Assets Planning and Delivery Group
Engineering

Strategic Product Specification

SPS 151
Bolted Mechanical Pipe Couplings and Dismantling Joints for Waterworks Purposes

VERSION 1
REVISION 0

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FOREWORD

Each Strategic Product Specification has been prepared to inform Water Corporation staff, consultants, contractors and land developers of the requirements for selecting and acquiring a manufactured product to be used in strategic Corporation infrastructure. The definition of 'Product' includes items that comprise assembled components, equipment or plant for mechanical, electrical and civil infrastructure applications.

The objective of a Strategic Product Specification is to specify fit-for-purpose Product which will contribute to the provision of effective water services at least whole-of-life cost and with least risk to service standards and safety. A Strategic Product Specification also provides uniform standards for compatibility of new water infrastructure with existing water assets.

Many Strategic Product Specifications have drawn on the design, asset management and operational experience of Product performance in live service gained by the Corporation over time. Some Strategic Product Specifications have drawn on the experience of the water industry nationally by referencing Australian or WSAA standards.

Strategic Product Specifications are intended for reference and use in the following typical procurement scenarios:

- Capital funded infrastructure design and construction work;
- Private developer funded subdivision infrastructure for takeover by the Corporation;
- Operationally funded infrastructure design and construction work;
- Corporation period contracts for Product purchases;
- Product purchases for stock or for miscellaneous minor work.

A published Strategic Product Specification will, in some cases, comprise technical content that is typical of a range of products of the same type (type specification) but may exclude specific requirements that should apply to a particular project or application. In such cases, the project designer is required to document the supplementary project specific requirements in the 'Project Specific Requirements' Appendix of the Specification.

The text of a published Specification should not be directly modified. In the event that a text variation is considered necessary to accommodate the needs of a particular project or application, the text modification should be documented in the appropriate Clause of a 'Project Specific Requirements' Appendix.

Enquiries relating to the technical content of this Specification should be directed to the Senior Principal Engineer, Wastewater Conveyance, Engineering.

Head of Engineering

This document is prepared without the assumption of a duty of care by the Water Corporation. The document is not intended to be nor should it be relied on as a substitute for professional engineering design expertise or any other professional advice.

Users should use and reference the current version of this document.

REVISION STATUS

The revision status of this specification is shown section by section below:

REVISION STATUS						
SECT	**VER/REV**	**DATE**	**PAGES REVISED**	**REVISION DESCRIPTION**	**RVWD**	**APRV**
1	**1/0**	**30/10/2021**	**All**	**New Specification**	**KR**	**KP**
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SPS 151
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CONTENTS

1 Scope and General

1.1 Scope

This Specification shall apply to the manufacture, supply, transportation, handling and delivery of:

- Pipe Couplings – Thrust-restrained and thrust-unrestrained, bolted or screwed rigid coupling body type for in-line but **not** end-of-line pipeline service applications; and
- Dismantling Joints – Axial thrust-restrained with through tie-rods for in-line and end-of-line pipeline service applications

for water, wastewater and drainage conveyance applications. Third party supplied pipe couplings are not intended for general use in lieu of integral pipe sockets and double-socketed joint couplings (or collars) supplied by an original pipe supplier.

The Specification also details acceptance criteria for pipe coupling and dismantling joint products and the means of demonstrating product conformity with the performance requirements of the Specification.

NOTE: Consideration of screw-tightened stainless steel banded elastomeric-bodied couplings in accordance with AS/NZS 4327 in lieu of rigid-bodied bolted or screwed couplings should be limited to non-pressure small (≤ DN 300) diameter wastewater applications where there is least risk of exposure to internal pressure events exceeding 30 metres (c300 kPa) pressure head.

1.2 Referenced Documents

The following documents are referenced in this Specification or are provided for the purposes of design and installation context relevant to the Product:

AS

1646	Elastomeric seals for waterworks purposes *(Performance requirements in AS 681)*
681.1	Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Vulcanized rubber
681.2	Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Thermoplastic elastomers
681.3	Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Cellular materials of vulcanized rubber
681.4	Elastomeric seals – Material requirements for pipe joint seals used in water and drainage applications – Cast polyurethane sealing elements
2345	Dezincification resistance of copper alloys
3688	Water supply – Copper and copper alloy body compression and capillary fittings and threaded-end connectors
2550.1	Cranes, hoists and winches – Safe use – General requirements
2550.5	Cranes, hoists and winches – Safe use – Mobile

AS/NZS

2566.1	Buried flexible pipelines – Structural design 2566.1 Supplement 1: Buried flexible pipelines – Part 1: Structural design – Commentary
2566.2	Buried flexible pipelines – Part 2: Installation
3500	National Plumbing and Drainage Code
4020	Products for use in contact with drinking water
4327	Metal-banded flexible couplings for low pressure applications
4998	Bolted unrestrained mechanical couplings for waterworks purposes

AS/NZS ISO

7.1	Pipe threads where pressure-tight joints are made on the threads – Dimensions, tolerances and designation
9001	Quality management systems – requirements
17000	ISO/IEC 17000: Conformity assessment – Vocabulary and general principles

17025	ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories
17026	ISO/IEC 17026 (TR): Conformity assessment – Example of a certification scheme for tangible products
Guide 28	ISO/IEC Guide 28: Conformity assessment -- Guidance on a third-party certification system for products
17030	Conformity assessment -- General requirements for third-party marks of conformity
17065	Conformity assessment -- Requirements for bodies certifying products, processes and services
17067	AS/NZS ISO/IEC 17067: Conformity assessment – Fundamentals of product certification and guidelines for product certification schemes
ASTM	
F1476	Standard specification for performance of gasketed mechanical couplings for use in piping applications
F1548	Standard specification for performance of fittings for use with gasketed mechanical couplings used in piping applications
BS EN	
12842	Ductile iron fittings for PVC-U or PE piping systems
14525	Ductile iron wide tolerance couplings and flange adaptors for use with pipes of different materials: ductile iron, grey iron, steel, PVC-U, PE, fibre-cement
ISO	
228.1	Pipe threads where pressure-tight joints are not made on the threads – Part 1: Dimensions, tolerances and designation
POP	**PIPA** (Plastics Industry Pipe Association of Australia) Guidelines
007	Metal backing flanges for use with Polyethylene (PE) pipe flange adaptors
103	Depth of engagement for PVC pipes
Water Corporation	
	Pipeline Selection Guidelines
	Strategic Products Register
DS38-02	Flanged Connections
DS 50	Design and construction requirements for gravity sewers DN 150 to DN 600
DS 51	The Design and Construction of Wastewater Pumping Stations and Pressure Mains 4.5 to 180 Litres per Second Capacity
DS 60	Water Supply Distribution Standard – Pipelines other than Reticulation
DS 63	Water Reticulation Standard –Design and Construction Requirements for Water Reticulation Systems up to DN250
DS 66	Urban Main Drainage Standard
DS 95	Standard for selection, preparation, application, inspection and testing of protective coatings on Water Corporation assets
WSA PS	WSAA Product Specifications
245	Ductile iron fittings with restrained flexible joints for polyethylene pipe of nominal sizes 90 to 710 in pressure applications – water supply and sewerage
271	Ductile iron wide tolerance mechanical couplings and flange adapters, end thrust restraint, for pressure applications – water supply and sewerage
284	Dismantling Joints
WSA-TN	WSAA Technical Notes
08	Additional Requirements for Conformity Assessment

1.3 Definitions and Notation

The following definitions are intended to clarify the terminology used in this Specification.

1.3.1 Australian Standards®

Standards that are developed, published and maintained by Standards Australia.

1.3.2 Certificate

A formal certificate issued by a Conformity Assessment Body as an outcome of a conformity audit in accordance with a Certification System.

1.3.3 Certification Mark

A proprietary mark of product conformity issued in accordance with ISO/IEC 17030.

1.3.4 Certification System

An impartial third-party product certification scheme or combination of schemes, as exemplified in ISO/IEC TR 17026, that are in accordance with the fundamentals of AS/NZS ISO/IEC 17067 and with the guiding principles of ISO/IEC Guide 28.

NOTE: The effect of this is to require maintenance by the manufacturer of effective production control planning in addition to full type testing from independently sampled production and subsequent verification of conformity with specified standards.

1.3.5 Conforming Product

Product that demonstrably conforms with standards and specifications nominated by the Corporation, where assessed by means of Product Appraisal.

1.3.6 Conformity Assessment Body (CAB)

A third-party organization that has been duly accredited as meeting the requirements of AS/ANZ ISO/IEC 17065 by a signatory member of the International Accreditation Forum (IAF) Multilateral Arrangement (MLA), previously known as a **Certification Body**.

1.3.7 Corporation

The Water Corporation of Western Australia.

1.3.8 Manufacturer

An entity or combination of entities that are responsible for selection, processing and control of Product constituent materials or compounds and for the processing equipment that collectively result in the manufactured product.

1.3.9 Notation

Statements governed by use of the word ‘shall’ are mandatory or ‘normative’ requirements of the Specification. Statements expressed by use of the words ‘should’ or ‘may’ are ‘informative’ but not mandatory and are provided for information and guidance. Notes in Specification text are informative. Notes that form part of Specification Tables are normative. An Appendix to the Specification that is designated ‘normative’ contains mandatory requirements. An Appendix that is designated ‘informative’ is provided for information and guidance only. The term ‘specified’ includes requirements of the Specification and requirements stated or referenced in other project documentation.

1.3.10 Officer

A duly authorized representative or appointed agent of the Corporation.

1.3.11 Product

A single unit or multiple units of manufactured end product or an assembly of manufactured component products, materials or equipment.

1.3.12 Product Appraisal

A formal process whereby Product is subjected to systematic engineering assessment to determine Product fitness for prescribed end uses and to evaluate its conformity with specified standards and requirements. Product Appraisal includes verification of the extent of conformity in accordance with the requirements of a relevant ‘Technical Compliance Schedule’.

1.3.13 Product Assessor

An organization, Officer or other person who, having demonstrated specialist product knowledge and competence acceptable to the Corporation, is appointed to evaluate Product, appraises the Product and issues one or more Product Verification Reports.

1.3.14 Product Certification

A formal process whereby the production and management systems for the manufacture of Product, are assessed by a Conformity Assessment Body to evaluate conformity of these systems with specified product standards and tests in accordance with Certification System rules.

1.3.15 Product Verification Report

A formal report wherein a Product Assessor evaluates the extent of Product conformity with the specified product standards and specifications.

NOTE: Verification may be on a project-by-project basis or at agreed intervals, as appropriate to the scope of a Purchasing Schedule and Product end use, subject to determination by the Corporation.

1.3.16 Product Warranty

A formal express undertaking by a Supplier that indemnifies the Corporation against the consequences of supplied Product failure to conform with specified fitness for application and in-service life expectancy performance requirements.

1.3.17 Purchasing Schedule

A Corporation purchase order, tender, schedule of prices, bill of quantities, or specification that details the nature, quantity and other characteristics of Product to be supplied, purchased or installed.

1.3.18 Quality System

A management system that establishes, documents, implements and maintains organizational structures, resources, responsibilities, processes and procedures for the manufacture of Product and provision of Product related services in accordance with the requirements of AS/NZS ISO 9001.

1.3.19 Standards Australia

The peak non-government standards development body in Australia which develops Australian Standards®.

1.3.20 Strategic Product

An essential infrastructure component whose performance is critical to the elimination of risk to the safe and effective provision of water services, which are functions of the Corporation under the Water Corporation Act as licensed under the Water Services Coordination Act.

NOTE: Strategic product is a component of permanent Corporation infrastructure. Ancillary operational and safety equipment that does not form part of permanent infrastructure but offers exceptional enhancements in operational performance or personnel safety may also be deemed strategic.

1.3.21 Strategic Product Appraisal Process

The process described in the Strategic Products Register whereby products and equipment are evaluated and authorized for use in Corporation infrastructure, subject to demonstrated conformity with the nominated product performance requirements.

1.3.22 Supplier

An entity or combination of entities that is responsible for the supply of Product or Product related service.

1.3.23 Testing

The determination of Product characteristics by inspection and by the application of specified test procedures in order to determine Product conformity with nominated performance requirements.

1.4 Technical Definitions

The following definitions are intended to clarify the technical Product terminology used in this Specification.

1.4.1 Dismantling Joint

A length adjustable axially restrained pipeline joint assembly that enables ready removal of flanged valves, flowmeters, pumps and other in-line equipment for servicing or maintenance and their subsequent re-installation or replacement, with minimal service disruption.

NOTE: Joint restraint is typically provided by the use of longitudinal tie rod fasteners to secure the joint assembly between the flanges of other connected pipeline components. Joint assembly configuration may be flanged or wafer style.

1.4.2 Pipe Coupling

A longitudinally restrained or flexibly jointed - usually third party - pipe fitting that is specifically designed to join two adjoining pipes or a pipe to an adjoining pipe fitting so as to form a structurally secure and water-tight pipeline assembly.

1.4.3 Pipe Diameter Series

The specific/nominated outside diameter (OD) series of a legacy pipe or of a planned new pipe.

2 Performance Requirements

2.1 General

Bolted mechanical couplings and dismantling joints shall be fit for installation on drinking water, non-drinking water, wastewater and drainage pipelines in pressure and non-pressure applications

The elastomeric seal and joint restraint grip 'ring' components of couplings intended for thrust-restrained applications shall be integrated into finished products by the original product manufacturer.

Joint seals shall be EPDM or NBR in accordance with AS 1646 (incorporating AS 681.1, 681.2, 681.3 and 681.4), for the nominated elastomer IRHD hardnesses.

The use of third-party pipe couplings to join pipeline components shall be limited to circumstances where use of integral pipeline system sockets or slip-on coupling collars - as provided by the original pipe manufacturer - proves impracticable (e.g. one-off pipeline closure joints, interconnection with existing fixed pipeline systems and connections to flanged pipeline components), as determined by the Corporation.

NOTES

1. Flexibly jointed couplings should not form part of a vacuum pipeline system except where the manufacturer warrants coupling seal performance in service under full vacuum (-100 KPa) conditions. Certified coupling conformity with coupling product standards typically provides for joint leak tightness testing pressures no lower than -80 KPa.
2. NBR is a preferred elastomeric pipe joint sealing material for wastewater applications because of its superior long-term resistance to hydrocarbon exposure that is typical of wastewater environments.
3. The legacy "Ferguson" coupling was an early 'gibault style' pipe coupling except that, unlike modern day gibault couplings, it offered little or no pipe OD variance capability.

2.2 Coupling Configuration

Typically, third party pipe couplings accommodate a modest range of outside diameter variability and are intended for flexible joint sealing purposes. Commonly available coupling variants provide for thrust-restrained and non-thrust restrained applications. Typical coupling joint configurations include:

End Configuration

- **Straight couplings** – typically having (a) socketed ends to interconnect two pipe/pipe fitting spigot ends; or (b) one socketed and one flanged end to interconnect a spigoted with a flanged pipe end.
- **Stepped** (or reducer) **couplings** - typically having socketed ends to securely join two pipe or pipe fitting spigots of dissimilar nominal diameters;
- Straight/stepped **adaptor couplings** – typically configured to interconnect two pipe/pipe fitting ends of the same or different nominal diameters and of different end configurations. Common coupling end configuration combinations are flange/spigot, flange/socket and flange/flange;

Joint Restraint Configuration

- **End load bearing** or thrust restrained configuration - to restrain coupled pipe/fitting spigots from axial or longitudinal pipe movement without the need for externally applied restraint structures e.g. thrust/anchor blocks or mass concrete;
- **Non-end load bearing** or non-thrust restrained configuration - coupled joint free to move axially or longitudinally e. g. flexible/thrust-unrestrained joints that will require externally applied restraint structures (e.g. thrust/anchor blocks or mass concrete) in pressure applications to restrain unbalanced pipeline axial forces;

Mechanical Fastening Configuration

- **Gibault style** - whereby couplings are fastened by means of axially disposed fasteners in coupling body end flanges. Most gibault couplings have a 'multi-fit' diameter range capability that can accommodate a significant range of pipe outside diameter variance;
- **Circumferential style** (pressure applications) - whereby couplings are fastened by means of tangentially disposed fasteners through longitudinal body/casing side brackets and are, typically, in accordance with ASTM F1476 for process piping network applications. These exclude

circumferential style pipe repair clamps - in accordance with AS 4181 - as clamps are neither designed nor suitable for **joining** pipelines;

- **Circumferential style** (non-pressure applications only) - whereby coupling body comprises elastomeric material and fastening is, typically, achieved by means of screws through external circumferential stainless-steel bands, in accordance with AS/NZS 4327.

NOTES:

1 The pipe couplings defined herein are non-pipe material specific and are typically provided by third parties. They do exclude double socketed coupling collars (e.g. GRP and AC) that are integral components of a (first party) or original manufactured pipeline system.

2 The most commonly used third party pipe couplings are of the 'multi-fit' gibault style. A typical 'multi-fit' coupling for a particular nominal DN value can accommodate a pipe OD variance of the order of 25-30 mm which can accommodate a significant range of standard/new and non-standard/legacy pipe diameters;

3 Traditional circumferential gasketed mechanical couplings for pressure applications (e.g. Teekay, Straub, Norma and similar branded products) have limited pipe diameter variance (3-6 mm) capability, although some newer coupling manufacturers nominate as much as 50 mm of pipe OD variance.

2.3 Dismantling Joint Configuration

Dismantling joints (DMJ) shall be configured with flanged end or 'wafer' body style for insertion between adjacent pipeline flanges. Joints shall be length adjustable so as to accommodate significant longitudinal adjustment for ease of equipment (valve, flowmeter or pump) installation, removal and maintenance. DMJ configuration shall facilitate the installation and servicing of in-line equipment between mating pipeline flanges.

Flanged dismantling joint end and intermediate DMJ body flanges shall be of the same diameter. Flange dimensions and flange fastener hole configuration shall be in accordance with the relevant flange dimension Figures in AS/NZS 4087 Appendix B. Tie rod diameter shall not be less than the flange bolt diameter requirements of AS/NZS 4087.

Flanged dismantling joints shall restrain connected equipment including flanges from axial/longitudinal movement by means of full-length tie-rod fasteners that span and penetrate both the mating end flanges and the seal activation flange.

Compact dismantling joint configuration shall be dimensionally and structurally compatible with the pipeline flanges between which a DMJ is to be installed. The clearances between the joint and all associated joint assembly tie rods and flange fasteners shall be designed so as not to impede DMJ installation, maintenance or removal and re-installation operations.

NOTE: Adjacent pipeline or connected equipment flanges may, on occasion, be of a non-standard configuration (e.g. EN 1092, AS 2129 or special Corporation design in accordance with EN 1951.1 – refer DS 38-02), Where this occurs, the use of in-line flanged pipeline adaptors that transition from the AS/NZS 4087 standard flange configuration to the non-standard configuration may be required, by agreement with the Corporation.

2.4 Coupling Engineering

Bolted mechanical pipe couplings shall be selected on the basis of demonstrated coupling conformity with the material and test performance requirements nominated. Gibault style bolted couplings for axially unrestrained applications shall be in accordance with AS/NZS 4998.

For sustained exposure to urban wastewater where the levels of biogenic corrosion agents are high or undetermined, the primary wetted parts of couplings shall comprise corrosion resistant materials - 316L stainless steel, plastics and elastomers for example. The use of corrodible wetted coupling components (e.g. DI, MS), albeit cement or thermal-bonded polymer lined, shall be non-preferred for urban wastewater applications.

The pull-out resistance of couplings intended for thrust-restrained non-end-of-line service applications, shall be subject to evidence of conformity with the pull-out test requirements of BS EN 12842 or of an equivalent documented pipeline joint pull-out conformity test that is acceptable to the Corporation.

Gasketed mechanical couplings for circumferential fastening in authorized service applications (see Note 2) shall generally be in accordance with the performance requirements of ASTM F1476 and shall

be made from type 316L stainless steel material. Elastomeric sealing gasket components shall be in accordance with AS 1646 for the nominated elastomer hardness.

The use of circumferential screw fastened metal-banded elastomeric-bodied AS/NZS 4327 couplings shall be limited to non-pressure (< 300 kPa) applications and shall be subject to specific Corporation acceptance on a project-by project basis. Coupling metal bands and shear rings shall be Type 316L stainless steel. Elastomeric coupling body components shall be in accordance with AS 1646 for the nominated elastomer hardness.

The use of mechanically fastened couplings to join PE pipes DN 125 and larger shall not generally be permissible (See Note 5) except where the PE pipe spigot ends to be joined are internally supported by means of fitted 316L stainless-steel ring stiffening inserts that support the PE pipe internal bore. Ring-stiffening inserts shall be designed by and sourced from the original pipeline coupling manufacturer.

Flanged end components shall be in conformity with DS 38-02 requirements for flanged connections.

Couplings shall have a nominal working pressure rating no less than PN 16 for pressure applications and PN 3 for non-pressure applications, except as may otherwise be authorized by the Corporation.

NOTES:

1. The Pipeline Selection Guidelines provide high level guidance on the selection of couplings and adaptors to interconnect new and legacy pipelines of various materials and sizes.
2. The use of stainless-steel coupling components in water conveyance applications is non-preferred.
3. A coupling or joint product supplier should demonstrate conformity of mechanical joint restraints with the performance requirements herein, notwithstanding the use of non-metallic product components.
4. Consideration may be given to products that conform to BS EN 14525 (ductile iron wide tolerance couplings) performance requirements where those requirements are not specifically covered by AS/NZS 4998.
5. The requirement for ring-stiffening inserts in pipeline joint end bores may be waived where sufficient independent engineering test evidence is provided to the Corporation's Engineering Business Unit/Engineering Advisory group. This test evidence is needed to validate the long-term watertightness of unstiffened PE pipeline (size $\geq$ DN 315) coupled joints for a declared valid PE pipe SDR (e.g. 17, 11) or PN (e.g. 12.5, 16) rating whilst exposed to a stated number of test pressure fluctuations from zero-PN-zero over realistic testing time cycles and should be supported by valid test modelling assumptions and measurements (or calculations) for the duration of testing.

2.5 Dismantling Joint Engineering

Dismantling joint material and type test performance shall conform to the requirements of AS/NZS 4998 for couplings. All surfaces of ferro-metallic (e.g. DI, MS) joint components shall be thermal-bonded polymeric coated in accordance with AS/NZS 4158.

Flanged dismantling joint assemblies shall incorporate fasteners that apply axial compression to joint end flanges by means of full length tie rod fasteners in combination with an intermediate joint sealing flange. Dismantling joint assemblies that incorporate a lesser number of full-length tie rods than is required by the relevant flange standard or those with seal activation rods that are threaded into an assembly flange shall not be permissible.

Compact or wafer style dismantling joint assemblies shall incorporate adjustable compression bolts to restrain axial joint movement and enable watertight seal against adjacent pipeline flanges. Joints shall incorporate integral lifting lugs that enable them to be readily secured in, removed from and re-installed in the required positions.

Joint tie rod and fastener component materials shall be protected from corrosion in accordance with the fastener material requirements in DS 38.02. Dismantling joints are intended for use in pipeline arrangements that are exposed above ground or in below ground pits. Dismantling joints shall not be permissible in below ground buried applications.

NOTE: Typically, DS 38.02 requires fastener - including tie-rod fastener - materials to be grade 316 (or higher) stainless steel in damp/moist environments such as in below ground pits and pumping station wet wells. Otherwise, fastener materials may be carbon steel that has been hot-dip galvanized in accordance with AS/NZS 4680.

2.6 Water-tightness Test Requirements

Non thrust restrained pipe couplings and dismantling joint assemblies shall, for acceptance, be subject to prior water-tightness type testing in accordance with the hydrostatic leak-tightness test requirements of AS/NZS 4998, with the test pipe deflected by the nominal coupling joint deflection during the test.

Thrust restrained couplings shall, for acceptance, be subject to prior water-tightness type testing in accordance with the test requirements of BS EN 14525.

2.7 Effect on Water

Bolted mechanical couplings and dismantling joints shall, for acceptance, be fit for drinking water, wastewater and drainage pipeline jointing in pressure and non-pressure applications. Accordingly, the wetted parts of each coupling and dismantling joint assembly, including component body materials, coatings, linings, joint seals, restraint grip 'rings', lubricants and priming fluids, shall conform with the requirements of AS/NZS 4020, irrespective of the intended application. For acceptance, AS/NZS 4020 test exposure shall meet or exceed the anticipated extent of component exposure to drinking water during its service life.

NOTE: The requirement for conformity with AS/NZS 4020, irrespective of the intended application, applies to preclude the use of products procured for the purposes of a particular application being re-directed to other applications by accident or design. It is also intended to eliminate the need to quarantine or control product spares/stocks in separate non-interchangeable product groups and eliminate associated stock issue and usage errors and consequent risks.

3 Transportation, Handling and Storage

3.1 General

Transportation, handling and storage facilities shall be designed to prevent Product damage or defects and to maintain Product free of deleterious matter. Lifting elements shall be designed and installed in accordance with lifting element designer/supplier requirements in conformity with the requirements of the appropriate regulatory authority. Product shall be securely and safely supported during lifting operations, with all operatives excluded from lifting operation movement and 'drop zones'.

Product shall not be dropped off elevated vehicle platforms or site positions. Mechanical handling equipment shall be in accordance with AS 2550.1, AS 2550.3, AS 2550.5 and AS 2550.11 and shall be appropriate to the loads to be lifted. Manual handling shall be in accordance with the National Standard for Manual Handling and the National Code of Practice for Manual Handling, published by National Occupational Health and Safety Commission, Australia. Product restraint during transportation shall be in accordance with Load Restraint Guide—Guidelines for Safe Carriage of Loads on Road Vehicles, published jointly by the Federal Office of Road Safety and the National Road Transport Commission, Australia.

Load restraint mechanisms shall be checked for tension at regular intervals not exceeding 300 kilometres of travel and shall not be released until the transporting vehicle is resting in a secure stable disposition on level ground.

3.2 Preservation of Product in Storage

Product shall be stored in original Product packaging in accordance with the published requirements of the manufacturer, prior to installation. Sensitive Product component materials shall be protected from extended exposure to direct sunlight and high temperatures e.g. elastomeric components, that do not form part of the original assembled Product, shall be stored in accordance with the general principles of and guidance in AS 1646.

Designated Product storage areas shall be of sufficient size to accommodate Product deliveries. Storage areas shall be flat, reasonably level and free of combustible vegetation, sharp stones or projections that could cause Product damage or defects. Packaging material shall have a minimum expected life in outside storage conditions of 12 months from the date of delivery.

4 Conformity with Requirements

4.1 General

Product conformity with the specified requirements shall be verified by means of an acceptable inspection and test plan (ITP) which shall assure product structural and durability design, materials control and performance conformity testing throughout production. Inspection and test plans shall be embodied in a duly accredited ISO 9001 production quality management system.

Product shall conform with the performance requirements specified notwithstanding whether verified by a competent Product Assessor or certified by a Conformity Assessment Body (CAB), in accordance with the requirements of a product standard acceptable to the Corporation. Otherwise, it shall be classified as non-conforming Product.

NOTE: Test laboratories and factory based test facilities should, for the purposes of Product performance testing and test equipment calibration, be accredited as meeting the requirements of AS/NZS ISO/IEC 17025 by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). The scope of test laboratory/and facility accreditation should provide for the competencies and capabilities required to undertake the appropriate performance tests and test equipment calibration.

4.2 Certification of Product

Products, in respect of which conformity with a particular nominated product Standard(s) is claimed, shall, for acceptance, be assessed in accordance with an acceptable product certification system and shall be subject to the issue of a certificate of conformity with the nominated Standard(s) by a duly accredited CAB.

The certification system or scheme with which product conformity is claimed shall:

- be based on ISO/IEC TR 17026, Conformity assessment -- Example of a certification scheme for tangible products and shall be in accordance with the fundamentals of AS/NZS ISO/IEC 17067 and with the guiding principles of ISO/IEC Guide 28;
- include product type testing from independently sampled production;
- require the manufacturer's production processes and associated controls to be part of a quality management system that has been certified as meeting the requirements of AS/NZS ISO 9001, Quality management systems - Requirements; and shall
- include subsequent verification that the manufacturer continues to maintain effective production control and product conformity with the nominated product Standard(s), at intervals not exceeding 12 months.

NOTE: Evidence of Product conformity with the specified requirements may be by means of a Product Verification Report provided by a Product Assessor including reference to a current relevant water industry appraisal report or certificate issued by WSAA.

4.3 Product Re-verification

Product conformity with the Specification shall be subject to re-verification by a Product Assessor when, during the agreed Product supply period, there occurs any:

- substantive change in Product design, material formulation or performance
- Product failure to perform in operational service to the nominated performance specification.

Re-verification shall require the issue of a new or supplementary Product Verification Report. Product components and test outcomes that are not significantly affected by the Product change or failure may be excluded from the scope of re-verification, provided that these outcomes have already been reported in a current valid Product Verification Report that is acceptable to the Corporation.

4.4 Acceptance Criteria

For acceptance, Product shall be supplied as specified in the Purchasing Schedule and shall be clearly and indelibly provided with product markings in accordance with the nominated product standard or specification.

Prior to the implementation of any arrangement to supply Product, the Supplier shall, in accordance with specified requirements, nominate applicable Product Warranty terms and shall provide documentary evidence of conformity with performance requirements in an acceptable format including, for example:

- a current valid Product Certificate (issued by a Conformance Assessment Body) and an associated schedule of all products certified, duly badged by unique product identifiers;
- third party audited evidence of Product conformity with a Corporation agreed inspection and test plan (ITP) together with all associated schedules of the performance tests undertaken and the products certified, duly badged by unique product identifiers.

The Supplier shall also detail in writing each element of Product that does not conform with the specified requirements together with the extent of non-conformity.

NOTE: Where the Specification includes Technical Compliance Schedules, the nature and extent of all non-conformances should be recorded in the appropriate Schedules to be submitted for contractual acceptance.

4.5 Non-conforming Product

4.5.1 General

Product whose design, workmanship or performance fails to conform to the specified requirements shall be clearly tagged and quarantined by the Supplier as non-conforming and shall be subject to rejection for return to and replacement by the Supplier.

4.5.2 Manufacturing Repairs (In-process)

The Manufacturer shall make provision in its production Quality System and in its ITP for sufficient hold points whenever Product non-conformities are encountered. Production work on non-conforming components shall cease and repair work shall not re-commence until the following have been confirmed by the Corporation in writing:

- acceptability of non-conforming component repair in lieu of component replacement; and
- acceptability of the particular proposed repair procedures; and
- acceptability of any proposal to vary the terms of the original Product Warranty as a consequence of an in-process repair.

4.5.3 Product Warranty

The Supplier shall replace non-conforming Product with Product that conforms to the acceptance criteria or shall repair or rectify all faults, damage or losses caused by non-conforming Product. Except as may otherwise be specified, the Product Warranty shall indemnify and keep indemnified the Corporation against all losses suffered by the Corporation as a result of non-conforming Product for a period no less than 24 months after Product delivery or 12 months after Product installation, whichever period elapses first.

4.5.4 Product Repair

All reasonable proposals for repair or remedy of defects will be considered, provided that each such proposal is accompanied by a methodology statement that accords with the performance objectives of this Specification, as determined by the Corporation. For acceptance, a proposal for repair or remedy of Product non-conformities shall not void or otherwise diminish the provisions of the Product Warranty.

4.5.5 Access to the Place of Manufacture

The Corporation shall be afforded access, at all reasonable times, to all places of manufacture of Product and shall be authorized to arrange or undertake such testing as the Corporation deems appropriate.

5 Appendix A: Material Master Records (Informative)

The following Material Master Records (MMR) comprise Corporation catalogue numbers that are unique to the particular products described for the purposes of Corporation activities or work.

MMR	PURCHASE ORDER LONG TEXT (Gibault Couplings)
20230	Coupling, Clamp, Pipe; Gibault; DN50; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN50 ISO/Series 1 Pipe (OD 59-71).
9741	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN58 x 81mm ID x 100mm Sleeve with Closed Flange; C/W Elastomeric Seals.
11988	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN58 x 81mm ID x 114mm Sleeve; Blank End; Sleeve Tapped Rp2 50mm; C/W Elastomeric Seals.
12368	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN58 x 81mm ID x 114mm Sleeve; Flange Tapped Rp2 50mm; C/W Elastomeric Seals.
21339	Coupling, Clamp, Pipe; Gibault; Stepped; DN58/100; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN58 AC and DN100 PVC Pipe. Note: Only Northern Iron and Brass Foundry (NIBF) type Acceptable from Iplex. No Substitutes Allowed.
19944	Coupling, Clamp, Pipe; Gibault; DN58/65; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN58 AC and PVC Pipe OD of 77.6mm.
22243	Coupling, Clamp, Pipe; Gibault; DN65; PN16 Minimum Pressure Rating; EPDM Gasket Seal; Materials, Coating and Performance to WSA 105 Long Series; OD Range to suit DN63 PE Pipe (OD 63-90); For DN63 (SDR11, PN16) and (SDR13.6, PN12.5) PE Pipe, use Wedge Insert Stiffener MMR 22244.
11990	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN80 x 99mm ID x 152mm Sleeve with Flange; Tapped Rp2 50mm; C/W Elastomeric Seals.
11992	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN80 x 99mm ID x 152mm Sleeve with Flange; Tapped Rp3 80mm; C/W Elastomeric Seals.
19943	Coupling, Clamp, Pipe; Gibault; Stepped; DN80 x DN65; PN24 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN80 Series 1 PVC Pipe at Large End and DN58 AC or DN58 PVC Pipe at Small End.
19807	Coupling, Clamp, Pipe; Gibault; DN80; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN80 CIOD and ISO/Series 2 and 1 Pipe.
11995	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN100 x 127mm ID x 150mm Sleeve; Flange Tapped Rp2 50mm; C/W Elastomeric Seals.
19906	Coupling, Clamp, Pipe; Gibault; Stepped; DN100 x DN80; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN100 CIOD and ISO/Series 2 and 1 Pipe at Large End and DN80 CIOD and ISO/Series 2 and 1 Pipe at Small End.
17144	Coupling, Clamp, Pipe; Gibault; Cast Iron; Composite; DN100; Adaptor for 159mm OD RC Pipe to 122mm OD Blue MPVC and DI Pipe; C/W O-Rings to Suit 122mm OD and 177mm OD Blue MPVC Pipe (1 of Each); Iplex Design Only - No Substitutes Accepted.
19808	Coupling, Clamp, Pipe; Gibault; DN100; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN100 CIOD and ISO/Series 2 and 1 Pipe (OD 109-133).

MMR	PURCHASE ORDER LONG TEXT (Gibault Couplings)
22209	Coupling, Clamp, Pipe; Gibault; DN100; PN16 Minimum Pressure Rating; EPDM Gasket Seal; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN110 and DN125 PE Pipe (OD 104-132). For DN110 (SDR11 PN16) PE Pipe, use Wedge Insert Stiffener MMR 22245. For DN125 (SDR11 PN16) PE Pipe, use ECO Insert Stiffener MMR 22210. For DN125 (SDR13.6 PN12.5) PE Pipe, use Wedge Insert Stiffener MMR 22270.
12364	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN100 x 127mm ID x 160mm Sleeve Tapped Rp2 50mm; With Closed Flange; C/W Elastomeric Seals.
9743	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN100 x 127mm ID x 150mm Sleeve with Closed Flange; C/W Elastomeric Seals.
2080	Coupling, Clamp, Pipe; Gibault; Stepped; DN125 x DN100; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN100 Sutton AC Pipe at Large End and DN100 CIOD Pipe at Small End.
9744	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN150 x 183mm ID x 150mm Sleeve with Closed Flange; C/W Elastomeric Seals.
9725	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN150 x 183mm ID x 150mm Sleeve with Flange; Tapped Rp2 50mm; C/W Elastomeric Seals.
20933	Coupling, Clamp, Pipe; Gibault; Cast Iron; Composite; DN150 Adaptor for 210mm OD Reinforced Concrete Pipe to 177mm OD Blue PVC and Ductile Iron Pipe (CIOD); C/W Elastomeric Seals to suit 177mm OD and 209mm OD Blue PVC Pipe. Iplex Design Only - No Substitutes Accepted.
19809	Coupling, Clamp, Pipe; Gibault; DN150; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN150 CIOD and ISO/Series 2 and 1 Pipe (OD 158-182).
22211	Coupling, Clamp, Pipe; Gibault; DN150; PN16 Minimum Pressure Rating; EPDM Gasket Seal; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN180 PE Pipe (OD 154-192). For DN180 (SDR11, PN16) Pipe, use ECO Insert Stiffener MMR 22212. For DN180 (SDR13.6, PN12.5) Pipe, use Wedge Insert Stiffener MMR 22271.
9725	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN150 x 183mm ID x 150mm Sleeve with Flange; Tapped Rp2 50mm; C/W Elastomeric Seals.
9730	Coupling, Clamp, Pipe; Gibault; Cast Iron; DN200 x 237mm ID x 150mm Sleeve with Flange; Tapped Rp2 50mm; C/W Elastomeric Seals.
19810	Coupling, Clamp, Pipe; Gibault; DN200; Pn16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN200 CIOD and ISO/Series 2 and 1 Pipe (OD 214-238).
17145	Coupling, Clamp, Pipe; Gibault; Stepped; DN200 x DN150; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN200 CIOD Pipe at Large End and DN150 CIOD Pipe at Small End.
22031	Coupling, Clamp, Pipe; Gibault; Ductile Cast Iron; DN225; Range:- 240mm - 264mm; 150mm Overall Length; C/W Closed Flange (Blank End); C/W Elastomeric Seals.
20232	Coupling, Clamp, Pipe; Gibault; DN225; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN225 CIOD and ISO/Series 2 and 1 Pipe (OD 240-264).
22213	Coupling, Clamp, Pipe; Gibault; DN225; PN16 Minimum Pressure Rating; EPDM Gasket Seal; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN250 PE Pipe (OD 230-268). For DN250 (SDR11, PN16) PE Pipe, use ECO Insert Stiffener MMR 22214. For DN250 (SDR13.6, PN12.5) PE Pipe, use Wedge Insert Stiffener MMR 22272.
20999	Coupling, Clamp, Pipe; Gibault; Stepped; DN225 x DN250; PN16 Minimum Pressure Rating; Materials, Coating and Performance to AS/NZS 4998; OD Range to Suit DN225 AC Pipe at Small End and DN250 PVC Pipe at Large End.

MMR	PURCHASE ORDER LONG TEXT (Gibault Couplings)
19811	Coupling, Clamp, Pipe; Gibault; DN250; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN250 CIOD and ISO/Series 2 and 1 Pipe (OD - 272-296).
17147	Coupling, Clamp, Pipe; Gibault; Stepped; DN300 x DN250; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN215 180 PSI RC Pipe at Large End and DN250 CIOD Pipe at Small End.
20233	Coupling, Clamp, Pipe; Gibault; DN300; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN300 CIOD and ISO/Series 2 Pipe (OD 330-354).
20231	Coupling, Clamp, Pipe; Gibault; DN300; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit 312mm OD RC (Reinforced Concrete) Pipe Rated for 180 PSI (OD 310-334).
22530	Coupling, Clamp, Pipe; Gibault; DN300; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit 380mm OD RC (Reinforced Concrete) DN300 Pipe and 345mm OD PVC Series 2 DN300 Pipe.
22766	Coupling, Clamp, Pipe; Gibault; Stepped; DN300 x DN350; PN16 Minimum Pressure Rating; Materials, Coating and Performance to AS/NZS 4998; OD Range to suit Non Standard DN350 (352-378mm) Old Cast Iron Pipe at Large End and DN300 (342-350mm) Blue PVC at Small End.
21921	Coupling, Clamp, Pipe; Gibault; DN300/350; PN16 Minimum Pressure Rating; 316 Stainless Steel; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN350 MSCL, ABS/PVC Series 1 and DN300 RC Pipe; (OD 346mm-370mm).
20234	Coupling, Clamp, Pipe; Gibault; DN375; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN375 CIOD and ISO/Series 2 Pipe (OD 410-434).
21922	Coupling, Clamp, Pipe; Gibault; DN375; PN16 Minimum Pressure Rating; 316 Stainless Steel; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN375 MSCL, ABS/PVC Series 1 Pipe; (OD 396mm-420mm).
21751	Coupling, Clamp, Pipe; Gibault; DN450 x 225mm Length; PN16; Long Barrel Type (SWB); SS316 Bolting; To Suit DI, CI and PVC Series 2 Pipe.
19940	Coupling, Clamp, Pipe; Gibault; DN450; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN450 CIOD and ISO/Series 2 and 1 Pipe (OD 488-512).
21923	Coupling, Clamp, Pipe; Gibault; DN450/500; PN16 Minimum Pressure Rating; 316 Stainless Steel; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN500 MSCL, ABS/PVC/GRP Series 1 and DN450 RC Pipe; (OD 552mm-576mm).
10927	Coupling, Clamp, Pipe; Gibault; DN525; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN525 AC Class C, CI Classes C/D and GRP Pipe (OD 574-598).
21937	Coupling, Clamp, Pipe; Gibault; DN525; PN16 Minimum Pressure Rating; 316 Stainless Steel; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN525 MSCL Pipe; (OD 596mm-620mm).
20312	Coupling, Clamp, Pipe; Gibault; DN700; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN700 AC Class C Pipe (OD 690-714).
20323	Coupling, Clamp, Pipe; Gibault; DN800; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN800 CIOD and Hobas Pipe (OD 810-834); Wastewater. For Sewage Pump Station Critical Spares - Cresswell.
20322	Coupling, Clamp, Pipe; Gibault; DN900; PN16 Minimum Pressure Rating; Materials, Coating and Performance to WSA 105 Long Series; OD Range to Suit DN900 CIOD and Hobas Pipe (OD 910-934); Wastewater. For Sewage Pump Station Critical Spares - Anaconda.

MMR	PURCHASE ORDER LONG TEXT (Straub Couplings)
60352	Coupling, Clamp, Pipe; Straub-Flex 1L Coupling; Size 3" IPS; PN16; Non-Axial Restraint Pipe Coupling; Stainless Steel; EPDM Sleeve; 88.9mm OD x 94mm Width.
60353	Coupling, Clamp, Pipe; Straub-Flex 1L Coupling; Size 4" IPS; PN16; Non- Axial Restraint Pipe Coupling; Stainless Steel; EPDM Sleeve; 114.3mm OD x 94mm Width.
60354	Coupling, Clamp, Pipe; Straub Combi-Grip Coupling; 108mm-110mm Diameter; PN16; Axial Restraint Pipe Coupling; Stainless Steel; EPDM Sleeve; Suitable for Transitions from Plastic to Metal Piping.
60336	Coupling, Clamp, Pipe; Straub-Flex 2L; DN300; Size 323.9mm OD; PN7; Type Open-Flex 2; Axially Flexible Coupling; Stainless Steel; EPDM Sealing Sleeve; Clamping Range 321-327mm; 138mm Width; Torque Rate 15Nm.
60337	Coupling, Clamp, Pipe; Straub-Flex 2L; DN400; Size 406.4mm OD; PN5.5; Type Open-Flex 2; Axially Flexible Coupling; Stainless Steel; EPDM Sealing Sleeve; Clamping Range 404-409mm; 138mm Width; Torque Rate 20Nm.
60338	Coupling, Clamp, Pipe; Straub-Flex 2LS; DN800; Size 812.8mm OD; PN3.5; Type Open-Flex 2; Axially Flexible Coupling; Stainless Steel; EPDM Sealing Sleeve; Clamping Range 809-817mm; 139mm Width; Torque Rate 30Nm.

MMR	PURCHASE ORDER LONG TEXT (Teekay Couplings)
20693	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN150; PN16; EPDM Sleeve; 140mm Wide; To Suit 177mm OD CI and AC Pipe.
20694	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN200; PN16; EPDM Sleeve; 210mm Wide; To Suit 232mm OD CI & AC Pipe.
20695	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN250; PN16; EPDM Sleeve; 210mm Wide; To Suit 273mm OD MS Pipe.
20696	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN250; PN16; EPDM Sleeve; 210mm Wide; To Suit 286mm OD CI and AC Pipe.
21913	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN300; PN16; EPDM Sleeve; 140mm Wide; To Suit 345mm OD CI Class CD Pipe.
20697	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN300; PN16; EPDM Sleeve; 310mm Wide; To Suit 324mm OD MS Pipe.
20698	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN300; PN16; EPDM Sleeve; 310mm Wide; To Suit 345mm OD CI Class CD Pipe.
20699	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN350; PN16; EPDM Sleeve; 310mm Wide; To Suit 378mm OD DI Pipe.
20700	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN375; PN16; EPDM Sleeve; 310mm Wide; To Suit 426mm OD CI Class CD Pipe.
21715	Coupling, Clamp, Pipe; Teekay; Axiflex Type I; AISI 304 Stainless Steel; DN450; PN20; EPDM Gasket; 140mm Wide; To Suit 446mm to 454mm OD Pipe.
21717	Coupling, Clamp, Pipe; Teekay; Hinged (Double-Lock) Type I; AISI 304 Stainless Steel; DN450; PN20; EPDM Gasket; 210mm Wide; To Suit 446mm to 454mm OD Pipe.
20701	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN500; PN16; EPDM Sleeve; 310mm Wide; To Suit 508mm OD MS Pipe.
20702	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN525; PN16; EPDM Sleeve; 310mm Wide; To Suit 572mm OD CI Class AB Pipe.
20703	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN525; PN16; EPDM Sleeve; 310mm Wide; To Suit 587mm OD CI Class CD Pipe.
20704	Coupling, Clamp, Pipe; Teekay; Hinged Type IV; 316 Stainless Steel; DN600; PN16; EPDM Sleeve; 310mm Wide; C/W 160mm Long Bolts; To Suit 667mm OD CI Class CD Pipe.

END OF DOCUMENT