# Saint-Gobain PAM

PRODUCT APPRAISAL REPORT 1409 Issue 3

CLASSIC & INTEGRAL Saint-Gobain PAM DI Pipes and Fittings for Water Supply and Sewerage Applications DN 900 – DN 2000

EN 545: 2010 Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods EN 598: 2009 Ductile iron pipes, fittings, accessories and their joints for sewerage applications - Requirements and test methods

ISO 2531: Ductile iron pipes, fittings, accessories and their joints for water applications

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WATER SERVICES ASSOCIATION OF AUSTRALIA 2

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# **Overview of WSAA**

The Water Services Association of Australia (WSAA) is the peak industry body representing the urban water industry. Our members provide water and sewerage services to over 20 million customers in Australia and New Zealand and many of Australia's largest industrial and commercial enterprises.

Based around our vision of 'customer driven, enriching life', WSAA facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. We are proud of the collegiate attitude of our members which has led to industry-wide approaches to national water issues.

WSAA can demonstrate success in the standardisation of industry performance monitoring and benchmarking, as well as many research outcomes of national significance. The WSAA Executive retains strong links with policy makers and legislative bodies and their influencers, to monitor emerging issues of importance to the urban water industry.

WSAA was formed in 1995 as a non-profit organisation to foster the exchange of information between industry, government and the community, and to promote sustainable water resource management.

The urban water industry is committed to anchoring its services to customers' values, and to enrich communities where water services have broad economic, environmental and social values. In line with this our main activities focus on four areas:

- 1. influencing national and state policies on the provision of urban water services and sustainable water resource management
- 2. promoting debate on environmentally sustainable development and management of water resources and the community health requirements of public water supplies
- 3. improving industry performance and establishing benchmarks and industry leading practices for water service processes; and
- 4. fostering the exchange of information on education, training, research, water and wastewater management and treatment and other matters of common interest.

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# 1 EXECUTIVE SUMMARY

Saint-Gobain is a leading international manufacturer and distributor of construction products, operating in 64 countries worldwide and employing approximately 190,000 people. Saint-Gobain PAM represents the pipeline activity of the Saint-Gobain Group and is a world leader in the design, manufacture and supply of complete ductile iron pipeline systems dedicated to the transport of water. Its manufacturing facilities are located in France, Italy, Spain, Germany, China and Brazil. The Saint-Gobain PAM name has been associated with manufacturing industry in Europe for over 150 years.

The Saint-Gobain PAM CLASSIC and INTEGRAL range of ductile iron pipe and fittings in sizes DN 900 to DN 2000 are manufactured to EN 545:2010 and EN 598:2007 respectively and also meet the requirements of ISO 2531:2009. Pipe outside diameters conform to ISO dimensions and compatible fittings also incorporate flanges to ISO dimensions.

This issue 3 includes a section to better address the estimated life expectancy of DI pipes. (see Section 7). The report has also been reviewed for currency and quality certificates updated.

The pipes and fittings are produced from two manufacturing facilities located in France and China, both wholly owned by Saint-Gobain PAM. The plants have accredited Quality Management Systems to ISO 9001 and both CLASSIC and INTEGRAL are included on the product certification licence issued by Bureau Veritas for EN545, EN598 and ISO 2531.

This Appraisal was originally published in November 2014 to address a range of CLASSIC and INTEGRAL ductile iron pipes, manufactured in accordance with EN 545, EN 598 and ISO 2531 in sizes from DN 900 to DN 2000. The report was amended to incorporate the available range of compatible ductile iron fittings. In addition, the option for seal coating on cement mortar lined pipes was removed, as it is deemed unnecessary for large diameter pipes with a surface area to volume ratio less than 5000.

The Saint-Gobain PAM range of CLASSIC ductile iron pipes and fittings is suitable for the transport of potable or recycled water. The pipes are cement mortar lined and coated externally with metallic zinc and a finishing layer of black coloured bituminous or synthetic resin paint. DN 900 to DN 2000 pipes are available in pressure classes PN25 and PN30 whilst pipes of DN 900 to DN 1200 are also available in pressure class PN40. Pipes with alternative pressure class are available on enquiry.

The Saint-Gobain PAM range of INTEGRAL ductile iron pipes and fittings is suitable for the transport of sewerage or aggressive waters with pH values of 4 to 12. The pipes are lined with a Calcium Aluminate cement mortar and coated externally with metallic zinc and a finishing layer of red coloured synthetic resin anti-corrosive paint. DN 900 to DN 2000 pipes are available in pressure classes PN25 and PN30 whilst pipes of DN 900 to DN 1200 are also available in pressure class PN40. Pipes with alternative pressure class are available on enquiry.

A compatible range of ductile iron fittings is available in sizes DN 900 to DN 2000 with various combinations of socket and flange ends. Flanges comply with EN1092-2 PN10, PN16 or PN25. The fittings are coated internally and externally with Resicoat R4 Fusion Bonded Epoxy to EN 14901. The available range of fittings is detailed in Appendix A.

The product range as described by this appraisal report meets the requirements of WSA PS-202 and WSA PS-202S.

# 1.1 Recommendations

It is recommended that WSAA members and associates accept/authorise the Saint-Gobain PAM CLASSIC and INTEGRAL range of DI pipes and fittings, as listed in Tables 1 to 3 and Appendix A, that are relevant to pressure pipelines in water supply and sewerage, provided

pipeline design, installation, acceptance testing and commissioning are in accordance with applicable WSAA Codes and the manufacturer's requirements where specified.

# 2 THE APPLICANT AND MANUFACTURER

# 2.1 Saint-Gobain PAM

The Saint-Gobain Group is a leading international manufacturer and distributor in the habitat and construction markets, operating in 64 countries worldwide and employing approximately 190,000 people. Saint-Gobain PAM represents the pipeline activity of the Saint-Gobain Group and is a world leader in complete ductile cast iron pipeline systems. Saint-Gobain PAM designs, produces and sells a complete range of solutions dedicated to the transport of water.

The Saint-Gobain PAM CLASSIC and INTEGRAL range of ductile iron pipe and fittings, manufactured to EN 545: 2010, EN 598: 2007 and ISO 2531: 2009, are produced from two manufacturing facilities located in France and China, both wholly owned by Saint-Gobain PAM.

The French manufacturing facility, located in Pont-a-Mousson, France manufactures the Saint-Gobain PAM CLASSIC and INTEGRAL range of ductile iron pipe and fittings, in sizes DN60 to DN2000. The other manufacturing facility, located in Yangzhuang, Xuzhou, Jiangsu, China manufactures Saint-Gobain PAM CLASSIC and INTEGRAL range of ductile iron pipe and fittings in sizes DN300 to DN2000.

Saint-Gobain PAM uses the latest ductile iron manufacturing technology, coating systems and product designs available in the world today. Saint-Gobain PAM has product certification to EN 545, EN 598 and ISO 2531 for the full range of pipe and fittings covered by these standards.

# 3 THE PRODUCT

This appraisal applies to the Saint-Gobain PAM CLASSIC and INTEGRAL range of ductile iron pipes and fittings, produced in manufacturing facilities owned by Saint-Gobain PAM in Pont-a-Mousson, France and Xuzhou (Jiangsu Province) China.

The Saint-Gobain PAM CLASSIC and INTEGRAL range of ductile iron pipes and fittings are manufactured to EN 545 *Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods*, EN 598 *Ductile iron pipes, fittings, accessories and their joints for sewerage applications - Requirements and test methods* and ISO 2531 *Ductile iron pipes, fittings, accessories and their joints for water applications.* 

The product range submitted for appraisal consists of ductile iron pipe and fittings with ISO outside diameters in sizes DN 900 to DN 2000 with spigot and socket rubber ring joint as detailed in Tables 1 to 3. Fittings include configurations with socket and/or flanged ends. Product Data Sheets are provided in Appendix A.

NOTE: Information is included for DN 700 and DN 800 pipe, which is not included in the scope of this Appraisal.

The CLASSIC range is internally lined with cement mortar and externally coated with 200g/m<sup>2</sup> of metallic zinc and a finishing layer of black coloured bituminous or synthetic resin paint applied in accordance with ISO 8179-1 *Metallic zinc with finishing layer*. The Saint-Gobain PAM CLASSIC ductile iron pipe and fittings are suitable for drinking water and recycled water applications.

The INTEGRAL range is internally lined with calcium aluminate cement mortar and externally coated with 200g/m<sup>2</sup> of metallic zinc and a finishing layer of red coloured synthetic resin anticorrosive paint applied in accordance with ISO 8179-1 *Metallic zinc with finishing layer.* The Saint-Gobain PAM INTEGRAL ductile iron pipe and fittings are suitable for most aggressive water and sewerage applications with pH values between 4-12. Cement mortar lining thicknesses are given in Table 4.

Both CLASSIC and INTEGRAL pipes are available in C 25 (PN 25), C 30 (PN 30), and C 40 (PN 40) pressure classes, depending on size. Other classes including C 50 (PN 50) and C 64 (PN 64) may be available on enquiry.

A compatible range of ductile iron fittings is available in sizes DN 900 to DN 2000 with combinations of socket and flange ends. Flanges comply with EN1092-2 PN10, PN16 or PN25. The fittings are coated internally and externally with Resicoat R4 Fusion Bonded Epoxy to EN 14901. The available range of fittings is detailed in Appendix A.

Nominal Diameter DN	Outside Diameter	Pressure Class	Allowable Operating Pressure	Nominal Wall Thickness	Effective Length	Mass
mm	mm	PN	MPa	mm	m	kg/m
900	945	25	2.5	10.6	6.95	219
1000	1048	25	2.5	11.6	6.95	266
1200	1255	25	2.5	13.6	8.18	377
1400	1462	25	2.5	15.7	8.17	503
1500	1565	25	2.5	16.7	8.16	573
1600	1668	25	2.5	17.7	8.16	647
1800	1875	25	2.5	19.7	8.15	810
2000	2082	25	2.5	21.8	8.13	991

# TABLE 1

# DIMENSIONS OF C 25 DUCTILE IRON PIPES (SPIGOT & SOCKET)

# TABLE 2

# DIMENSIONS OF C 30 DUCTILE IRON PIPES (SPIGOT & SOCKET)

Nominal Diameter DN	Outside Diameter	Pressure Class	Allowable Operating Pressure	Nominal Wall Thickness	Effective Length	Mass
mm	mm	PN	МРа	mm	m	kg/m
900	945	30	3.0	12.3	6.95	254
1000	1048	30	3.0	13.4	6.95	309
1200	1255	30	3.0	15.8	8.18	436
1400	1462	30	3.0	18.2	8.17	582
1500	1565	30	3.0	19.4	8.16	664
1600	1668	30	3.0	20.6	8.16	752
1800	1875	30	3.0	23.0	8.15	943
2000	2082	30	3.0	25.4	8.13	1157

# TABLE 3

**DIMENSIONS OF C 40 DUCTILE IRON PIPES (SPIGOT & SOCKET)** 

Nominal Diameter DN	Outside diameter	Pressure Class	Allowable Operating Pressure	Nominal wall thickness	Effective Length	Mass
mm	mm	PN	МРа	mm	m	kg/m
900	945	40	4.0	15.5	6.87	321
1000	1048	40	4.0	17.1	6.88	390
1200	1255	40	4.0	20.2	8.15	552

# TABLE 4

# CEMENT MORTAR LINING THICKNESS

# FOR CLASSIC AND INTEGRAL DUCTILE IRON PIPES AND FITTINGS

DN (mm)	Nominal CML thickness (mm)	Minimum CML thickness value at one point (mm)		
900-1200	6	3.5		
1400-2000	9	6.0		

# 4 SCOPE OF THE APPRAISAL

The scope of this product appraisal applies to the Saint-Gobain PAM CLASSIC and INTEGRAL range of ductile iron pipes and fittings in sizes DN 900 to DN 2000, as detailed in Tables 1, 2, 3 and 5 and Appendix A.

# TABLE 5

Saint-Gobain PAM Designation	Standards	Coating	Lining	DN	Application	Country of origin
CLASSIC	EN 545 / ISO 2531	Black Bitumen Paint or Synthetic Resin + Zinc 200g/m <sup>2</sup>	CML	900-2000	Normal soils / Drinking water	France, China
INTEGRAL	EN 598 / ISO 2531	Red Synthetic Resin Paint + Zinc 200g/m <sup>2</sup>	HAC CML	900-2000	Normal soils / Sewer	France, China

# CLASSIC AND INTEGRAL DUCTILE IRON PIPES

# 5 APPRAISAL CRITERIA

# 5.1 Quality Assurance Requirements

The WSAA product appraisal network accepts ductile iron pipes and fittings manufactured in compliance with EN 545: 2010 *Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods* and EN 598: 2007 *Ductile iron pipes, fittings, accessories and their joints for sewerage applications - Requirements and test methods* and duly certified by means of an ISO Type 5 product certification scheme undertaken by a JAS-ANZ accredited Conformity Assessment Body (CAB) or by an international accreditation system recognised by JAS-ANZ.

The manufacturer is generally expected to have a production management and control system that has been duly accredited in accordance with AS/NZS ISO 9001 as a prerequisite to undergoing a product certification audit.

# 5.2 Performance Requirements

The Saint-Gobain PAM CLASSIC and INTEGRAL range of ductile iron pipes and fittings has been appraised for compliance with EN 545 and EN 598 respectively.

Appraisal criteria are also determined by the WSAA Product Appraisal Technical Advisory Group and regularly reviewed to ensure that the criteria reflect the requirements of WSAA members.

The following WSAA Product Specifications are also relevant to this application:

WSA PS – 202 Ductile Iron Pipes and Fittings (ISO sized) for Pressure Applications – Water Supply

WSA PS – 202S Ductile Iron Pipes and Fittings (ISO sized) for Pressure and Non-Pressure Applications – Sewerage

WSA PS – 312 Flange Gaskets and O-Rings

WSA PS – 320 Sleeving, Polyethylene (PE) for Ductile Iron Pipes and Fittings -Water Supply and Sewerage

Copies of the above Product Specifications can be found in Appendix C or downloaded from the WSAA members website.

# 6 COMPLIANCE WITH APPRAISAL CRITERIA

# 6.1 Compliance with Quality Assurance Requirements

Saint-Gobain PAM manufacturing facilities are 100% owned, operated and managed by Saint-Gobain PAM. All manufacturing operations are integrated with a Worldwide Quality System that ensures that specified quality standards are applied. These plants operate under the same quality control/assurance systems worldwide. Saint-Gobain PAM worldwide manufacturing facilities are fully accredited and certified to ISO 14001 Environmental Management Systems.

Saint-Gobain Pipelines Co Ltd (Pont-a-Mousson) and Saint-Gobain Pipelines Co. Ltd (Xuzhou) are quality endorsed Companies and hold ISO 9001:2015 Certificates of Registration Nos FR034033-1 and CNBJ312420-UK respectively, issued by Bureau Veritas.

Saint-Gobain Pipelines Co Ltd has Product Certification to EN 545, EN 598 and ISO 2531, issued by Bureau Veritas Italia S.p.A. rev 7, 07.2012, for both the Pont-a-Mousson and Xuzhou manufacturing facilities.

Refer to Appendix B for copies of relevant quality certificates.

# 6.2 Compliance to the Appraisal Requirements

# 6.2.1 Material properties

# **6.2.1.1** Ductile iron tensile and hardness properties

EN 545 and EN 598 both require that DI pipe and fittings material conform to a minimum tensile strength of 420 MPa. The minimum required elongation is 10% for pipe sizes up to DN 1000 and 7% for pipes sizes DN 1100 to DN 2000 and 5% for fittings. The maximum hardness is specified as 230 HB for pipes and 250HB for fittings.

Saint-Gobain PAM has submitted typical material test reports to demonstrate compliance to these requirements.

# 6.2.2 Wall thickness

The minimum wall thickness of the CLASSIC and INTEGRAL range of C25, C30 and C40 DI pipes and fittings comply with the minimum requirements specified in EN 545 and EN 598.

# 6.2.3 Elastomeric joints

The Saint-Gobain PAM "Standard" elastomeric joint (not restrained) consists of a pipe socket profile with a locking chamber, sealing chamber and spigot end chamber. The elastomeric seal consists of a locking heel and a sealing body complemented with two lip seals. The locking heel locates in the locking chamber of the socket to restrain the seal from being dislodged during jointing. Sealing is achieved by compression of the seal body between the socket sealing chamber and pipe spigot.



# FIGURE 1 SAINT-GOBAIN PAM "STANDARD" ELASTOMERIC JOINT

The CLASSIC and INTEGRAL range of ductile iron pipes are supplied with EPDM and Nitrile elastomeric seals respectively.

Copies of Type Test reports issued by Bureau Veritas have been submitted to demonstrate that the elastomeric joints comply with the performance requirements specified in EN 545 and ISO 2531.

A Certificate of Conformity issued by Bureau Veritas has been submitted to confirm that the elastomeric compounds comply with EN 681.1. A test report has also been submitted to demonstrate compliance with AS/NZS 4020.

Saint-Gobain PAM has also submitted a copy of a test report to confirm that the bactericidal jointing lubricant, manufactured by Tianjin, complies with AS/NZS 4020.

# 6.2.4 Restrained joints

Saint-Gobain PAM advises that restrained joints are available for pipe sizes DN 900-2000. STANDARD Ve, UNIVERSAL Ve and PAMLOCK are the brand names nominated. They all feature a locking weld bead and ductile iron wedge segments which, when inserted, act to restrain push-out of the pipe joint.

However, these joints have not been considered within this appraisal.

For information relating to restrained joints refer directly to Saint-Gobain PAM.

# 6.2.5 Linings for DI pipes

# 6.2.5.1 Cement mortar lining

Materials used for cement mortar lining are locally sourced from approved sub-suppliers in France and China.

CLASSIC ductile iron pipes are cement mortar lined using a Type GP, GB or SR cement mortar in accordance with EN 545, which also complies with AS/NZS 2280. Saint-Gobain PAM has submitted a test report to demonstrate that the Cement Mortar Lining is in compliance with AS/NZS 4020.

INTEGRAL ductile iron pipes utilise calcium aluminate cement in accordance with EN 598. Calcium Aluminate cement mortar lining is not is not suitable for drinking water applications and is therefore not AS/NZS 4020 compliant. It is typically used for sewage and other aggressive conveyants with pH4 to pH12.

A synthetic resin coating, with a nominal thickness of 100µmm is applied to the spigot and socket surfaces that interface with the conveyant.

The cement mortar linings are applied at the site of manufacture by a centrifugal process for pipes and manual techniques for fittings.

The cement mortar lining thicknesses for the CLASSIC and INTEGRAL ductile iron pipes are given in Table 4 and comply with cement mortar lining thicknesses given in EN 545 and EN 598.

# 6.2.6 External Coatings

The Saint-Gobain PAM CLASSIC and INTEGRAL ductile iron pipes are externally protected with metallic zinc coating in accordance with ISO 8179-1 *Ductile iron pipes - External zinc-based coating - Part 1: Metallic zinc with finishing layer*. Saint-Gobain PAM applies the metallic zinc coating at a minimum of 200 g/m<sup>2</sup> as prescribed in EN 545 and EN 598. The metallic zinc coating is applied to the substrate of the ductile iron pipe by electric arc melting of zinc wire and spraying with compressed air.

CLASSIC ductile iron pipes have a black bituminous or synthetic resin paint applied as a finishing layer to an average thickness of 100 µm.

INTEGRAL ductile iron pipes have a red synthetic resin anticorrosive paint applied as a finishing layer to an average thickness of 100 µm.

Alternative coating options using zinc-aluminium alloy applied to 400 g/m<sup>2</sup> finished with a synthetic resin layer, black for CLASSIC and red for INTEGRAL, are also available upon request.

# 6.2.7 Polyethylene Sleeving

Most Australian Water agencies specify polyethylene sleeving of ductile iron pipes as a means of corrosion protection. Polyethylene sleeving provides corrosion protection in aggressive soils by creating a passive uniform environment around the pipe and limiting oxygen exposure.

Loose PE sleeving is installed on site on ductile iron pipelines in the form of a tubular film. Cut lengths are slipped over the pipe, overlapped and wrapped up tight before securing in place with bands and plastic adhesive tape. Polyethylene sleeving should be installed in accordance with AS 3681:2008 - *Guidelines for the application of polyethylene sleeving to ductile iron pipeline*. As the sleeving is the primary corrosion barrier, care needs to be exercised during installation to prevent damage. Only accredited pipe layers trained in the application of sleeving should be employed.

Saint-Gobain PAM source Polyethylene sleeving from the Aperio Group Filmpac Chester Hill, a division of Aperio Group Australia Pty Ltd. Filmpac is a Quality Endorsed Company

and holds AS/NZS ISO 9001:2008 Certificate of Registration No QEC24241 issued by SAI Global for the design, manufacture, distribution and sale of flexible packaging.

An alternative source of sleeving is Lidoten Pty Ltd trading as Agricultural Plastics. Agricultural Plastics is a Quality Endorsed Company and holds AS/NZS ISO 9001:2008 Certificate of Registration No QEC0387 issued by SAI Global for the sale and manufacture of extruded plastic products such as extruded polyethylene sleeving for the protection of ductile iron pipes and horticultural plastic products.

## 6.2.8 Contact with drinking water

Test certificates have been submitted to demonstrate AS/NZS 4020 compliance of cement mortar lining, joint seals and jointing lubricant utilised on Saint-Gobain PAM CLASSIC range of ductile iron pipes and fittings.

## 6.2.9 Flanged pipe

Flanged pipe is offered by Saint-Gobain PAM, however has not been included in the Scope of this appraisal.

## 6.2.10 Angular joint deflection of pipes and fittings

Allowable joint deflections nominated by Saint-Gobain PAM are shown in Table 6. These deflections exceed the 1<sup>o</sup> 30' minimum deflections specified in EN 545 for joints above DN 700.

# TABLE 6

# **ELASTOMERIC SEAL JOINT DEFLECTION – "STANDARD" JOINT**

Nominal Size DN	Allowable Joint Deflection (degrees)
900 to 1200	4°
1400 to 1600	3°
1800	2½°
2000	2°

# 7 LIFE EXPECTANCY OF DI PIPE

# 7.1 Linings

Cement mortar lining is considered to be the default internal protection system for potable and recycled water applications.

Seal coating may be applied over cement mortar lining. The intended purpose of a seal coating is to reduce the contact between the cement mortar lining and the contents of the water main, thereby restricting lime leaching and consequent high pH levels when conveying soft (i.e. low carbonate alkalinity) water, especially in small diameter pipelines where flow rates are low and residence times are lengthy.

AS/NZS 2280 suggests that consideration should be given to the use of seal coatings where the total alkalinity of the water being conveyed is less than 30 mg/L.

Many Australian water utilities specify seal coatings as mandatory for pipes up to and including DN 300.

Calcium aluminate cement mortar linings are intended for aggressive water applications and are typically used in gravity and pressure sewerage mediums with pH between 4 and 12. For applications outside of this pH range consideration should be given to polymeric lining systems. Calcium Aluminate Cement is not AS/NZS 4020 compliant and is therefore not suitable for potable water applications.

WSA Technical Note 6 - *Guidelines for the use of cement mortar linings in sewerage applications* provides details of operating limits for different cements used for the cement mortar lining of DI and steel pipes for sewers. It reviews literature with regard to the use of cement mortar lining for sewerage conveyance and in particular focuses on the prime water chemistry constituents that need to be considered viz. sulphate(SO4), pH, and hydrogen sulphide (H2S) (which can be transformed to sulphuric acid). A copy of WSA Technical Note 6 is available for download from the WSAA website.

Polyurethane linings may also be considered for aggressive medium applications.

# 7.2 Coatings

The majority of Australian Water Agencies have adopted a policy of specifying loose polyethylene sleeving (LPS) for all ductile iron pipes as a corrosion protection measure, unless specialised coatings such as polyurethane or polyethylene, for example, are employed. Properly installed LPS provides a high degree of corrosion protection by creating a passive uniform environment around the pipe and limiting oxygen exposure. LPS should be installed in accordance with AS 3681 and only accredited pipe layers trained in the application of sleeving should be utilised.

The need for LPS depends on the type of soil and the required service life of the pipeline. Ductile iron pipes may be buried without extra external protection in soils that are not aggressive. In soils that are aggressive, and where either the time or the cost of soil assessment is prohibitive, LPS is the recommended solution.

The application of zinc coatings has not historically been utilised on ductile iron pipes in Australia, although they have been used in Europe for more than 60 years. Zinc coatings are now provided in Australia as a standard offering with 200 g/m<sup>2</sup> thickness complete with a finishing layer and are considered to enhance the external corrosion benefits of pipe in buried applications. In some soil applications it is considered acceptable to install zinc coated pipes without polyethylene sleeving.

Enhancements to zinc coatings are also available where 85/15 Zinc-Aluminium alloy, copper enhanced Zinc-Aluminium alloy and rare earth element enhanced Zinc-Aluminium alloys are offered with 400 g/m<sup>2</sup> thickness complete with a finishing layer. It is reported that these coatings provide improved corrosion protection over standard zinc coating and allows for installation in a wider range of soils, without the need for sleeving.

EN 545 nominates that DI pipes with zinc coating of 200 g/m<sup>2</sup> thickness and min 100 $\mu$ m thick finishing layer or enhanced zinc alloy coating with 400 g/m<sup>2</sup> thickness and min 100 $\mu$ m thick finishing layer can be buried without sleeving except:

For Zinc coatings

- soils with a resistivity less than 1500  $\Omega$  cm when laid above the water table, or less than 2500  $\Omega$  cm when laid below the water table
- mixed soils i.e. comprising two or more soil natures
- soils with a pH below 6 and a high reserve of acidity
- soils containing refuse, cinders, slags or polluted by wastes or industrial effluents
- areas where there are stray currents

For Zinc-Aluminium or enhanced Zinc-Aluminium alloys

- acidic peaty soils
- soils containing refuse, cinders, slag or polluted by wastes or industrial effluents
- soils below the marine water table with a resistivity lower than 500  $\Omega$  cm,
- areas where there are stray currents

EN 545 also advises that evidence of the long-term performance of the above-mentioned solution (e.g. tests and references) should be provided by the manufacturer.

It should be noted however that there has been no proven experience or data to support the extrapolation of European experience to Australian conditions and environments. It is considered imperative that testing be undertaken to ensure that the soil environment meets any necessary pre-conditions.

Manufacturers should be consulted for life expectancy estimates.

Refer to Appendix D for the manufacturers life expectancy estimates for the DI pipe considered in this Appraisal.

# 8 FITTING INSTRUCTIONS, TRAINING AND INSTALLATION

# 8.1.1 Installation Instructions

Installation methods for DI pipes and fittings are generally in accordance with AS/NZS 2566 *Buried flexible pipelines Part 2: 'Installation'*. The standard specifies the requirements for the installation, field testing and commissioning of buried flexible pipelines with structural design in accordance with AS/NZS 2566.1. Saint-Gobain PAM has comprehensive installation instructions available.

# 8.1.2 Ductile iron fittings

A comprehensive range of ductile iron bends, tees, tapers and connectors are available from Saint-Gobain PAM in sizes DN 900 to DN 2000. The range of fittings is detailed in Appendix A.

# 8.1.3 Tapped connections

CLASSIC and INTEGRAL ductile iron pipes may be direct tapped. For more information on direct tapping of DI pipe refer to Saint-Gobain PAM.

# 9 MAINTENANCE

A range of mechanical couplings up to DN 2000 and repair clamps up to DN 1200 is available for use on Saint-Gobain PAM DI pipes.

# 10 PIPE LAYING TRAINING AND DEVELOPMENT OF TECHNICAL LITERATURE

Saint-Gobain PAM offers on-site installation training backed up with technical support services including water analysis, soil survey, hydraulic and mechanical calculations. A comprehensive range of technical literature is also available.

# 11 PRODUCT MARKING

Saint-Gobain PAM ductile iron pipes and fittings are branded with markings which clearly identify the manufacturer's mark, nominal size, classification, traceability using batch number and codes for manufacturing facility locations, and manufacturing standard. Additional markings have been added to identify pipe class, internal linings and external coatings.

For example pipes have the following markings conforming to EN 545, EN 598 and ISO 2531:

Manufacturers name –Saint-Gobain PAM

Year of manufacture – xx e.g. 14 cast into socket for 2014

Identification as DI - cast into socket

Nominal size – DN xxxx cast into socket

Reference to Standard – EN 545 or EN 598

Classification – C25, C30, C40 and PRESSURE

# 12 TRACEABILITY

All Saint-Gobain PAM ductile iron pipes and fittings are provided with identification batch marking and recording on inspection and test reports.

# 13 PACKAGING AND TRANSPORTATION

Pipes and fittings are packed in fully sealed shipping containers and/or carefully stacked in bulk shipping vessels at the place of manufacture, shipped to local port facilities, then trucked to site where the containers are off loaded and unpacked.

Pipes are protected in the shipping containers by bundling with vertical and horizontal timber spacers to ensure the coatings are not damaged. Saint-Gobain PAM ships approximately 40,000 km of pipe products to world markets each year.

# 14 PRODUCT WARRANTY

The products are covered by the normal commercial and legal requirements of the *Competition and Consumer Act 2010 (Cth)*, which covers manufacture to the relevant standard, and details of St Goban PAM's warranty is included in their terms and conditions of sale.

# 15 WATER AGENCY EXPERIENCE WITH THE PRODUCT OR FIELD TESTING REPORT

DI pipelines in sizes from DN 900 to DN 2000 are commonly utilised within other countries, however there has been minimal experience within Australia. Saint-Gobain PAM has advised of the following projects undertaken within Australia over recent years.

ACTEW – Murumbidgee to Googong, ACT– 11 km of DN 1000 DI pipe – installed 2012

Tasmanian Irrigation – Midlands Water Scheme, Arthurs Lake, Tasmania – 18 km of DN 1000 DI pipe – installed 2013

Gosford City Council – Kincumber NSW – 1 km of DN 1000 DI pipe – installed 2013

# 16 FUTURE WORKS

No future works have been identified for this appraisal.

# 17 DISCLAIMER

This Product Appraisal Report (Report) is issued by the Water Services Association of Australia Limited on the understanding that:

This Report applies to the product(s) as submitted. Any changes to the product(s) either minor or major shall void this Report.

To maintain the recommendations of this Report any such changes shall be detailed and notified to the Product Appraisal Manager for consideration and review of the Report and appropriate action. Appraisals and their recommendations will be the subject of continuous review dependent upon the satisfactory performance of products.

WSAA reserves the right to undertake random audits of product manufacture and installation. Where products fail to maintain appraised performance requirements the appraisal and its recommendations may be modified and reissued. Appraisal reports will be reviewed and reissued at regular intervals not exceeding five (5) years.

The following information explains a number of very important limits on your ability to rely on the information in this Report. Please read it carefully and take it into account when considering the contents of this Report.

Any enquiries regarding this report should be directed to the Program Manager, Carl Radford, Phone: 03 8605 7601 email carl.radford@wsaa.asn.au.

# 17.1 Issue of Report

This Report has been published and/or prepared by the Water Services Association of Australia Limited and nominated Project Manager and peer group of technical specialists (the Publishers).

The Report has been prepared for use within Australia only by technical specialists that have expertise in the function of products such as those appraised in the Report (the Recipients).

By accepting this Report, the Recipient acknowledges and represents to the Publisher(s) and each person involved in the preparation of the Report that the Recipient has understood and accepted the terms of this Disclaimer.

# 17.2 Limits on Reliance on Information and Recommendations

# 17.2.1 Disclaimer of liability

Neither the Publisher(s) nor any person involved in the preparation of the Report accept(s) any liability for any loss or damage suffered by any person however caused (including negligence or the omission by any person to do anything) relating in any way to the Report or the product appraisal criteria underlying it. This includes (without limitation) any liability for any recommendation or information in the Report or any errors or omissions.

# 17.2.2 Intellectual Property and other rights

The Water Services Association of Australia Limited does not undertake any assessment of whether the importation, manufacture, sale or use of the Product the subject of this Report infringes the intellectual property rights or proprietary rights of any person. Recipients of the report should undertake their own assessment of whether (as relevant) the importation, manufacture, sale or use of the relevant Products infringe the intellectual property rights or other proprietary rights of any person. If the Product infringes intellectual property rights or other proprietary rights there is potential for the supply of the Products to be interrupted.

From time to time the Water Services Association of Australia Limited and the other Publishers may receive notice of allegations that the importation, manufacture, sale or use of the Product infringes intellectual property rights or other proprietary rights. The Water Services Association of Australia Limited's policy is to not refer to such allegations in its reports or take any other steps to put Recipients on notice of such allegations, unless and until it is aware that the allegations have been admitted or proved in Court. As such, Recipients acknowledge, agree and accept that the Water Services Association of Australia Limited may have information in its possession about intellectual property rights infringement allegations or other infringement allegations in relation to the Product which are not referred to or disclosed in this Report and which are not otherwise communicated to Recipients.

# 17.2.3 Need for independent assessment

The information and any recommendation contained (expressly or by implication) in this Report are provided in good faith (and subject to the limitations noted in this Report). However, you should treat the information as indicative only. You should not rely on that information or any such recommendation except to the extent that you reach an agreement to the contrary with the Publisher(s).

This Report does not contain all information that a person might require for the purposes of assessing any product discussed or appraised within it (Product). The product appraisal criteria used in preparing this Report may not address all relevant aspects of the Product.

Recipients should seek independent evidence of any matter which is material to their decisions in connection with an assessment of the Product and consult their own advisers for any technical information required. Any decision to use the Product should take into account the reliability of that independent evidence obtained by the Recipient regarding the Product.

Recipients should also independently verify and assess the appropriateness of any recommendation in the Report, especially given that any recommendation will not take into account a Recipient's particular needs or circumstances.

WSAA has not evaluated the extent of the product liability and professional indemnify insurance that the provider of the product maintains. Recipients should ensure that they evaluate the allocation of liability for product defects and any professional advice obtained in relation to the product or its specification including the requirements for product liability and professional indemnity insurance.

# 17.3 No Updating

Neither the Publisher(s) nor any person involved in the preparation of this Report [has] [have] any obligation to notify you of any change in the information contained in this Report or of any new information concerning the Publisher(s) or the Product or any other matter.

# 17.4 No Warranty

The Publisher(s) do[es] not, in any way, warrant that steps have been taken to verify or audit the accuracy or completeness of the information in this Report, or the accuracy, completeness or reasonableness of any recommendation in this Report.

# **APPENDIX A – TECHNICAL MANUAL/BROCHURES**



## STANDARD CLASSIC Pipes with STANDARD Joint



### Legend

· DN : nominal diameter

- · Lu : laying length, in m
- · Class : pressure class according to EN 545 and ISO 2531
- e: nominal thickness according to ISO 2531, in mm
- · ØDE : external nominal diameter of the barrel according to EN 545 and ISO 2531, en mm

Standard joint

- · ØDI : internal nominal diameter of the socket, in mm
- · P : nominal depth of the socket, in mm
- · ØB : nominal diameter of the socket, in mm
- Mass : total mass per meter (including cement coating and socket), determined with the nominal thickness, in kg/m
- Reference : commercial reference Saint-Gobain PAM



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## STANDARD CLASSIC Pipes with STANDARD Joint

# 

DN	Lu	Class	e	ØDE	ØDI	P	ØB	Mass		
mm	m	Cidss	mm	mm	mm	mm	mm	kg/m	Reference	
1400	8,17	C25	15,7	1462	1465	245	1592,0	634.333	SSC14H80	
1500	8,16	C25	16,7	1565	1568	265	1710,0	720,319	SSC15H80	
1600	8,16	C25	17,7	1668	1671	265	1816,0	807,525	SSC16H80	
1800	8,15	C25	19,7	1875	1878	275	2032,0	995,055	SSC18H80	
2000	8,13	C25	21,8	2082	2085	290	2259,0	1210,037	SSC20H80	

### Standard joint

### Legend

- · DN : nominal diameter
- · Lu : laying length, in m
- Class : pressure class according to EN 545 and ISO 2531
- · e: nominal thickness according to ISO 2531, in mm
- ØDE : external nominal diameter of the barrel according to EN 545 and ISO 2531, en mm
- · ØDI : internal nominal diameter of the socket, in mm
- · P : nominal depth of the socket, in mm
- · ØB : nominal diameter of the socket, in mm
- Mass : total mass per meter (including cement coating and socket), determined with the nominal thickness, in kg/m
- · Reference : commercial reference Saint-Gobain PAM

#### Field of use:

· For drinking water networks and other water networks (except sewage water)

#### Main characteristics:

- · Pressure class in conformity with Standard EN 545-2010 and ISO 2531-2009
- External coating: metallic zinc (200g/m<sup>2</sup>) + bituminous paint
- · Internal coating: sulfate resisting blast furnace cement mortar
- · Standard joint in alimentary elastomer EPDM (ACS, KTW, WRAS,...)



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SEWAGE INTEGRAL RANGE		Date	15/ 03/ 2013
INTEGRAL PIPES DN700 to 1200	SAINT-GOBAIN	FP N	° AS 601-E

# INTEGRAL<sup>®</sup> Pipe with Standard joint



DN	Lu	e	er	r ØDE ØDI P ØE		ØB	Mass	PFA		
mm m	m	mm	mm	mm	mm	mm	mm	kg/m	bar	Reference
700	6,960	9,6	6,0	736,6	741.7	192,0	863.0	199,000	29	TSB70E69
800	6,950	10,4	6,0	840,4	845,8	197,0	974.0	243,600	28	TSB80E69
900	6,950	11,2	6,0	943,2	948,9	200,0	1082,0	291,500	27	TSB90E69
1000	6,960	12,0	6,0	1046,0	1052,0	203,0	1191,0	343,100	26	TSC10E69
1100	8,190	14.4	6.0	1148,8	1155,1	225,0	1300,0	440,000	29	TSC11N79
1200	8,190	15,3	6,0	1252,3	1260,0	235,0	1412.5	507,600	29	TSC12N79

Clic : Standard Gasket NBR

#### Legend

- · DN : nominal diameter
- · Lu : laying length, in m
- e: thickness according to EN598 + A1 August 2009, in mm
- · er: thickness of the cement mortar, in mm
- ØDE : external nominal diameter of the barrel according to EN598 + A1 August 2009, en mm
- · ØDI : internal nominal diameter of the socket, in mm
- · P : nominal depth of the socket, in mm
- · ØB : nominal diameter of the socket, in mm
- Mass : total mass per meter (including cement coating and socket), determined with the nominal thickness, in kg/m
- · Reference : commercial reference Saint-Gobain PAM





# INTEGRAL<sup>®</sup> Pipes with Standard joint



DN	Lu	6	er	ØDE	ØDI	ØDI P ØB		Mass	PFA		
mm m mm mm mm		mm	mm mm kg/m			Kelerence					
1400	8,170	17,1	9,0	1458,9	1467,9	245,0	1592,1	678,900	28	TSC14N80	
1500	8,160	18,0	9,0	1561,7	1571,1	265,0	1709,8	764,700	27	TSC15N80	
1600	8,160	18,9	9,0	1664,5	1674,2	265,0	1815,9	851,300	27	TSC16N80	
1800	8,150	20,7	9,0	1871,1	1881,5	275,0	2032,2	1036,300	27	TSC18N80	
2000	8,130	22,5	9,0	2077,7	2088,8	290,0	2259,0	1242,200	26	TSC20N80	

#### Clic : Standard gasket NBR

### Legend

- · DN : nominal diameter
- · Lu : laying length, in m
- e: thickness according to EN598 + A1 August 2009, in mm
- · er: thickness of the cement mortar, in mm
- ØDE : external nominal diameter of the barrel according to EN598 + A1 August 2009, en mm
- · ØDI : internal nominal diameter of the socket, in mm
- · P : nominal depth of the socket, in mm
- · ØB : nominal diameter of the socket, in mm
- Mass: total mass per meter (including cement coating and socket), determined with the nominal thickness, in kg/m
- · Reference : commercial reference Saint-Gobain PAM



# **RANGE OF DUCTILE IRON FITTINGS**

# SOCKET

DN	Double Socket Bend				Flange Spigot	Flange Socket		D	oub	le S	bock	et⊺ ≺	ſap€	er	
	11°	22.5°	45°	90°			700	800	006	1000	1200	1400	1500	1600	1800
900					**	**									
1000					**	**									
1200					**	**									
1400					**	**									
1500					**	**									
1600					**	**									
1800					*	*									
2000					*	*									

DN	Double Socket Tee with Flange Branch								
	200	250	300	400	600	800	1000	1200	1800
900	***	***		***	***				
1000	***	***	***	***	***	***			
1200	***	***	***	***	***	***	***		
1400				**	**	**	**	**	
1500				**	**	**	**	**	**
1600	**	**	**	**	**	**	**	**	**
1800			*	*	*	*	*	*	*
2000			*	*	*	*	*	*	*

 $Generally, all \ socketed \ fittings \ are \ available \ in \ PN \ 25 \ - \ Higher \ pressures \ available \ - \ consult \ manufacturer.$ 

\* Available in PN10

\*\* Available in PN10 and PN16

\*\*\* Available in PN10, PN16 and PN25

Flanged fittings available at higher pressures - consult manufacturer



DN	Double Flange Bend							
	11°	22.5°	45°	90°				
900	**	**	**	**				
1000	**	**	**	**				
1200	**	**	**	* *				
1400	* *	* *	**					
1500	* *	* *	**					
1600	* *	**	**					
1800	*	*	*					
2000	*	*	*					

	Double Flange Taper									
DN	Л									
	700	800	900	1000	1200	1400	1500	1600	1800	
900	**	**								
1000		**	**							
1200				**						
1400					**					
1500					**	**				
1600					**	**	**			
1800					*	*	*	*		
2000					*	*	*	*	*	

DN	All Flange Tee								
	200	250	300	400	600	800	1000	1200	1800
900	**	**		*	*				
1000	**	**	*	*	*	*			
1200	*	*	* *	* *	**	**	**		
1400				*	*	*	*	*	
1500				*	*	*	*	*	**
1600	**	**	**	**	**	**	**	**	**
1800			*	*	*	*	*	*	*
2000			*	*	*	*	*	*	*

\* Available in PN10

\*\* Available in PN10 and PN16

Flanged fittings available at higher pressures - consult manufacturer

# **APPENDIX B - QUALITY CERTIFICATIONS**

Copies of Quality Certificates are available for downloading from the WSAA members Website.

# TABLE B1 SAINT-GOBAIN PIPELINES CO LTD (PONT-A-MOUSSON) – FRANCEMANAGEMENT SYSTEMS

Quality Systems Standard	ISO 9001:2015
Certification Licence no	FR034033-1
Certifying agency	Bureau Veritas
First Date of certification	11 February 1993
Current date of certification	28 January 2017
Expiry date of certification	27 January 2020

# TABLE B2 SAINT-GOBAIN PIPELINES CO LTD – (PONT-A-MOUSSON) – FRANCEPRODUCT CERTIFICATION

Product Certification Licence	EN 545:2010, EN 598:2007, ISO 2531:2009, ISO 7186:2011
Certification Licence no	220/011
Certifying agency	Bureau Veritas
Originally registered	21 December 2006
Latest issue	8 March 2018
Expiry date of certification	27 January 2019

# TABLE B3 SAINT-GOBAIN PIPELINES CO LTD (XUZHOU) – CHINAMANAGEMENT SYSTEMS

Quality Systems Standard	ISO 9001:2015
Certification Licence no	CNBJ312420-UK
Certifying agency	Bureau Veritas
First Date of certification	17 October 1999
Current date of certification	15 November 2017
Expiry date of certification	14 November 2020

# TABLE B4 SAINT-GOBAIN PIPELINES CO LTD (XUZHOU) – CHINAPRODUCT CERTIFICATION

Product Certification Licence	EN 545:2010, ISO 2531:2009
Certification Licence no	220/009
Certifying agency	Bureau Veritas
Originally registered	21 December 2006
Latest issue	28 January 2016
Expiry Date of certification	27 January 2019



# SAINT GOBAIN PAM

This is a multi-site certificate, additional site details are listed in the appendix to this certificate

21 avenue Camille Cavallier - BP 129 -54705 PONT-A-MOUSSON CEDEX - FRANCE

Bureau Veritas Certification France certify that the Management System of the above organization has been audited and found to be in accordance with the requirements of the management system standard detailed below

Standard

# ISO 9001:2015 Scope of certification DESIGN, MANUFACTURE AND MARKETING OF PRODUCTS FOR PIPELINES AND ACCESSORIES, VALVES AND MUNICIPAL CASTINGS.

## CONCEPTION, PRODUCTION ET COMMERCIALISATION DE PRODUITS POUR CANALISATIONS ET ACCESSOIRES, APPAREILS DE ROBINETTERIE ET PIECES DE VOIRIE.

Certification cycle start date: 28 January 2017 Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on : 27 January 2020 Original certification date: 11 February 1993

Certificate No. : FR034033-1

Date: 01 February 2017

Contract No. : 6405622

Certification body address:

Jacques Matillon – Managing Director Signed on behalf of BVCH SAS – UK Branch







5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom Local office: Bureau Veritas Certification France 60, avenue du Général de Gaulle – 92046 Paris La Défense

Further clarifications regarding the scope of this certificate the applicability of the management system requirements may be obtained by consulting the organization. To check this certificate validity, please call + 33(0) 1 41 97 00 60.

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	Certification
ACCEPT OF A CONTRACT OF A C	0/2-8
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and the second	1828
Certificat	e of Conformity
A CONTRACTOR OF A	swarded to:
SAINT C	GOBAIN PAM
Factory P	ONT & MOUSSON
Av Cavallier - BP 129 547(	05 PONT & MOUSSON - FRANCE
The Cardinact - Die 167 July	
Bureau Veritas Italia S.p.A	. certify that the following products:
Ductile iron piner	Ductile iron pines
for water pipelines	for severage pipelines
from DN 150 to DN 2000	from DN 150 to DN 2000
Commercial brand:	Commercial brand:
Natural	Integral
Classic	Integral pH1
TT-PUX	Pluvial
Imgal	Tag
Alpinal	
have been evaluated and found in conform	id by Saint Gobain Canalisation nity against the requirements of the following standard:
EN ELE ANIA	
EN 545:2010	ISO 7186-2011
Ductile iron pipes, fittings,	Ductile iron pipes, fittings,
accessories and their joints	accessories and their joints
for water pipelines	for sewerage applications
and the second se	Domain - Domain
These prod	ucts belong to family Press
(water intended for human co	onsumption, irrigation, fire protection, sewerage)
Certification	according requirements stated in:
TOR- RE	G-02 Bureau Veritas
This certificate has not to be int	tended as related to Notify Body activity according to
UE Construction Products Regulation	m CPR 305/2011 neither can be used for the CE marking
Original Emission Date: 21/12/2006	
Last Emission Date: 08/03/2018	3
Expiration Date: 27/01/2019	)
and the second sec	
Further clarifications regarding the scope of this	to creck this certificate validity picase refer to website/www. bureauvortak.n. certificate and the applicability of standard's requirements may be obtained
by consulting the organisation.	
14-	ACCREDIA 3
House No	CO- INTERNATION CONTRACTOR
Eng. FRANCESCO SUTERA - TA	echnical Director son and w ones and w ones
	SGA Nº DOBD EMAS Nº DOBP PAD Nº DOBB GAG Nº DOBP SGA Nº DOBP TIP Nº DOBP
Date: 08/03/2018	75545 M* 86551 553 M* 61355 945 M* 62565
Continue No. 220/044	Meinten diegil Accenti di Mutue Microsofiniente EA e LAF Signatory of EA and LAP mutual Reconstituti Agreemente
Central of 220/011	A Unit Marrie 207 AMAR AN AN AVAIL
Bureau Veritas Italia 5.p	A - Viale Monza, 347 - 20126, MILAN - TTALY





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BUREAU VERITAS Certification U

## Certificate of Conformity Awarded to SAINT GOBAIN PIPELINES CHINA

Factory: XUZHOU Yangzhuang, Dongjia – Jaingsu Province 221 004 XUZHOU CHINA

Bureau Veritas Italia S.p.A. Division certify that the following products:

Ductile iron pipes and fittings for water pipelines

from Ø 400 to Ø 2000

Commercial brand: Classic Hydroclass

designed and produced by Saint Gobain Canalisation have been evaluated and found in conformity against the requirements of the following standard:

#### ISO 2531:2009 EN 545:2010

Ductile iron pipes, fittings, accessories and their joints for water pipelines Requirements and test methods

These products belong to family PALL

Ductile iron piping systems including pipes, fittings and valves to convey water (water intended for human consumption, irrigation, fire protection, sewerage)

Certification according requirements stated in:

#### RG-01-03 ACCREDIA Rev.00 I&F-IT-TQR-ORG-REG-02 Rev 01.2015 IT-IND-REP-10 CP Rev.0 04.12.2013

Original Emission Date: Last Emission Date: Expiration Date: 21/12/2006 28/01/2016 27/01/2019

Subject to the continued satisfactory operation, to check this certificate validity please refer to website www.bureauveritas.i. Further clarifications regarding the scope of this certificate and the applicability of standard's requirements may be obtained by consulting the organisation.

Eng. FRANCESCO SUITERA - Technical Director

Date: 28/01/2016



500 N° 005A M3 N° 076C 503A N° 005D 503E N° 006A M0 N° 045B 814A5 N° 006A 502 N° 045B 614A5 N° 006D 502 N° 045B 6146 N° 006D 75H5 N° 0431 15P N° 066B

Certificate Nº: 220/009

Bureau Veritas Italia S.p.A - Via Miramare, 15 - 20126, MILANO - ITALY

# **APPENDIX C - WSA PRODUCT SPECIFICATION**

#### WATER SERVICES ASSOCIATION of Australia

### PRODUCT SPECIFICATION

### WSA PS - 202 DUCTILE IRON PIPES AND FITTINGS (ISO SIZED) FOR PRESSURE APPLICATIONS - WATER SUPPLY

### 202.1 SCOPE

This specification<sup>1</sup> covers ISO sized ductile iron pipes<sup>2</sup> and fittings for use in water supply<sup>3</sup>.

#### 202.2 REQUIREMENTS

- (a) Ductile iron pipes and fittings shall comply with EN 545:2010.
- (b) Pipes and fittings shall be externally coated with bitumen or synthetic resin coating in accordance with EN 545:2010.
- (c) Pipes shall be cement mortar lined in accordance with EN 545:2010.
- (d) Elastomeric joint seals shall be EPDM complying with EN 681-1:1996.
- (e) Pipes, fittings, joint seals and gaskets<sup>4</sup> and jointing lubricant shall comply with AS/NZS 4020:2005.

#### 202.3 QUALITY ASSURANCE

- (a) Ductile iron pipes and fittings shall have product certification (ISO Type 5) to EN 545:2010. The ISO Type 5 Product Certification Scheme shall meet the criteria described in WSA TN-08<sup>5</sup>.
- (b) For lined and / or coated pipes and fittings, the schedule of the certificate issued by the conformity assessment body shall include reference to the relevant coating/lining process.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to EN 681-1:1996.
- (d) Flange gaskets shall have certificates of compliance to WSA 109:2011.
- (e) All products shall be marked in accordance with the conformity assessment body's requirements.

#### 202.4 AGENCY OR PROJECT SPECIFIC REQUIREMENTS

Pressure Class, PN	
Fitting types (configurations)	
Restrained flexible joints	
Seal coating of the cement mortar lining	
Epoxy or other coatings to EN 545:2010	
Alternative elastomeric material for joint seals	

NOTES - see over

#### UNCONTROLLED IF PRINTED

Issue: 05

File Name: WSA\_PS\_202\_06 Copyright Doc Name: Product Specifications for Products & Materials January 2018 Page 1 of 2

#### WATER SERVICES ASSOCIATION of Australia

#### NOTES:

- 1 Use of this specification requires approval by the Water Agency.
- 2 Pipes manufactured to this specification are not directly compatible with fittings manufactured to AS/NZS 2280:2014/Amdt 1:2015. In some cases special adapter elastomeric seals may be used but their suitability would need to be tested to verify performance.
- 3 Includes drinking water and recycled water supply.
- 4 Flange gaskets and O-rings should be supplied to WSA PS-312.
- 5 Water Services Association of Australia Technical Note (WSA TN-08) sets out additional product conformity assessment requirements that are associated with demonstration of conformity to EN 545:2010.

#### UNCONTROLLED IF PRINTED

Issue: 05

File Name: WSA\_PS\_202\_06 Copyright Doc Name: Product Specifications for Products & Materials January 2018 Page 2 of 2 WATER SERVICES ASSOCIATION of Australia

### PRODUCT SPECIFICATION

### WSA PS - 202S DUCTILE IRON PIPES AND FITTINGS (ISO SIZED) FOR PRESSURE AND NON-PRESSURE APPLICATIONS - SEWERAGE

### 202S.1 SCOPE

This specification<sup>1</sup> covers ISO sized ductile iron pipes<sup>2</sup> and fittings for use in pressurised and non-pressurised pipes conveying sewage.

### 202S.2 REQUIREMENTS

- (a) Ductile iron pipes and fittings shall comply with EN 598:2007+A1:2009.
- (b) Pipes and fittings shall be externally coated with bitumen or synthetic resin coating in accordance with EN 598:2007+A1:2009.
- (c) Pipes shall be cement mortar lined in accordance with EN 598:2007+A1:2009.
- (d) Elastomeric joint seals shall be EPDM complying with EN 681-1:1996.

#### 202S.3 QUALITY ASSURANCE

- (a) Ductile iron pipes and fittings shall have product certification (ISO Type 5) to EN 598:2007+A1:2009. The ISO Type 5 Product Certification Scheme shall meet the criteria described in WSA TN-08<sup>3</sup>.
- (b) For lined and/or coated pipes and fittings, the schedule of the certificate issued by the conformity assessment body shall include reference to the relevant coating/ lining process.
- (c) Elastomeric joint seals shall have product certification (ISO Type 5) to EN 681-1:1996.
- (d) All products shall be marked in accordance with the conformity assessment body's requirements.

#### 202S.4 AGENCY OR PROJECT SPECIFIC REQUIREMENTS

NOTES:

- 1 Use of this specification requires approval by the Water Agency.
- 2 Pipes manufactured to this specification are not directly compatible with fittings manufactured to AS/NZS 2280:2014/Amdt 1:2015. In some cases special adapter elastomeric seals may be used but their suitability would need to be tested to verify performance.

#### UNCONTROLLED IF PRINTED

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### WATER SERVICES ASSOCIATION of Australia

- 3 Water Services Association of Australia Technical Note (WSA TN-08) sets out additional product conformity assessment requirements that are associated with demonstration of conformity to EN 598:2007+A1:2009.
- 4 For applications where the sewage being conveyed has a sulphate content >500 mg/L, Type SR cement should be used.

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# APPENDIX D – ESTIMATED LIFE EXPECTANCY

The following estimated life expectancies have been provided by Saint-Gobain PAM.

Life expectancy estimates are indicative only and may increase or decrease as a result of the system operating conditions, preventative maintenance programs, operating environment and other geographical and site-specific factors.

It should be noted that service life for a pipeline is not necessarily defined as the time to first failure but as the typical service life achievable before major rehabilitation is required.

## TABLE D1

# ESTIMATED LIFE EXPECTANCY OF DI PIPE – SAINT-GOBAIN PAM

	ENVIRONMENT		
COATING AND LINING OPTIONS	BENIGN	MODERATELY AGGRESSIVE	AGGRESSIVE
INTERNAL LINING			
Portland Cement	>100 years	>100 years	>100 years
Calcium Aluminate Cement	>100 years	>75 years	>50 years
EXTERNAL COATING			
200 g/m <sup>2</sup> zinc + finishing layer	>100 years	>50 years	>20 years
200 g/m <sup>2</sup> zinc + finishing layer + PE sleeving	>100 years	>100 years	>75 years

Saint Gobain-PAM has also provided a recommended guide for external protection systems based on soil resistivity. See Figure D1

SOIL Resis	cm Prote	ction
LOW	Zinc + Bitumen	
MEDIUM		ZnAI Coating DN 60-600
HIGH 750/1500 when water table	+ PE sleeving	
EXTREME 500 >	Special Coating	Special Coating

## FIGURE D1 RELATIONSHIP BETWEEN SOIL RESISTIVITY AND EXTERNAL CORROSION PROTECTION SYSTEMS

# **APPENDIX E - SUPPLIER CONTACTS**

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