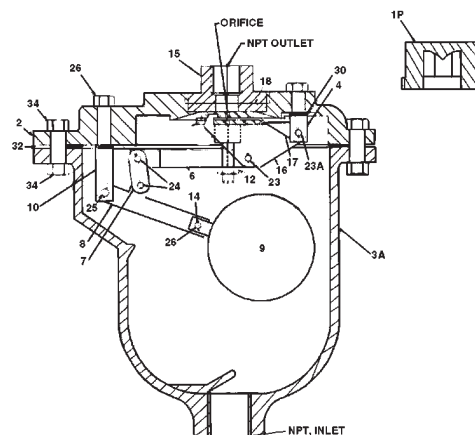
Universal Valves

Parts List: 1"–4" Valves

PART NO.	ITEM	MATERIAL
1P*	PROTECTOP	Cast Iron
1S*	TOP	Cast Iron
2	FLANGE	Cast Iron
3*	BODY, SCREWED	Cast Iron
3F*	BODY, 125 LB FLG.	Cast Iron
3FH*	BODY, 250 LB FLG.	Cast Iron
4	A&V FULCRUM	Stainless Steel
5&16	PRESSURE FULCRUM	Stainless Steel
6	VALVE LEVER	Stainless Steel
7	LINK	Stainless Steel
8	BALL LEVER	Stainless Steel
9	BALL FLOAT	Stainless Steel
10	BALL FULCRUM	Stainless Steel
13	NUT	Stainless Steel
14	PRESSURE VALVE PLUNGER	Rubber/S/S
15	PRESSURE SEAT	Stainless Steel
17	SEAT CAGE	Stainless Steel
18	A&V SEAT	Rubber
21	PRESS LIMIT STOP	Stainless Steel
23	BEARING PIN	Stainless Steel
23A	BEARING PIN	Stainless Steel
24	BEARING PIN	Stainless Steel
25	BEARING PIN	Stainless Steel
26	PIN CLIP	Stainless Steel
28	SCREW	Stainless Steel
29	DRAIN PLUG	Steel
30	FULCRUM WASHER	Fibre
31	FULCRUM WASHER	Fibre
32	FLANGE GASKET	Armstrong
33	FLANGE BOLT	Steel
34	FLANGE NUT	Steel
35	A&V FULCRUM NUT	Steel
36	BALL FULCRUM NUT	Steel

Dimensions and Weights

MODEL	INLET	TRIM	HEIGHT	WIDTH	LENGTH	WT(LBS)
UL10	1" NPT	S/S	10 1/4"	6 7/8"	9 3/4"	27
UL10.1	1" NPT	S/S/BRASS	10 1/4"	6 7/8"	9 3/4"	27
UL20	2" NPT	S/S	13 1/2"	8 3/8"	12 3/8"	72
UL20.1	2" NPT	S/S/BRASS	13 1/2"	8 3/8"	12 3/8"	72
UL21	2" 125# Flg.	S/S	17"	8 3/8"	12 3/8"	74
UL21.1	2" 125# Flg.	S/S/BRASS	17"	8 3/8"	12 3/8"	74
UL22	2" 250# Flg.	S/S	17 1/4"	8 3/8"	12 3/8"	75
UL22.1	2" 250# Flg.	S/S/BRASS	17 1/4"	8 3/8"	12 3/8"	75
UL30	3" NPT	S/S	17 1/4"	10 1/4"	14 3/4"	111
UL30.1	3" NPT	S/S/BRASS	17 1/4"	10 1/4"	14 3/4"	111
UL31	3" 125# Flg.	S/S	20 5/8"	10 1/4"	14 3/4"	131
UL31.1	3" 125# Flg.	S/S/BRASS	20 5/8"	10 1/4"	14 3/4"	131
UL32	3" 250# Flg.	S/S	21"	10 1/4"	14 3/4"	133
UL32.1	3" 250# Flg.	S/S/BRASS	21"	10 1/4"	14 3/4"	133
UL40	4" NPT	S/S	20"	11 3/4"	16 3/4"	163
UL40.1	4" NPT	S/S/BRASS	20"	11 3/4"	16 3/4"	163
UL41	4" 125# Flg.	S/S	23"	11 3/4"	16 3/4"	180
UL41.1	4" 125# Flg.	S/S/BRASS	23"	11 3/4"	16 3/4"	180
UL42	4" 250# Flg.	S/S	23 5/16"	11 3/4"	16 3/4"	183
UL42.1	4" 250# Flg.	S/S/BRASS	23 5/16"	11 3/4"	16 3/4"	183
C61	6" 125# Flg.	S/S	16 1/4"	15"	22 7/8"	198
C62	6" 250# Flg.	S/S	16 3/4"	15"	22 7/8"	222
C81	8" 125# Flg.	S/S	18 1/8"	17 3/4"	25 3/8"	290
C82	8" 250# Flg.	S/S	18 5/8"	17 3/4"	25 3/8"	320



* The above parts are interchangeable at the customer's request.

Submittal Sheet for Crispin UL Series

1" Universal Air Release Valve

Manufactured in compliance with ANSI/AWWA C512

Date: October, 2001



Orifice Options

DIAMETER	MAX. PRESSURE	FLOW RATE
3/16	150 PSIG	54.6 SCFM
3/32	300 PSIG	26.4 SCFM

Size Specifications

MODEL	INLET SIZE	OUTLET SIZE	A	B	WHT.
UL10	1" NPT	1" NPT	9.75	10.75	27
UL10.1	1" NPT	1" NPT	9.75	10.75	27

Parts List

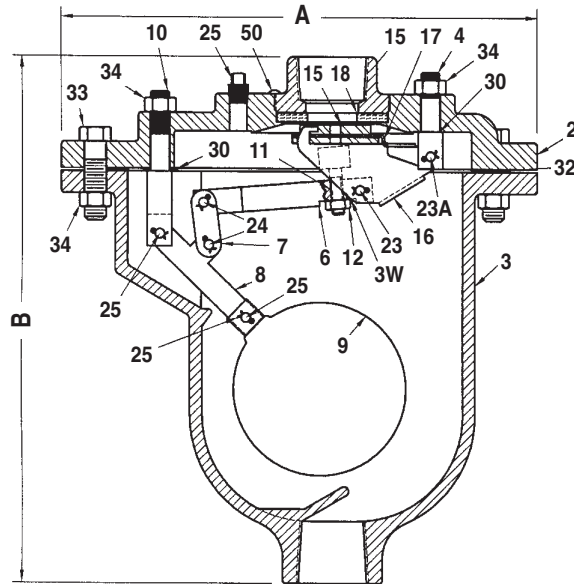
ITEM	DESCRIPTION	MATERIAL	ASTM
1S	TOP	CAST IRON	A126 CL.B
2	FLANGE	CAST IRON	A126 CL.B
3	BODY	CAST IRON	A126 CL.B
3W	LOCK WASHER	STAINLESS STEEL	A240
4	AIR & VAC FULCRUM	STAINLESS STEEL	A240
**6	VALVE LEVER	STAINLESS STEEL	A582
7	LINK	STAINLESS STEEL	A240
8	BALL LEVER	STAINLESS STEEL	A240
9	FLOAT	STAIN LESS STEEL	A240
10	BALL FULCRUM	STAINLESS STEEL	A582
11	VALVE PLUNGER	STAINLESS STEEL & BUNA-N RUBBER	A193
12	PLUNGER NUT	STAINLESS STEEL	A194
15	PRESSURE SEAT	STAINLESS STEEL	A582
16	PRESSURE FULCRUM	STAINLESS STEEL	A240
17	SEAT CAGE	STAINLESS STEEL	A240
18	AIR & VAC SEAT	BUNA - N RUBBER	N/A
23	BEARING PIN	STAINLESS STEEL	A582
23A	BEARING PIN	STAINLESS STEEL	A582
24	BEARING PIN	STAINLESS STEEL	A582
25	BEARING PIN	STAINLESS STEEL	A582
26	COTTER PIN	STAINLESS STEEL	A313
29	DRAIN PLUG	BRASS	B505
30	FULCRUM WASHER	FIBER	N/A
32	FLANGE GASKET	ARMSTRONG N-8092	N/A
33	FLANGE BOLT	STEEL	A307
34	NUT	STEEL	A563
50	INTERFERENCE PIN	STAINLESS STEEL	A582

** Material for UL10.1 will be brass

Option: A protectop will be supplied to prevent debris from entering the outlet of the valve.

Option: (Where pressures are greater than 300 PSIG), the valve(s) shall be ANSI Class _____ flanged inlet connection, and shall have a (steel, stainless steel, or ductile iron) body, top and inlet flange.

Standard operating pressure for Crispin Air Valves is 20 to 150 PSIG. Please check one of the following if your operating needs differ:
 ____ 2 to 40 PSIG ____ 151 to 300 PSIG



Specifications

The valve(s) shall be installed at the high points in the system or at points selected by the engineer. This will permit discharging the surge of air from an empty line when filling, and relieve the vacuum when draining the system. The valve(s) shall also release an accumulation of air when the system is under pressure. This shall be accomplished in a single valve body.

The valve(s) shall operate through a compound lever system which will seal both the pressure orifice and the air and vacuum orifice simultaneously. This lever system shall permit a _____" orifice to release an accumulation of air from the valve body at a capacity of _____ SCFM of air and pressure of _____ PSIG.

The function of the lever system shall also permit a positive disengagement of the main valve from the large orifice, as the float drops and pressure decreases. The disengagement shall be immediate and not limited to the initial draw of a vacuum.

The valve(s) shall be Crispin Model _____ Universal Air Valve as manufactured by Multiplex Manufacturing Co., Berwick, PA. The valve(s) shall be _____" NPT screwed or ANSI Class (125, 250) flanged inlet connection, and shall have a cast iron body, top and inlet flange (where required), stainless steel float and trim with Buna-N seat. Valves which operate the pressure plunger via a single lever and fulcrum will not be acceptable.

SUBMITTAL SHEET FOR UL SERIES

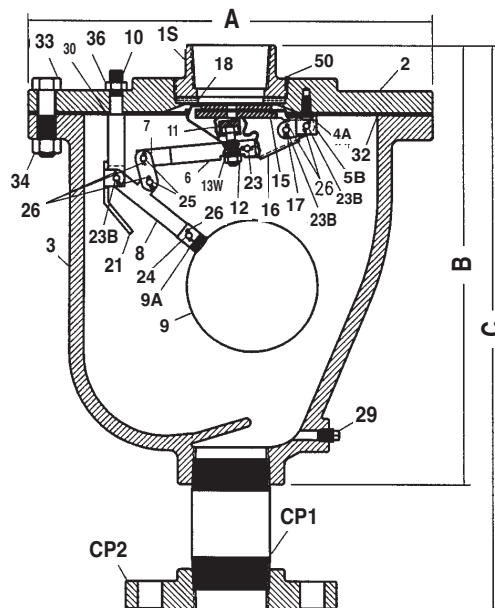


Submittal Sheet for Crispin UL Series

2" Universal Air Release Valve

Manufactured in compliance with ANSI/AWWA C512

Date: October, 2001



Specifications

The valve(s) shall be installed at the high points in the system or at points selected by the engineer. This will permit discharging the surge of air from an empty line when filling, and relieve the vacuum when draining the system. The valve(s) shall also release an accumulation of air when the system is under pressure. This shall be accomplished in a single valve body.

The valve(s) shall operate through a compound lever system which will seal both the pressure orifice and the air and vacuum orifice simultaneously. This lever system shall permit a _____" orifice to release an accumulation of air from the valve body at a capacity of _____ SCFM of air and pressure of _____ PSIG.

The function of the lever system shall also permit a positive disengagement of the main valve from the large orifice, as the float drops and pressure decreases. The disengagement shall be immediate and not limited to the initial draw of a vacuum.

The valve(s) shall be Crispin Model _____ Universal Air Valve as manufactured by Multiplex Manufacturing Co., Berwick, PA. The valve(s) shall be _____" NPT screwed or ANSI Class (125, 250) flanged inlet connection, and shall have a cast iron body, top and inlet flange (where required), stainless steel float and trim with Buna-N seat. Valves which operate the pressure plunger via a single lever and fulcrum will not be acceptable.

Option: A protectop will be supplied to prevent debris from entering the outlet of the valve.

Option: (Where pressures are greater than 300 PSIG), the valve(s) shall be ANSI Class _____ flanged inlet connection, and shall have a (steel, stainless steel, or ductile iron) body, top and inlet flange.

All Crispin Valves are hydrostatically tested at 150% of their maximum working pressure. Standard operating pressure for Crispin Air Valves is 20 to 150 PSIG. Please check one of the following if your operating needs differ: _____ 2 to 40 PSIG _____ 151 to 300 PSIG

**** Material for UL2_1 will be brass**

Orifice Options

DIAMETER	MAX. PRESSURE	DISCHARGE RATE
1/4"	150 PSIG	98 SCFM
3/16"	250 PSIG	88 SCFM
1/8"	300 PSIG	46.7 SCFM

Size Specifications

MODEL	INLET SIZE	OUTLET SIZE	A	B	C	WHT.
UL20	2" NPT	2" NPT	12.50	13.50		72
UL20.1	2" NPT	2" NPT	12.50	13.50		72
*UL21	2" 125# FLG	2" NPT	12.50		17.00	78
UL21.1	2" 125# FLG	2" NPT	12.50		17.00	78
UL22	2" 250# FLG	2" NPT	12.50		17.25	89
UL22.1	2" 250# FLG	2" NPT	12.50		17.25	89

* Includes ANSI Class 125 or 250 Companion FLG and NPL

Parts List

ITEM	DESCRIPTION	MATERIAL	ASTM
1S	TOP	CAST IRON	A126 CL.B
2	FLANGE	CAST IRON	A126 CL.B
3	BODY	CAST IRON	A126 CL.B
4A	CAP SCREW	STAINLESS STEEL	A193
5B	AIR & VAC FULCRUM	STAINLESS STEEL	A240
**6	VALVE LEVER	STAINLESS STEEL	A582
7	LINK	STAINLESS STEEL	A240
8	BALL LEVER	STAINLESS STEEL	A240
9	FLOAT	STAINLESS STEEL	A240
9A	FLOAT ROD	STAINLESS STEEL	A582
10	BALL FULCRUM	STAINLESS STEEL	A582
11	VALVE PLUNGER	STAINLESS STEEL & BUNA-N RUBBER	A193
12	PLUNGER NUT	STAINLESS STEEL	A194
13W	LOCK WASHER	STAINLESS STEEL	A240
15	PRESSURE SEAT	STAINLESS STEEL	A582
16	PRESSURE FULCRUM	STAINLESS STEEL	A240
17	SEAT CAGE	STAINLESS STEEL	A240
18	AIR & VAC SEAT	BUNA-N RUBBER	N/A
21	PRESSURE LIMIT STOP	STAINLESS STEEL	A240
23	BEARING PIN	STAINLESS STEEL	A582
23A	BEARING PIN	STAINLESS STEEL	A582
23B	BEARING PIN	STAINLESS STEEL	A582
24	BEARING PIN	STAINLESS STEEL	A582
25	BEARING PIN	STAINLESS STEEL	A582
26	COTTER PIN	STAINLESS STEEL	A313
29	DRAIN PLUG	BRASS	B505
30	FULCRUM WASHER	FIBER	D710
32	FLANGE GASKET	ARMSTRONG N-8092	N/A
33	FLANGE BOLT	STEEL	A307
34	NUT	STEEL	A563
36	BALL FULCRUM NUT	STEEL	A563
50	INTERFERENCE PIN	STAINLESS STEEL	A582

FLANGE CONNECTION PARTS

CP1	NIPPLE	STEEL	A53
CP2	COMPANION FLANGE	CAST IRON	A126 CL. B



SUBMITTAL SHEET FOR UL SERIES

Manufactured in compliance with ANSI/AWWA C512

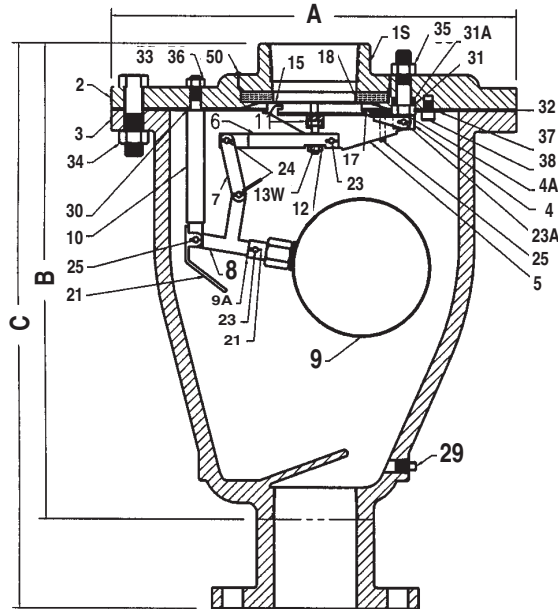
Date: October, 2001

DIAMETER	MAX. PRESSURE	DISCHARGE RATE
1/4"	150 PSIG	98 SCFM
3/16"	250 PSIG	88 SCFM
1/8"	300 PSIG	46.7 SCFM

MODEL	INLET SIZE	OUTLET SIZE	A	B	C	WHT.
UL30	3"NPT	3" NPT	14.75	18.00		114
UL31	3" 125# FLG	3" NPT	14.75		20.50	125
UL32	3" 250# FLG	3" NPT	14.75		21.00	131
UL30.1	3" NPT	3" NPT	14.75	18.00		114
UL31.1	3" 125# FLG	3" NPT	14.75		20.50	125
UL32.1	3" 250# FLG	3" NPT	14.75		21.00	131
UL40	4" NPT	4" NPT	16.75	20.00		162
UL41	4" 125# FLG	4" NPT	16.75		23.00	177
UL42	4" 250# FLG	4" NPT	16.75		23.25	188
UL40.1	4" NPT	4" NPT	16.75	20.00		162
UL41.1	4" 125# FLG	4" NPT	16.75		23.00	177
UL42.1	4" 250# FLG	4" NPT	16.75		23.25	188

ITEM	DESCRIPTION	MATERIAL	ASTM
1S	TOP	CAST IRON	A126 CLB
2	FLANGE	CAST IRON	A126 CLB
3	BODY	CAST IRON	A126 CLB
4	AIR/VAC FULCRUM	STAINLESS STEEL	A240
4A	FULCRUM BOLT	STAINLESS STEEL	A193
5	PRESSURE FULCRUM	STAINLESS STEEL	A240
**6	VALVE LEVER	STAINLESS STEEL	A582
7	LINK	STAINLESS STEEL	A240
8	BALL LEVER	STAINLESS STEEL	A240
9	FLOAT	STAINLESS STEEL	A240
9A	FLOAT ROD	STAINLESS STEEL	A582
10	BALL FULCRUM	STAINLESS STEEL	A582
11	VALVE PLUNGER	STAINLESS STEEL & BUNA-N RUBBER	A193/D2000
12	PLUNGER NUT	STAINLESS STEEL	A194
13W	LOCK WASHER	STAINLESS STEEL	A240
15	PRESSURE SEAT	STAINLESS STEEL	A582
17	SEAT CAGE	STAINLESS STEEL	A240
18	AIR & VAC SEAT	BUNA-N RUBBER	D2000
21	PRESSURE LIMIT STOP	STAINLESS STEEL	A240
23	BEARING PIN	STAINLESS STEEL	A582
23A	BEARING PIN	STAINLESS STEEL	A582
24	BEARING PIN	STAINLESS STEEL	A582
25	BEARING PIN	STAINLESS STEEL	A582
26	COTTER PIN	STAINLESS STEEL	A313
29	DRAIN PLUG	BRASS	B505
30	FULCRUM WASHER	FIBER	D710
31	FULCRUM WASHER	FIBER	D710
31A	FULCRUM WASHER	FIBER	D710
32	FLANGE GASKET	ARMSTRONG N-8092	N/A
33	FLANGE BOLT	STEEL	A307
34	NUT	STEEL	A563
35	AIR/VAC FULCRUM NUT	STEEL	A563
36	BALL FULCRUM NUT	STEEL	A563
37	ADJUSTING PLATE	STAINLESS STEEL	A240
38	BOLT	STAINLESS STEEL	A193
50	INTERFERENCE PIN	STAINLESS STEEL	A582

** Material for UL30.1, UL31.1, UL40.1, UL41.1, UL42.1 will be brass



The valve(s) shall be installed at the high points in the system or at points selected by the engineer. This will permit discharging the surge of air from an empty line when filling, and relieve the vacuum when draining the system. The valve(s) shall also release an accumulation of air when the system is under pressure. This shall be accomplished in a single valve body.

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The function of the lever system shall also permit a positive disengagement of the main valve from the large orifice, as the float drops and pressure decreases. The disengagement shall be immediate and not limited to the initial draw of a vacuum.

The valve(s) shall be Crispin Model _____ Universal Air Valve as manufactured by Crispin-Multiplex Manufacturing Co., Berwick, PA. The valve(s) shall be _____" NPT screwed or ANSI Class (125, 250) flanged inlet connection, and shall have a cast iron body, top and inlet flange (where required), stainless steel float and trim with Buna-N seat. Valves which operate the pressure plunger via a single lever and fulcrum will not be acceptable.

Option: A protectop will be supplied to prevent debris from entering the outlet of the valve.

Option: (Where pressures are greater than 300 PSIG), the valve(s) shall be ANSI Class _____ flanged inlet connection, and shall have a (steel, stainless steel, or ductile iron) body, top and inlet flange.

Standard operating pressure for Crispin Air Valves is 20 to 150 PSIG. Please check one of the following if your operating needs differ:

_____ 2 to 40 PSIG _____ 151 to 300 PSIG