Water Supply and Sewerage Approved Products Manual - February 2006

Pressure Sewerage Products – PVC Metric Pipeline System

Section SPPS 02

PowerWater

PVC METRIC PIPELINE SYSTEM CONTENTS

SPPS 02-1 SPIGOT-SOCKET PVC-U PIPES

STANDARD	AS/NZS 1477:1999 PVC pipes and fittings for pressure applications
DESIGN	Unplasticised PVC pressure pipes (PVC-U or uPVC) have a plain (solid) wall structure and are manufactured in two standard sizings. For pressure sewers, Power and Water follows WSAA Codes and uses Series 1 pipe, which conforms to the metric sizing in international piping standards. Pipe wall thickness is varied to achieve the desired pipe pressure rating. Pressure ratings are determined at 20°C. Pressure derating is required for higher operating temperatures. Pressure de-rating is required to cater for fatigue issues where fluctuating pressures occur (ie. pumped systems) – refer WSAA Technical Notes TN4 and TN5.
MATERIALS	Pipe: Polyvinyl chloride (83.3 % minimum) Calcium-zinc to prevent PVC degradation from high processing temperatures Lubricants to lower the viscosity of molten PVC during pipe processing Fillers, e.g. calcium carbonate, to aid pipe processing Rutile titanium dioxide to prevent ultraviolet degradation and to provide white colouring pigment for Series 1 pipe (1.5 parts minimum per 100 parts PVC). Joint seal: Approved elastomer to AS 1646.1 and AS 1646.2 or AS 1646.3
JOINTING	Rubber ring joints are to be used unless otherwise permitted. Sockets are to have grooves to capture elastomeric seals. Seal profiles are to manufacturers' proprietary designs. Spigots are to have witness marks to identify socket insertion depth.
EFFECTIVE LENGTH	6 m (+0.05, -0 m)
PRESSURE CLASSES	PN 9, PN 12, PN 15 and PN 18 corresponding to 0.9, 1.2, 1.5 and 1.8 MPa working pressure
MARKINGS	Manufacturer's name and registered trademark The pipe series number '1' for metric pipe series The letters 'PVC-U' Nominal size in the form '100', as appropriate Classification in the form 'PN 12', as appropriate For pipes designed with deflection joints, the maximum allowable angular deflection in degrees Date of manufacture, using the ISO system in the form YYMMDD Identification of place of manufacture. The manufacturer's code is acceptable The Australian Standard number, i.e. AS/NZS 1477 Product certification mark, e.g. StandardsMark Warning - 'SEWERAGE - DO NOT DRINK'
MARKING METHOD	Legible and durable marking along the pipe barrel, minimum lettering height of 3 mm for DN 100 and 5 mm for greater than DN 100. Unmarked pipe length not to exceed 1 m.
USE LIMITS	Do not use PVC-U for new works in sizes greater than DN 225 Do not use solvent cement jointing except for unusual requirements. Do not use in ground subject to extreme movement where joint pull-out could occur Do not use above ground or in ground contaminated with chemicals deleterious to PVC Do not use pipe stored unshaded for 6 months or more from date of manufacture Do not use pipe older than 12 months from the date of manufacture Do not use pipe scratched to a depth greater than 0.5 mm (or 10% of wall thickness for sizes smaller than DN80)

SPPS 02-2 SPIGOT-SOCKET PVC-M PIPES

STANDARD	AS/NZS 4765 (Int):2000 Modified PVC (PVC-M) pipes for pressure applications
DESIGN	Modified PVC (PVC-M) differs from traditional unplasticised PVC (PVC-U or uPVC) by way of an elastomer additive of quantity sufficient to improve toughness without excessive yield strength reduction. Improved toughness and performance predicability allows the pressure rating design factor for PVC-M pipe to be less than that for PVC-U pipe. PVC-M pipe of the same pressure rating as PVC-U pipe thus has a thinner wall (and lower stiffness). PVC-M pipes have a plain (solid) wall structure. For pressure sewers, Power and Water follows WSAA Codes and uses Series 1 pipe, which conforms to the metric sizing in international piping standards. Pipe wall thickness is varied to achieve the desired pipe pressure rating. Pressure ratings are determined at 20°C. Pressure de-rating is required for higher operating temperatures. Pressure de-rating is required to cater for fatigue issues where fluctuating pressures occur (ie. pumped systems) – refer WSAA Technical Notes TN4 and TN5.
MATERIALS	Pipe: Polyvinyl chloride (83.3% minimum) Elastomer to improve ductility (fracture toughness) Rutile titanium dioxide to prevent ultraviolet degradation (minimum of 1.5 parts per 100 parts PVC mass) Calcium-zinc to prevent PVC degradation from high processing temperatures Lubricants to lower the viscosity of molten PVC during pipe processing Fillers, e.g. calcium carbonate, to aid pipe processing Joint seal: Approved elastomer to AS 1646.1 and AS 1646.2 or AS 1646.3
JOINTING	Only rubber ring joints permitted. Sockets to have grooves to capture seals. Spigots to have witness marks to identify socket insertion depth.
EFFECTIVE LENGTH	6 m (+0.05, -0 m)
PRESSURE CLASSES	PN 9, PN 12, PN 15 and PN 18 corresponding to 0.9, 1.2, 1.5 and 1.8 MPa working pressure
MARKINGS	*Product code (e.g. PPRW 12225)* Manufacturer's name and registered trademark *Trade name (e.g. White Rhino)* - OPTIONAL The pipe series number '1' for metric pipe series The letters 'PVC-M' Nominal size in the form '100', as appropriate Classification in the form 'PN 12', as appropriate For pipes designed with deflection joints, the maximum allowable angular deflection in degrees Date of manufacture, using the ISO system in the form YYMMDD *Time of manufacture* - OPTIONAL Identification of place of manufacture. The manufacturer's code is acceptable The Australian Standard number, i.e. AS/NZS 4765(Int) Warning - 'SEWERAGE - DO NOT DRINK'
MARKING METHOD	Legible and durable marking along the pipe barrel, minimum lettering height of 5 mm. Unmarked pipe length not to exceed 1 m.
USE LIMITS	Solvent cement joint PVC-M pipes not permitted Do not use in ground subject to extreme movement where joint pull-out could occur Do not use above ground or in ground contaminated with chemicals deleterious to PVC Do not use pipe stored unshaded for 6 months or more from date of manufacture Do not use pipe older than 12 months from the date of manufacture Do not use pipe scratched to a depth greater than 0.25 mm Do not use PVC-M pipes for new works in sizes greater than DN225 unless specific project approval has been granted by the Water Engineering section of Power and Water

SPPS 02-3 DUCTILE IRON FITTINGS

STANDARD	AS/NZS 2280:2004	Ductile iron pressure pipes and fittings
	AS/NZS 4087:2004	Metallic Flanges for waterworks purposes
DESIGN	Ductile iron fittings to the Australian Standard have dimensions based on imperial sizing. As a result, the metric nominal sizing relates only roughly to the internal diameter after cement lining.	
MATERIALS	Fitting:	Spheroidal graphite cast iron to AS 1831(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 Other coatings may be considered
	Joint seal:	Elastomer type to AS 1646
JOINTING	Socket:	Sockets with grooves to capture elastomeric seals. Sockets and seals of proprietary designs (e.g. Tyton/Plastyt, Nortite) to connect with metric series PVC pipe. Allowable minimum joint deflections of 3.5° for DN 100-250 and 2.5° for DN 300-375. Jointing lugs on 90° and 45° bends for sizes DN 200 and greater.
	Spigot:	End to be chamfered over 10 to 20 mm at approximately 20° to pipe barrel. Jointing lugs on 90° and 45° bends for sizes DN 200 and greater.
	Flange:	Integral flanges to AS 4087 figure B5 for PN16 and figure B6 for PN35. 1.5mm and 3mm flat elastomeric full face gasket to AS 4087 for PN16 and PN35 - Appendix C, Table C1
ALLOWABLE OPERATING PRESSURE	PN16:	1.6 MPa
	PN35:	3.5 MPa

MARKINGS

Manufacturer's name or mark cast on
Nominal size
Ductile or DI moulded in raised form
Where applicable, the angle of the bend cast on
The standard designation AS/NZS 2280
Product certification mark, e.g. StandardsMark
Traceability code
Place of manufacture (may be incorporated in traceability code)

MARKING METHOD Clearly & indelibly marked on fitting. Lettering size & raised height not specified in AS/NZS 2280.

SPPS 02-4 JOINT SEALS

STANDARD

AS 1646: 2000 Elastomeric seals for waterworks purposes
AS 4087: 2004 Metallic flanges for waterworks purposes

SEALING DESIGN

Joint seals are to be of elastomeric compounds comprising suitable polymers. 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.

COMPOUND MATERIALS

Polymer for spigot-socket rings:	Ethylene propylene diene monomer (EPDM), 40% minimum volume of compound for IRHD of ≥55<85 Styrene Butadiene Rubber (SBR), 50% minimum volume of compound for IRHD of ≥55<85
Polymer for flange gaskets:	Ethylene propylene diene monomer (EPDM), 30% minimum volume of compound for IRHD of ≥35<55 or 40% minimum volume of compound for IRHD ≥55≤65 Styrene Butadiene Rubber (SBR), 50% minimum volume of compound for IRHD of ≥35<55 or ≥55≤65
Antidegradant:	For EPDM: Not required For SBR: Based on the combined antioxidant –antiozonant N-(1,3 dimethy-butyl)-N'-phenyl-p-phenylene diamine with a concentration (m/m) of not less than 1.5 parts per hundred of polymer.
Protective wax:	For EPDM: Not required For SBR: Wax with a melting point of not less than 57°C and concentration (m/m) not greater than 3.0 parts per hundred of polymer.
Filler:	Carbon black
Copper & manganese:	For EPDM: Not applicable For SBR: Not greater than 0.0008% copper and 0.0005% manganese

MARKINGS

Rings:
Manufacturer's identification mark
Cavity number, if applicable
Nominal size or nominal internal and cord diameters as appropriate
Year of manufacture, e.g. 01 to represent year 2001
Standard designation where the elastomeric ring is certified to AS 1646.

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.

ELASTOMER TYPE IDENTIFICATION

Marking colour:	EPDM: Green SBR: Blue
Marking method:	Continuous durable stripe of width 3.5 ± 1.5 mm; or Durable flash or dot of 6 mm minimum dimension

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 for date of manufacture
Do not use EPDM elastomeric seals more than 6 years for 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).

SPPS 02-5 JOINTING LUBRICANT

STANDARD	None
SPECIFICATION	MP52: None
DESIGN	Jointing lubricant is required to achieve the following: • Provide sufficient lubrication to prevent damage to joint seals or surfaces on jointing. • Enable correctly configured jointing when using jointing methods recommended by the pipe or fitting manufacturer. • Not affect the elastomer or pipe or fitting materials. • Remain an effective lubricant under wet conditions. • Not be hazardous to handle and be able to be applied by hand. • Be completely soluble in water. • Be able to be removed under standard flushing arrangements for commissioning.
MATERIALS	Lubricant: Water based emulsion
CONTAINER MARKINGS	Manufacturer's name or trademark Proprietary name of joint seal with which the lubricant can be used. The words 'Jointing Lubricant' or 'Joint Lubricant'. Date of manufacture. Date of expiry for use. The specification to which it complies The WaterMark or other mark to certify compliance with the specification. Instructions for use of lubricant.
USE LIMITS	Do not use where past expiry date.

SPPS 02-6 SOLVENT CEMENTING

STANDARD	AS: 3879: 1995	Solvent cements and priming fluids for use with unplasticized PVC (uPVC) pipes and fittings
SPECIFICATION	WSAA: None	
DESIGN	Solvent cement:	The solvent in the cement softens and swells a layer of the PVC on the spigot and socket mating surfaces and these layers combine with the PVC already in the solvent cement to create a bond on drying of the solvent.
	Priming fluid:	The priming fluid cleans the joint mating surfaces of dirt, oil and other contamination prior to application of the solvent cement and removes the surface sheen on the PVC to aid action of the solvent cement.
MATERIALS	Solvent cement:	Consists of one or more solvents and a sufficient quantity of base PVC material dissolved in the solvent/s to give the cement the body and consistency required for proper application. Small amounts of inert fillers are sometimes added to control shrinkage during drying. The principal solvent used is tetrahydrofuran (THF).
	Priming fluid:	
CONTAINER MARKINGS	Manufacturer's name Marking 'Type P' to indicate solvent cement for pressure applications. Net mass or volume Date of manufacture Recommended storage life Instructions for storage and use The statement 'Priming fluids shall be used to prepare the jointing surface prior to solvent cement application.' A statement of any toxic vapour or flammability hazards associated with the solvent cement or priming fluid. The statement 'No additives of any kind shall be mixed with this solvent cement/priming fluid'. (as applicable) The number of the Australian Standard, i.e. AS/NZS 3879	
COLOUR	Solvent cement:	Green for pressure applications.
	Priming fluid:	Pink or red
USE LIMITS	Clear solvent cement is not permitted Solvent cement jointing is permitted only for unusual requirements. Do not use solvent cement where 12 months past the date on the container.	

SPPS 02-7 SPIGOT-SOCKET PVC-O PIPES

STANDARD AS/NZS 4441 (Int):2003 Oriented PVC (PVC-O) pipes for pressure applications

UNDER DEVELOPMENT

SPIGOT-SOCKET RRJ PIPES

CLASS PN 9

Nominal size DN	Iplex (PVC-U)	Iplex (PVC-M)	Iplex (PVC-M) Reiber Joint	Tyco (PVC-U) Plas-flo	Tyco (PVC-M) Tuf-flo	Vinidex (PVC-M)
80	✔			✔		
100		✔			✔	✔
150			✔		✔	✔
200			✔		✔	✔
225			✔		✔	✔
250			✔		✔ 1	✔ 1
300			✔ 1		✔ 1	✔ 1
375			✔ 1		✔ 1	✔ 1

CLASS PN 12

Nominal size DN	Iplex (PVC-U)	Iplex (PVC-M)	Iplex (PVC-M) Rieber Joint	Tyco (PVC-U) Plas-flo	Tyco (PVC-M) Tuf-flo	Vinidex (PVC-M)
80	✔			✔		
100		✔			✔	✔
150			✔		✔	✔
200			✔		✔	✔
225			✔		✔	✔
250			✔ 1		✔ 1	✔ 1
300			✔ 1		✔ 1	✔ 1
375			✔ 1		✔ 1,2	✔ 1

CLASS PN 15

Nominal size DN	Iplex (PVC-U)	Iplex (PVC-M)	Iplex (PVC-M) Rieber Joint
80	✔		
100		✔	
150			✔
200			
225			
250			
300			
375			

CLASS PN 18

Nominal size DN	Iplex (PVC-U)	Iplex (PVC-M)	Iplex (PVC-M) Rieber Joint
80	✔		
100		✔	
150			✔
200			✔ 2
225			✔ 2
250			✔ 1,2
300			✔ 1,2
375			✔ 1,2

NOTES

1. Project approval necessary (refer to Water Engineering section of Power and Water)
2. Not readily available

SPIGOT-SOCKET SCJ PIPES
(Only permitted for unusual requirements)

CLASS PN 9

Nominal size DN	Iplex (PVC-U)	Tyco (PVC-U)
80	✔	✔
100	✔	✔
150	✔	✔

CLASS PN 12

Nominal size DN	Iplex (PVC-U)	Tyco (PVC-U)
80	✔	✔
100	✔	✔
150	✔	✔

CLASS PN 15

Nominal size DN
80
100
150

CLASS PN 18

Nominal size DN	Iplex (PVC-U)
80	✔
100	✔
150	✔

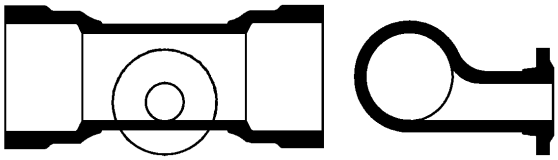
SOCKET-SOCKET BENDS

Nominal Size DN x Degrees	Mallet	Tyco Water	Tyco Water Austlite[1]	Derwent	Dobbie Dico
100 x 11.25	✔	✔	✔	✔	✔
100 x 22.5	✔	✔	✔	✔	✔
100 x 45	✔	✔	✔	✔	✔
100 x 90	✔	✔	✔	✔	✔
150 x 11.25	✔	✔	✔	✔	✔
150 x 22.5	✔	✔	✔	✔	✔
150 x 45	✔	✔	✔	✔	✔
150 x 90	✔	✔	✔	✔	✔
200 x 11.25	✔	✔		✔	✔
200 x 22.5	✔	✔		✔	✔
200 x 45	✔	✔		✔	✔
200 x 90	✔	✔		✔	✔
225 x 11.25	✔	✔		✔	
225 x 22.5	✔	✔		✔	
225 x 45	✔	✔		✔	
225 x 90	✔	✔		✔	
250 x 11.25	✔	✔		✔	✔
250 x 22.5	✔	✔		✔	✔
250 x 45	✔	✔		✔	✔
250 x 90	✔	✔		✔	✔
300 x 11.25	✔	✔		✔	
300 x 22.5	✔	✔		✔	
300 x 45	✔	✔		✔	
300 x 90	✔	✔		✔	
375 x 11.25	✔	✔		✔	
375 x 22.5	✔	✔		✔	
375 x 45	✔	✔		✔	
375 x 90	✔	✔		✔	

NOTES

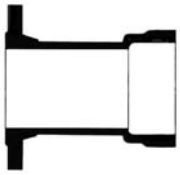
1. Auslite fittings available in PN16 rating only

SOCKET-SOCKET-FLANGE SCOUR TEES



Nominal Size DN x DN x dn	Mallet	Tyco Water	Derwent
150 x 150 x 80	✔	✔	✔
200 x 200 x 80	✔	✔	✔
225 x 225 x 100	✔	✔	✔
250 x 250 x 100	✔	✔	✔
300 x 300 x 100	✔	✔	✔
375 x 375 x 150	✔	✔	✔

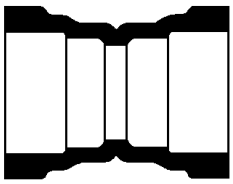
FLANGE-SOCKET CONNECTORS



Nominal Size DN	Mallet[1]	Tyco Water	Derwent	Tyco Water Auslite[1]	Dobbie Dico[1]
100	✔	✔	✔	✔	✔
150	✔	✔	✔	✔	✔
200	✔	✔	✔		✔
225	✔	✔	✔		
250	✔	✔	✔		✔
300	✔	✔	✔		
375	✔	✔	✔		

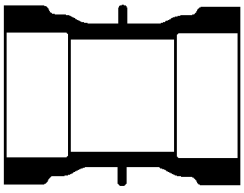
NOTES 1. Auslite, Dobbie Dico and Mallet fittings available in PN16 rating only

SOCKET-SOCKET CONNECTORS



Nominal Size DN	Mallet	Tyco Water	Derwent
100	✔	✔	✔
150	✔	✔	✔
200	✔	✔	✔
225	✔	✔	✔
250	✔	✔	✔
300	✔	✔	✔
375	✔	✔	✔

SOCKET-SOCKET SLIP COLLARS



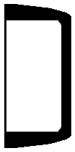
Nominal Size DN	Tyco Water (Sliptyt)
100	✔
150	✔

NOTES

1. Sliptyt offered only with thermal bonded polymeric encapsulation utilising polyamide (nylon) being Rilsan T Blue 7411 MAC

POLYVINYL CHLORIDE PIPELINE SYSTEM END SEALS

CAPS

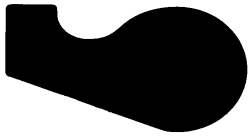


Nominal Size DN	Mallet	Tyco Water	Derwent	Dobbie Dico
100	✔	✔	✔	✔
150	✔	✔	✔	✔
200	✔	✔	✔	✔
225	✔	✔	✔	
250	✔	✔	✔	✔
300	✔	✔	✔	
375	✔	✔	✔	

PVC SPIGOT TO PVC SOCKET ELASTOMERIC SEALS

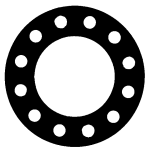
Nominal Size DN	Iplex (Gulf & Hultec)	Vinidex (Gulf & Hultec)	Derwent (Gulf)	Dobbie Dico (Gulf)
100	✔	✔	✔	✔
150	✔	✔	✔	✔
200	✔	✔	✔	✔
225	✔	✔	✔	
250	✔	✔	✔	✔
300	✔	✔	✔	
375	✔	✔	✔	

PVC SPIGOT TO DI SOCKET ELASTOMERIC SEALS



Nominal Size DN	Mallet (Ludowici)	Tyco Water (Gulf)	Derwent (Gulf)
80	✔	✔	✔
100	✔	✔	✔
150	✔	✔	✔
200	✔	✔	✔
225	✔	✔	✔
250	✔	✔	✔
300	✔	✔	✔
375	✔	✔	✔

FLANGE ELASTOMERIC SEALS



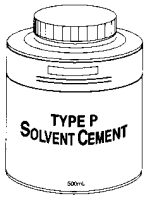
Nominal Size DN	Mallet	Tyco Water (SDQ))
80	✔	✔
100	✔	✔
150	✔	✔
200	✔	✔
225	✔	✔
250	✔	✔
300	✔	✔
375	✔	✔

JOINTING LUBRICANT

Lubricants Size	Iplex (Thomas Grozier)	Vinidex (IDL Chemicals)
500ml	✔	
1L	✔	✔
2L		✔
5L	✔	✔

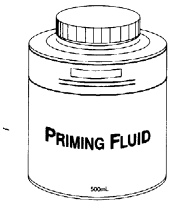
SOLVENT CEMENTING

SOLVENT CEMENT (type P – colour green)



Sizes	Iplex (Bostik)
125ml	✔
250ml	✔
500ml	✔
1L	✔
4L	

PRIMING FLUID (colour pink or red)



Sizes	Iplex (Bostik)
250ml	✔
500ml	✔
1L	✔
4L	

EXTERNAL CORROSION PROTECTION FOR DI FITTINGS
POLYETHYLENE SLEEVING & PETROLATUM SYSTEM

REFER TO SECTION SPO 04 CORROSION PROTECTION