Water Supply and Sewerage Approved Products Manual 2024

Water Pipeline Systems – Ductile Iron (DI) Water Pipeline Systems

Section WPS 01



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Abbreviation	In full
AS	Australian Standard
AS/NZS	Australian / New Zealand Standard
WSA PS	Water Services Association Product Specification



1 Pipes

1.1 Ductile iron cement lined pipe (DICL), spigot-socket or flanged

pipes

Compliance	Size DN (mm)	Length (m)	Products	Manufacturers
AS/NZS 2280	150	6		Viadux DIMAX Ranges (XCEED, XCEL,
WSA PS - 200	225			XTREME and Z+ variants)
AS 3680	300		-	St Gobain PAM (HYDROCLASS and
	375		<u>ی م</u>	ZINALIUM)
	450			Iplex (Irontite)
	500			Vinidex (Linx GP and ZAP)
	600			
	750			

Notes:

- Pipes must be:
 - Installed in a loose PE sleeve
 - Located away from electricity transmission lines and railways/trams due to stray current
 - o Insulated from copper services
- All ductile iron pipes shall be a minimum of pressure nominal PN16 with cement mortar lining.
- If soil conditions are aggressive, all pipes and fittings shall be wrapped in polyethylene sleeving to ensure protection.
- Approved thrust-resisting joints to be used as per manufacturers specification (i.e. TYTON-LOK with TYTON ductile iron pipe) when concrete restraints are unstable or in grounds subject to extreme movement.
- Other products may be considered but approval is required from Power and Water representative.



2 Bends

2.1 Fittings notes

Shall comply with the following standards and specification:

- AS/NZS 2280: Ductile iron pipes and fittings.
- WSA PS 201: Ductile iron fittings (CIOD) for pressure and non-pressure applications Drinking water, non-drinking water supply and sewerage.
- AS/NZS 4020: Testing of products for use in contact with drinking water
- AS 3680: Polyethylene sleeving for ductile iron piping.

Sizes DN (mm): 150, 225, 300, 375, 450, 500, 600 and 750

Angle: 6°, 11.25°, 22.5°, 45°, 90°

Notes:

- All ductile iron bends shall be a minimum of pressure nominal PN16.
- If soil conditions are aggressive, all fittings shall be wrapped in polyethylene sleeving to ensure protection.
- Approved thrust-resisting joints to be used when concrete restraints are unstable or in grounds subject to extreme movement.
- Other products may be considered but approval is required from Power and Water representative. Refer to manufacturer regarding availability.

Bends	Products	Manufacturers
Socket-socket		AVK
		Derwent Industries
		DIMAX (Reece)
		lplex (Crevet)
		Mallet Foundry
Chigot chigot		Northern Iron and Brass Foundry (NIBF)
Spigot-spigot		Viadux SUREFLOW (Reece)
Flange-flange		
Flange-socket	J	



Note: Includes socket-spigot and spigot-flange arrangements.

2.2 Supported bends

Bends	Sizes DN (mm)	Products	Manufacturers
Socket-flanged	150 x 80	□┫╌┣□	AVK
hydrant bend			Derwent Industries
			DIMAX (Reece)
			lplex (Crevet)
			Viadux SUREFLOW (Reece)
Socket-flanged	150 x 100		
washout bend			

Notes: These items are less frequently utilised and generally not preferred under normal circumstance (i.e. temporary dead end arrangement).



3 Tees

Shall comply with the following standards and specification:

- AS/NZS 2280: Ductile iron pipes and fittings.
- WSA PS 201: Ductile iron fittings (CIOD) for pressure and non-pressure applications Drinking water, non-drinking water supply and sewerage.
- AS/NZS 4020: Testing of products for use in contact with drinking water
- AS 3680: Polyethylene sleeving for ductile iron piping.

Sizes DN (mm): 150, 225, 300, 375, 450, 500, 600 and 750.

Notes:

- All ductile iron bends shall be a minimum of pressure nominal PN16.
- If soil conditions are aggressive, all fittings shall be wrapped in polyethylene sleeving to ensure protection.
- Approved thrust-resisting joints to be used when concrete restraints are unstable or in grounds subject to extreme movement.
- Other products may be considered but approval is required from Power and Water representative. Refer to manufacturer regarding availability.

Tees	Products	Manufacturers
Socket-socket-socket		AVK DIMAX (Reece) Derwent Industries Iplex (Crevet) Mallet Foundry
Spigot-spigot-spigot		Northern Iron and Brass Foundry (NIBF) Viadux SUREFLOW (Reece)
Spigot-spigot-flange		
Socket-socket-flange		



Tees	Products	Manufacturers
Flange-flange-flange		
Socket-spigot-flange		

3.1 Scour tees

Scour tees	Products	Manufacturers
Socket-socket-flange		AVK
		Derwent Industries
		DIMAX (Reece)
		Iplex (Crevet)
Spigot-spigot-flange		Mallet Foundry
shifter shifter unuffe		Northern Iron and Brass Foundry (NIBF)
		Viadux SUREFLOW (Reece)
)	



4 Tapers/Reducer

Tapers	Products	Manufacturers
Socket-socket		AVK Derwent Industries DIMAX (Reece) Iplex (Crevet) Mallet Foundry
Socket-flanged		Northern Iron and Brass Foundry (NIBF) Viadux SUREFLOW (Reece)
Spigot-flange		
Spigot-spigot		
Flange-flange		



5 Connectors

Connectors	Products	Manufacturers
Flange-spigot		AVK Derwent Industries DIMAX (Reece) Iplex (Crevet) Mallet Foundry
Flange-socket		Viadux SUREFLOW (Reece)
Socket-socket		
Socket-socket slip		

5.1 Caps and plugs

Types	Products	Manufacturers
Caps		AVK
		Derwent Industries
		DIMAX (Reece)
		Iplex (Crevet)
Plugs		Mallet Foundry
		Northern Iron and Brass Foundry (NIBF)
		Viadux SUREFLOW (Reece)
Blank flanges		



5.2 Seals and lubricant

Types	Products	Manufacturers
Elastomeric seals	3	Iplex (Gulf & Hultec) Viadux (Gulf)
Restraining elastomeric seals		Viadux (Tyton-lok)
Flange elastomeric seals		Daemco Wenac James Walker Ludowici
Jointing Lubricant		Iplex MacDermid Plc Thomas Grozier & Son

6 Specifications

6.1 Spigot-socket pipes to AS/NZS 2280

Shall comply with the following standard:

• AS/NZS 2280:2020 - Ductile iron pipes and fittings

Design:

- Ductile iron pipes to the Australian Standard have dimensions based on imperial sizing. As a result, the metric nominal sizing relates only roughly to the internal diameter of the pipe after cement lining.
- Pipe is classified by PN number based on the allowable operating pressure.
- Standard pressure classifications are PN20 and PN35.
- Other pressure classifications are allowed by AS2880 and include PN16, PN25, PN30, PN40 and PN45.
- Allowable operating pressure of the pipe is generally not a factor in design due to the lower rating of pipe flanges and valves.

Materials:

- Pipe:
 - Spheroidal graphite cast iron to AS1831 (commonly known as ductile iron) manufactured from scrap ductile iron, steel, ferrosilicon, coke, limestone and magnesium.
- Internal lining:
 - GP or SL or SR cement to AS 3972 and inert aggregate
 - Nominal lining thickness 5mm for DN100 to DN600 and 6mm for DN750
 - \circ $\,$ Minimum lining thickness 3.5mm for DN100 to DN600 and 4.5mm for DN750 $\,$
- External coating:
 - Bitumen to AS/NZS 3750.4 (sleeving also required)
 - Synthetic resin based coating to AS 4089
 - Thermal bonded polymer to AS/NZS 4158
 - Other coatings may be considered for approval.
- Socket lining:
 - o Bitumen to AS/NZS 3750.4
 - Synthetic resin based coating to AS 4089
 - Thermal bonded polymer to AS/NZS 4158
 - \circ $\;$ Other socket linings may be considered for approval.
- Joint seal:
 - Approved elastomer to AS 1646.

Jointing:

- Skid fit elastomeric sealing joint allowing maximum joint deflections of 3.5° for DN 150-250, 2.5° for DN 300-600 and 1° for DN 750.
- Witness marks at spigot end showing insertion depth with no angular deflection.
- Lubricant as supplied by pipe manufacturer.



Effective length:

• Minimum 5.0 m.

Allowable operating pressure:

- PN20 2.0 MP
- PN35 3.5 MP.

Seal coat:

- Leaching of calcium from cement mortar linings can cause the pH of delivered water to exceed water quality guidelines, particularly if flow through new mains is low or mains are smaller than DN450.
- The provision of a seal coat over the internal surface of the cement mortar lining is strongly recommended for Darwin, Yulara and Borroloola, where water quality parameters accelerate leaching of calcium from cement mortar linings.
- For other areas, technical advice should be sought from the supplier on the requirement for a seal coat for the proposed duty. Seal coat must satisfy the requirements of ISO 16132 and AS/NZS 4020. Azko Nobel Interline 876 is currently approved for use as a seal coat.

Markings:

Marking cast onto products in accordance with AS/NZS 2280 including:

- Manufacturer's name or mark
- Nominal size
- Classification
- The number of the standard (i.e. AS/NZS 2280)
- Product certification mark, e.g. StandardsMark
- Traceability code
- Place of manufacture (may be incorporated in traceability code).

Use limits:

- Only use DI pipe in tidal zones, anaerobic ground conditions and aggressive ground water when it has an external polymeric coating.
- Suitable for above ground use (i.e. where bridging support is provided, e.g. water course, culvert, drain and exposed bridge crossings).
- Externally coated bitumen pipes not suitable for use in extreme marine environments seek specialist advice.
- Use restraining elastomeric seals where buried service congestion prevents the use of thrust blocks or is subject to extreme ground movement.
- Only use under or near DC traction systems (e.g. electric trains) with appropriate stray current insulation.
- Suitable for use as conduit pipe for high loading applications (e.g. major road crossings, shallow cover, railway crossings).



6.2 Flanged pipes to AS/NZS 2280

Shall comply with the following standards:

- AS/NZS 2280:2020 Ductile iron pipes and fittings
- AS 4087:2011 Metallic flanges for waterworks purposes.

Design:

- Ductile iron pipes to the Australian Standard have dimensions based on imperial sizing. As a result, the metric nominal sizing relates only roughly to the internal diameter of the pipe after cement lining.
- Flange Class pipe has a greater wall thickness than PN20 and PN35 pipe.
- Allowable operating pressures for flanged pipes are governed by the pressure rating of the flanges.

Materials:

- Pipe and flanges:
 - Spheroidal graphite cast iron to AS1831 (commonly known as ductile iron) manufactured from scrap ductile iron, steel, ferrosilicon, coke, limestone and magnesium.
- Internal lining:
 - o General Purpose (GP) or Sulphur Resistant (SR) cement to AS 3972 and inert aggregate
 - \circ $\,$ Nominal lining thickness 5mm for DN100 to DN600 and 6mm for DN750 $\,$
 - Minimum lining thickness 3.5mm for DN100 to DN600 and 4.5mm for DN750
 - Thermal bonded polymer to AS/NZS 4158
 - Other linings may be considered.
- External coating:
 - Bitumen to AS/NZS 3750.4 (sleeving also required)
 - Synthetic resin based coating to AS 4089
 - Thermal bonded polymer to AS/NZS 4158
 - Other coatings may be considered for approval.
- Flange thread seal:
 - Epoxy resin.
- Flange gasket:
 - o Elastomer to AS 1646.

Jointing:

- Standard flanges:
 - Screw-on flanges to AS 4087 Figure B5 for class 16.
- High pressure flanges:
 - Screw-on flanges to AS 4087 Figure B6 for class 35.
- Flange gasket:
 - 3mm flat elastomeric full face gasket to AS 4087 for PN16 and PN35 Appendix C, Table C1.
- Socket and spigot:
 - Refer spigot-socket pipes specification.

Effective length:

- Maximum:
 - Typically manufactured at approx. 6 m.

Allowable operating pressure:

- PN16: 1.6 MPa
- PN35: 3.5 MPa.

Markings:

Marking cast onto products in accordance with AS/NZS 2280 including:

- Manufacturer's name or mark
- Nominal size
- Classification
- The number of the standard (i.e. AS/NZS 2280)
- Product certification mark, e.g. StandardsMark
- Traceability code
- Place of manufacture (may be incorporated in traceability code).

Use limits:

- Use only where restrained DI joints are required and spigot-socket restrained DI joints are inappropriate.
- Flange Class pipe is to be pressure tested in accordance with AS/NZS 2280.

6.3 Fittings to AS/NZS 2280

Shall comply with the following standards:

- AS/NZS 2280:2020 Ductile iron pipes and fittings
- AS 4087:2011 Metallic flanges for waterworks purposes

Design:

• Ductile iron fittings to the Australian Standard have dimensions based on imperial sizing. Materials:

- Fitting:
 - Spheroidal graphite cast iron to AS1831 (commonly known as ductile iron) manufactured from scrap ductile iron, steel, ferrosilicon, coke, limestone and magnesium.
- Internal lining:
 - Thermal bonded polymer to AS/NZS 4158
- External coating:
 - Thermal bonded polymer to AS/NZS 4158
- Joint seal:
 - Elastomer to AS 1646.

Jointing:

- Socket:
 - Sockets with grooves to capture elastomeric seals. Sockets and seals of proprietary profile designs (e.g. Tyton Griptite). Allowable maximum joint deflection of 3° for DN 150-250, 2° for DN 300-600 and 1° for DN 750.
 - Witness marks at spigot end showing insertion depth with no angular deflection.
 - Lubricant as supplied by pipe manufacturer.
- Flange: Screw-on flanges to AS/NZS 4087. 3 mm flat elastomeric full face gasket to AS/NZS 4087 Appendix C, Table C1.

Allowable operating pressure:

- PN16: 1.6 MPa
- PN35: 3.5 MPa.



Markings:

- Marking cast onto products in accordance with AS/NZS 2280 including:
- Manufacturer's name or mark
- Nominal size
- Classification
- The number of the standard (i.e. AS/NZS 2280)
- Product certification mark, e.g. StandardsMark
- Traceability code
- Place of manufacture (may be incorporated in traceability code).

Markings method:

• Clearly and indelibly marked on the fitting. Lettering heights and raised height not specified in AS/NZS 2280.

6.4 Joint seals for pipes/fittings to AS/NZS 2280

Shall comply with the following standards:

- AS/NZS 2280: 2020 Ductile iron pipes and fittings
- AS/NZS 4087:2011 Metallic flanges for waterworks purposes.

Sealing design:

- Joint seals are to be of elastomeric compounds complying with AS 1646.
- The elastomers have performance properties, which deteriorate with time and as such the design of the seal's profile and the compounding of the elastomer needs to ensure long term sealing of the joint.
- The elastomer properties affecting long term sealing performance are hardness, rate of compression stress relaxation, water absorption, resistance to ageing, resistance to chemicals and resistance to microbiological deterioration.

Lateral restraint design:

• An option for lateral restraint of the spigot-socket joint available for use with Tyco Water pipes is the TYTON-LOK spigot-socket joint seal. This seal has stainless steel segments moulded into it at uniform intervals around the seal ring, which lock onto the spigot wall to resist joint pull-out.

Marking methods:

- Embossing with lettering 3 ± 1 mm high and 0.3 ± 0.1 mm proud of the surface or
- Vulcanised transfer or permanent ink with lettering 3.5 ± 1.5 mm.

Storage:

- Do not store seals in a room with any equipment capable of generating ozone (e.g. mercury vapour lamps, electric motors, high voltage equipment).
- Store in a relaxed condition free from tension, compression or other deformation.
- Seal temperature not to exceed 35° C and preferably not above 25° C or less than 5° C.

Use limits:

- Do not use elastomeric seals removed from packaging for more than 3 months
- Do not use elastomeric seals older than 18 months from date of manufacture unless supplier can demonstrate that seals have been stored in a cool, controlled environment
- Do not use SBR elastomeric seals more than 3 years from date of manufacture
- Do not use EPDM elastomeric seals more than 6 years from date of manufacture
- Do not use SBR seals that have been stored unprotected from sunlight for more than 7 days
- Do not use elastomeric seals that have been in contact with chemicals, e.g. solvents (petrol).



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