

PRODUCT SPECIFICATIONS FOR PRODUCTS AND MATERIALS

Numerical Listing

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WSA PS – 204	Steel Fittings for Water Supply and Sewerage
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PRODUCT SPECIFICATIONS FOR PRODUCTS AND MATERIALS

Alphabetical Listing

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DUCTILE IRON PIPE AND FITTINGS

WSA PS – 200 Ductile Iron Pipe for Water Supply and Sewerage

WSA PS – 201 Ductile Iron Fittings for Water Supply and Sewerage

WSA PS – 212 Ductile Iron Fittings for Plastics Pipe for Water Supply and Sewerage

WSA PS – 234 Ductile Iron Pipe for Gravity Sewers

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- WSA PS – 361** **Embedment / 5 mm Minus Sand**
- WSA PS – 359** **Fine Crushed Rock for Pipe Embedment**
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- WSA PS – 272** **Fittings, End Thrust Restraint**

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- WSA PS – 312** **Flange Gaskets and O-Rings**

GEOTEXTILE FILTER FABRIC

- WSA PS – 355** **Geotextile Filter Fabric**

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- WSA PS – 205** **Glass Reinforced Plastic (GRP) Pressure Pipe for Water Supply**
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- WSA PS – 206** **Glass Reinforced Plastic (GRP) Fittings for Water Supply**
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- WSA PS – 232** **Glass Reinforced Plastic (GRP) Non-Pressure Pipe**
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- WSA PS – 315** **Fixed Ladders**

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- WSA PS – 236** Variable Bend, Post-Formed PVC-U Non-Pressure Fittings
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- WSA PS – 321** Maintenance Shafts – PVC-U
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- WSA PS – 323** Maintenance Holes – Precast Concrete

MARKING TAPE

- WSA PS – 318** Marking Tape, Detectable
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- WSA PS – 207** Polyethylene (PE) Pipe for Water Supply and Sewerage
- WSA PS – 208** Polyethylene (PE) Pressure Fittings for Water Supply and Sewerage
- WSA PS – 215** Property Service Pipe – Water Supply – Polyethylene
- WSA PS – 216** Polyethylene (PE) Fittings for Water Supply and Sewerage – Fabricated
- WSA PS – 241** Polyethylene (Ribbed Construction) Non-Pressure Pipe and Fittings
- WSA PS – 242** Polyethylene (Plain Wall) Non-Pressure Pipe and Fittings

POLYPROPYLENE PIPE AND FITTINGS

- WSA PS – 240** Polypropylene (Ribbed Construction) Non-Pressure Pipe and Fittings

POLYVINYLCHLORIDE, MODIFIED (PVC-M) PIPE

- WSA PS – 209** Polyvinylchloride, Modified (PVC-M) Pressure Pipe for Water Supply and Sewerage

POLYVINYLCHLORIDE, ORIENTED (PVC-O) PIPE

- WSA PS – 210** Polyvinylchloride, Oriented (PVC-O) Pressure Pipe for Water Supply and Sewerage

POLYVINYLCHLORIDE, UNPLASTICISED (PVC-U) PIPE AND FITTINGS

- WSA PS – 211** Polyvinylchloride, Unplasticised (PVC-U) Pressure Pipe for Water Supply and Sewerage
- WSA PS – 213** PVC Pressure Fittings, Moulded and Post-Formed for Water Supply and Sewerage

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WSA PS – 230	Polyvinylchloride, Unplasticised (PVC-U) Non-Pressure Pipe and Fittings
WSA PS – 236	Variable Bend, Post-Formed PVC-U Non-Pressure Fittings
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WSA PS – 265	Air Valves for Water Supply
WSA PS – 268	Automatic Control Valves
WSA PS – 269	Extension Spindles for Valves, General
WSA PS – 263	Butterfly Valves

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WSA PS – 261	Gate Valves, Metal Seated
WSA PS – 260	Gate Valves, Resilient Seated
WSA PS – 266	Knife Gate Valves for Water Supply and Sewerage
WSA PS – 264	Non-Return (Reflux) Valves
WSA PS – 276	Resilient Seated Ball Valves for Property Services
WSA PS – 274	Resilient Seated Ball Valves for Sewage Pressure Mains
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WSA PS – 312	Flange Gaskets and O-Rings
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OVERVIEW

These product specifications for products and materials for use in constructing water and sewerage infrastructure have been prepared to facilitate procurement, referencing in a project specification, inclusion on design drawings and for appraisal of products.

Hunter Water product specifications have been adapted from the WSAA product specifications to reflect Hunter Water's specific requirements for particular products and can be accessed on the Hunter Water website at

<http://www.hunterwater.com.au/>

The product specifications are the default requirements for products and materials referenced in the following WSAA Codes and Supplements (**Hunter Water Version**):

WSA 02	Sewerage Code of Australia
WSA 03	Water Supply Code of Australia
WSA 04	Sewage Pumping Station Code of Australia
WSA 06	Vacuum Sewerage Code of Australia
WSA 07	Pressure Sewerage Code of Australia
WSA 03 Suppl 1	Dual Water Supply
WSA 03 Suppl 2	Under-Pressure Cut-In Connections

In some cases more than one specification is provided for a product to accommodate variations across Australia e.g. quarry products used for embedment and trench fill.

It is an individual Water Agency's responsibility to nominate a specification most appropriate to its needs. It is a Designer's responsibility to nominate a specification most appropriate to project-specific circumstances and to complete the "**Project Specific requirements**" table and nominate the "**Hunter Water approved options**" for each product. An example of a prepared Product Specification is attached.

A project-specific or an Agency-specific set of specifications should be developed for all items used to construct water supply and sewerage network infrastructure and other applicable projects.

To facilitate this task copies of product specifications are available in Word format upon written request to :

Email Enquiries

enquiries@hunterwater.com.au

Mailing Directly to Hunter Water

Address all mail to:

Hunter Water Corporation
PO Box 5171
HUNTER REGIONAL MAIL CENTRE NSW 2310

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DISCLAIMER

These default specifications are produced by Water Services Association of Australia Limited ("WSAA") for use by members of WSAA and other parties. They are intended to provide general information in relation to the subject matter and include information obtained from a number of sources.

Over time, changes in industry standards and legislative requirements, as well as technical advances and other developments or factors relevant to the information contained in these specifications, may have affected the accuracy of that information. Accordingly, caution should be exercised in relation to the use of the information in these specifications.

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PRODUCT SPECIFICATION XXX DUCTILE IRON PIPE FOR XYZ PROJECT

GENERAL REQUIREMENTS

- (a) Ductile iron pipe shall comply with AS/NZS 2280.
- (b) Pipe shall be cement mortar lined to AS/NZS 2280.
- (c) Pipe shall be externally coated with bituminous or synthetic resin coating to AS/NZS 2280.
- (d) Elastomeric joint seals shall be EPDM complying with AS 1646.
- (e) Ductile iron pipe, joint seals and jointing lubricant shall comply with AS/NZS 4020.

QUALITY ASSURANCE

- (i) Ductile iron pipe shall have product certification (ISO Type 5) to AS/NZS 2280.
- (ii) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646.
- (iii) All products shall be marked in accordance with the certification body's requirements.

SPECIFIC REQUIREMENTS

Nominal sizes, DN	100, 150, 200
Pressure Class	PN 35
End configuration	Spigot-socket and Socket- flange
Seal coat of CML	Required
Jointing lubricant	X x 20L containers
Flange gaskets	Required – see attached product specification (should be based on WSA PS-312)
PE sleeving	Required – see attached product specification (should be based on WSA PS-320)
Lengths, m	5.5 m effective length spigot-socket XX x DN 100 XX x DN 150 XX x DN 200 5.35 m effective length socket-flange X x DN 100 X x DN 150 X x DN 200
Packaging, transportation and delivery requirements	Include details as appropriate to project

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PRODUCT SPECIFICATION

WSA PS - 200 DUCTILE IRON PIPE FOR WATER SUPPLY AND SEWERAGE

200.1 SCOPE

This specification covers ductile iron pipes for use in water supply¹ and pressure sewerage.

200.2 REQUIREMENTS

- (a) Ductile iron pipe shall comply with AS/NZS 2280.
- (b) Where pipe does not comply with AS/NZS 4020, it shall be marked with 'NOT SUITABLE FOR WATER SUPPLY' in accordance with Clause 1.8.4 of AS/NZS 2280.
- (c) Pipe shall be cement mortar lined² to AS/NZS 2280. A sealing coat is required on the cement lining for pipe used for drinking water.
- (d) Pipe shall be externally coated with bituminous or synthetic resin coating to AS/NZS 2280.
- (e) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (f) Ductile iron pipe, joint seals, flange gaskets³ and jointing lubricant shall comply with AS/NZS 4020.
- (g) Spigot-socket pipe shall be Pressure Class PN35 unless project specific approval is given by Hunter Water to use PN20 pipe.⁴

200.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ⁴ (see 200.2 (g))	
Seal coating of the cement mortar lining (see 200.2 (c))	
Specific packaging, transportation and delivery requirements	
Length, m	
Alternative type of cement for cement mortar lining ²	

200.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Restrained joint seals	
Specialised external coatings	
Alternative elastomeric material for joint seals	

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200.5 QUALITY ASSURANCE

- (a) Ductile iron pipe shall have product certification (ISO Type 5) to AS/NZS 2280.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply.
- 2 For applications where the wastewater being conveyed has a sulphate content >500 mg/L, Type SR cement should be used.
- 3 Flange gaskets and O-rings should be supplied to WSA PS-312.
- 4 PN 35 is the standard Pressure Class for many pressure applications. PN 20 may be a suitable alternative in some applications, but should only be used with Water Agency approval. Flange Class pipe may be required for structural purposes as specified in the Project Specification or on the Design Drawings.

PRODUCT SPECIFICATION

WSA PS – 201 DUCTILE IRON FITTINGS FOR WATER SUPPLY AND SEWERAGE

201.1 SCOPE

This specification covers ductile iron fittings for use with ductile iron pipes in water supply^{1,2} and pressure sewerage.

Fittings without flanges may be used with pipelines up to and including Class 35. Fittings with flanges may be used up to the maximum pressure rating of the flange, generally Class16.

201.2 REQUIREMENTS FOR DUCTILE IRON FITTINGS

- (a) Ductile iron fittings shall comply with AS/NZS 2280.
- (b) Where fittings do not comply with AS/NZS 4020, each fitting shall be marked with 'NOT SUITABLE FOR WATER SUPPLY' in accordance with Clause 1.8.4 of AS/NZS 2280.
- (c) Fittings shall be lined and coated with fusion bonded polymer in accordance with AS/NZS 4158. Project specific approval must be obtained from Hunter Water to use alternative coating and lining eg. Cement mortar lining or bituminous coating to AS/NZS 2280.
- (d) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (e) Ductile iron fittings, joint seals and gaskets and jointing lubricant shall comply with AS/NZS 4020.

201.3 PROJECT SPECIFIC REQUIREMENTS

Fitting types (configurations) ³	
Nominal sizes, DN	
Specific packaging, transportation and delivery requirements	

201.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Restrained joint seals	
Alternative elastomeric materials for joint seals	
Alternative lining and coating (see 201.2 (c))	

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201.5 QUALITY ASSURANCE

- (a) Ductile iron fittings shall have product certification (ISO Type 5) to AS/NZS 2280.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (d) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 See WSA PS – 212 for ductile iron fittings for use with plastic pipes in water supply and sewerage.
- 2 Includes drinking water and recycled water supply.
- 3 End configurations of fittings (e.g. socketed or spigoted or flanged) shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS - 203 STEEL PIPE FOR WATER SUPPLY AND SEWERAGE

203.1 SCOPE

This specification covers steel pipe for water supply¹ and sewerage. This specification does not cover field joint welding requirements².

203.2 REQUIREMENTS

- (a) Steel pipe shall comply with AS 1579 and be hydrostatically tested.
- (b) Steel pipe, joint seals, flange gaskets and O-rings³, and jointing lubricant shall comply with AS/NZS 4020. Where pipe does not comply with AS/NZS 4020, each pipe shall be marked with 'NOT SUITABLE FOR WATER SUPPLY' in accordance with Clause 1.4 of AS 1579.
- (c) Pipe shall be cement mortar lined in accordance with AS 1281.
- (d) For buried applications, steel pipe shall be externally coated with fusion bonded polyethylene (medium density) complying with AS 4321.
- (e) Elastomeric ring joint seals shall comply with AS 1646 or EN 681-1, EPDM.

203.3 PROJECT SPECIFIC REQUIREMENTS

Rated pressure ⁴ (Pressure Class, PN)	
Outside diameter, mm	
Pipe length, m	
Seal coating of cement mortar lining	
External protective coating for above ground installations	
Jointing requirements including end configurations and flange classes (16 to 35) ⁵	
Cathodic protection bonding lugs (for elastomeric seal joints only)	
Specific packaging, transportation and delivery requirements	

203.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative methods to hydrostatic testing e.g. non-destructive testing (NDT)	
Alternative internal lining	
Alternative elastomeric material for joint seals	
Alternative external coatings for buried applications	

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203.5 QUALITY ASSURANCE

- (a) Steel pipe shall have product certification (ISO Type 5) to AS 1579.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes source water, drinking water and recycled water supply.
- 2 Refer to WTIA Technical Note No. 25 Welding Specification for the Water Industry.
- 3 Flange gaskets and O-rings should be supplied to WSA PS-312.
- 4 Rated pressure shall be calculated by the pipe designer in accordance with Clause 2.1 of AS 1579.
- 5 Jointing requirements and Flange Classes shall be as specified in the Project Specification or on the Design Drawings.
- 6 This specification does not cover field joint welding requirements.

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PRODUCT SPECIFICATION**WSA PS - 204 STEEL FITTINGS FOR WATER SUPPLY AND SEWERAGE****204.1 SCOPE**

This specification covers steel fittings for water supply¹ and sewerage. This specification does not cover field joint welding requirements².

204.2 REQUIREMENTS

- (a) Steel fittings shall comply with AS 1579 and may be manufactured from non-hydrostatically tested pipe (Clause 2.2 of AS 1579).
- (b) Steel fittings, joint seals, flange gaskets and O-rings³, and jointing lubricant shall comply with AS/NZS 4020. Where fittings do not comply with AS/NZS 4020, each fitting shall be marked with 'NOT SUITABLE FOR WATER SUPPLY' in accordance with Clause 1.4 of AS 1579.
- (c) Steel fittings shall be cement mortar lined in accordance with AS 1281.
- (d) For buried applications, steel fittings shall be externally coated with fusion bonded polyethylene (medium density) complying with AS 4321.
- (e) Elastomeric ring joint seals shall comply with AS 1646 or EN 681-1, EPDM.

204.3 PROJECT SPECIFIC REQUIREMENTS

Rated pressure ⁴ (Pressure Class, PN)	
To suit pipe of nominal size(s), mm	
Fitting types (configurations)	
Seal coating of cement mortar lining	
External protective coating for above ground installations	
Jointing requirements including end configurations and flange classes (16 to 35) ⁵	
Cathodic protection bonding lugs (for elastomeric seal joints only)	
Specific packaging, transportation and delivery requirements	

204.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative internal lining	
Alternative elastomeric material for joint seals	
Alternative external coatings for below ground applications	

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204.5 QUALITY ASSURANCE

- (a) Steel fittings shall have product certification (ISO Type 5) to AS 1579.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes source water, drinking water and recycled water supply.
- 2 Refer to WTIA Technical Note No. 25 Welding Specification for the Water Industry.
- 3 Flange gaskets and O-rings should be supplied to WSA PS-312.
- 4 The rated pressure of fittings is the responsibility of the designer (Clause 2.3 of AS 1579).
- 5 Jointing requirements and Flange Classes shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS - 205 GLASS REINFORCED PLASTIC (GRP) PRESSURE PIPE FOR WATER SUPPLY

205.1 SCOPE

This specification covers GRP pressure pipe for water supply¹.

205.2 REQUIREMENTS

- (a) GRP pipe shall comply with ISO 10639.
- (b) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (c) Pipes, joint seals, flange gaskets² and jointing lubricant shall comply with AS/NZS 4020.
- (d) Minimum pressure class of PN 16 and stiffness class of SN 10000 shall be used unless project specific approval is given by Hunter Water to use alternative classes.

205.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pipe length, m	
Pressure Class ³ , PN (see 205.2 (d))	
Stiffness Class ³ , SN (see 205.2 (d))	
Joints and couplings ²	
Specific packaging, transportation and delivery requirements	

205.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative resin type	
Alternative glass type	
Alternative elastomeric material for joint seals	

205.5 QUALITY ASSURANCE

- (a) GRP pipe shall have product certification (ISO Type 5) to ISO 10639.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) Jointing lubricants shall have product certification (ISO Type 1) to AS/NZS 4020.
- (d) All products shall be marked in accordance with the certification body's requirements.

NOTES:

1 Includes source water, drinking water and recycled water supply.

2 Flange gaskets and O-rings should be supplied to WSA PS-312.

1 Pressure and stiffness classes shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION**WSA PS - 205S GLASS REINFORCED PLASTIC (GRP) PIPE FOR SEWERAGE****205S.1 SCOPE**

This specification covers GRP pipe for gravity and pressure sewerage.

205S.2 REQUIREMENTS

- (a) GRP pipe shall comply with ISO 10467.
- (b) GRP pipe shall be manufactured using orthophthalic polyester resin and ECR glass.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (d) Minimum pressure class of PN 16 and stiffness class of SN 10000 shall be used unless project specific approval is given by Hunter Water to use alternative classes.

205S.3 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Nominal size, DN	
Pipe length, m	
Pressure Class ¹ , PN (see 205S.2 (d))	
Stiffness Class ¹ , SN (see 205S.2 (d))	
Joints and couplings ²	
Specific packaging, transportation and delivery requirements	

205S.4 PROJECT SPECIFIC REQUIREMENTS

Alternative resin type	
Alternative glass type	
Alternative elastomeric material for joint seals	

205S.5 QUALITY ASSURANCE

- (a) GRP pipe shall have product certification (ISO Type 5) to ISO 10467.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Pressure and stiffness classes shall be as specified in the Project Specification or on the Design Drawings.
- 2 Flange gaskets and O-rings should be supplied to WSA PS-312.

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PRODUCT SPECIFICATION

WSA PS - 206 GLASS REINFORCED PLASTIC (GRP) FITTINGS FOR WATER SUPPLY

206.1 SCOPE

This specification covers fabricated GRP pressure fittings for use with GRP pressure pipe for water supply¹.

206.2 REQUIREMENTS

- (a) GRP fittings shall comply with ISO 10639.
- (b) GRP fittings shall be manufactured using orthophthalic polyester resin and ECR glass.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (d) Fittings, joint seals, flange gaskets² and jointing lubricant shall comply with AS/NZS 4020.
- (e) Minimum pressure class of PN 16 and stiffness class of SN 10000 shall be used unless project specific approval is given by Hunter Water to use alternative classes.

206.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ³ , PN (see 206.2 (e))	
Stiffness Class ³ , SN (see 206.2 (e))	
Fitting types (configurations)	
Joints and couplings ²	
Specific packaging, transportation and delivery requirements	

206.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative resin type	
Alternative glass type	
Alternative elastomeric material for joint seals	

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206.5 QUALITY ASSURANCE

The purchaser shall specify requirements for:

- (a) GRP fittings shall have product certificate (ISO Type 5) to ISO 10639.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes source water, drinking water and recycled water supply.
- 2 Flange gaskets and O-rings should be supplied to WSA PS-312.
- 3 Pressure and stiffness classes shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS - 206S GLASS REINFORCED PLASTIC (GRP) FITTINGS FOR SEWERAGE

206S.1 SCOPE

This specification covers fabricated GRP fittings for use with GRP pipe for gravity and pressure sewerage.

206S.2 REQUIREMENTS

- (a) GRP fittings shall comply with ISO 10467.
- (b) Where fittings do not comply with AS/NZS 4020, they shall be legibly and durably marked with 'NOT SUITABLE FOR DRINKING WATER' in black letters of at least 10 mm high adjacent to each end of the fitting.
- (c) GRP fittings shall be manufactured using orthophthalic polyester resin and ECR glass.
- (d) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (e) Minimum pressure class of PN 16 and stiffness class of SN 10000 shall be used unless project specific approval is given by Hunter Water to use alternative classes.

206S.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ¹ , PN (see 206S.2 (e))	
Stiffness Class ¹ , SN (see 206S.2 (e))	
Fitting types (configurations)	
Joints and couplings ²	
Specific packaging, transportation and delivery requirements	

206S.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative resin type	
Alternative glass type	
Alternative elastomeric material for joint seals	

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206S.5 QUALITY ASSURANCE

The purchaser shall specify requirements for:

- (a) GRP fittings shall have product certification (ISO Type 5) to ISO 10467.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Pressure and stiffness classes shall be as specified in the Project Specification or on the Design Drawings.
- 2 Flange gaskets and O-rings should be supplied to WSA PS-312.

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PRODUCT SPECIFICATION

WSA PS - 207 POLYETHYLENE (PE) PIPE FOR WATER SUPPLY AND SEWERAGE

207.1 SCOPE

This specification covers polyethylene pressure pipe for use in water supply¹ and sewerage.

207.2 REQUIREMENTS

- (a) Pipe shall be PE 100 Series 1 complying with AS/NZS 4130.
- (b) Drinking water pipe shall be solid blue or sheathed blue or black with blue stripes.
- (c) Recycled water pipe shall be solid purple² or sheathed purple or black with purple stripes.
- (d) Sewerage pipe shall be solid cream³ or sheathed cream.
- (e) Recycled water pipe shall be legibly and durably marked with letters of at least 10 mm high "RECYCLED WATER – DO NOT DRINK", repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- (f) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

207.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ⁴ , PN (see 207.2 (f))	
Application ⁴	
Length of pipe or coils, m	
Specific packaging, transportation and delivery requirements	

207.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Colour identification ⁵ (complete pipe colour or striped)	
Alternative pipe compounds e.g. PE 80B	

207.5 QUALITY ASSURANCE

- (a) Polyethylene pipe shall have product certification (ISO Type 5) to AS/NZS 4130.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply.
- 2 Purple is defined in accordance with RAL⁷ DESIGN colour numbers as being no darker than 330 40 40 or 310 50 30 and no lighter than 310 70 15, respectively. It is equivalent to being no darker than P24 Jacaranda or P12 Purple and no lighter than P23 Lilac in accordance with AS 2700 (NZS 7702).

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- 3 Cream is defined in accordance with RAL⁷ DESIGN colour numbers as being no lighter than RAL 080 90 20 and no darker than RAL 075 80 20.
- 4 Pressure Class and application shall be as specified in the Project Specification or on the Design Drawings.
- 5 Some water agencies may have a specific colour identification requirement e.g. solid/sheathed complete pipe colour only.
- 6 RAL Deutsches Institut für Gütesicherung und Kennzeichnung e.V. (RAL German Institute for Quality Assurance and Certification)
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D-53757 Sankt Augustin
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PRODUCT SPECIFICATION

WSA PS - 208 POLYETHYLENE (PE) PRESSURE FITTINGS FOR WATER SUPPLY AND SEWERAGE - MOULDED

208.1 SCOPE

This specification covers moulded electrofusion and moulded mechanical pressure fittings for use with polyethylene pipe in water supply¹ and sewerage.

208.2 REQUIREMENTS

- (a) Polyethylene fittings² shall comply with AS/NZS 4129.
- (b) Mechanical joint elastomeric seals shall comply with AS 1646 or EN 681-1, EPDM and AS/NZS 4020.
- (c) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

208.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ³ , PN (see 208.2 (c))	
Type of fitting e.g. mechanical or electrofusion	
Fitting types (configurations)	
Specific packaging, transportation and delivery requirements	

208.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative elastomeric material for joint seals	
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208.5 QUALITY ASSURANCE

- (a) Polyethylene fittings shall have product certification (ISO Type 5) to AS/NZS 4129.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes water supply and recycled water supply.
- 2 All fittings to AS/NZS 4129 for applications other than fuel gas are required to comply with AS/NZS 4020. Fittings may be used for drinking water, recycled water and sewerage pipework. Individual colour identification for each application is not required.
- 3 Pressure Class and type of fitting shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION**WSA PS - 209 POLYVINYLCHLORIDE, MODIFIED (PVC-M)
PRESSURE PIPE FOR WATER SUPPLY AND SEWERAGE****209.1 SCOPE**

This specification covers modified polyvinylchloride (PVC-M) pressure pipe¹ for water supply² and sewerage.

209.2 REQUIREMENTS

- (a) PVC-M pipes shall comply with AS/NZS 4765, Series 2³.
- (b) Pipes for sewerage shall be legibly and durably marked with black letters of at least 10 mm high "SEWAGE – DO NOT DRINK", repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or SBR.
- (d) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

209.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ⁴ , PN (see 209.2 (d))	
Application ⁴	
Specific packaging, transportation and delivery requirements	

209.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative pipe diameter series i.e. Series 1 (metric) ⁵	
Permitted colours for sewerage	
Alternative elastomeric material for joint seals	
Pipe length, if not 6 meters	

209.5 QUALITY ASSURANCE

- (a) PVC-M pipes shall have product certification (ISO Type 5) to AS/NZS 4765.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Refer to Information and Guidance Notes TN4 and TN5 downloadable from www.wsaa.asn.au.
- 2 Includes drinking water and recycled water supply.
- 3 AS/NZS 4765 specifies that Series 2 pipe is blue for drinking water applications, purple for recycled water applications and cream for sewerage and requires additional marking of recycled water pipe.

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- 4 Pressure Class and application shall be as specified in the Project Specification or on the Design Drawings.
- 5 AS/NZS 4765 specifies that Series 1 pipe is white for drinking water applications, purple for recycled water applications and cream for sewerage and requires additional marking of recycled water pipe.

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PRODUCT SPECIFICATION

WSA PS - 210 POLYVINYLCHLORIDE, ORIENTED (PVC-O) PRESSURE PIPE FOR WATER SUPPLY AND SEWERAGE

210.1 SCOPE

This specification covers oriented polyvinylchloride (PVC-O) pressure pipe¹ for water supply² and sewerage.

210.2 REQUIREMENTS

- (a) PVC-O pipe shall comply with AS/NZS 4441, Series 2.
- (b) Pipes for sewerage shall be legibly and durably marked with black letters of at least 10 mm high "SEWAGE – DO NOT DRINK", repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or SBR.
- (d) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

210.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ⁴ , PN (see 210/2 (d))	
Material classification number ⁴	
Application ⁴	
Specific packaging, transportation and delivery requirements	

210.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative pipe diameter series i.e. Series 1 (metric) ⁵	
Alternative elastomeric material for joint seals	
Pipe length if not 6 metres	

210.5 QUALITY ASSURANCE

- (a) PVC-O pipes shall have product certification (ISO Type 5) to AS/NZS 4441.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Refer to Information and Guidance Notes TN4 and TN5 downloadable from www.wsaa.asn.au.
- 2 Includes water supply and recycled water supply.
- 3 AS 4441 specifies that Series 2 pipe is blue for drinking water applications, purple for recycled water applications and cream for sewerage and requires additional marking of recycled water pipe.

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- 4 Pressure Class, Materials Classification number and application shall be as specified in the Project Specification or on the Design Drawings.
- 5 AS 4441 specifies that Series 1 pipe is white for drinking water applications, purple for recycled water applications and cream for sewerage and requires additional marking of recycled water pipe.

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PRODUCT SPECIFICATION

WSA PS – 211 POLYVINYLCHLORIDE, UNPLASTICISED (PVC-U) PRESSURE PIPE FOR WATER SUPPLY AND SEWERAGE

211.1 SCOPE

This specification covers unplasticised polyvinylchloride (PVC-U) pressure pipe for use in water supply¹ and sewerage.

211.2 REQUIREMENTS

- (a) PVC-U pipe shall comply with AS/NZS 1477, Series 2².
- (b) Pipes for recycled water shall be legibly and durably marked with black letters of at least 10 mm high "RECYCLED WATER – DO NOT DRINK", repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- (c) Pipes for sewerage shall be legibly and durably marked with black letters of at least 10 mm high "SEWAGE – DO NOT DRINK", repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- (d) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or SBR.
- (e) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

211.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ³ , PN (see 211.2 (e))	
Application ²	
Specific packaging, transportation and delivery requirements	

211.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative pipe diameter series i.e. Series 1 (metric) ⁴	
Permitted colours for sewerage	
Alternative elastomeric material for joint seals	
Pipe length if not 6 metres	

211.5 QUALITY ASSURANCE

- (a) PVC-U pipe shall have product certification (ISO Type 5) to AS/NZS 1477.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply.
- 2 AS/NZS 1477 specifies that Series 2 pipe is blue for drinking water applications, purple for recycled water applications and cream for sewerage.

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- 3 Pressure Class and application shall be as specified in the Project Specification or on the Design Drawings.
- 4 AS/NZS 1477 specifies that Series 1 pipe is white for drinking water applications, purple for recycled water applications and cream for sewerage.

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PRODUCT SPECIFICATION

WSA PS – 212 DUCTILE IRON FITTINGS FOR PLASTICS PRESSURE PIPE FOR WATER SUPPLY AND SEWERAGE

212.1 SCOPE

This specification¹ covers ductile iron fittings for use with plastics pressure pipe² such as PVC-M, PVC-O³ and PVC-U, ABS and GRP in water supply and pressure sewerage.

212.2 REQUIREMENTS

- (a) Ductile iron fittings for use with plastics pressure pipe^{1,2} shall comply with AS/NZS 2280.
- (b) Where fittings do not comply with AS/NZS 4020, each fitting shall be marked with 'NOT SUITABLE FOR WATER SUPPLY' in accordance with Clause 1.8.4 of AS/NZS 2280.
- (c) Sockets and jointing seals shall be suitable for Series 2 pipe.
- (d) Fittings shall be coated and lined with fusion bonded polymer⁴ in accordance with AS/NZS 4158.
- (e) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or SBR.
- (f) Flange gaskets shall comply with WSA 109.
- (g) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

212.3 PROJECT SPECIFIC REQUIREMENTS

Fitting types (configurations)	
Nominal size, DN	
Pressure Class ⁵ , PN (see 212.3 (g))	
Specific packaging, transportation and delivery requirements	

212.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Jointing seals suitable for an alternative pipe diameter series e.g. Series 1	
Alternative elastomeric material for jointing seals	
Alternative coating and lining	

212.5 QUALITY ASSURANCE

- (a) Ductile iron fittings shall have product certification (ISO Type 5) to AS/NZS 2280.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (d) Flange gaskets shall have product certification (ISO Type 1) to WSA 109.
- (e) All products shall be marked in accordance with the certification body's requirements.

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NOTES:

- 1 Only a limited size range of moulded pressure fittings in PVC-U and other plastics materials is available⁶. Fittings are not moulded from PVC-M or PVC-O. Ductile iron fittings are therefore deemed to be the default option for use with plastics pressure pipes such as PVC, GRP and ABS. Socket dimensions are generally designed to suit Series 2 pressure pipe, although, in many diameters, Series 1 pressure pipe may be jointed with the use of specially designed jointing seals.
- 2 Ductile iron fittings are generally unsuitable for use with PE pressure pipe.
- 3 The use of ductile iron fittings with PVC-O material classifications 450 and 500 should be verified with the pipe manufacturer so that fittings with an adequate socket depth are used.
- 4 Individual colour identification for each application is not required.
- 5 Pressure Class shall be as specified in the Project Specification or on the Design Drawings.
- 6 The use of moulded PVC-U fittings with PVC-M, PVC-O and other plastics pressure pipes requires Water Agency approval.

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PRODUCT SPECIFICATION

WSA PS – 213 PVC PRESSURE FITTINGS, MOULDED AND POST-FORMED FOR WATER SUPPLY AND SEWERAGE

213.1 SCOPE

This specification¹ covers moulded pressure fittings and post-formed bends manufactured from PVC² for use with plastics pressure pipe in water supply³ and sewerage.

213.2 REQUIREMENTS

- (a) Moulded fittings⁴ manufactured from PVC-U shall comply with AS/NZS 1477.
- (b) Sockets and jointing seals shall be suitable for Series 2 pipe.
- (c) Post-formed bends⁴ manufactured from PVC-U shall comply with AS/NZS 1477.
- (d) Post-formed bends⁴ manufactured from PVC-M shall comply with AS/NZS 4765.
- (e) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or SBR.
- (f) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

213.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure Class ² , PN	
Swept bend angle	
Preference for type of PVC, if any.	
Specific packaging, transportation and delivery requirements	

213.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Jointing seals suitable for an alternative pipe diameter series e.g. Series 1	
Alternative elastomeric material for joint seals	

213.5 QUALITY ASSURANCE

- (a) Moulded PVC-U fittings shall have product certification (ISO Type 5) to AS/NZS 1477.
- (b) Post-formed bends manufactured from PVC shall have product certification (ISO Type 5) to AS/NZS 1477 (PVC-U) or AS/NZS 4765 (PVC-M) as appropriate.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (d) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Due to the limited availability of moulded plastic pressure fittings (except for PE), WSA PS - 212 is the default specification for fittings for use with PVC pressure pipes. The use of this Specification requires approval by the Water Agency.

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- 2 Moulded and post-formed fittings are not available in PVC-O.
- 3 Includes drinking water and recycled water supply.
- 4 Individual colour identification for each application is not required.
- 5 Pressure Class shall be as specified in the Project Specification or on the Design Drawings.
- 6 Moulded PVC fittings are not recommended for pumped systems and for applications where pipe systems are de-rated for fatigue or operating temperature.

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PRODUCT SPECIFICATION**WSA PS – 214 PROPERTY SERVICE PIPE - WATER SUPPLY -
COPPER****214.1 SCOPE**

This specification covers copper pipe for use as a property service pipe in water supply¹.

214.2 REQUIREMENTS

- (a) Copper pipe shall be Type A and bendable temper BQ complying with AS 1432.
- (b) Pipe for property services installed in standard water reticulation areas shall be naturally coloured or sheathed blue².
- (c) Pipe for property services in dual water reticulation areas shall be sheathed blue¹ for drinking water services and purple³ for recycled water services.
- (d) Pipe for recycled water shall be legibly and durably marked with black letters of at least 5 mm high "RECYCLED WATER – DO NOT DRINK", repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- (e) Pipe shall comply with AS/NZS 4020.

214.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Specific packaging, transportation and delivery requirements	

214.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Hard drawn or annealed temper	
Permitted pipe colour for standard water reticulation areas	
Pipe length if not 6 metres	

214.5 QUALITY ASSURANCE

- (a) Copper pipe shall have product certification (ISO Type 5) to AS 1432.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply.
- 2 Blue shall be defined in accordance with RAL⁴ DESIGN colour numbers as being no darker than 200 80 25 or 210 80 25 and no lighter than 200 90 10 or 210 90 10, respectively.
- 3 Purple is defined in accordance with RAL⁴ DESIGN colour numbers as being no darker than 330 40 40 or 310 50 30 and no lighter than 310 70 15, respectively. It is equivalent to being no darker than P24 Jacaranda or P12 Purple and no lighter than P23 Lilac in accordance with AS 2700 (NZS 7702).
- 4 RAL Deutsches Institut für Gütesicherung und Kennzeichnung e.V. (RAL German Institute for Quality Assurance and Certification)
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PRODUCT SPECIFICATION

WSA PS – 215 PROPERTY SERVICE PIPE - WATER SUPPLY - POLYETHYLENE

215.1 SCOPE

This specification covers polyethylene pipe for use as a property service pipe in water supply¹.

215.2 REQUIREMENTS

- (a) Property service pipe shall be PE 100, PN 16, Series 1 complying with AS/NZS 4130.
- (b) Drinking water property service pipe shall be black with blue stripes.
- (c) Recycled water property service pipe shall be solid purple² or sheathed purple.
- (d) Recycled water property service pipe shall be legibly and durably marked with black letters of at least 10 mm high "RECYCLED WATER – DO NOT DRINK", repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.

215.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN ²	
Length of pipe or coils, m	
Specific packaging, transportation and delivery requirements	

215.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative colour identification ⁴ (complete pipe colour or striped)	
Alternative pressure rating	

215.5 QUALITY ASSURANCE

- (a) Polyethylene pipe shall have product certification (ISO Type 5) to AS/NZS 4130.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply.
- 2 Purple is defined in accordance with RAL⁵ DESIGN colour numbers as being no darker than 330 40 40 or 310 50 30 and no lighter than 310 70 15, respectively. It is equivalent to being no darker than P24 Jacaranda or P12 Purple and no lighter than P23 Lilac in accordance with AS 2700 (NZS 7702).
- 3 A minimum diameter of DN 20 is recommended to limit potential taste and odour complaints with small diameter PE pipe.
- 4 Some water agencies may have a specific colour identification requirement e.g. solid/sheathed complete pipe colour only.
- 5 RAL Deutsches Institut für Gütesicherung und Kennzeichnung e.V. (RAL German Institute for Quality Assurance and Certification)
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PRODUCT SPECIFICATION

WSA PS – 216 POLYETHYLENE (PE) FITTINGS FOR WATER SUPPLY AND SEWERAGE - FABRICATED

216.1 SCOPE

This specification¹ covers fabricated pressure fittings for use with polyethylene pipe in water supply and sewerage.

216.2 REQUIREMENTS

- (a) Polyethylene fittings² shall comply with PIPA Industry Guideline [POP006](#).
- (b) Mechanical joint elastomeric seals shall comply with AS 1646 or EN 681-1, EPDM or SBR.
- (c) Fittings and joint seals shall comply with AS/NZS 4020.
- (d) The internal weld beads of fabricated fittings with weld reinforcement in excess of 5 mm shall be removed.
- (e) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

216.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure rating ^{2,3} , PN	
Type of fitting (i.e. mechanical or electrofusion)	
Specific packaging, transportation and delivery requirements	

216.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

216.5 QUALITY ASSURANCE

- (a) Polyethylene fittings shall have product certification (ISO Type 1) to PIPA Industry Guideline [POP006](#).
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Use of this specification requires approval by the Water Agency.
- 2 Fittings may be used for drinking water, recycled water and sewerage pipework. Individual colour identification for each application is not required.
- 3 Pressure Class and type of fitting shall be as specified in the Project Specification or on the Design Drawings.
- 4 The fatigue derating of the fitting shall be as nominated in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION**WSA PS - 217 ACRYLONITRILE BUTADIENE STYRENE (ABS)
PRESSURE PIPE FOR WATER SUPPLY AND SEWERAGE****217.1 SCOPE**

This specification covers acrylonitrile butadiene styrene (ABS) pressure pipe with elastomeric seal joints for water supply¹ and sewerage.

217.2 REQUIREMENTS

- (a) ABS pipe shall comply with AS/NZS 3518, Series 2.
- (b) Elastomeric joint seals shall comply with AS 1646 or EN 681.1, EPDM or SBR.
- (c) Solvent cement and priming fluid shall comply with AS 3691 and AS/NZS 4020.
- (d) Minimum classes required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

217.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Pressure rating ² , PN (see 217,2 (d))	
Specific packaging, transportation and delivery requirements	

217.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative pipe diameter series i.e. Series 1 (metric)	
Alternative pipe colour ³ e.g. blue or purple	
Alternative elastomeric material for joint seals	
Pipe length, if not 6 metres	

217.5 QUALITY ASSURANCE

- (a) ABS pipe shall have product certification (ISO Type 5) to AS/NZS 4765.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681.1.
- (c) Solvent cements and priming fluids shall have product certification (ISO Type 5) to AS 3691.
- (d) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply.
- 2 Pressure Class shall be as specified in the Project Specification or on the Design Drawings.
- 3 Series 1 and 2 pipes are grey.

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PRODUCT SPECIFICATION

WSA PS - 230 POLYVINYLCHLORIDE, UNPLASTICISED (PVC-U) NON-PRESSURE PIPE AND FITTINGS

230.1 SCOPE

This specification covers PVC-U non-pressure pipe and fittings for use in gravity sewerage.

230.2 REQUIREMENTS

- (a) PVC-U pipe and fittings shall comply with AS/NZS 1260.
- (b) Pipe Stiffness Class SN8 (DN 150 and above) or SN10 (DN 100).
- (c) Joints:
 - (i) Elastomeric seals shall comply with AS 1646 or EN 681-1, EPDM or CR or SBR.
 - (ii) Solvent cement and priming fluid for use with tapered socketed fittings shall comply with AS/NZS 3879.
 - (iii) Solvent cement for use with parallel socketed fittings shall comply with manufacturer's requirements.

230.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Wall construction type (plain wall, ribbed or sandwich).	
Joint type (elastomeric seal or solvent cement).	
Specific packaging, transportation and delivery requirements.	

230.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Length, m.	
Stiffness Class, SN.	
Alternative elastomeric material for joint seals e.g. NBR.	

230.5 QUALITY ASSURANCE

- (a) PVC-U non-pressure pipe and fittings shall have product certification (ISO Type 5) to AS/NZS 1260.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) Solvent cements for use with tapered socketed fittings shall have product certification (ISO Type 5) to AS/NZS 3879.
- (d) Solvent cements for use with parallel socketed fittings shall have product certification (ISO Type 1) to manufacturer's requirements.

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- (e) All products shall be marked in accordance with the certification body's requirements.

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PRODUCT SPECIFICATION**WSA PS – 231 VITRIFIED CLAY (VC) PIPE AND FITTINGS****231.1 SCOPE**

This specification covers vitrified clay (VC) pipe and fittings for use in gravity sewerage.

231.2 REQUIREMENTS

- (a) VC pipe, fittings and jointing assemblies shall comply with EN 295-1
- (b) Special fittings, adaptors and compatible accessories shall comply with EN 295-4.
- (c) Elastomeric joint seals shall comply with EN 681-1, EPDM or CR or SBR.
- (d) The minimum crushing strength / Class number shall be:

Nominal Size, DN	Crushing Strength kN/m	Minimum Class Number
150	34	Not applicable
200-250	Note 1	160
300-450	Note 1	120
≥500	Note 1	95

231.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Class number ² .	
Joint type (sleeve, spigot/socket).	
Specific packaging, transportation and delivery requirements.	

231.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative elastomeric material for joint seals e.g. TPE to EN 681-2.	
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231.5 QUALITY ASSURANCE

- (a) Vitrified clay pipe and fittings, including jointing assemblies, shall have product certification (ISO Type 5) to EN 295-1 (Sampling in accordance with EN 295-2).
- (b) Special fittings, adaptors and compatible accessories shall have product certification (ISO Type 5) to EN 295-4.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to EN 681-1.
- (d) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Crushing strength shall comply with EN 295.1 for the specified Class number.
- 2 Class number shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS – 232 GLASS REINFORCED PLASTIC (GRP) NON-PRESSURE PIPE

232.1 SCOPE

This specification covers GRP non-pressure pipe for gravity sewerage.

232.2 REQUIREMENTS

- (a) GRP pipe shall comply with ISO 10467.
- (b) Where pipe does not comply with AS/NZS 4020, it shall be legibly and durably marked with 'NOT SUITABLE FOR DRINKING WATER' in black letters of at least 10 mm high, repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m.
- (c) GRP pipe shall be manufactured using orthophthalic polyester resin and ECR glass.
- (d) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.

232.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Pipe length, m.	
Pressure Class ¹ , PN.	
Stiffness Class ¹ , SN.	
Specific packaging, transportation and delivery requirements.	

232.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative resin type.	
Alternative glass type.	
Alternative elastomeric material for joint seals.	

232.5 QUALITY ASSURANCE

- (a) GRP pipe shall have product certification (ISO Type 5) to ISO 10467.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTE:

- 1 Pressure and stiffness classes shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS – 233 REINFORCED CONCRETE (RC) PLASTICS-LINED NON-PRESSURE PIPE

233.1 SCOPE

This specification covers non-pressure reinforced precast-concrete plastics-lined pipe for gravity sewerage.

233.2 REQUIREMENTS

- (a) Reinforced concrete plastics-lined pipe shall comply with WSA 113.
- (b) Aggregates shall conform to the requirements of AS 4058.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (d) Pipe shall be routinely tested in accordance with Clause 4.3 of AS 4058 at a frequency defined in Appendix A of AS 4058 for the following tests listed in Table 4.1 of AS 4058:
 - (i) Crack load.
 - (ii) Ultimate load.
 - (iii) Hydrostatic pressure.
 - (iv) Dimensional accuracy.
 - (v) Cover.
 - (vi) Joint assembly.
- (e) Lifting holes are not required.

233.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Pipe load Class.	
Configuration of bends.	
External coatings for aggressive soils e.g. acid sulphate soils.	
Lifting holes (if required).	
Specific packaging, transportation and delivery requirements.	

233.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative aggregates e.g. calcareous ^{3,4} .	
Additional sacrificial cover over reinforcement,	
Alternative elastomeric material for joint seals.	

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233.5 QUALITY ASSURANCE

- (a) RC pipe shall have product certification (ISO Type 1) to WSA 113.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.

NOTES:

- 1 This specification applies to pipe that will be installed in a trench. For pipe jacking, requirements for collars, joints and end-squareness shall be negotiated with the pipe manufacturer.
- 2 Load Class number shall be as specified in the Project Specification or on the Design Drawings.
- 3 Calcareous aggregate is defined as having an acid solubility greater than 98% when tested in accordance with AWWA B100.
- 4 Calcareous aggregates may not be available in all locations.

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PRODUCT SPECIFICATION

WSA PS – 234 DUCTILE IRON PIPE FOR GRAVITY SEWERS

234.1 SCOPE

This specification covers ductile iron pipe for use in gravity sewers.

234.2 REQUIREMENTS

- (a) Ductile iron spigot-socket pipe shall be PN 20 complying with AS/NZS 2280.
- (b) Pipe shall be marked “NOT SUITABLE FOR DRINKING WATER”.
- (c) Pipe shall be cement mortar¹ lined in accordance with AS/NZS 2280.
- (d) Pipe shall be externally coated with bituminous or synthetic resin coating to AS/NZS 2280.
- (e) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.

234.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Specialised external coatings or polyethylene sleeving.	
Specific packaging, transportation and delivery requirements.	
Length.	
Type of cement for cement mortar lining.	

234.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Restrained joint seals.	
Alternative Pressure Class e.g. PN 35 or Flange Class (See Note 2).	
Specialised external coatings.	
Alternative elastomeric material for joint seals.	

234.5 QUALITY ASSURANCE

- (a) Ductile iron pipe shall have product certification (ISO Type 5) to AS/NZS 2280.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 For applications where the wastewater being conveyed has a sulphate content >500 mg/L, Type CA (calcium aluminate) cement should be used.
- 2 PN 20 is the standard Pressure Class for many non-pressure applications. PN 35 or Flange Class pipe may be required for structural purposes as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION**WSA PS - 235 COUPLINGS, METAL- BANDED FLEXIBLE, NON-PRESSURE****235.1 SCOPE**

This specification covers metal-banded flexible couplings for gravity sewers.

235.2 REQUIREMENTS

- (a) Metal-banded flexible couplings shall comply with AS/NZS 4327.
- (b) Couplings shall have metal shear rings.
- (c) Couplings shall be type B i.e. AS 1646 elastomer.

235.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Adaptor bushes (required where difference between OD of pipe and ID of coupling is greater than 16 mm).	
Specific packaging, transportation and delivery requirements.	

235.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative product standard and type— EN 295-4 Type 2B	
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235.5 QUALITY ASSURANCE

- (a) Metal-banded flexible couplings shall have product certification (ISO Type 5) to AS/NZS 4327 or EN 295-4.
- (b) All products shall be marked in accordance with the certification body's requirements.

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PRODUCT SPECIFICATION

WSA PS – 236 VARIABLE BEND, POST-FORMED PVC-U NON-PRESSURE FITTINGS

236.1 SCOPE

This specification covers post-formed variable bend non-pressure fittings manufactured from PVC for use with maintenance shafts and PVC-U sewer pipe.

236.2 REQUIREMENTS

- (a) Post-formed bends manufactured from PVC-U shall comply with WSA 115.
- (b) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.

236.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Stiffness Class ¹ , SN.	
Swept bend angle, degrees.	
Specific packaging, transportation and delivery requirements.	

236.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative elastomeric materials for joint seals.	
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236.5 QUALITY ASSURANCE

- (a) Post formed bends manufactured from PVC shall have product certification (ISO Type 1) to WSA 115.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTE:

- 1 Stiffness Class shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

**WSA PS – 237 GLASS REINFORCED PLASTIC (GRP) NON-
PRESSURE FITTINGS**

Superseded by WSA PS – 205S.

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PRODUCT SPECIFICATION

WSA PS – 238 ACRYLONITRILE BUTADIENE STYRENE (ABS) NON-PRESSURE PIPE AND FITTINGS

238.1 SCOPE

This specification covers acrylonitrile butadiene styrene (ABS) non-pressure pipe and fittings for use in sewerage systems.

238.2 REQUIREMENTS

- (a) ABS pipe and fittings shall comply with WSAA Standard WSA 117.
- (b) Pipe stiffness Class shall be SN8.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or CR or SBR.
- (d) Solvent cement shall comply with AS/NZS 3691.

238.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Stiffness Class.	
Joint type (elastomeric seal or solvent cement).	
Specific packaging, transportation and delivery requirements.	

238.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative pipe stiffness class.	
Alternative elastomeric materials for joint seals e.g. NBR.	

238.5 QUALITY ASSURANCE

- (a) ABS non-pressure pipe and fittings shall have product certification (ISO Type 1) to WSA 117.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements.

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PRODUCT SPECIFICATION

WSA PS – 239 DUCTILE IRON FITTINGS FOR GRAVITY SEWERS

239.1 SCOPE

This specification covers ductile iron fittings for use with ductile iron and plastic pipes in gravity sewers.

239.2 REQUIREMENTS FOR DUCTILE IRON FITTINGS

- (a) Ductile iron fittings shall comply with AS/NZS 2280.
- (b) Fittings shall be lined and coated with fusion bonded polymer in accordance with AS/NZS 4158.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.

239.3 PROJECT SPECIFIC REQUIREMENTS

Fitting type (configuration).	
Nominal size, DN.	
Specific packaging, transportation and delivery requirements.	

239.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative elastomeric materials for joint seals e.g. NBR.	
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239.5 QUALITY ASSURANCE

- (a) Ductile iron fittings shall have product certification (ISO Type 5) to AS/NZS 2280.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (d) All products shall be marked in accordance with the certification body's requirements

NOTE:

- 1 End configurations of fittings (e.g. flanged) shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS – 240 POLYPROPYLENE (RIBBED CONSTRUCTION) NON-PRESSURE PIPE AND FITTINGS

240.1 SCOPE

This specification covers polypropylene (PP) ribbed-construction non-pressure pipe and fittings for use in gravity sewerage.

240.2 REQUIREMENTS

- (a) Polypropylene pipe and fittings shall be Type B ID Series complying with AS/NZS 5065.
- (b) Pipe Stiffness Class shall be SN10.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or CR or SBR.

240.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Specific packaging, transportation and delivery requirements.	

240.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Dimensions e.g. Type B OD Series.	
Length, m.	
Stiffness Class ¹ , SN.	
Alternative elastomeric materials for joint seals e.g. NBR.	

240.5 QUALITY ASSURANCE

- (a) Polypropylene pipe and fittings shall have product certification (ISO Type 5) to AS/NZS 5065.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements

NOTE:

- 1 Where not SN10, Stiffness Class shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS – 241 POLYETHYLENE (RIBBED CONSTRUCTION) NON-PRESSURE PIPE AND FITTINGS

241.1 SCOPE

This specification covers polyethylene (PE) ribbed-construction non-pressure pipe and fittings for use in gravity sewerage.

241.2 REQUIREMENTS

- (a) Polyethylene pipe and fittings shall be Type B ID Series complying with AS/NZS 5065.
- (b) Pipe Stiffness Class shall be SN10.
- (c) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or CR or SBR.

241.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Length, m.	
Specific packaging, transportation and delivery requirements.	

241.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Dimensions e.g. Type B OD Series.	
Stiffness Class ¹ , SN.	
Alternative elastomeric materials for joint seals e.g. NBR.	

241.5 QUALITY ASSURANCE

- (a) Polyethylene pipe and fittings shall have product certification (ISO Type 5) to AS/NZS 5065.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements

NOTE:

- 1 Where not SN10, Stiffness Class shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS – 242 POLYETHYLENE (PLAIN WALL) NON-PRESSURE PIPE AND FITTINGS

242.1 SCOPE

This specification covers polyethylene (PE) plain wall non-pressure pipe and fittings for use in gravity sewerage.

242.2 REQUIREMENTS

- (a) Polyethylene pipe and fittings shall be plain wall SDR 17 OD Series complying with AS/NZS 5065.
- (b) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM or CR or SBR.

242.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Length, m.	
Specific packaging, transportation and delivery requirements.	

242.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Dimensions e.g. Type B OD Series.	
SDR ¹	
Alternative elastomeric materials for joint seals e.g. NBR.	

242.5 QUALITY ASSURANCE

- (a) Polyethylene pipe and fittings shall have product certification (ISO Type 5) to AS/NZS 5065.
- (b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (c) All products shall be marked in accordance with the certification body's requirements

NOTE:

- 1 Where not SDR 17, standard dimension ratio shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION**WSA PS - 260 GATE VALVES, RESILIENT SEATED****260.1 SCOPE**

This specification covers resilient seated gate valves for use in water supply^{1,2} and sewerage applications.

260.2 REQUIREMENTS

- (a) Resilient seated valves shall comply with AS 2638, Part 2.
- (b) The direction of rotation of input shaft shall be clockwise to close the valve.
- (c) Valves shall be supplied with a spindle cap.
- (d) For socket joint configurations, elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (e) Minimum class required by Hunter Water shall be PN 16 for water supply and PN 12 for sewerage.

260.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Pressure Class ³ , PN. (see 260.2 (e))	
End configuration ⁴ (eg. flange/flange, socket/socket).	
Integral by-pass.	
Gearbox depending on the size of the valve and the differential head on the valve.	
Specific packaging, transportation and delivery requirements.	

260.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Opposite direction of closing i.e. anti-clockwise to close the valve.	
Handwheel in lieu of spindle cap.	
Alternative elastomeric materials for joint seals.	

260.5 QUALITY ASSURANCE

- (a) Resilient seated gate valves shall have product certification (ISO Type 5) to AS 2638.2.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681-1.
- (d) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.

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- 2 All gate valves to AS 2638.2 are required to comply with AS/NZS 4020.
- 3 Pressure Class shall be as specified in the Project Specification or on the Design Drawings.
- 4 End configurations and extension spindles shall be as specified in the Project Specification or on the Design Drawings.
- 5 Specification WSA PS – 312 covers flange gaskets.
- 6 Specification WSA PS – 262 covers extension spindles.

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PRODUCT SPECIFICATION

WSA PS – 261 GATE VALVES, METAL SEATED

261.1 SCOPE

This specification covers metal seated gate valves for use in water supply¹ and sewerage applications.

261.2 REQUIREMENTS

- (a) Metal seated gate valves shall comply with AS 2638, Part 1.
- (b) Pressure Class shall be PN 16.
- (c) The direction of closing shall be clockwise.
- (d) Valves shall be supplied with a spindle cap.
- (e) For socket joint configurations, the elastomeric joint seal shall comply with AS 1646 or EN 681-1, EPDM.
- (f) Valves and joint seals for water supply shall comply with AS/NZS 4020.
- (g) Valves that do not comply with AS/NZS 4020 shall be legibly and durably marked with black letters of at least 10 mm high "SEWAGE – DO NOT DRINK".

261.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
End configuration (e.g. flange/flange, socket/socket).	
Gearbox depending on the size of the valve and the differential head on the valve.	
Handwheel in lieu of spindle cap.	
Specific packaging, transportation and delivery requirements.	

261.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative Pressure Class PN 35.	
Opposite direction of closing i.e. anti-clockwise to close the valve.	
Handwheel in lieu of spindle cap.	
Alternative elastomeric materials for joint seals.	

261.5 QUALITY ASSURANCE

- (a) Metal seated valves shall have product certification (ISO Type 5) to AS 2638.1.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646 or EN 681.1.
- (d) All products shall be marked in accordance with the certification body's requirements.

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NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 End configurations and extension spindles shall be as specified in the Project Specification or on the Design Drawings.
- 3 Specification WSA PS – 312 covers flange gaskets.
- 4 Specification WSA PS – 262 covers extension spindles.

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PRODUCT SPECIFICATION

WSA PS – 262 EXTENSION SPINDLES FOR GATE VALVES

262.1 SCOPE

This specification covers extension spindles for use with metal and resilient seated gate valves.

262.2 REQUIREMENTS

- (a) The extension spindle shall comply with AS 2638.1 Test J and AS 2638.2 Test M.
Where the maximum strength test torques specified in AS 2638.1 and AS 2638.2 are not the same for the same nominal size of valve, the higher value shall be used.
- (b) Where extension spindles are fabricated using welding, all welding shall be carried out in accordance with AS 1554 Category GP. Cast iron (including grey and ductile iron) components shall not be welded.
- (c) Where the materials used are not corrosion resistant to soil and groundwater (e.g. plain carbon or low alloy steels) the extension spindle shall be coated using bitumen or synthetic resin based protection systems or thermal bonded polymeric coatings. Bitumen coatings shall comply with AS/NZS 3750.4. Synthetic resin base coatings shall comply with AS 4089. Thermal-bonded polymeric coatings shall comply with AS/NZS 4158.

In aggressive soils and groundwaters, corrosion resistant materials such as grade 316 stainless steel should be specified.

262.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size(s) of valve(s) (DN) on which extension spindles are to be used.	
Length(s) of extension spindle(s).	

262.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

A specific corrosion protection system i.e. bitumen or synthetic resin based protection systems or thermal bonded polymeric coatings.	
Grade 316 stainless steel.	

262.5 QUALITY ASSURANCE

- (a) Extension spindles shall have product certification (ISO Type 1) to AS 2638.
- (b) All products shall be marked in accordance with the certification body's requirements.

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PRODUCT SPECIFICATION

WSA PS – 263 BUTTERFLY VALVES

263.1 SCOPE

This specification covers resilient seated wafer, tapped lugged and flanged butterfly valves for use in pressure (typically water supply¹) applications.

263.2 REQUIREMENTS

- (a) Butterfly valves shall be double flanged complying with AS 4795.
- (b) The direction of closing shall be clockwise.

263.3 OPTIONS TO BE SPECIFIED

Specific packaging, transportation and delivery requirements.	
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263.4 AGENCY APPROVED VARIATIONS TO BE SPECIFIED

Opposite direction of closing i.e. anti-clockwise to close the valve.	
Alternative end configurations e.g. wafer or tapped lugged.	
Alternative protective coatings.	

263.5 QUALITY ASSURANCE

- (a) Butterfly valves shall have product certification (ISO Type 5) to AS 4795.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) High build two-pack epoxy coatings shall have Australian Paint Approval Scheme (APAS) approval to Specifications 2975P or 2977P.
- (d) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 End configurations and extension spindles shall be as specified in the Project Specification or on the Design Drawings.
- 3 Specification WSA PS – 312 covers flange gaskets.
- 4 Specification WSA PS – 262 covers extension spindles.

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PRODUCT SPECIFICATION**WSA PS – 264 NON-RETURN (REFLUX) VALVES****264.1 SCOPE**

This specification covers non-return valves of either the swing check or tilting disc type for use in water supply¹ and sewerage applications.

264.2 REQUIREMENTS

- (a) Valves shall comply with AS 4794.
- (b) Pressure Class shall be PN 16.
- (c) Lifting lugs shall be provided for valves \geq DN 250.
- (d) Non-return valves for water supply shall comply with AS/NZS 4020.
- (e) Valves that do not comply with AS/NZS 4020 shall be legibly and durably marked with black letters of at least 10 mm high "SEWAGE – DO NOT DRINK".

264.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Installation i.e. horizontal or vertical.	
Extended spindle.	
Whether micro-switches, counterweights or indicators are required.	
Provision of counterweight guard.	
Minimum flow rate or velocity.	
Specific packaging, transportation and delivery requirements.	

264.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative Pressure Class PN 35.	
Alternative materials as per Appendix C of AS 4794.	

264.5 QUALITY ASSURANCE

- (a) Non-return valves shall have product certification (ISO Type 5) to AS/NZS 4794.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Non-return valves may also be known as reflux valves or check valves.
- 3 End configurations and extension spindles shall be as specified in the Project Specification or on the Design Drawings.
- 4 Specification WSA PS – 312 covers flange gaskets.
- 5 Specification WSA PS – 262 covers extension spindles.

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PRODUCT SPECIFICATION

WSA PS – 265 AIR VALVES FOR WATER SUPPLY

265.1 SCOPE

This specification covers air valves of the following types for use on water supply¹.

- (a) Small orifice valves with nominal inlet size of DN 15, 20 and 25.
- (b) Large orifice valves with nominal inlet size of DN 50, 80, 100, 150 and 200.
- (c) Combination (double) air valves.

265.2 REQUIREMENTS

- (a) Air valves shall comply with AS 4956.

265.3 PROJECT SPECIFIC REQUIREMENTS

Purchasing options – see Annexure 1	
Specific packaging, transportation and delivery requirements.	

265.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

265.5 QUALITY ASSURANCE

- (a) Air valves shall have product certification (ISO Type 5) to AS 4956.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 See WSA PS-275 for sewage air release and vacuum break valves for installation on sewage pressure mains.

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ANNEXURE 1

Size of valve DN.....

Class of valve PN 16 PN 21 PN 35

Type of port Full port valve
 Reduced port valve

Type of valve Large orifice valve
 Small orifice valve
 Double orifice valve
 Anti-slam valve
 Anti-vacuum valve

Hydraulic data

Maximum inlet pressurekPa

Minimum inlet pressurekPa

Maximum air discharge rate (for large orifice valve and anti-slam valve)L/s

Differential pressure at maximum air discharge rate (for large orifice valve and anti-slam valve)kPa

Maximum air intake rate (for large orifice valve and anti-vacuum valve)L/s

Differential pressure at maximum air intake rate (for large orifice valve and anti-vacuum valve)kPa

Maximum air discharge rate (for small orifice valve)L/s

Differential pressure at maximum air discharge rate (for small orifice valve)kPa

Materials

Body and cover

Float

Resilient seal

Seat

Drain valve

Fasteners

End connection Threaded
 Flanged

Thread type

Flange drilling details

Special requirements

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PRODUCT SPECIFICATION

WSA PS – 266 KNIFE GATE VALVES FOR WATER SUPPLY AND SEWERAGE

266.1 SCOPE

This specification covers PN 10 flanged or wafered or lugged knife gate valves for use in water supply¹ and sewerage applications:

Additionally, valves may be:

- (a) Rising or non-rising stem.
- (b) Uni-directional or bi-directional.

266.2 REQUIREMENTS

- (a) Knife gate valves shall comply with AS 6401.
- (b) Knife gate valves for water supply shall comply with AS/NZS 4020.
- (c) Knife gate valves that do not comply with AS/NZS 4020 shall be legibly and durably marked with black letters of at least 10 mm high "SEWAGE – DO NOT DRINK".

266.3 PROJECT SPECIFIC REQUIREMENTS

Purchasing options – see Annexure 1	
Specific packaging, transportation and delivery requirements.	

266.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative materials as per Appendix D of AS 6401.	
---	--

266.5 QUALITY ASSURANCE

- (a) Knife gate valves shall have product certification (ISO Type 5) to AS 6401.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 End configurations and extension spindles shall be as specified in the Project Specification or in the Design Drawings.
- 3 Specification WSA PS – 312 covers flange gaskets.
- 4 Specification WSA PS – 262 covers extension spindles.

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ANNEXURE 1

Size	DN.....	
Hydraulic Data	Maximum Static pressure	_____
	Maximum pressure differential	_____
	Maximum flow	_____
Valve	Details	_____
Materials	Body material	_____
	Blade material	_____
	Seat	_____
	Other	_____
Application	<input type="checkbox"/> Uni-directional	
	<input type="checkbox"/> Bi-directional	
Actuation	<input type="checkbox"/> Manual – Rising spindle	
	<input type="checkbox"/> Manual – Non-rising spindle	
	<input type="checkbox"/> Pneumatic	
	<input type="checkbox"/> Electric	
Body style	<input type="checkbox"/> Wafer	
	<input type="checkbox"/> Lugged	
	<input type="checkbox"/> Bonneted	
	<input type="checkbox"/> Gland box	
Flange drilling		_____
Manufacturer's model No.		_____
Trim No.		_____
Power Supply	Pneumatic	_____ kPa
	Electric	_____ volts/hz

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PRODUCT SPECIFICATION**WSA PS – 267 HYDRANTS (SPRING) FOR WATER SUPPLY****267.1 SCOPE**

This specification covers PN 16 DN 80 below-ground spring hydrants for connection to water mains¹ using a DN 80 or DN 100 flanged tee (hydrant tee).

267.2 REQUIREMENTS

- (a) Spring hydrants shall comply with AS 3952.
- (b) Flange gaskets shall comply with WSA 109.

267.3 PROJECT SPECIFIC REQUIREMENTS

Flange size (DN 80 or DN 100).	
Specific packaging, transportation and delivery requirements.	

267.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

267.5 QUALITY ASSURANCE

- (a) Spring hydrants shall have product certification (ISO Type 5) to AS 3952.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Specification WSA PS – 312 covers flange gaskets.

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PRODUCT SPECIFICATION**WSA PS – 268 AUTOMATIC CONTROL VALVES****268.1 SCOPE**

This specification covers PN 16, 21 and 35 hydraulically-operated, diaphragm or piston actuated, globe or piston-style, automatic control valves in size range DN 40 to DN 900 for use in water supply¹ applications.

268.2 REQUIREMENTS

- (a) Valves shall comply with AS 4866.

268.3 PROJECT SPECIFIC REQUIREMENTS

Purchasing options – see Annexure 1	
Specific packaging, transportation and delivery requirements.	

268.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative materials as per Appendix D of AS 4866.	
Alternative coatings as per Appendix E of AS 4866.	

268.5 QUALITY ASSURANCE

- (a) Valves shall have product certification (ISO Type 5) to AS 4866.
- (b) If applicable, high-build two-pack epoxy coatings shall have Australian Paint Approval Scheme (APAS) approval to Specifications 2975P or 2977P.
- (c) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Pressure Class shall be as specified in the Project Specification or on the Design Drawings.
- 3 End configurations shall be as specified in the Project Specification or on the Design Drawings.
- 4 Specification WSA PS – 312 covers flange gaskets.

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ANNEXURE 1

Size of valve DN.....

Class of valve PN 16 PN 21 PN 35

Type of valve

- Fixed-outlet pressure reducing valve
- Variable-outlet pressure reducing valve
- Pressure sustaining/relief valve
- Surge anticipating valve
- Altitude valve (specify one-way flow or two-way flow, with or without delayed opening)
- Float valve (specify on-off or modulating)
- Rate-of-flow control valve
- Double solenoid control valve
- Single solenoid control valve
- Multi-function valve (specify functions e.g., altitude/pressure sustaining valve)

Hydraulic control system

- Required (i.e., valve with hydraulic control system fitted)
- Factory preset
- Not required (i.e., bare valve)

Hydraulic data

Maximum inlet pressurekPa

Maximum flowL/s

Inlet pressure at maximum flowkPa

Outlet pressure at maximum flowkPa

Minimum flow (greater than 0)L/s

Inlet pressure at minimum flowkPa

Outlet pressure at minimum flowkPa

Set-point required for each function (e.g., fixed-outlet pressure reducing)

Set-point range required for each function (e.g., variable-outlet pressure reducing)

Materials

Body and cover

Seal disc

Diaphragm supporting disc(s)

Body of pilot valve, solenoid valve, isolating ball valve, needle valve, and strainer

Other

End connection

- Threaded
- Grooved
- Flanged

Thread type

Flange drilling details

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Special requirements

- Manual override valve
- Solenoid override for remote control (specify power supply e.g., 24 V D.C.)
- Two-way pilot for fixed-outlet pressure reducing valve
- Three-way pilot for fixed-outlet pressure reducing valve
- Variable-outlet pressure reducing valve with hydraulic pilot and orifice plate
- Variable-outlet pressure reducing valve with motorised pilot (specify power supply e.g., 24 V D.C.)
- Variable-outlet pressure reducing valve with electro-hydraulically actuated pilot (specify power supply e.g., 24 V D.C.)
- Double solenoids (specify power supply e.g., 24 V D.C.)
- Limit switches (specify power supply e.g., 24 V D.C., and how many required e.g., fully open, fully closed and an intermediate position)
- Position transmitter (specify type eg. analogue 4-20 mA, and power supply e.g., 24 V D.C.)
- Position indicator
- Low flow bypass
- V-port throttling plug
- Anti-cavitation trim
- Double chamber arrangement
- Non-return feature
- Opening speed control valve
- Closing speed control valve
- Dual strainers/filters mounted in parallel
- Cartridge filter
- Self-flushing filter
- Other special requirements

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PRODUCT SPECIFICATION

WSA PS – 269 EXTENSION SPINDLES FOR VALVES, GENERAL

269.1 SCOPE

This specification covers extension spindles for use with valves other than metal and resilient seated gate valves.

269.2 REQUIREMENTS

- (a) The extension spindle shall comply with AS 2638.1 Test J and AS 2638.2 Test M except that the maximum strength test torques specified in the valve product standard shall be used.

NOTE: Where the maximum strength test torques specified in the valve standard are not the same for the same nominal size of valve, the higher value shall be used.

- (b) Where extension spindles are fabricated using welding, all welding shall be carried out in accordance with AS 1554 Category GP. Cast iron (including grey and ductile iron) components shall not be welded.
- (c) Where the materials used are not corrosion resistant to soil and groundwater (e.g. plain carbon or low alloy steels) the extension spindle shall be coated using bitumen or synthetic resin based protection systems or thermal bonded polymeric coatings. Bitumen coatings shall comply with AS/NZS 3750.4. Synthetic resin base coatings shall comply with AS 4089. Thermal-bonded polymeric coatings shall comply with AS/NZS 4158.

NOTE: In aggressive soils and groundwaters, corrosion resistant materials such as grade 316 stainless steel should be specified.

269.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size(s) of valves(s) (DN) on which extension spindles are to be used.	
Length(s) of extension spindle(s), m.	

269.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

A specific corrosion protection system i.e. bitumen or synthetic resin based protection systems or thermal bonded polymeric coatings.	
Grade 316 stainless steel.	

269.5 QUALITY ASSURANCE

- (a) Extension spindles shall have product certification (ISO Type 3) to AS 2638 and the valve standard.
- (b) All products shall be marked in accordance with the certification body's requirements.

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PRODUCT SPECIFICATION**WSA PS – 270 MECHANICAL COUPLINGS, NON END THRUST RESTRAINT****270.1 SCOPE**

This specification covers non end thrust restraint mechanical couplings for use in water supply¹ and sewerage applications.

270.2 REQUIREMENTS

- (a) Couplings for pipelines other than PE shall comply with WSA 105.
- (b) Couplings for PE pipelines shall comply with AS/NZS 4129.
- (c) Flange adaptor connections shall comply with AS 4087.
- (d) Flange gaskets shall comply with WSA 109.
- (e) Jointing lubricant shall comply with AS/NZS 4020.
- (f) Pressure Class shall be PN 16.

270.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Pipe material(s) to be joined.	
Coupling length i.e. short series or long series.	
Coupling type e.g. straight, stepped, flange adaptor.	
For stepped couplings nominate the range of outside diameters to be joined.	
For flange adaptors nominate the flange drilling Figure from AS 4087 or other nominated flange Standard.	
Specific packaging, transportation and delivery requirements.	

270.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative Pressure Class e.g. PN 35.	
Alternative bolt head configurations.	
Coating requirements.	

270.5 QUALITY ASSURANCE

- (a) Couplings shall have product certification (ISO Type 1) to WSA 105.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646.
- (d) Flange gaskets shall have product certification (ISO Type 1) to WSA 109.
- (e) Jointing lubricants shall have product certification (ISO Type 1) to AS/NZS 4020.
- (f) All products shall be marked in accordance with the certification body's requirements.

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NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Specification WSA PS – 312 covers flange gaskets.

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PRODUCT SPECIFICATION**WSA PS – 271 COUPLINGS, END THRUST RESTRAINT****271.1 SCOPE**

This specification covers PN 16 end thrust restraint mechanical couplings for use in water supply¹ and sewerage applications.

271.2 REQUIREMENTS

- (a) Couplings for pipelines shall comply with WSA 125.
- (b) Jointing lubricant shall comply with AS/NZS 4020.

271.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Pipe material(s) to be joined.	
Specific packaging, transportation and delivery requirements.	

271.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Coating requirements.	
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271.5 QUALITY ASSURANCE

- (a) Couplings shall have product certification (ISO Type 1) to WSA 125.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) Jointing lubricants shall have product certification (ISO Type 1) to AS/NZS 4020.
- (d) All products shall be marked in accordance with the certification body's requirements.

NOTE:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.

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PRODUCT SPECIFICATION**WSA PS – 272 FITTINGS, END THRUST RESTRAINT****272.1 SCOPE**

This specification covers ductile iron PN 16 Series 1 and 2 end thrust restraint fittings for use in water supply¹ and sewerage applications.

272.2 REQUIREMENTS

- (a) Fittings shall comply with WSA 126.
- (b) Flanged connections shall comply with AS 4087.
- (c) Flange gaskets shall comply with WSA 109.
- (d) Jointing lubricant shall comply with AS/NZS 4020.

272.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Series i.e. 1 or 2.	
Fitting type e.g. bend, tee.	
Configuration e.g. 90° Soc-Soc, Soc-Soc-Fl.	
For flanges nominate the flange drilling Figure from AS 4087 or other nominated flange Standard.	
Specific packaging, transportation and delivery requirements.	

272.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Coating requirements.	
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272.5 QUALITY ASSURANCE

- (a) Fittings shall have product certification (ISO Type 1) to WSA 126.
- (b) Polymeric coatings shall have product certification (ISO Type 5) to AS/NZS 4158.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646.
- (d) Flange gaskets shall have product certification (ISO Type 1) to WSA 109.
- (e) Jointing lubricants shall have product certification (ISO Type 1) to AS/NZS 4020.
- (f) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Specification WSA PS – 312 covers flange gaskets.

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PRODUCT SPECIFICATION
WSA PS – 273 VACUUM INTERFACE VALVES

273.1 SCOPE

This specification covers DN 80 vacuum interface valves for use in vacuum sewerage applications.

273.2 REQUIREMENTS

(a) Vacuum interface valves shall comply with AS 4310.

273.3 PROJECT SPECIFIC REQUIREMENTS

Cycle counters to be fitted.	
Air admittance valve or breather bell to be supplied.	
Specific packaging, transportation and delivery requirements.	

273.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative materials as per Appendix D of AS 4310.	
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273.5 QUALITY ASSURANCE

- (a) Vacuum interface valves shall have product certification (ISO Type 1) to AS 4310.
- (b) All products shall be marked in accordance with the certification body's requirements.

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PRODUCT SPECIFICATION

WSA PS – 274 RESILIENT SEATED BALL VALVES FOR SEWAGE PRESSURE MAINS

274.1 SCOPE

This specification covers stainless steel bodied DN 40 and DN 50 resilient seated ball valves for air/sewage gas release on sewage pressure mains <DN 300.

274.2 REQUIREMENTS

- (a) Ball valves shall be similar in design to a service connection ball valve (see Figure 1.1 of AS 4796).
- (b) Ball valves shall comply with the following clauses of AS 4796:
 - (i) Clause 1.4(b) Marking
 - (ii) Clause 2.3 Body materials
 - (iii) Clause 3.2.1 End connections
 - (iv) Clause 3.4 Lever handle
 - (v) Clauses 4.1, 4.3, 4.4.1, 4.5, 4.8 Performance requirements
- (c) Materials, apart from bodies [see b(ii)], shall be suitable for contact with sewage and hydrogen sulphide gas.

274.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN.	
Specific packaging, transportation and delivery requirements.	

274.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative materials e.g. plastics bodied.	
Alternative end configurations.	

274.5 QUALITY ASSURANCE

- (a) Ball valves shall be manufactured under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include “Metallic bodied valve manufacture” (or similar).

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PRODUCT SPECIFICATION
WSA PS – 275 AIR VALVES FOR SEWERAGE

275.1 SCOPE

This specification covers metallic bodied PN 10, PN 16 and PN 21 air valves for sewerage in size range DN 50 to DN 200 including the following types:

- (a) Large orifice air valve
- (b) Small orifice air valve
- (c) Double orifice air valve
- (d) Anti-slam air valve

275.2 REQUIREMENTS

- (a) Valves shall comply with AS 4883.

275.3 PROJECT SPECIFIC REQUIREMENTS

Purchasing options – see Annexure 1	
Specific packaging, transportation and delivery requirements.	

275.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative materials as per Appendix D of AS 4883.	
---	--

275.5 QUALITY ASSURANCE

- (a) Valves shall have product certification (ISO Type 5) to AS 4883.
- (b) All products shall be marked in accordance with the certification body's requirements.

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ANNEXURE 1

Size of valve DN.....

Class of valve PN 10 PN 16 PN 21

Type of port Full port valve
 Reduced port valve

Type of valve Large orifice valve
 Small orifice valve
 Double orifice valve
 Anti-slam valve

Hydraulic data
 Maximum inlet pressurekPa
 Minimum inlet pressurekPa
 Maximum air discharge rate (for large orifice valve and anti-slam valve)L/s
 Differential pressure at maximum air discharge rate (for large orifice valve and anti-slam valve)kPa
 Maximum air intake rate (for large orifice valve)L/s
 Differential pressure at maximum air intake rate (for large orifice valve)kPa
 Maximum air discharge rate (for small orifice valve)L/s
 Differential pressure at maximum air discharge rate (for small orifice valve)kPa

Materials
 Body and cover
 Float
 Resilient seal
 Seat
 Drain valve
 Fasteners

End connection Threaded
 Flanged

Thread type

Flange drilling details

Special requirements

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PRODUCT SPECIFICATION**WSA PS – 276 RESILIENT SEATED BALL VALVES FOR PROPERTY SERVICES****274.1 SCOPE**

This specification covers DN 15 to DN 50 resilient seated ball valves for water supply¹.

274.2 REQUIREMENTS

(a) Ball valves shall comply with AS 4796.

274.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Configuration e.g. tapping service connection, terminating service connection or right-angle meter assembly	
Supply of plastics protection cover for buried valves	
Specific packaging, transportation and delivery requirements.	

274.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Body material e.g. metallic-bodied and/or plastics-bodied	
---	--

274.5 QUALITY ASSURANCE

- (a) Ball valves shall have product certification (ISO Type 5)² to AS 4796.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply.
- 2 Includes WaterMark Level 1.

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PRODUCT SPECIFICATION

WSA PS - 290 ACCESS COVERS FOR WATER SUPPLY AND SEWERAGE TO AS 3996

290.1 SCOPE

This specification covers circular and single and multi-part square or rectangular access (surface) covers and frames conforming to AS 3996¹ for use in:

- (a) Water supply networks e.g. covers for valve or scour chambers².
- (b) Sewerage networks e.g. maintenance holes, maintenance shafts, inspection openings.

290.2 REQUIREMENTS

Covers and frames shall conform to AS 3996 with the following variations:

- (i) Delete Clauses 2.7.1 and replace with:

All cast iron solid-top covers and frames other than recessed parts covers for concrete infill shall be coated. The coating shall comply with AS/NZS 3750.4 or BS 3416.

The coating shall be applied to all non-sealing and non-threaded surfaces of the cover and frame. Coating inadvertently applied to sealing and threaded surfaces shall be removed prior to delivery or supply.

After application and drying (curing) the coating shall be dry to touch (not sticky) and not mark clothing or skin during manual handling.

- (ii) For Classes B, D, E and F covers in Table 3.1 of AS 3996 increase the serviceability design and ultimate limit state design loads as shown in amended Table 3.1.

- (iii) Delete Clause 3.3.2 and replace with:

For single part round covers \geq DN 375 the gap between the edge of the cover and the inside edge of the frame shall be 0.3 ± 0.03 mm

For multi-part covers, with each part located snugly against the frame, there shall be no gap greater than 4 mm between either part or between either part and the frame.

- (iv) From Clause 3.3.3, delete "contact" (i.e. the tolerance applies to the top surface of the cover as installed in its frame)

- (v) Delete Clause 4.2.1.1 and replace with:

"When tested in accordance with Appendix C, covers shall satisfy the requirements of Clauses 4.2.1.2 and 4.2.1.3. Test loads for Class B, D, E and F covers shall be as specified in amended Table 3.1. Where a clear opening (CO) is less than 250 mm, test loads shall be as given in amended Table 3.1 but multiplied by CO/250."

- (vi) Delete Table 4.2 and replace with amended Table 4.2.

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AMENDED TABLE 3.1
LOAD CLASSIFICATIONS OF COVERS AND GRATES

Class	Typical use	Nominal wheel loading kg	Serviceability design load kN	Ultimate limit state design load kN
A	Footways and areas accessible only to pedestrians and pedal cyclists. (extra-light duty)	330	6.7	10
B	Areas (including footways and light tractor paths) accessible to vehicles (excluding commercial vehicles) or livestock (light duty)	2 670	53 54	80 82
C	Malls and areas open to slow moving commercial vehicles (medium duty)	5 000	100	150
D	Carriageways of roads and areas open to commercial vehicles (heavy duty)	7 000	140 160	240 240
E	General docks and aircraft pavements and carriageways of major roads open to commercial vehicles travelling at high speed >100 km/h (extra heavy duty)	13 700	267 280	400 420
F	Docks and aircraft pavements subject to high wheel loads (extra heavy duty - F)	20 000	400 410	600 615
G	Docks and aircraft pavements subject to very high wheel loads (extra heavy duty - G)	30 000	600	900

NOTES:

- 1 Nominal wheel loads are a guide only. Consideration should be given to the type, size and pneumatic pressure of the load applied.
- 2 Class B design loads exceed AS 5100.2 requirements for footway loading.
- 3 Class D design loads exceed AS 5100.2 requirements for a W80 wheel load.
- 4 Class C units are based on an intermediate load.
- 5 The serviceability load is set at 2/3 of the ultimate limit state design load.
- 6 A force of 1 kN approximately equals a weight of 100 kg.

AMENDED TABLE 4.2
SERVICEABILITY LOAD PERMANENT SET AND DEFLECTION LIMITS

Class	Conditions	Maximum permanent set mm	Maximum deflection mm
A and B	All sizes	CO/250	CO/100
C to G	CO ≤500 mm	1 mm	CO/150
	CO >500 mm	CO/500	

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290.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, mm e.g. 600 mm diameter, 900 x 1200 mm etc	
The style of the cover e.g. round, solid top, infill etc and its sealability e.g. sealed, unsealed, ventilated	
Minimum clear opening, mm	
Class e.g. B, D, E, F	
Rocking of units in their frames restricted (Refer to Clause 3.2.1.4 of AS 3996)	
Lifting requirements	
Additional marking requirements e.g. CP test point	
Specific requirements for a hinged connection	
Specific packaging, transportation and delivery requirements	

290.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Specific marking requirements	
Alternative coating requirements	
Bolt-down requirements, including bolting material and class	
Alternative materials	

290.5 QUALITY ASSURANCE

- (a) Access covers and frames shall have ISO Type 5 product certification to AS 3996, as amended by this specification.
- (b) All products shall be marked in accordance with the certification body's requirements.

All products shall be tagged to indicate that they comply with the requirements of this specification.

NOTES:

- 1 Product Specification WSA PS-291 specifies access covers and frames (manhole tops) conforming to EN 124.

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PRODUCT SPECIFICATION

WSA PS - 310 TAPPING BANDS – MECHANICAL, FOR WATER SUPPLY

310.1 SCOPE

This specification covers mechanical tapping bands for connecting property services to water reticulation mains¹, except for PE mains.

310.2 REQUIREMENTS

- (a) Tapping bands shall comply with WSA 107.
- (b) Pressure Class shall be PN 16.

310.3 PROJECT SPECIFIC REQUIREMENTS

Nominal pipe size (DN) and off-take size (DN)	
With or without electrical insulation ²	
Series RP or Series RC internal outlet thread ³	

310.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative Pressure Class, PN	
--------------------------------	--

310.5 QUALITY ASSURANCE

- (a) Tapping bands shall have product certification (ISO Type 1) to WSA 107.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Electrical insulation should be specified for tapping bands used on metallic pipes.
- 3 Where a tapered RC external threaded fitting is to be screwed into a plastic bodied tapping band, a tapered RC internal outlet thread is recommended.
- 4 Specification WSA PS – 327 covers tapping bands for PE pipe.

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PRODUCT SPECIFICATION

WSA PS - 311 MECHANICAL COUPLINGS, UNRESTRAINED

311.1 SCOPE

This specification covers unrestrained mechanical couplings for jointing spigot ends of pipes, fittings and valves in water supply¹ and pressure sewerage applications.

311.2 REQUIREMENTS

- (a) Unrestrained mechanical couplings shall comply with WSA 105.
- (b) Pressure Class shall be PN 16.
- (c) Mechanical couplings and jointing seals for water supply shall comply with AS/NZS 4020.
- (d) Mechanical couplings that do not comply with AS/NZS 4020 shall be legibly and durably marked with black letters of at least 10 mm high "SEWAGE – DO NOT DRINK".

311.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size range (DN) of pipes to be coupled	
Coupling length i.e. short or long series	

311.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Pressure Class i.e. PN 35	
Alternative corrosion protection systems e.g. coatings	

311.5 QUALITY ASSURANCE

- (a) Unrestrained mechanical couplings shall have product certification (ISO Type 1) to WSA 105.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Unrestrained mechanical couplings are often referred to as Gibault joints. Modern versions of these fittings allow the same coupling to be used over a range of similar pipe diameters.

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PRODUCT SPECIFICATION

WSA PS - 312 FLANGE GASKETS AND O-RINGS

312.1 SCOPE

This specification covers flange gaskets and O-rings for use in water supply¹ and sewerage applications.

312.2 REQUIREMENTS

- (a) Flange gaskets and O-rings shall comply with WSA 109.
- (b) Pressure Class shall be PN 16.

312.3 PROJECT SPECIFIC REQUIREMENTS

O ring or gasket	
Type (Refer to Table 4.3 of WSA 109)	
Nominal size	
Material	
Pressure Class i.e. PN 16, PN 35	
Hardness classification for elastomers	
Purchasing requirements as per Appendix B of WSA 109	

312.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative Pressure Class	
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312.5 QUALITY ASSURANCE

- (a) Flange Gaskets and O-Rings shall have product certification (ISO Type 1) to WSA 109.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTE:

- 1 Includes drinking water and recycled water supply.

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PRODUCT SPECIFICATION

WSA PS - 313 CLAMPS, OFF-TAKE FOR UNDER-PRESSURE CONNECTIONS

313.1 SCOPE

This specification covers PN 16 off-take clamps for water supply¹ and sewerage in applications such as under-pressure cut-in connection of pressure pipelines and appurtenances e.g. a reticulation water main¹ to a transfer or distribution main, a fire service to a reticulation water main, one pressure sewer to another, an air valve to a distribution main.

313.2 REQUIREMENTS

- (a) Off-take clamps for under-pressure connections shall comply with AS 4181.
- (b) Off-take clamps for water supply¹ shall comply with AS/NZS 4020.
- (c) Off-take clamps that do not comply with AS/NZS 4020 shall be legibly and durably marked with black letters of at least 10 mm high "SEWAGE – DO NOT DRINK".

313.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, DN	
Flange fastener type	
Fastener insulation requirements	
Anti-tuberculation inserts	

313.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Pressure Class e.g. Class 35	
Flanges	

313.5 QUALITY ASSURANCE

- (a) Off-take clamps for under-pressure connections shall have product certification (ISO Type 5) to AS 4181.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTE:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.

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PRODUCT SPECIFICATION

WSA PS - 315 FIXED LADDERS

315.1 SCOPE

This specification covers ladders for installation in service reservoirs, tanks, MHs and below ground chambers and pits used in water supply and sewerage applications. It may be used for purchase of products, referencing in a project specification, inclusion on design drawings and for appraisal of products.

315.2 REQUIREMENTS

- (a) Fibre reinforced plastic ladders including ladder mounting brackets and fasteners shall comply with EN 14396¹.
- (b) Ladders for water supply² shall comply with AS/NZS 4020.
- (c) Ladders that do not comply with AS/NZS 4020 shall be legibly and durably marked with black letters of at least 10 mm high "DO NOT USE FOR WATER SUPPLY".
- (d) Spacing between inside faces of stiles shall be 350±25 mm.
- (e) Ladders shall be bright yellow.
- (f) Ladder mounting and fastening components shall be stainless steel, Grade 316.

315.3 PROJECT SPECIFIC REQUIREMENTS

Type of fixed ladder ³	
Ladder material ⁴	
Top of ladder – distance from stile end to top of first rung, mm	
Bottom of ladder – distance from stile end to bottom of last rung, mm	
Reflectors at the rung/stile interface and colour (if manufacturer's option)	
Ladder mounting bracket dimension—offset from the MH wall to the inside edge of the rung as measured at the end of the rung (150 minimum), mm	
Spacing of ladder mounting brackets (3000 minimum), mm	

315.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Colour of ladder (other than bright yellow)	
Material for ladder mounting and fastening components (if other than stainless steel, Grade 316)	

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315.5 QUALITY ASSURANCE

- (a) Fibre reinforced plastic ladders shall have product certification (ISO Type 1) to EN 14396
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 EN 14396 Fixed ladders for manholes.
- 2 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 3 EN 14396 specifies five Types of fixed ladders:

Type	Designation
A	Fixed ladder with movable top extensions
B	Fixed ladder with two stringers and fall arrester
C	Fixed ladder with one stringer and fall arrester
D	Fixed ladder with two stringers
E	Fixed ladder with one stringer

- 4 EN 14396 permits:
 - (a) Hot dipped galvanised steel.
 - (b) Glass reinforced plastics.
 - (c) Austenitic stainless steel.
 - (d) Aluminium alloys.
- 5 Some Water Agencies do not permit the use of ladders in MHs, chambers and pits.

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PRODUCT SPECIFICATION

WSA PS - 318 MARKING TAPE, DETECTABLE

318.1 SCOPE

This specification covers detectable marking tape for use in water supply and sewerage applications.

318.2 REQUIREMENTS

- (a) Detectable marking tape shall comply with AS 2648.1.
- (b) Tape width shall be 100 mm minimum.
- (c) Tracer wire shall be stainless steel grade 316 or copper alloy designation 122.
- (d) Tracer wire shall allow at least 25% elongation of the plastic tape before breakage of the wire.
- (e) Height of message letters shall be 40 mm minimum.

318.3 PROJECT SPECIFIC REQUIREMENTS

Tape colour (see AS 2648.1)	
Tape message (see Notes)	

318.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Other tracer wire metal of equivalent corrosion resistance in a buried environment	
Tape colour not in accordance with AS 2648.1 e.g. blue for drinking water to match pipe and/or sleeving colour	

318.5 QUALITY ASSURANCE

- (a) Detectable marking tape shall have product certification (ISO Type 1) to AS 2648.1.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 The purpose of the tape is to warn excavators of the presence of a service line buried further below in the ground. In addition, "detectable" tape contains a metal wire or strip which enables the route of a non-metallic pipeline to be established by means of detecting equipment, operated from the surface above the pipe.
- 2 Tape message shall be "CAUTION BURIED BELOW" where is either SEWER, WATER MAIN or RECYCLED WATER MAIN.

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PRODUCT SPECIFICATION

WSA PS - 319 MARKING TAPE, NON-DETECTABLE

319.1 SCOPE

This specification covers non-detectable marking tape for use in water supply and sewerage applications. It may be used for purchase of products, referencing in a project specification, inclusion on design drawings and for appraisal of products.

319.2 REQUIREMENTS

- (a) Non-detectable marking tape shall comply with AS 2648.1.
- (b) Tape width shall be 100 mm minimum.
- (c) Height of message letters shall be 40 mm minimum.

319.3 PROJECT SPECIFIC REQUIREMENTS

Tape colour (see AS 2648.1)	
Tape message (see Notes)	

319.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Tape colour not in accordance with AS 2648.1 e.g. blue for drinking water to match pipe and/or sleeving colour	
--	--

319.5 QUALITY ASSURANCE

- (a) Non-detectable marking tape shall have product certification (ISO Type 1) to AS 2648.1.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 The purpose of the tape is to warn excavators of the presence of a service line buried further below in the ground. "Non-detectable" tape does not contain a metal wire or strip and hence is not detectable by means of above-ground detectors.
- 2 Tape message shall be "CAUTION BURIED BELOW" where is either SEWER, WATER MAIN or RECYCLED WATER MAIN.

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PRODUCT SPECIFICATION

WSA PS - 320 SLEEVING, POLYETHYLENE FOR DUCTILE IRON PIPE AND FITTINGS

320.1 SCOPE

This specification covers polyethylene sleeving for corrosion protection of ductile iron pipe and fittings used in water supply¹ and sewerage applications.

320.2 PROJECT SPECIFIC REQUIREMENTS

- (a) Polyethylene sleeving shall comply with AS 3680.
- (b) Sleeving for pipe and fittings conveying drinking water shall be blue².
- (c) Sleeving for pipe and fittings conveying recycled water shall be purple³.
- (d) Sleeving for pipe and fittings conveying sewage shall be cream⁴.
- (e) Sleeving shall be supplied in rolls with protective end flanges and perforated at intervals of 6.1 metres.
- (f) Sleeving shall be printed with one of the following messages in letters at least 40 mm high corresponding to the sleeving colour and repeated at intervals such that the length of any unmarked pipe shall not exceed 1 m:
 - (i) "DRINKING WATER".
 - (ii) "RECYCLED WATER – DO NOT DRINK".
 - (iii) "SEWAGE – DO NOT DRINK".

320.3 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

320.4 QUALITY ASSURANCE

- (a) Polyethylene sleeving shall have product certification (ISO Type 1) to AS 3680.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply.
- 2 Blue shall be defined in accordance with RAL⁵ DESIGN colour numbers as being no darker than 240 60 40 and no lighter than 240 70 25.
- 3 Purple shall be defined in accordance with RAL⁵ DESIGN colour numbers as being no darker than 330 40 40 or 310 50 30 and no lighter than 310 70 15.
- 4 Cream shall be defined in accordance with RAL⁵ DESIGN colour numbers as being no darker than 075 80 20 and no lighter than 080 90 20.
- 5 RAL Deutsches Institut für Gütesicherung und Kennzeichnung e.V. (RAL German Institute for Quality Assurance and Certification)
Siegburger Straße 39
D-53757 Sankt Augustin
<http://www.ral.de/farben/en/farbvorlagen/index.html?content1.shtml>

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PRODUCT SPECIFICATION

WSA PS - 321 MAINTENANCE SHAFTS – PVC-U

321.1 SCOPE

This specification covers maintenance shafts manufactured from unplasticised polyvinylchloride.

321.2 REQUIREMENTS

(a) Maintenance shafts (PVC-U) shall comply with AS/NZS 4999.

321.3 PROJECT SPECIFIC REQUIREMENTS

Nominal sizes, DN, of inlet(s) and outlet	
Intended maximum installation depth to invert, m	
Configuration e.g. in-line, bend (0 and 45°), junction and terminal	
Inlet / outlet socket type i.e. solvent cement joint or elastomeric seal joint	
Locking type cap / plug or flow relief cap / plug	
Specific packaging, transportation and delivery requirements	

321.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

End connections e.g. adaptors to connect to VC pipes	
--	--

321.5 QUALITY ASSURANCE

- (a) Maintenance shafts (PVC-U) shall have product certification (ISO Type 5) to AS/NZS 4999.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Configurations shall be as specified in the Project Specification or on the Design Drawings.
- 2 Product Specification WSA PS - 236 covers variable bends for use with maintenance shafts.

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PRODUCT SPECIFICATION

WSA PS - 322 MAINTENANCE SHAFTS - PE

322.1 SCOPE

This specification covers maintenance shafts manufactured from polyethylene.

322.2 REQUIREMENTS

(a) PE maintenance shafts shall comply with AS/NZS 4798 (Int).

322.3 PROJECT SPECIFIC REQUIREMENTS

Nominal sizes, DN, of inlet(s) and outlet	
Maximum installation depth to invert, m	
Configuration ¹ e.g. in-line, bend (0 and 45°), junction and terminal	
Inlet / outlet connections e.g. solvent cement joint socket for PVC-U pipe or elastomeric seal joint socket for PVC-U or VC or PE spigot for electrofusion welding to PE	
Locking type cap / plug or flow relief cap / plug	
Specific packaging, transportation and delivery requirements	

322.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

322.5 QUALITY ASSURANCE

- (a) PE maintenance shafts shall have product certification (ISO Type 5) to AS/NZS 4798 (Int).
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Configurations shall be as specified in the Project Specification or on the Design Drawings.
- 2 Product Specification WSA PS - 236 covers variable bends for use with maintenance shafts.

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PRODUCT SPECIFICATION

WSA PS - 323 MAINTENANCE HOLES - PRECAST CONCRETE

323.1 SCOPE

This specification covers precast concrete maintenance holes¹ for use in sewers of size \leq DN 300.

323.2 REQUIREMENTS

- (a) Precast concrete maintenance holes shall comply with AS 4198.
- (b) Cement shall be type SR.
- (c) The cement content shall not be less than 450 kg per cubic metre of concrete.
- (d) Characteristic strength of the concrete shall be 50 MPa.
- (e) Aggregate durability shall be in accordance with AS 2758.1, Clause 9 and exposure condition C.
- (f) Minimum cover over reinforcement shall be 40 mm internally and 25 mm externally, except at joint ends where cover shall be not less than 20 mm.
- (g) Each component shall have two lifting inserts, each having safe-lift rating of at least 1 tonne. The lifting elements shall be corrosion resistant and not affect the corrosion resistance of the reinforcement. The lifting elements shall be fitted such that the pre-cast component will hang horizontally (mating surfaces) when lifted.
- (h) Elastomeric joint seals shall comply with AS 1646 or EN 681-1, EPDM.
- (i) Preformed flexible joint sealants shall comply with ASTM C990M, butyl rubber sealant.

323.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size, mm	
Configurations ²	
Step irons, spacing and anchoring or ladder requirements ³	
Type of jointing i.e. elastomeric joint seal or butyl rubber sealant	
Special aggregates e.g. calcareous ⁴ and additional sacrificial cover over reinforcement	
Special treatments, coatings or linings	
Precast base details	
Maintenance hole configuration at top, e.g. straight back taper, converter slab	

323.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

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323.5 QUALITY ASSURANCE

- (a) Maintenance holes shall have product certification (ISO Type 5) to AS 4198.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Also known as Access Chambers.
- 2 Configurations shall be as specified in the Project Specification or on the Design Drawings.
- 3 See Product Specifications, WSA PS – 314 and 315.
- 4 Calcareous aggregate defined as having an acid solubility greater than 98% when tested in accordance with AWWA B100. Calcareous aggregates are not available in all locations.

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PRODUCT SPECIFICATION

WSA PS - 324 SLIPPERS, PLASTIC

324.1 SCOPE

This specification covers plastic slippers used to provide protection to carrier pipes when installed in an encasement pipe.

324.2 REQUIREMENTS

- (a) Plastic segments to be manufactured from PE 80 polyethylene.
- (b) Segment fasteners to be stainless steel, Grade 304.

324.3 PROJECT SPECIFIC REQUIREMENTS

Outside diameter of the carrier pipe barrel (including the pipeline coating if applicable), mm	
Maximum diameter of any pipe sockets (including the pipeline coating if applicable) on the carrier pipe, mm	
Inside diameter of the encasement pipe, mm	
Number of assemblies	

324.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative types of plastics for slippers e.g. PP	
Alternative grades of stainless steel for segment fasteners e.g. Grade 316	

324.5 QUALITY ASSURANCE

Not applicable.

NOTES:

- 1 Plastic slippers (often referred to as thinsulators) consist of a number of segments of plastic material with raised runners that are fastened together around the circumference of the carrier pipe. The slipper assemblies keep the carrier pipe separated from the encasement pipe.
- 2 Slipper assemblies should not be spaced more than 2.5 m to 3.5 m apart, with additional assemblies being provided at each end of the pipe (Refer Standard Drawing Nos. WAT-1214 and SEW-1403).

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PRODUCT SPECIFICATION

WSA PS - 327 TAPPING BANDS, MECHANICAL, PE MAINS, WATER SUPPLY

327.1 SCOPE

This specification covers mechanical tapping bands for use in connecting property services to PE water reticulation mains¹.

327.2 REQUIREMENTS

(a) Tapping bands shall comply with AS/NZS 4129.

327.3 PROJECT SPECIFIC REQUIREMENTS

Nominal pipe size, DN, and off-take size, mm	
With or without electrical insulation	
Series RP or Series RC internal outlet thread ²	

327.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative Pressure Class ³	
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327.5 QUALITY ASSURANCE

- (a) Tapping bands shall have product certification (ISO Type 5) to AS/NZS 4129.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Where a tapered RC external threaded fitting is to be screwed into a plastic bodied tapping band, a tapered RC internal outlet thread is recommended.
- 3 PN 16 is standard.

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PRODUCT SPECIFICATION

WSA PS - 329 TAPPING BANDS, ELECTROFUSION, PE MAINS, WATER SUPPLY

329.1 SCOPE

This specification covers electrofusion tapping bands for connecting property services to PE water reticulation mains¹.

329.2 REQUIREMENTS

(a) Tapping bands shall comply with AS/NZS 4129.

329.3 PROJECT SPECIFIC REQUIREMENTS

Nominal pipe size, DN, and off-take size, mm	
With or without electrical insulation	
Series RP or Series RC internal outlet thread ²	

329.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative Pressure Class ³	
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329.5 QUALITY ASSURANCE

- (a) Tapping bands shall have product certification (ISO Type 5) to AS/NZS 4129.
- (b) All products shall be marked in accordance with the certification body's requirements.

NOTES:

- 1 Includes drinking water and recycled water supply. Colour differentiation is not required.
- 2 Where a tapered RC external threaded fitting is to be screwed into a plastic bodied tapping band, a tapered RC internal outlet thread is recommended.
- 1 PN 16 is standard.

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PRODUCT SPECIFICATION

WSA PS - 350 COMPACTION SAND FOR PIPE EMBEDMENT

350.1 SCOPE

This specification nominates requirements for naturally occurring compaction sand used for pipe embedment.

This specification does not cover recycled, reuse or waste products.

350.2 REQUIREMENTS

Compaction sand shall:

- (a) Consist of hard durable inert grains of washed river, marine or dune sand or hard rock sand or a blend of these naturally occurring sand types.
- (b) Compaction sand grading shall comply with Table 350.1
- (c) The resistivity shall be greater than 1500 Ohm.cm² when tested in accordance with AS 1289.4.4.1.
- (d) The pH shall be in the range 5 - 9 when determined in accordance with AS 1289.4.3.1.
- (e) The sand shall be free from noxious weeds as proclaimed by the relevant regulators.
- (f) The sand shall be free from dangerous chemicals as proclaimed by the relevant regulators.

TABLE 350.1
COMPACTION SAND GRADING

Sieve Size mm	Mass of sample passing, percent	
	Grade A	Grade B ¹
6.7	100	
4.75	95-100	100
2.36	85-95	100-90
1.18	65-80	85-100
0.6	50-70	70-100
0.3	30-50	50-100
0.15	5-12	0-40
0.075	3-8	0-5

NOTE

¹ Table taken from Table G3 of AS/NZS 2566.2:2002.

350.3 PROJECT SPECIFIC REQUIREMENTS

Grade i.e. A or B	
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350.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

350.5 QUALITY ASSURANCE

Sand shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Quarrying, processing, cleaning and grading of sands" (or similar).

NOTES:

- 1 The grading requirements of this sand may not be readily available in all locations.
- 2 Soil resistivity requirements are incorporated to provide optimum corrosion protection of ductile cast iron pipe and fittings when used in conjunction with loose polyethylene sleeving.

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PRODUCT SPECIFICATION

WSA PS - 351 PROCESSED AGGREGATES FOR PIPE EMBEDMENT

(Replaces Section 2.4 of WITS Specification 95-007.1
for single size crushed rock 10 and 20 mm)

351.1 SCOPE

This specification nominates requirements for graded and single size coarse processed naturally occurring aggregates used for pipe embedment.

This specification does not cover recycled, reuse or waste products.

351.2 REQUIREMENTS

- (a) Aggregates shall have grading conforming to Table 351.1.
- (b) Aggregates shall be free from noxious weeds as proclaimed by the relevant regulators.
- (c) Aggregates shall be free from dangerous chemicals as proclaimed by the relevant regulators.
- (d) Wet strength shall be not less than 80 kN when determined in accordance with AS 1141.22.
- (e) Wet strength/dry strength variation shall not exceed 35% when determined in accordance with AS 1141.22.
- (f) Weak particles shall not exceed 0.5% when determined in accordance with AS 1141.32.

351.3 PROJECT SPECIFIC REQUIREMENTS

Aggregate type i.e. graded or single size.	
Nominal size of aggregate, mm.	

351.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

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TABLE 351.1*
PROCESSED AGGREGATES - ACCEPTABLE FOR EMBEDMENT MATERIALS

Sieve size mm	Mass of sample passing, percent						
	Nominal size of graded aggregate** mm		Nominal size of single-size aggregates mm				
	20	14	20	14	10	7	5
75.0	–	–	–	–	–	–	–
53.0	–	–	–	–	–	–	–
37.5	–	–	–	–	–	–	–
26.5	100	–	100	–	–	–	–
19.0	85– 100	100	85–100	100	–	–	–
13.2	–	85– 100	–	85–100	100	–	–
9.50	25 – 55	–	0 – 20	–	85– 100	100	–
6.70	–	25 – 55	–	0 – 20	–	85 –100	100
4.75	0 – 10	–	0 – 5	–	0 – 20	–	85–100
2.36	0 – 5	0 – 10	–	0 – 5	0 – 5	0 – 20	0 – 40
0.075***	0 – 2	0 – 2	0 – 2	0 – 2	0 – 2	0 – 2	0 – 2

* Table taken from Table G2 of AS/NZS 2566.2:2002.

** Single-size aggregate should always be specified where strict control of grading is considered essential. Graded aggregates are considered more susceptible to segregation in transport and handling.

*** See Clause 8.2 of AS 2758.1. In addition, where coarse aggregates contain more than about 1% of material passing the 0.075 mm sieve, particular care should be taken to remix or wash this material to minimize the effect of segregation.

351.5 QUALITY ASSURANCE

Aggregates shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include “Quarrying, processing, cleaning and grading of aggregates” (or similar).

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PRODUCT SPECIFICATION

WSA PS - 352 CONTROLLED LOW STRENGTH MATERIALS (CLSM) FOR PIPE EMBEDMENT

352.1 SCOPE

This specification nominates requirements for Controlled Low Strength Materials (CLSM) used for pipe embedment.

This specification does not cover recycled, reuse or waste products for use as embedment material for cement stabilisation.

352.2 REQUIREMENTS

- (a) Embedment material shall be naturally occurring materials having gradings conforming to Table 352.1.

TABLE 352.1¹

EMBEDMENT MATERIAL - ACCEPTABLE FOR CEMENT STABILISATION

Sieve size mm	Mass of sample passing, percent	
	20 mm	10 mm
26.5	100	—
19.0	85-100	—
13.2	—	100
9.5	58-80	90-100
6.7	55-72	—
4.75	44-65	60-80
2.36	32-54	40-65
1.18	24-45	30-50
0.60	18-36	20-38
0.30	15-30	15-30
0.15	8-24	5-24
0.075	5-20	2-20
Liquid limit	35	25
Plasticity index	15	6

NOTES:

- 1 Table taken from Table G4 of AS/NZS 2566.2:2002.
- 2 These gravel/sand gradings meet the requirements of Table K1 of AS/NZS 2566.2:2002 for cement stabilised embedment material.
- 3 Tolerances on aggregates generally $\pm 10\%$ for sieve sizes above 2.36 mm – see AS 2758.1 for details.

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(b) CLSM mix proportions shall conform to Table 352.2.

TABLE 352.2¹
CLSM MIX PROPORTIONS

Material	% by mass	Standard
GP cement	2-6	AS 3972
Fly ash	0-20	AS 3582.1
Granular material	60-80	Table 352.1

NOTES:

- 1 Table taken from Table K1 of AS/NZS 2566.2:2002.
- 2 Slump shall be in the range 150 – 200.
- 3 Trial mixes should be prepared to confirm the strength characteristics and setting times of the selected mix, and to confirm mix suitability for the installation. It is important that the surrounding trench walls or embankment have a density and stiffness not less than that of the CLSM fill.
- 4 Mix strengths at the lower end of the range can usually be excavated with a backhoe.
- 5 Alternative mixes to this specification may be preferred to suit a specific situation. Refer to AS 2566.2, Appendix L for guidance.
- 6 The mix proportions detailed above should achieve a 28 day compressive strength of 0.6 to 3 MPa.
- 7 CLSMs are normally transported to site in ready-mixed form, with care being taken to minimise segregation during transportation.

352.3 PROJECT SPECIFIC REQUIREMENTS

Embedment material size for stabilisation i.e. 10 or 20 mm	
28 day compressive strength required, MPa	

352.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

352.5 QUALITY ASSURANCE

Aggregates shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include “Quarrying, processing, cleaning and grading of aggregates” (or similar).

NOTE:

- 1 The grading requirements of these aggregates may not be readily available in all locations.

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PRODUCT SPECIFICATION

WSA PS - 353 ROCK, FINE CRUSHED FOR ROADBASE

353.1 SCOPE

This specification nominates requirements for fine crushed rock used as an unbound and modified base and sub-base material ("roadbase") for the reinstatement of pipe trench road pavements.

This specification does not cover recycled, reuse or waste products.

353.2 REQUIREMENTS

- (a) Fine crushed rock or "roadbase" shall comply with relevant state or territory Road Owner's specifications.

353.3 PROJECT SPECIFIC REQUIREMENTS

The purchaser shall specify requirements as nominated by the Road Owner.

353.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

353.5 QUALITY ASSURANCE

Roadbases shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Quarrying, processing, cleaning and grading of aggregates" (or similar).

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PRODUCT SPECIFICATION

WSA PS - 354 ROCK, COARSE CRUSHED FOR ROADBASE

354.1 SCOPE

This specification nominates requirements for coarse crushed rock used for roadbase in the reinstatement of pipe trench road surfaces.

This specification does not cover recycled, reuse or waste products.

354.2 REQUIREMENTS

- (a) Coarse crushed rock or “roadbase” shall comply with relevant state or territory Road Owner’s specifications¹.

354.3 PROJECT SPECIFIC REQUIREMENTS

The purchaser shall specify requirements as nominated by the Road Owner.

354.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

354.5 QUALITY ASSURANCE

Roadbases shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include “Quarrying, processing, cleaning and grading of aggregates” (or similar).

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PRODUCT SPECIFICATION

WSA PS - 355 GEOTEXTILE FILTER FABRIC

355.1 SCOPE

This specification covers geotextile filter fabric used for the encapsulation of pipe embedment and foundations or separation of embedment from backfill in water supply and sewerage systems so as to control soil particle migration into and within the embedment zone.

355.2 REQUIREMENTS

- Geotextile shall be a non woven fabric made from filaments of synthetic fibres which meets the requirements of Table 355.1.
- Geotextile shall be unaffected by bacteria and fungi and be suitable for burial.
- Marking on outside wrapping of geotextile rolls and on inside core of rolls shall be in accordance with AS 3705.

TABLE 355.1
SPECIFICATION FOR GEOTEXTILE FILTER FABRIC

Properties	Test Method	Units	Values 1	Values 2
Mean values of mechanical properties				
mass per unit area	AS 3706.1	g/m ²	≥ 140	≥ 240
Trapezoidal tear strength	AS 3706.3	N	≥ 300	≥ 400
"G" Rating	*	G*	≥ 1500	≥ 2000
Grab tensile strength	AS 2001.2.3	N	≥ 700	≥ 800
Mean Hydraulic Properties				
Pore size – dry sieving O ₉₅	AS 3706.7	µm	≤ 170	≤ 160
Permittivity	AS 3706.9	s ⁻¹ (reciprocal seconds)	≥ 2.7	≥ 2.35
Flow rate under 100 mm head	AS 3706.9	L/m ² .s	≥ 270	≥ 235

* G rating (Geotextile robustness rating) = $\sqrt{(Lh_{50})}$
where

L = Plunger failure load (N) as determined by AS 3706.4

h_{50} = Normalised drop height (mm) as determined by AS 3706.5

355.3 OPTIONS TO BE SPECIFIED

Values 1 or Values 2 ¹	
Width of the geotextile, e.g. 2, 3, 4, 6 m (encapsulation should be achieved with a single width)	
Material preference, if required e.g. polyester, polypropylene, etc	

355.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

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355.5 QUALITY ASSURANCE

Geotextile filter fabric shall be manufactured and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Manufacture of geotextile filter fabric" (or similar).

NOTE:

- 1 Values 2 are required where settlement of closely adjacent structures or pavements would be a concern.

PRODUCT SPECIFICATION

WSA PS - 356 PILES

356.1 SCOPE

This default specification covers piles used to provide support in water supply and sewerage systems in non-supportive ground.

356.2 REQUIREMENTS

- (a) Piles shall comply with AS 2159.
- (b) Be either treated hardwood conforming to AS 1604 (H5) or concrete.

356.3 PROJECT SPECIFIC REQUIREMENTS

Dimensions ¹	
Material i.e. treated hardwood or concrete	
If appropriate, concrete specification ¹ and grade	

356.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Alternative materials for piles e.g. steel, composite steel concrete	
--	--

356.5 QUALITY ASSURANCE

Piles shall be manufactured and supplied under cover of a certified ISO 9001 management system.

NOTES:

- 1 Dimensions and concrete requirements shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION

WSA PS - 357 CONCRETE, PRE-MIXED, NORMAL CLASS

357.1 SCOPE

This purchase specification covers Normal Class pre-mixed concrete³.

357.2 REQUIREMENTS

- (a) Normal Class concrete shall comply with AS 1379.
- (b) Nominated slump shall be not less than 80 mm.

357.3 PROJECT SPECIFIC REQUIREMENTS

Strength Class ¹	
Slump ²	

357.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

357.5 QUALITY ASSURANCE

Concrete shall be manufactured and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Manufacture and supply of pre-mixed concrete to AS 1379" (or similar).

NOTES:

- 1 The Strength Class shall be as specified in the Project Specification or on the Design Drawings.
- 2 Slump shall be as specified in the Project Specification or on the Design Drawings. Slump shall be appropriate to the project and method of concrete placement. If slump is not nominated in the project specification, the supplier's and/or other specialist advice shall be obtained.
- 3 This concrete is for use in such applications as anchor blocks and concrete encasement of pipe in water supply and sewerage systems (in non-aggressive environments).

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PRODUCT SPECIFICATION

WSA PS - 358 CONCRETE, PRE-MIXED, SPECIAL CLASS

358.1 SCOPE

This specification covers Special Class pre-mixed concrete for use in such applications as cast in-situ (sewerage) maintenance holes and for concrete placed in an aggressive environment. This class of concrete may not be appropriate for water retaining structures. Seek Water Agency advice for such structures.

358.2 REQUIREMENTS

(a) Special Class concrete shall conform to WSA 114.

358.3 PROJECT SPECIFIC REQUIREMENTS

Strength Class ¹	
Slump ²	
Calcareous aggregates ^{3, 4}	

358.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

358.5 QUALITY ASSURANCE

Concrete shall be manufactured and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Manufacture and supply of pre-mixed concrete to AS 1379" (or similar).

NOTES:

- 1 The Strength Class of concrete ordered shall be as specified in the Project Specification or on the Design Drawings.
- 2 Slump shall be as specified in the Project Specification or on the Design Drawings. Slump shall be appropriate to the project and method of concrete placement. If slump is not nominated in the project specification, the supplier's and/or other specialist advice shall be obtained.
- 3 Calcareous aggregate is defined as having an acid solubility greater than 98% when tested in accordance with AWWA B 100.
- 4 Calcareous aggregates are not available in all locations.

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PRODUCT SPECIFICATION

WSA PS - 359 FINE CRUSHED ROCK FOR PIPE EMBEDMENT

359.1 SCOPE

This specification nominates requirements for fine crushed rock used as pipe embedment.

This specification does not cover recycled, reuse or waste products.

359.2 REQUIREMENTS

- (a) Fine crushed rock shall have grading conforming to Table 359.1.
- (b) Fine crushed rock shall be free from noxious weeds as proclaimed by the relevant regulators.
- (c) Fine crushed rock shall be free from dangerous chemicals as proclaimed by the relevant regulators.
- (d) Wet strength shall be not less than 80 kN when determined in accordance with AS 1141.22.
- (e) Wet strength/dry strength variation shall not exceed 35% when determined in accordance with AS 1141.22.
- (f) Weak particles shall not exceed 0.5% when determined in accordance with AS 1141.32.

TABLE 359.1*

FINE CRUSHED ROCK - ACCEPTABLE FOR EMBEDMENT MATERIAL

Sieve size mm	Mass of sample passing percent
26.5	–
19.0	–
13.2	–
9.5	100
6.7	85–100
4.75	–
2.36	0–20
1.18	–
0.60	–
0.30	–
0.15	–
0.075	0–2

NOTES:

- 1 Table taken from Table G3 of AS/NZS 2566.2:2002.
- 2 Tolerances on aggregates generally $\pm 10\%$ for sieve sizes above 2.36 mm – see AS 2758.1 details.

359.3 PROJECT SPECIFIC REQUIREMENTS

Not used.

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359.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

359.5 QUALITY ASSURANCE

Fine crushed rock shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Quarrying, processing, cleaning and grading of aggregates" (or similar).

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PRODUCT SPECIFICATION

WSA PS - 360 EMBEDMENT/CONCRETE SAND

(Replaces Section 2.1 of WITS Specification 95-007.1)

360.1 SCOPE

This specification nominates requirements for naturally occurring sand used for pipe embedment and for mixing of concrete and CSLM material on-site.

This specification does not cover recycled, reuse or waste products.

360.2 DEFINITION

A processed, washed naturally occurring sand of particle size less than 5 mm and produced in a controlled manner to close tolerances of grading, allowing the sand to have filtering properties.

360.3 REQUIREMENTS

Embedment/concrete sand shall consist of hard durable inert grains of washed river, marine or dune sand or hard rock sand or a blend of these sand types.

Embedment/concrete sand shall:

- (a) comply with requirements of Table 360.1.
- (b) have a grading¹ complying with Table 360.2.
- (c) have a resistivity² greater than 15 Ohm.m when tested in accordance with AS 1289.4.4.1.
- (d) have a pH in the range of 5 – 9 when determined in accordance with AS 1289.4.3.1.
- (e) be free from noxious weeds as proclaimed by the relevant regulators.
- (f) be free from dangerous chemicals as proclaimed by the relevant regulators.

Embedment sand shall have gradings complying with Table 360.2.

TABLE 360.1

GENERAL PROPERTIES OF EMBEDMENT/CONCRETE SAND

Property	Property Value
Particle Density	(min)2100Kg/m ³
Water Absorption	(max) 3%
Material Finer than 0.075 nun	(max) 10%
Material Finer than 0.002 nun	(max) 1%
Friable/Weak/Light Particles	(max) 1%

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TABLE 360.2
EMBEDMENT/CONCRETE SAND GRADING

Sieve Size Mm	Mass of sample passing %
9.50	100
4.75	90-100
2.36	60-100
1.18	30-100
0.6	15-100
0.3	5-50
0.15	0-15
0.075	0-5

360.4 MOISTURE CONTENT

The moisture content shall not exceed 10% by mass at delivery.

360.5 PROJECT SPECIFIC REQUIREMENTS

Not used.

360.6 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

360.7 QUALITY ASSURANCE

Sand shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Quarrying, processing, cleaning and grading of sands" (or similar).

NOTES:

- 1 The grading requirements of this sand may not be readily available in all locations.
- 2 Soil resistivity requirements are incorporated to provide optimum corrosion protection of ductile cast iron pipe and fittings when used in conjunction with loose polyethylene sleeving.

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PRODUCT SPECIFICATION

WSA PS - 361 EMBEDMENT / 5 MM MINUS SAND

(Replaces Section 2.2 of WITS Specification 95-007.1)

361.1 SCOPE

This specification nominates requirements for naturally occurring sand used as pipe embedment.

This specification does not cover recycled, reuse or waste products.

361.2 DEFINITION

A manufactured product produced from the crushing and screening of non-sedimentary quarried rock (including scoria.) It has a particle size less than 7 mm and varies with the type of rock quarried for production.

361.3 REQUIREMENTS

Embedment sand shall consist of hard durable inert grains of washed river, marine or dune sand or hard rock sand or a blend of these sand types, produced in a controlled manner to close tolerances of grading, allowing the sand to have filtering properties.

Embedment sand shall:

- (a) comply with requirements of Table 361.1.
- (b) have a grading¹ complying with Table 361.2.
- (c) have a resistivity² greater than 15 Ohm.m when tested in accordance with AS 1289.4.4.1.
- (d) have a pH in the range of 5 – 9 when determined in accordance with AS 1289.4.3.1.
- (e) be free from noxious weeds as proclaimed by the relevant regulators.
- (f) be free from dangerous chemicals as proclaimed by the relevant regulators.

TABLE 361.1

GENERAL PROPERTIES OF EMBEDMENT/5 MM MINUS SAND

Property	Property Value
Particle Density	(min) 1900Kg/m ³
Plasticity Index	(max) 10
Degradation Factor – Fines	(min) 50

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**TABLE 361.2
EMBEDMENT/5 MM MINUS SAND GRADING**

Sieve Size Mm	Mass of sample passing %
6.70	100
4.75	90-100
2.36	60-100
1.18	30-80
0.6	15-60
0.3	5-40
0.15	0-20
0.075	0-10

361.4 PROJECT SPECIFIC REQUIREMENTS

Maximum moisture content at delivery, %	
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361.5 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

361.6 QUALITY ASSURANCE

Sand shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Quarrying, processing, cleaning and grading of sands" (or similar).

NOTES:

- 1 The grading requirements of this sand may not be readily available in all locations.
- 2 Soil resistivity requirements are incorporated to provide optimum corrosion protection of ductile cast iron pipes and fittings when used in conjunction with loose polyethylene sleeving.

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PRODUCT SPECIFICATION

WSA PS - 362 WELL GRADED CRUSHED ROCK FOR PIPE EMBEDMENT

(Replaces Section 2.3 of WITS Specification 95-007.1)

362.1 SCOPE

This specification nominates requirements for well graded crushed rock³ used as pipe embedment.

This specification does not cover recycled, reuse or waste products.

362.2 REQUIREMENTS

- (a) Well graded crushed rock shall be produced from igneous or metamorphic source rock by crushing clean spalls.
- (b) Well graded crushed rock shall have grading conforming to Table 362.1.
- (c) Well graded crushed rock shall be free from noxious weeds as proclaimed by the relevant regulators.
- (d) Well graded crushed rock shall be free from dangerous chemicals as proclaimed by the relevant regulators.

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TABLE 362.1¹

WELL GRADED CRUSHED ROCK - ACCEPTABLE FOR EMBEDMENT MATERIAL

Sieve size mm	Mass of sample passing, percent	
	20 mm	10 mm
26.5	100	–
19.0	85-100	–
13.2	–	100
9.5	60-80	90-100 ²
6.7	55-72	
4.75	42-62	60-80 ²
2.36	30-48	40-65
1.18	22-36	25-50
0.60	16-28	16-38
0.30	10-20	9-30
0.15	6-15	5-24
0.075	4-12	2-20
Liquid limit	25	25
Plasticity index	4	6

NOTES:

- 1 Table taken from Table G3 of AS/NZS 2566.2:2002.
- 2 Tolerances on aggregates generally $\pm 10\%$ for sieve sizes above 2.36 mm – see AS 2758.1 details.

362.3 PROJECT SPECIFIC REQUIREMENTS

Not used.

362.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

362.5 QUALITY ASSURANCE

Well graded crushed rock shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include “Quarrying, processing, cleaning and grading of aggregates” (or similar).

NOTE:

- 3 The grading requirements of well graded crushed rock may not be readily available in all locations.

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PRODUCT SPECIFICATION

WSA PS - 363 TRENCH FILL MATERIALS

(Replaces Section 3 of WITS Specification 95-007.1)

363.1 SCOPE

This specification nominates requirements for materials used for trench fill below paved and unpaved surfaces.

Due to varying environmental regulations Water Agency approval to supply crushed concrete to this Specification is required. This specification does not cover other recycled, reuse or waste products.

363.2 DEFINITION

The material used to fill the trench from the top of the embedment zone to the level below the paved or unpaved surface.

363.3 REQUIREMENTS FOR TRENCH FILL MATERIALS UNDER PAVED SURFACES

363.3.1 Crushed rock

Crushed Rock, excepting scoria, shall be of 20 mm nominal size, Class 4 or higher grade and shall comply with VicRoads Standard Specification 812.

363.3.2 Crushed scoria

Crushed scoria shall be of 20 mm nominal size and shall comply with VicRoads Standard Specification 818.

363.3.3 Crushed concrete

Crushed concrete shall be of 20 mm nominal size and shall comply with VicRoads Standard Specification 820.

363.4 REQUIREMENTS FOR TRENCH FILL MATERIALS UNDER UNPAVED SURFACES

Selected excavated and imported material shall:

- (a) be free of hard, sharp objects and organic material;
- (b) have a particle size not exceeding 75 mm; and
- (c) be capable of being compacted without excessive effort to a mean value of density ratio (R_D) of not less than 90%.

363.5 PROJECT SPECIFIC REQUIREMENTS

Not used.

363.6 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

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363.7 QUALITY ASSURANCE

- (a) Crushed rock and scoria shall be quarried, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include “Quarrying, processing, cleaning and grading of aggregates” (or similar).
- (b) Crushed concrete shall be recycled material processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include “Recycling, processing, cleaning and grading of recycled concrete” (or similar).

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PRODUCT SPECIFICATION

WSA PS – 364 GRADED RECYCLED MATERIALS FOR PIPE EMBEDMENT

364.1 SCOPE

This specification nominates requirements for graded processed recycled materials used for pipe embedment, predominantly comprising crushed concrete, brick and reclaimed asphalt blends but excluding granulated slag.

Due to varying environmental regulations Water Agency approval to adopt this Specification is required.

364.2 REQUIREMENTS

- (a) Recycled materials¹ shall be Class D20 or Class D10 complying with IPWEA Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage².
- (b) Recycled materials shall be free from noxious weeds as proclaimed by the relevant regulators.
- (c) Recycled materials shall be free from dangerous chemicals as proclaimed by the relevant regulators.

364.3 PROJECT SPECIFIC REQUIREMENTS

Material Class i.e. D20 or D10.	
Maximum moisture content at delivery, %	

364.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

364.5 QUALITY ASSURANCE

- (a) Recycled materials shall be collected, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Collecting, processing, cleaning and grading of recycled building materials" (or similar).
- (b) Sampling and testing shall be in accordance with Section 5 of IPWEA Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage².

NOTES:

- 1 These recycled materials may not be readily available in all locations.
- 2 Available from the [IPWEA Website](#); also known as "Greenspec".

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PRODUCT SPECIFICATION

WSA PS – 365 RECYCLED MATERIALS FOR TRENCH FILL

365.1 SCOPE

This specification nominates requirements for graded recycled materials used for trench fill, predominantly comprising crushed concrete, brick and reclaimed asphalt blends but excluding granulated slag.

Due to varying environmental regulations Water Agency approval to adopt this Specification is required.

365.2 REQUIREMENTS

- (a) Recycled materials¹ shall comply with IPWEA Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage².
- (b) Recycled materials shall be free from noxious weeds as proclaimed by the relevant regulators.
- (c) Recycled materials shall be free from dangerous chemicals as proclaimed by the relevant regulators.

365.3 PROJECT SPECIFIC REQUIREMENTS

Material Class i.e. D75 or D20 or D10	
Maximum moisture content at delivery, %	

365.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

365.5 QUALITY ASSURANCE

- (a) Recycled materials shall be collected, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Collecting, processing, cleaning and grading of recycled building materials" (or similar).
- (b) Sampling and testing shall be in accordance with Section 5 of IPWEA Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage².

NOTES:

- 1 These recycled materials may not be readily available in all locations.
- 2 Available from the [IPWEA Website](#); also known as "Greenspec".

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PRODUCT SPECIFICATION

WSA PS – 366 GRADED AND SINGLE SIZED RECYCLED MATERIALS FOR PIPE EMBEDMENT

366.1 SCOPE

This specification nominates requirements for graded and single size recycled materials used for pipe embedment, predominantly comprising crushed concrete, brick and reclaimed asphalt blends but excluding granulated slag. This specification may be used as an alternative to WSA PS - 351 with Water Agency approval¹.

366.2 REQUIREMENTS

- Recycled materials² shall comply with IPWEA Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage³ except that recycled materials shall have gradings conforming to Table 366.1⁴.
- Recycled materials shall be free from noxious weeds as proclaimed by the relevant regulators.
- Recycled materials shall be free from dangerous chemicals as proclaimed by the relevant regulators.

TABLE 366.1⁴
RECYCLED MATERIALS FOR PIPE EMBEDMENT

Sieve size mm	Mass of sample passing, percent					
	Nominal size of recycled materials mm					
	20	16	14	10	7	5
26.5	100	–	–	–	–	–
19.0	95–100	100	–	–	–	–
16.0	35–65	95–100	100	–	–	–
13.2	0–10	40–70	90–100	100	–	–
9.50	0–2	0–10	0–15	85–100	100	–
6.70		0–2	0–2	0–15	80–100	100
4.75	–	–	–	0–3	0–20	80–100
2.36	–	–	–	–	0–5	0–10
1.18	0–1	0–1	0–1	0–1	0–1	0–1

366.3 PROJECT SPECIFIC REQUIREMENTS

Nominal size of aggregate, mm	
Maximum moisture content at delivery, %	

366.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

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366.5 QUALITY ASSURANCE

Recycled materials shall be collected, processed and supplied under cover of a certified ISO 9001 management system. The scope of the ISO 9001 certification shall include "Collecting, processing, cleaning and grading of recycled building materials" (or similar).

Sampling and testing shall be in accordance with Section 5 of IPWEA Specification for Supply of Recycled Material for Pavements, Earthworks and Drainage³.

NOTES:

- 1 This use of these recycled materials may require Water Agency specific environmental certifications and/or controls.
- 2 These recycled materials may not be readily available in all locations.
- 3 Available from the [IPWEA Website](#); also known as "Greenspec".
- 4 Adopted from Transport South Australia specification.

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PRODUCT SPECIFICATION

WSA PS – 367 STEEL REINFORCING MATERIALS FOR CONCRETE

367.1 SCOPE

This specification covers steel reinforcing materials for the reinforcement of concrete in the form of:

- (a) deformed or plain bars and coils;
- (b) machine-welded mesh: and
- (c) continuously threaded bars.

This specification does not apply to prestressing steels, stainless steel reinforcement, polymer coated steels and galvanised steels.

367.2 REQUIREMENTS

- (a) Steel reinforcing materials shall comply with AS/NZS 4671.

367.3 PROJECT SPECIFIC REQUIREMENTS

Product e.g. deformed bar, plain bar, coil, rectangular mesh etc.	
Designation e.g. D500N16, RL1218 etc.	
As appropriate to the product form, mass and/or dimensions of steel e.g. bar length, m, coil diameter, mm and coil mass, kg.	

367.4 HUNTER WATER APPROVED VARIATIONS TO BE SPECIFIED

Not used.

367.5 QUALITY ASSURANCE

- (a) Steel reinforcing materials shall have product certification (ISO Type 5) to AS/NZS 4671.
- (b) All products shall be marked in accordance with the certification body's requirements.

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