Saint-Gobain PAM

PRODUCT APPRAISAL REPORT 1012 Issue 3

BLUTOP® Ductile Iron Pipe DN 75 – DN 160 and IZIFIT® Fittings DN 75-225 compatible with PE Pipe

Published: 2 August 2018

Document History

The following information indicates the changes made to this document.

Date	Version
1 March 2016	Client Review
29 April 2016	Publication
29 June 2016	Issue 2 Publication
1 August 2018	Issue 3 Client Review
2 August 2018	Issue 3 Publication

Peer Reviewers

Name/Title	Organisation	Date
Product Appraisal Technical Advisory Group	WSAA	24 February 2016
WSAA Expert Panel	WSAA	24 February 2016
Peter Pittard, WSAA Consultant	WSAA	29 February 2016
Carl Radford, Product Appraisal Manager	WSAA	1 March 2016
Peter Pittard, WSAA Consultant	WSAA	29 June 2017
Carl Radford, Product Appraisal Manager	WSAA	29 June 2017
Peter Pittard, WSAA Consultant	WSAA	23 May 2018
Carl Radford, Product Appraisal Manager	WSAA	2 August 2018

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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CONTENTS

1. EXECUTIVE SUMMARY

This Issue 3 includes a section to better address the estimated life expectancy of DI pipes. (see Section 7). A Future Work item in the original report that required a field trial to be undertaken has not been completed as a project has yet to be installed. This requirement has been extended to end November 2018. Quality certificates have also been updated.

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 in Europe for over 150 years.

A range of BLUTOP® ductile iron pipe and IZIFIT ® fittings has been submitted for Appraisal in sizes DN 75, 90, 110, 125, 140, and 160. The DI pipes are manufactured with an outside diameter equivalent to AS/NZS 4130 polyethylene pipes. In conjunction with the compatible fittings the product range is intended to provide an integrated system for the two pipeline materials. IZIFIT fittings are also available in sizes DN 75 to DN 225 for use with PE pipe. The system also includes gate valves with IZIFIT sockets in sizes DN75 to DN160 manufactured to EN1074-2 *Valves for water supply*, however these valves have not been appraised to AS/NZS 2638.2 *Gate valves for water works purposes* and are not included in the scope of this Appraisal.

Saint-Gobain PAM literature includes references to joining PVC pipe, however it should be noted that in Europe PVC pipe outside diameters are the same as PE pipe, whilst in Australia PVC and PE pipe outside diameters are not compatible. Accordingly, the range of products contained within this Appraisal are not suitable for use with PVC pipes in Australia.

The BLUTOP jointing system utilizes elastomeric seals for either non-restrained or restrained applications. A non-restrained BLUTOP gasket is provided when joining BLUTOP pipe together or BLUTOP pipe to IZIFIT fittings. A restrained BLUTOP gasket version is also available with embedded stainless-steel inserts, to provide a self-anchoring joint when joining BLUTOP pipe together or BLUTOP pipe to IZIFIT fittings.

The IZIFIT restrained jointing system is designed to join PE pipe to either a BLUTOP socket or an IZIFIT fitting socket. For sizes DN 75 to DN 125 the IZIFIT gasket incorporates stainless steel inserts to provide the necessary joint restraint. For larger sizes a BLUTOP non-restrained gasket is employed in conjunction with a gripper ring and gland, fitted to the socket profile by a quarter turn bayonet operation.

BLUTOP pipes and IZIFIT fittings with non-restrained joints are rated at PN 25 whilst restrained joints are rated at PN 16.

Saint-Gobain PAM advise there is no requirement to utilise stiffener inserts in PE pipe for the BLUTOP or IZIFIT joints as restraint is provided by the barbs on the stainless-steel inserts on the retaining ring and hence there is no significant compressive loading on the pipe. As the water pressure in the pipe increases, the pressure on the gasket and inserts also increases to assist in sealing and restraint.

Flanges incorporated on the fittings comply to the physical dimensions of EN 1092-2 and are drilled for compatibility to AS/NZS 4087 Fig B5 (PN16) or AS 2129 Table D dimensions. See Section 6.2.3 for further details.

A recently published standard, ISO16631 *Ductile iron pipes, fittings, accessories and their joints compatible with plastic (PVC or PE) piping systems, for water applications and for plastic pipeline connections, repair and replacement* is applicable to the BLUTOP pipe and IZIFIT fittings range, however Saint Gobain-PAM undertook testing to the relevant European standards prior to the publication of this standard. The test results submitted are considered

equivalent to the tests prescribed in ISO16631. Product certification has since been achieved to ISO 16631.

The pipes and fittings are manufactured from ductile iron conforming to the metallurgical properties of EN545 *Ductile iron pipes fittings accessories and their joints for water pipelines.* The pipe outside diameters are compatible with PE pipes manufactured to AS/NZS 4130. The BLUTOP joints have been type tested (both non-restrained and restrained) to EN 545 requirements and the IZIFIT restrained joints have been type tested to EN 12842 *Ductile iron fittings for PVC-U or PE piping systems - Requirements and test methods.*

The pipes and fittings are manufactured to minimum wall thicknesses to facilitate manual handling.

The pipes are externally coated with BioZinalium®, a copper enriched zinc-aluminium alloy with a minimum mass of 400 g/m^2, and a finishing layer of Aquacoat®, a water based blue coloured acrylic, sprayed to a minimum thickness of 80 microns. The pipes are internally lined with Ductan®, a thermoplastic ethylene vinyl acetate co-polymer applied in accordance with EN 14901 *Ductile iron pipes, fittings and accessories - Epoxy coating (heavy duty) of ductile iron fittings and accessories - Requirements and test methods.*

Fittings are coated and lined with Akzo Nobel Resicoat R4-ES fusion bonded epoxy applied in accordance with EN 14901.

The product is promoted as a long-life pipe with high mechanical strength and protection against external soil corrosion and internal water aggression. The jointing system provides for both non-restrained and restrained joints with high angular deflections. The system is light weight such that pipes can be carried by two people and lowered into the trench without the need for mechanical handling. Pipe fittings have ergonomically-designed handles for easy lifting.

Saint-Gobain PAM advise that BioZinalium coated pipes are widely used within Europe in many soils without sleeving. However, there has been no experience in Australia to date and it is therefore imperative that suitable testing be undertaken to ensure that the soil environment meets necessary pre-conditions. Saint-Gobain PAM offers a service to provide advice regarding the suitability or otherwise of BioZinalium coated pipes for a particular project.

The product range does not provide an option for lilac coloured external coating and should not be considered for recycled water supply or pressure sewerage applications.

It should be noted that there are differences in the application and testing requirements of EN 14901 and AS/NZS 4158. See Section 6.2.7.

1.1. Recommendations

It is recommended that WSAA members, subject to any specific requirements of the member, accept/authorise the Saint-Gobain PAM range of BLUTOP DI pipe and IZIFIT DI fittings as detailed in this report for use in pressure pipelines in water supply provided pipeline design, installation, acceptance testing and commissioning are in accordance with applicable WSAA Codes and manufacturer's requirements.

2. THE APPLICANT

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 in Europe for over 150 years.

The range of BLUTOP pipes is manufactured at the Saint-Gobain PAM manufacturing facility in Foug, France. The range of IZIFIT fittings is manufactured at the Saint-Gobain PAM manufacturing facility in Itauna, Brazil.

3. THE PRODUCT

This Appraisal applies to the Saint-Gobain PAM range of PE outside diameter compatible ductile iron pipes and fittings for use with water supply applications.

The products consist of a range of BLUTOP ductile iron pipes and IZIFIT fittings in sizes DN 75, 90, 110, 125, 140, and 160. A range of IZIFIT fittings are also available in sizes DN 200 and DN 225 for use with PE pipe.

Note: PE pipe sizes commonly used within the Australian Water Agency reticulation networks are DN 125, DN 180, DN 250, DN 280, DN 315 and DN 355.

The DI pipes are manufactured with an outside diameter compatible with AS/NZS 4130 polyethylene pipes. In conjunction with the compatible fittings the product range is intended to provide an integrated system for the two pipeline materials. The system also includes gate valves with IZIFIT sockets in sizes DN75 to DN160 manufactured to EN1074-2 *Valves for water supply*, however these valves have not been appraised to AS/NZS 2638.2 *Gate valves for water works purposes* and are not included in the scope of this Appraisal.

The available range of BLUTOP pipes and IZIFIT fittings is detailed in Tables 1 and 2.

Mechanical couplings, tapping bands and other fittings compatible with BLUTOP pipes are generally available within the Australian market.

BLUTOP pipes and IZIFIT fittings with non-restrained joints are rated at PN 25 whilst restrained joints are rated at PN 16.

Saint-Gobain PAM advise there is no requirement to utilize stiffener inserts in PE pipe when jointed to BLUTOP or IZIFIT socket joints as restraint is provided by the barbs on the stainless-steel inserts on the retaining ring; hence there is no significant compressive loading on the pipe. As the water pressure in the pipe increases, the pressure on the gasket and inserts also increases to assist in sealing and restraint.

Flanges incorporated on the fittings comply to the physical dimensions of EN 1092-2 and are drilled for compatibility to AS/NZS 4087 Fig B5 (PN16) or AS 2129 Table D dimensions. See Section 6.2.3 for further details.

A recently published standard, ISO16631 *Ductile iron pipes, fittings, accessories and their joints compatible with plastic (PVC or PE) piping systems, for water applications and for plastic pipeline connections, repair and replacement* is applicable to the BLUTOP pipe and IZIFIT fittings range, however Saint Gobain-PAM undertook testing to the relevant European standards prior to the publication of this standard. The test results submitted are considered equivalent to the tests prescribed in ISO 16631.

TABLE 1 BLUTOP DI PIPE, SP-SOC

DN / OD	Effective Length, m	Approximate Mass, kg	Allowable Operating Pressure (AOP), MPa	
			Non-Restrained Joint	Restrained Joint
75	6.0	30	2.5	1.6
90	6.0	37	2.5	1.6
110	6.0	46	2.5	1.6
125	6.0	53	2.5	1.6
140	6.0	60	2.5	1.6
160	6.0	71	2.5	1.6

TABLE 2 IZIFIT FITTINGS

Main Size:	75	90	110	125	140	160	200	225
Fitting Type:								
Soc-Soc Bend								
x 90	✓	✓	✓	✓	✓	✓	✓	✓
x 45	✓	✓	✓	✓	✓	✓	✓	✓
x 22 1/2	✓	✓	✓	✓	✓	✓	✓	✓
x 11 1/4	✓	✓	✓	✓	✓	✓		
Soc x Soc Tee								
x 75	✓	✓	✓	✓				
x 90		✓	✓	✓				
x 110			✓	✓	✓	✓		
x 125				✓	✓	✓		
x 140					✓	✓		
x 160						✓		
Soc-Soc Taper								
- 75		✓	✓	✓		✓		
- 90			✓	✓	✓	✓		
- 110				✓	✓	✓		✓
- 125					✓	✓	✓	
- 140						✓	✓	✓
- 160							✓	✓
- 200								✓
Soc x Fl Tee								
x 65	✓	✓	✓	✓	✓	✓	✓	✓
x 80		✓	✓	✓	✓	✓	✓	✓
x 100			✓	✓	✓	✓	✓	✓
x 150						✓	✓	✓
x 200							✓	✓
Fl-Soc - flange size		✓80	✓100			✓150	✓200	
Fl-Sp - flange size		✓80	✓100			✓150	✓200	
Soc Cap	✓	✓	✓	✓	✓	✓		
Soc Collar	✓	✓	✓	✓	✓	✓	✓	✓

4. SCOPE OF THE APPRAISAL

The scope of this product appraisal applies to the Saint-Gobain PAM range of BLUTOP ductile iron pipes for sizes DN 75, 90, 110, 125, 140 and 160. A range of IZIFIT ductile iron fittings is also included for sizes DN 75, 90, 110, 125, 140, 160, 200 and 225. See Section 3 for details.

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 *Ductile iron pipes, fittings, accessories and their joints for water pipelines - 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

A recently published standard, ISO16631 *Ductile iron pipes, fittings, accessories and their joints compatible with plastic (PVC or PE) piping systems, for water applications and for plastic pipeline connections, repair and replacement* is applicable to the BLUTOP pipe and IZIFIT fittings range, however Saint Gobain-PAM undertook testing to the relevant European standards prior to the publication of this standard. The test results submitted are considered equivalent to the tests prescribed in ISO16631. Product certification has since been achieved to ISO 16631.

Appraisal criteria are also determined by the WSAA Infrastructure Products and Materials Network and regularly reviewed to ensure that the criteria reflect the requirements of WSAA members.

The following 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 245 *Ductile iron fittings with restrained flexible joints for polyethylene pipe of nominal sizes 90 to 1000 in pressure applications – Water Supply and Sewerage*

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

6. COMPLIANCE WITH APPRAISAL CRITERIA

6.1. Compliance with Quality Assurance Requirements

Both the Saint-Gobain PAM owned Foug, France and Itauna, Brazil manufacturing facilities are quality endorsed Companies and hold ISO 9001 Licences issued by Bureau Verita and SGS respectively.

The following Quality Certificates have been submitted by St-Gobain PAM:

- Certificate of Conformity - BLUTOP Pipes and Fittings – ISO 16631:2016 - issued by Bureau Veritas.
- Attestation of Joint Performance - BLUTOP Pipe – EN 545 for joint testing both non-restrained and restrained joints - issued by Bureau Veritas.
- Attestation of Joint Performance – IZIFIT – EN 12842 for joint testing restrained joints with PE pipe - issued by Bureau Veritas.
- Attestation of Conformity – BioZinalium coating – EN 545 –issued by Bureau Veritas.
- Attestation of Compliance – Epoxy Coating for fittings – EN 14901- issued by Bureau Veritas.
- Attestation of Performance – Ductan lining for BLUTOP Pipe – EN 598 Abrasion Resistance Test - issued by Bureau Veritas.

Copies of the primary Quality Certificates have been included in Appendix B. Other QA certification is available for downloading from the WSAA member's website.

6.2. Compliance with Performance Requirements

6.2.1 Material properties

The pipes and fittings are manufactured from ductile iron conforming to the metallurgical properties of EN 545 *Ductile iron pipes fittings accessories and their joints for water pipelines.* The minimum tensile strength for pipes and fittings is 420MPa, the minimum elongation is 10% for pipes and 5% for fittings and the maximum hardness is 230HB for pipes and 250HB for fittings. A Certificate of Conformity Certificate No 523/003, issued by Bureau Veritas, has been submitted to demonstrate compliance.

6.2.2 Wall thickness

The minimum wall thickness for pipes and fittings is determined by a formula within EN545 but shall not be less than 3mm. A Certificate of Conformity Certificate No 523/003, issued by Bureau Veritas, has been submitted to demonstrate compliance.

The pipes and fittings are manufactured to minimum wall thicknesses to facilitate manual handling.

6.2.3 Flanges

The flanges incorporated on the IZIFIT fittings comply with the physical dimensions of EN 1092-2 (PN16) and are drilled to match AS/NZS 4087 Fig B5 (PN16) or AS2129 Table D configurations.

EN 1092-2 PN16 flanges have minor differences in outside diameter and raised face diameter compared to the AS/NZS 4087 PN16 flanges, however these differences do not prevent compatibility.

EN 1092-2 PN16 flanges incorporate additional or/and larger bolts than AS/NZS 4087 PN16 bolting configurations which facilitates slightly thinner flanges for some sizes. The effect on the pressure rating of the thinner flanges cannot be quantified from a desktop analysis.

WSAA is currently consulting with its members to determine a policy in relation to these differences. EN flanges drilled to AS/NZS configurations are known to have been commonly supplied within Australia for many years in sizes up to DN 200 without any adverse reports. It is also known that the thicknesses of AS/NZS 4087 Fig B5 flanges were originally determined on the basis of a PN 20 rating and are therefore overdesigned.

A comparison of nominal flange thicknesses is provided in Table 3.

TABLE 3 COMPARISON OF EN AND AS/NZS NOMINAL FLANGE THICKNESSES

DN	EN1092-2 PN16	AS/NZS4087
65	19	17*
80	19	19
100	19	20
150	19	23
200	20	23

* Thickness to AS 2129 Table D

The flanges proposed for this appraisal are deemed acceptable in sizes up to DN 200.

6.2.4 Elastomeric joints

The BLUTOP jointing system utilizes elastomeric seals for either non-restrained or restrained applications. A non-restrained BLUTOP gasket is provided when joining BLUTOP pipe together or BLUTOP pipe to IZIFIT fittings. A restrained BLUTOP gasket version is also available, with embedded stainless-steel inserts, to provide a self-anchoring joint when joining BLUTOP pipe together or BLUTOP pipe to IZIFIT fittings.

FIGURE 1 BLUTOP NON-RESTRAINED AND RESTRAINED GASKETS

The IZIFIT restrained jointing system is designed to join PE pipe to either a BLUTOP socket or an IZIFIT fitting socket. For sizes DN 75 to DN 125 the IZIFIT gasket incorporates stainless steel inserts to provide the necessary joint restraint. For larger sizes a BLUTOP non-restrained gasket is employed in conjunction with a gripper ring and gland, fitted to the socket profile by a quarter turn bayonet operation. Saint-Gobain PAM advises that it is in the process of developing an anchored gasket for these larger sizes.

FIGURE 2 IZIFIT RESTRAINED GASKETS DN 75-DN 125 AND DN 140-DN 225

A Data Sheet is available to provide more details of the application of these gaskets.

The BLUTOP joints have been type tested (both non-restrained and restrained) in accordance with EN545 and the IZIFIT restrained joints have been type tested in accordance with EN 12842 *Ductile iron fittings for PVC-U or PE piping systems - Requirements and test methods.* A Certificate of Attestation No CB188/14 6136580, issued by Bureau Veritas, has been submitted to demonstrate compliance.

6.2.5 Coatings-pipe

BLUTOP ductile iron pipes are externally coated with BioZinalium®, a copper enriched zinc-aluminium alloy with a minimum mass of 400 g/m^2. The coating is applied by electric arc spraying of the ZnAl (Cu) alloy wire onto the substrate layer of the ductile iron pipe.

A finishing layer of Aquacoat®, a water-based blue coloured single component acrylic is applied by spraying over the copper enriched zinc-aluminum alloy to a minimum thickness of 80 microns.

A Certificate of Attestation No CB188/14 6123960, issued by Bureau Veritas, has been submitted to demonstrate compliance to EN 545 and the coating is also WRc Approved.

6.2.6 Linings-pipe

The pipes are internally lined with Ductan®, a thermoplastic ethylene vinyl acetate co-polymer, applied in accordance with EN 14901 *Ductile iron pipes, fittings and accessories - Epoxy coating (heavy duty) of ductile iron fittings and accessories - Requirements and test methods.* The minimum coating thickness applied is 300µm.

A Certificate of Attestation No CB188/13/6038004, issued by Bureau Veritas, has been submitted to demonstrate compliance to the abrasion test defined in EN 598 *Ductile iron pipes, fittings, accessories and their joints for sewerage applications. Requirements and test methods.*

6.2.7 Coatings – fittings

Fittings are coated and lined with Akzo Nobel Resicoat R4-ES fusion bonded epoxy applied in accordance with EN 14901 *Ductile iron pipes, fittings and accessories - Epoxy coating (heavy duty) of ductile iron fittings and accessories - Requirements and test methods.*

The Resicoat R4 powder has a product certification StandardsMark licence issued by SAI Global.

A Certificate of Attestation No CB188/08/1684594, issued by Bureau Veritas, has been submitted to demonstrate application compliance to EN 14901.

It should be noted that AS/NZS4158 specifies minimum coating thicknesses for FBE coatings as 350µm for internal surfaces and 300µm for external surfaces, whilst the EN 14901 requirement is for a minimum of 250µm for all surfaces.

There are also differences in test procedures for other attributes which may not be directly comparable.

6.2.8 Angular joint deflection

Saint-Gobain PAM nominates 6^{o} deflection for pipe and fitting joints, except for those restrained joints where the gripper ring and gland is used. In such cases, the deflection is 3^{o}.

6.2.9 Contact with drinking water

Type test compliance to AS/NZS 4020 has been demonstrated for the BioZinalium coating system, Ductan material, Resicoat R4 FBE and the EPDM gasket material.

7. FITTING INSTRUCTIONS, TRAINING AND INSTALLATION

A brochure entitled Advice for Laying is included in Appendix A. In addition, Saint-Gobain PAM has an extensive library of literature available at www.pamline.com

8. PRODUCT MARKING

The BLUTOP and IZIFIT fittings are marked in accordance with EN 545 as follows:

- Manufacturers Name: PAM
- Year of Manufacture: 2015
- Pipe Material: Ductile or DI
- Nominal diameter: DN125
- Pressure rating of fitting: PN16

- Nominal Pressure of pipe: C25

9. PACKAGING AND TRANSPORTATION

Pipes are packed in bundles and strapped to imprinted wood. The spigot ends are fitted with protective sleeves. Fittings are packed on pallets and shrink wrapped.

Further details are available in the Advice for Laying brochure in Appendix A.

FIGURE 3 PACKING DETAILS FOR PIPES AND FITTINGS

10. 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 Saint-Gobain PAM warranty is included in their terms and conditions of sale.

11. WATER AGENCY EXPERIENCE WITH THE PRODUCT OR FIELD TESTING REPORT

The BLUTOP pipe and IZIFIT fittings system has been available within Europe for more than 10 years, however the system has not yet been used within Australia. A field test is required to be undertaken in conjunction with an Australian Water Agency by the end of July 2017.

12. DISCUSSION

The range of BLUTOP ductile iron pipes and IZIFIT® ductile fittings, compatible with polyethylene pipe to AS/NZS 4130, is an innovative concept for the Australian water industry.

The product is promoted as a long-life pipe with high mechanical strength and protection against external soil corrosion and internal water aggression. The jointing system provides for both non-restrained and restrained joints with high angular deflections. The system is light weight such that pipes can be carried by two people and lowered into the trench without the need for mechanical handling. Pipe fittings have ergonomically-designed handles for easy lifting.

Saint-Gobain PAM advise that BioZinalium® coated pipes are widely used within Europe in many soils without sleeving. However, there has been no experience in Australia to date and it is therefore imperative that suitable testing be undertaken to ensure that the soil environment meets the necessary pre-conditions. Saint-Gobain PAM offers a service to provide advice regarding the suitability or otherwise of BioZinalium coated pipes for a particular project.

13. OUTCOMES OF EXPERT PANEL PRODUCT REVIEW

There are no outstanding issues associated with the Expert Panel review process.

14. LIFE EXPECTANCY

14.1 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.

14.2 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^2 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^2 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^2 thickness and min 100μm thick finishing layer or enhanced zinc alloy coating with 400 g/m^2 thickness and min 100μm thick finishing layer can be buried without sleeving except:

For Zinc coatings

- soils with a resistivity less than 1500 Ω cm when laid above the water table, or less than 2500 Ω 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 Ω 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.

15. FUTURE WORKS

Saint-Gobain PAM is required to undertake a field trial and submit a Water Agency endorsed field trial report to WSAA by the end of November 2018. The time frame for this requirement has been extended as a project has yet to be installed.

16. 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.

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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).

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APPENDIX A –TECHNICAL MANUALS / BROCHURES

Technical brochures and Installation instructions are available at the following link:

http://www.pamline.com/pages/site/Gamme.asp?idrubriquecatalogue=10763

or by contacting Saint-Gobain PAM (see Appendix D)

Comprehensive pipe solutions

PAM SAINT-GOBAIN

blutop

CONTENT

Innovating for you

BENEFITS OF blutop

SUSTAINABLE DEVELOPMENT
The BLUTOP® solution was developed in keeping with the principles of sustainable development and delivers outstanding environmental performance.

EXTENDED SERVICE LIFE
As investment in renewing water supply infrastructure is declining in relative terms, water network managers are demanding longer service lives. Ductile iron components are not prone to ageing. Their mechanical properties remain constant over time.

LEAKTIGHTNESS
Reducing the amount of water lost in leaks from pipe systems is a major issue. BLUTOP® delivers a two-pronged solution, as ductile iron components (including pipes, fittings, valves and accessories) have an excellent reputation for both leaktightness and pressure resistance.

LESS ENERGY REQUIRED FOR PUMPING
Improving leaktightness reduces head losses, which in turn saves energy.

INSTALLATION
BLUTOP® revolutionises pipe installation and use. Pipe-laying operations are quicker because pipes and fittings can be transported by hand and inserted using a crowbar.

OPERATION
The BLUTOP® pipe range is compatible with existing plastic pipe networks and their related connection and maintenance accessories.

WATER QUALITY
In accordance with the major European regulatory requirements, drinking water Certificates have been obtained for all materials used in the BLUTOP® range (DUCTAN® coating, epoxy, elastomers, lubricating paste and repair products).

blutop

PRODUCTION "MADE IN EUROPE"

Saint-Gobain PAM in Europe:

- **factories in France, Germany, United Kingdom, Spain, Italy and Czech Republic**
- **4,500 employees**
- **1 research centre**
- **1,500 patents**

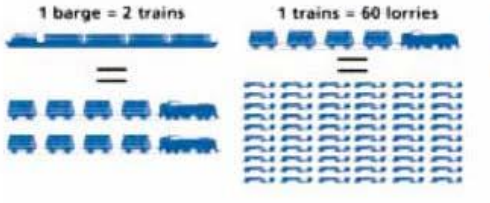
BLUTOP® A EUROPEAN TECHNOLOGICAL BREAKTHROUGH!

BLUTOP® awards:

- 8 patents
- Société Industrielle de L'Est award
- Saint-Gobain Arches for Innovation award
- Innovation Award presented by Brazil's largest water company, SABESP

4

Sustainable development



65% of raw materials used in the production process are carried by river, rail and/or sea.

We all need to take responsibility for the environment

5

blutop

A RANGE DESIGNED TO LAST MORE THAN 100 YEARS

TARGET - 100 YEARS!

The replacement rate for water networks is less than 1% per year (around 0.6% in France).We expect that pipelines laid today will last more than 100 years, which is longer than the periods adopted in conventional depreciation calculations and longer than the service life specified in the applicable standards.

To achieve this durability target, BLUTOP® features:

- High mechanical strength
- Protection against soil aggression
- Protection against water aggression
- Flexible junctions

BLUTOP where I live:

An economically and

environmentally sound choice!

Designed and manufactured in Europe

Forward thinking asset management

Sustainable development

6

Durability

Ductile iron

HIGH MECHANICAL STRENGTH

BLUTOP® pipes are marketed as pressure class C25 (25 bar) products. Burst tests conducted on DN/OD 110 products yielded actual failure values in excess of 150 bar.
Each pipe is subjected to a factory pressure test at 40 bar followed by a gas-tightness test after the interior coating has been applied.

DN/OD	75	90	110	125	140	160
Diametrical rigidity	656 kN/m²	373 kN/m²	201 kN/m²	136 kN/m²	113 kN/m²	103 kN/m²

As the table above shows, BLUTOP® pipes have excellent diametrical rigidity, which helps to prevent ovalisation when buried.

BioZinalium®

PROTECTION AGAINST SOIL CORROSION

The BioZinalium® coating consists of two layers:

- **A layer of zinc-aluminium 85/15 alloy, enriched with copper, with a minimum surface density of** 400g/m², applied by spraying molten metal onto the surface of the iron, using an electric arc spray gun, from ZnAl (Cu) alloy wire.
- **A protective layer of Aquacoat® (semi-permeable),** a water-based blue acrylic of average thickness 80 microns applied using a spray gun.

The BioZinalium® coating retains the «active» properties of the Zinalium® coating when in contact with the ground, which provides Overall corrosion protection (service life extended by a factor of three).

Furthemore, the copper enrichment of the ZnAl (Cu) alloy helps, by leveraging the bactericidal properties of copper, to reduce the possible risk of localised bio-corrosion.

Ductan®

RESISTANCE TO WATER AGGRESSION

Water can attack pipes, either as a result of its mineral composition or because it contains disinfectants or other chemical treatments.
Saint-Gobain PAM has opted to apply an ultramarine blue DUCTAN® thermoplastic interior coating rather than the cement lining traditionally used with cast iron pipes.

Key features:
- Outstanding adhesion, with a mean tear strength of 15 MPa (150 kg/c m²) and a minimum of 8 MPa (an important value for tapping under load and on-site cutting).
- Perfectly smooth for optimum flow
- Full and uninterrupted protection for the pipe shell, bell and spigot
- The lightweight but extremely tough DUCTAN® coating enables the weight of BLUTOP® pipes to be reduced by 25%.

blutop

LEAKTIGHTNESS

GUARANTEED LEAKTIGHTNESS

Water authorities all around the world have to keep in mind the reduction of leakage rates and the respect of a defined budget frame work. These concerns have a direct influence on maintenance, renewal and extension programmes for water networks, as well as encouraging the choice of reliable and durable pipes.

Blutop® is Saint-Gobain PAM's practical response to the genuine concerns of investors, managers and operators in charge of water distribution networks.

Blutop joint performance makes easier the installation of the pipeline and contributes to a reliable operation of the network (normal service pressure and transient surge pressure conditions).

CHANNELLING THE JOINTING FORCE

The Blutop joint has been specially designed in order to guarantee:

- Easy laying with a lower force requirement to allow for jointing using a crowbar
- Safe laying thanks to a mechanism to prevent the gasket from becoming loose during assembly
- Support points along the fittings make for easy jointing along the correct axis plane

Joint reliability

CONTROLLED INSERTION FORCE

The BLUTOP® joint features a unique, optimised design and was developed in close cooperation with pipe laying teams:

- The insertion force is adjusted by hand using just a crowbar, making pipe-laying much easier.
- Designed for reliable installation with a device to prevent the joint gasket from being ejected during assembly.
- Fittings feature load bearing points enabling them to be easily pushed into position when aligned with the pipe.

PRESSURE TESTS PERFORMED IN EXTREME CONDITIONS

Buried pipe runs are subject to multiple pressure variations (due to day/night cycles, water hammer effects, pressure exerted by the water table, etc.).

BLUTOP® joints have been rigorously tested in accordance with the criteria defined in the EN545 standard, in extreme angular deviation and dimensional tolerance conditions.
In particular, joint performance was tested in the following circumstances:

- Transient surge in operating pressure (at least 1.5 times the maximum allowable working pressure of the joint),
- Vacuum due to draining or cavitation
- Pressure pulses near pumps (24,000 cycles)
- External pressure exerted by a water table

Saint-Gobain PAM developed these tests with the aid of state-of-the-art finite-elements computer modelling techniques.

A FLEXIBLE JOINT WHICH ADAPTS TO GROUND MOVEMENTS

Both the anchored and unanchored versions of BLUTOP® joints are designed to withstand a particularly high angular deviation of 6°.
The enhanced jointing depth also decreases the risk of pipe dislocation.
As a result, BLUTOP® offers excellent performance in soil subject to ground movements.

Angular deviation
(with anchored and unanchored joints)

blutop

INCREASED EFFICIENCY

MANUAL INSTALLATION

Easier pipe-laying conditions are a key benefit with the BLUTOP® range: transport to hard-to-reach locations; lowering into trenches; assembly in confined spaces, etc.

BLUTOP® has proved its effectiveness in the field, significantly improving the operating efficiency and working conditions of pipe-laying teams.

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Installation

IMPORTANT BENEFITS !

TRANSPORTABLE BY HAND

BLUTOP® pipes can be carried by two people without the need for mechanical handling equipment.
Pipes can be brought right to the edge of the trench, even in hard-to-reach locations. They can be lowered into the trench without using mechanical lifting equipment. Pipe fittings have ergonomically-designed handles for easy handling.

PIPES INSERTED USING A CROWBAR

Pipes and fittings can be inserted using just a crowbar. This achievement is attributable to:
- The design of the BLUTOP® junction, which has been optimised to reduce the required insertion force.
- The shape of the fittings, which feature load-bearing points against which the crowbar can be positioned in order to apply force in exactly the right direction, along the insertion plane.

FASTER PROGRESS AT WORKSITES

BENEFITS

- **Easily-cleaned socket**. The flowing lines of the socket enable it to be easily cleaned if contaminated by earth from the trench.
- **Easily-fitted joint.** The pre-lubricated joint fits easily into the socket without causing deformation.
- **Quick to cut.** The thinner iron wall and the use of a DUCTAN® coating rather than a cement lining help to decrease cutting times and disk wear.
- **Easy hole cutting.** BLUTOP® hole-cutting tools cut the DUCTAN® coating cleanly and systematically recover the cut core.
- **Fewer fittings.** The exceptional angular deviation (up to 6°) at joints means that fewer fittings are required, thereby reducing the cost of works.

For more information, please refer to the "installation advice" guide.

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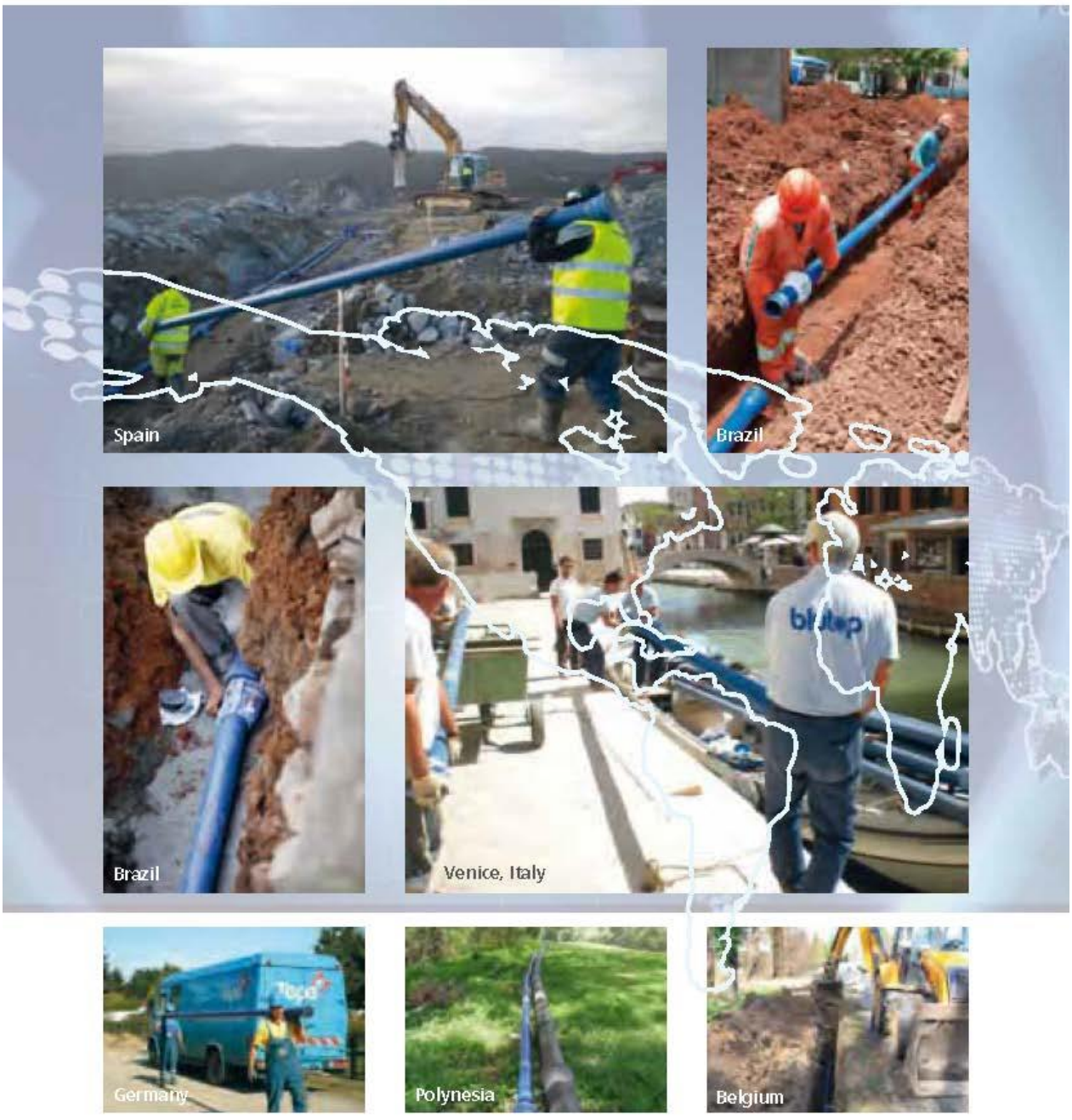
A SHARED SUCCESS ACROSS 17 COUNTRIES



Ecopose

THE ECO-INSTALLATION ADVANTAGE OF BLUTOP®

Traditional installation with brought-in backfill

95 % compression (SPO*)

Eco- installation using original backfill

85 % compression (SPO*)

* SPO : Standard Proctor Optimum

500 m of pipes laid using the ECOPOSE technique saves 1 tonne of carbon emissions!

ECOPOSE SAVINGS

- Cover = **less filler material required**
- Fewer truck journeys = **lower carbon emissions**
- Ductile iron = **endlessly recyclable**
- Anchoring = no concrete stops = **lower carbon emissions**

TESTIMONIAL

In Valleroy-aux-Saules, DN 110, PFA 25 bar :

«Also, everyone involved in this project agreed that using natural backfill offers significant gains by eliminating the need to bring in additional materials. »

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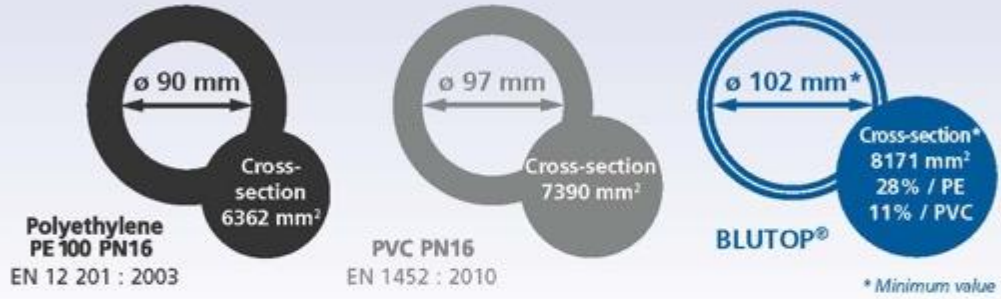
blutop

OPERATION-ORIENTED DESIGN

The BLUTOP® range has been designed with careful consideration for water network operators' requirements. The range's dimensional compatibility with PE or PVC plastic pipes is a major advantage when extending the existing network or replacing old or prematurely aged pipe sections.

Example : DN/OD 110



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Operation

Hydraulic diameters of PVC, HDPE and BLUTOP® pipes

	PVC	Polyethylene		BLUTOP®
PN/PFA	16	PE 80 16	PE 100 16	25
DN/OD 75	64	58	61	68
DN/OD 90	77	70	74	83
DN/OD 110	97	85	90	103
DN/OD 125	110	97	102	118
DN/OD 140	123	109	115	132
DN/OD 160	141	124	131	152

PVC pipe as per EN 1452 and PE pipe as per EN 12201

LOWER PUMPING COSTS

Head losses are reduced by a combination of a large hydraulic cross-section and the perfectly smooth DUCTAN® lining.

These characteristics help to cut pumping costs, and in some cases, enable sufficient water flow rates for fire protection purposes in remote locations (60 m³/h as specified in the French ministerial memo of 10/12/1951)

FULLY COMPATIBLE WITH PLASTIC PIPES

BLUTOP® pipes and fittings are designed to be compatible with plastic pipes and accessories.

PVC or HDPE pipe spigots that comply with applicable standards can be inserted into BLUTOP® pipes and fittings.

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SUSTAINABLE AND RELIABLE

SUSTAINABLE DEVELOPMENT COMMITMENT

The finishing coat (pore sealer) of BioZinalium® is produced using an emulsion of water-based acrylic-PVDC resin, which contains neither organic solvents nor Bisphenol A (BPA).

It contributes to :

- reducing emissions of volatile organic compounds (VOCs) into the atmosphere,
- complying with sanitary recommendations for reducing the risk of exposure for the population and the environment to BPA.

As an illustration, the move to acrylic paint in 2012 helped to reduce VOC emissions by 24 % in our Saint-Gobain PAM plants.

Water quality

CAREFULLY SELECTED MATERIALS

All materials used in BLUTOP® components that come into contact with water have drinking water certificates. They comply with European regulations, and are fully suitable for the distribution of potable water.

EUROPEAN APPROVAL

The BLUTOP® range is designed for use throughout Europe. It has already been approved at national level as follows:

- Certificate of conformity with the Belgian "Hydrocheck" approval procedure issued by Belgaqua
- Certificate of conformity with the German UBA-Guideline and DVGW-W270 approval procedures issued by the Hygiene-Institut des Ruhrgebiets in Gelsenkirchen
- Certificate of conformity with the BS 6920 standard issued by WRAS in the United Kingdom
- Certificate of conformity with "DWI Regulation 31 (4)(a)" in England, Wales and Scotland, issued by DWI on the basis of a report by WRc.

INERT IN CONTACT WITH WATER

DUCTAN® is an extremely pure lining material. It successfully passed all tests relating to the migration of organic compounds into water.

AN ECOLOGICAL AND SAFE CHOICE

Thanks to its AQUACOAT® painting, BioZinalium® not only has a low environmental impact, but also is a solution to public health concerns.


Handle
BLUTOP® anchored joint with deviation up to 6°
Bend fitting
250 µm-thick fusion bonded epoxy exterior coating
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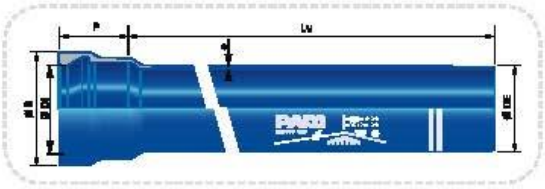
A complete solution

blutop

PIPES



Pipe

DN/OD mm	DI** mm	Lu m	Class bar	nominal th.mm	DE mm	DI mm	P mm	B mm	Weight kg/m	Reference
75	75	6	25	3.0	75.0	77.7	82.0	113.0	5.10	KXL75H60AQ
90	90				90.0	92.7	84.0	130.2	6.20	KXL90H60AQ
110	110				110.0	112.8	87.0	149.5	7.60	KXM11H60AQ
125	125			3.1	125.0	128.0	92.0	164.0	8.90	KXM12H60AQ
140	140				140.0	143.1	94.4	183.0	10.00	KXM14H60AQ
160	160				160.0	163.3	97.5	202.0	11.80	KXM16H60AQ

Standard BLUTOP® Gasket

DN/OD mm	PFA bar	Weight kg	Reference
75	25	0.059	JXL75BA
90		0.067	JXL90BA
110		0.081	JXM11BA
125		0.108	JXM12BA
140		0.140	JXM14BA
160		0.169	JXM16BA

Anchored BLUTOP® Gasket

DN/OD mm	PFA bar	Weight kg	Reference
75	16	0.067	JXL75CA
90		0.076	JXL90CA
110		0.093	JXM11CA
125		0.118	JXM12CA
140		0.190	JXM14CA
160		0.221	JXM16CA

DN 75 to 125

DN 140 and 160

Anchored IZIFIT® Gasket

DN/OD mm	Weight kg	Reference
75	0.109	JIL75CA
90	0.125	JIL90CA
110	0.146	JIM11CA
125	0.189	JIM12CA

Locking extension piece

DN/OD	Weight kg	Reference
63	1.560	JZL63VX
140	2.800	JZM14VX
160	3.100	JZM16VX
200	4.180	JZM20VX
225	4.640	JZM22VX

The blutop range

FITTINGS

Non-sliding collar

DN/OD mm	ØOD mm	P mm	Lu mm	Weight kg	Reference
90	90	92.5	40	4.00	KXL90MN
110	110	99.0		4.90	KXM11MN
125	125	104.0		5.50	KXM12MN

Semi-sliding collar with bulge for hole-cutting

DN/OD mm	ØOD mm	P mm	L mm	Weight kg	Reference
75	75	87.0	254	5.30	KXL75MM
90	90	92.5	265	6.30	KXL90MM
110	110	99.0	275	7.30	KXM11MM
125	125	104.0	295	8.80	KXM12MM
140	140	108.0	305	9.00	KXM14MM
160	160	114.0	315	10.70	KXM16MM

Bend

Angle (degrees)	DN/OD mm	ØOD mm	P mm	Lu m	Weight kg	Reference
90° 1/4	75	75	87.0	70.0	4.40	KXL75CA
	90	90	92.5	75.0	5.50	KXL90CA
	110	110	99.0	85.0	7.10	KXM11CA
	125	125	104.0	110.0	8.80	KXM12CA
	140	140	108.0	110.0	9.50	KXM14CA
	160	160	114.0	130.0	12.30	KXM16CA
45° 1/8	75	75	87.0	45.0	4.20	KXL75CB
	90	90	92.5	50.0	5.10	KXL90CB
	110	110	99.0	60.0	6.20	KXM11CB
	125	125	104.0	65.0	7.00	KXM12CB
	140	140	108.0	70.0	8.65	KXM14CB
	160	160	114.0	70.0	10.30	KXM16CB
22°30 1/16	75	75	87.0	25.0	3.40	KXL75CD
	90	90	92.5	30.0	4.40	KXL90CD
	110	110	99.0	30.0	5.50	KXM11CD
	125	125	104.0	30.0	6.60	KXM12CD
	140	140	108.0	35.0	6.97	KXM14CD
	160	160	114.0	35.0	9.20	KXM16CD
11°15 1/32	75	75	87.0	25.0	3.50	KXL75CE
	90	90	92.5	25.0	3.80	KXL90CE
	110	110	99.0	30.0	5.80	KXM11CE
	125	125	104.0	30.0	6.70	KXM12CE
	140	140	108.0	30.0	7.00	KXM14CE
	160	160	114.0	35.0	9.10	KXM16CE

Duckfoot bend

Angle (degree)	DN/OD mm	ØOD mm	dn mm	P mm	Lu m	h mm	k mm	Weight kg	Reference
90° 1/4	75	75	80	87.0	165	110	107	8.30	KXL75DF0E
	90	90	80	92.5	165	110	107	8.00	KXL90DF0E
	110	110	80	99.0	180	125	126	11.40	KXM11DF0E
	125	125	80	104.0	220	120	146	13.60	KXM12DF0E
	140	140	80	108.0	220		146	14.00	KXM14DF0E
	160	160	80	114.0	220	150	146	16.20	KXM16DF0E
	160	160	100	114.0	220	150	146	16.40	KXM16DF0F

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Taper

DN/OD mm	ØOD mm	Ød mm	P mm	p m	Lu mm	Weight kg	Reference
90	90	75	92.5	87.0	40.0	3.56	KXL90VE0C
110	110	75	99.0	87.0	50.0	4.60	KXM11VE0C
	110	90		92.5	50.5	5.00	KXM11VE0D
125	125	75	104.0	87.0	55.0	5.10	KXM12VE0C
	125	90		92.5	50.0	5.20	KXM12VE0D
	125	110		99.0	45.0	5.50	KXM12VE0E
140	140	90	108.0	92.5	50.0	5.51	KXM14VE0D
	140	110		99.0	45.0	5.91	KXM14VE0E
	140	125		104.0	45.0	6.29	KXM14VE0G
160	160	75	114.0	87.0	65.0	6.50	KXM16VE0C
	160	90		92.5	60.0	7.00	KXM16VE0D
	160	110		99.0	55.0	7.40	KXM16VE0E
	160	125		104.0	50.0	7.80	KXM16VE0G
	160	140		108.0	50.0	7.43	KXM16VE0H

Flanged spigot

DN/OD mm	ØOD mm	Flange DN mm	PN bar	Lu mm	L mm	B mm	Weight kg	Reference
75	75	60	10-16	98	158	175	3.85	KXL75BU1C
75	75	65		98	158	185	4.15	KXL75BU1D
90	90	80		102	167	200	4.80	KXL90BU1E
110	110	100		110	180	220	6.00	KXM11BU1F
125	125	125		114	188	250	7.90	KXM12BU1G
140	140	125		119	190	250	8.56	KXM14BU1G
160	160	150		127	197	285	12.10	KXM16BU1J

Flanged socket

DN/OD mm	ØOD mm	Flange DN mm	PN bar	P mm	Lu mm	B mm	Weight kg	Reference
75	75	60	10-16	87.0	58	175	5.00	KXL75BE1C
75	75	65		87.0	58	185	5.30	KXL75BE1D
90	90	80		92.5	68	200	5.50	KXL90BE1E
110	110	100		99.0	68	220	6.70	KXM11BE1F
125	125	125		104.0	66	250	8.20	KXM12BE1G
140	140	125		108.0	62	250	9.15	KXM14BE1G
160	160	150		114.0	68	285	11.00	KXM16BE1J

Anchored flange adapter

DN/OD mm	DN mm	A	B	Weight kg	Reference
75	60-65	58	185	2.50	226300
90	80	62	200	2.80	216901
110	100	68	220	3.40	216902
125	125	73	250	4.30	216906
140	125	76	250	5.00	233658
160	150	82	285	5.70	226301

Unanchored flange adapter

DN/OD mm	DN mm	A	B	Weight kg	Reference
75	60-65	58	185	2.30	MAL75DACH
90	80	62	200	2.60	MAL90DACH
110	100	68	220	3.10	160754
125	125	73	250	4.10	160755
140	125	76	250	4.10	160756
160	150	82	285	5.20	160757

The blutop range

Flanged tee with two sockets

DN/OD mm	ØOD mm	Flange DN	PN bar	P mm	Lu m	Hu mm	B mm	Weight kg	Reference
75	75x40	40	10-16	87.0	60.0	130.0	150.0	5.80	KXL75TD1A
	75x60	60			85.0	140.0	175.0	7.80	KXL75TD1C
	75x65	65			85.0	140.0	185.0	8.20	KXL75TD1D
90	90x40	40	10-16	92.5	65.0	135.0	150.0	6.80	KXL90TD1A
	90x60	60			90.0	155.0	175.0	8.60	KXL90TD1C
	90x65	65			90.0	160.0	185.0	8.70	KXL90TD1D
	90x80	80			105.0	160.0	200.0	9.40	KXL90TD1E
110	110x40	40	10-16	99.0	65.0	145.0	150.0	7.60	KXM11TD1A
	110x60	60			90.0	165.0	175.0	9.40	KXM11TD1C
	110x65	65			90.0	160.0	185.0	9.50	KXM11TD1D
	110x80	80			105.0	170.0	220.0	11.00	KXM11TD1E
	110x100	100			125.0	170.0	220.0	12.20	KXM11TD1F
125	125x40	40	10-16	104.0	65.0	160.0	150.0	9.20	KXM12TD1A
	125x60	60			90.0	160.0	175.0	10.80	KXM12TD1C
	125x65	65			90.0	160.0	185.0	11.10	KXM12TD1D
	125x80	80			105.0	170.0	200.0	11.50	KXM12TD1E
	125x100	100			125.0	180.0	220.0	12.20	KXM12TD1F
	125x125	125			150.0	180.0	250.0	15.00	KXM12TD1G
140	140x40	40	10-16	108.0	65.0	160.0	150.0	9.34	KXM14TD1A
	140x60	60			90.0	180.0	175.0	11.04	KXM14TD1C
	140x65	65			90.0	180.0	185.0	11.20	KXM14TD1D
	140x80	80			105.0	185.0	200.0	12.35	KXM14TD1E
	140x100	100			125.0	195.0	220.0	14.03	KXM14TD1F
	140x125	125			150.0	200.0	250.0	16.28	KXM14TD1G
160	160x40	40	10-16	114.0	65.0	170.0	150.0	11.30	KXM16TD1A
	160x60	60			90.0	190.0	175.0	12.90	KXM16TD1C
	160x65	65			90.0	190.0	185.0	12.90	KXM16TD1D
	160x80	80			105.0	200.0	200.0	14.30	KXM16TD1E
	160x100	100			125.0	205.0	220.0	16.40	KXM16TD1F
	160x125	125			150.0	210.0	250.0	18.00	KXM16TD1G
	160x150	150			175.0	220.0	285.0	20.30	KXM16TD1J

Tee with three sockets

DN/OD mm	ØOD mm	P mm	p mm	Lu m	Hu mm	Weight kg	Reference
75	75x75	87.0	87.0	85.0	52.0	5.60	KXL75TE0C
90	90x75	92.5	87.0	90.0	60.0	6.30	KXL90TE0C
	90x90	92.5	92.5	105.0	56.0	6.80	KXL90TE0D
110	110x75	99.0	87.0	90.0	70.0	8.00	KXM11TE0C
	110x90		92.5	105.0	67.0	7.80	KXM11TE0D
	110x110		99.0	134.0		8.70	KXM11TE0E
125	125x75	104.0	87.0	90.0	75.0	8.80	KXM12TE0C
	125x90		92.5	105.0	74.0	9.20	KXM12TE0D
	125x110		99.0	125.0		10.00	KXM12TE0E
	125x125		104.0	150.0		11.00	KXM12TE0G
140	140x110	108.0	99.0	125.0	82.0	10.55	KXM14TE0E
	140x125		104.0	150.0		11.46	KXM14TE0G
	140x140		108.0	155.0		11.90	KXM14TE0H
160	160x110	114.0	99.0	125.0	92.0	13.00	KXM16TE0E
	160x125		104.0	140.0		13.60	KXM16TE0G
	160x140		108.0	150.0		13.25	KXM16TE0H
	160x160		114.0	175.0		15.10	KXM16TE0J

Cap

DN/OD mm	ØOD mm	Lu mm	Reference	Weight kg
75	75	101.0	KXL75BH	1.60
90	90	107.0	KXL90BH	2.00
110	110	113.0	KXM11BH	2.20
125	125	118.0	KXM12BH	2.95
140	140	122.0	KXM14BH	3.00
160	160	128.0	KXM16BH	4.30

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VALVES

Euro 20® valve - PFA 16 bar

DN/OD	Anticlockwise-to-close, bonnet		Clockwise-to-close, bare screw	
	Reference	Weight kg	Reference	Weight kg
75	RDL75KDXH	12.3	RDL75KBXH	12.1
90	RDL90KDXH	12.8	RDL90KBXH	12.6
110	RDM11KDXH	16.2	RDM11KBXH	16.0
125	RDM12KDXH	22.8	RDM12KBXH	22.6
140	RDM14KDXH	24.8	RDM14KBXH	25.0
160	RDM16KDXH	30.0	RDM16KBXH	29.8

Connection with BLUTOP® pipe - BLUTOP® anchored joint

DN/OD	Weight kg	Reference
75	0.067	JXL75CA
90	0.076	JXL90CA
110	0.093	JXM11CA
125	0.118	JXM12CA
140	0.190	JXM14CA
160	0.221	JXM16CA

Connection with PVC-U, PVC-BO and PE - Anchored IZIFIT® joint 16 bar

DN/OD	Weight kg	Reference
75	0.109	JIL75CA
90	0.125	JIL90CA
110	0.146	JIM11CA
125	0.189	JIM12CA
140*	2.800	JZM14VX + JXM14BA
160*	3.100	JZM16VX + JXM16BA

*DN 140 and 160 : locking extension piece

CONNECTIONS

MPE multimaterial collars / PFA 16 bar

For main pipes		Small bulge M 40 x 3		Large bulge M 55 x 3	
Nominal DN	Min-max. OD	Reference	Weight	Reference	Weight
75	75 - 83	RSL75CPAB	1.80	-	-
90	88 - 100	RSL90CPAB	2.00	RSL90CQAB	2.20
110	110 - 122	RSM11CPAB	2.40	RSM11CQAB	2.30
125	125 - 137	RSM12CPAB	2.40	RSM12CQAB	2.30
140	139 - 150	RSM14CPAB	2.60	RSM14CQAB	2.70
160	160-172	RSM16CPAB	2.70	RSM16CQAB	2.80

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CONNECTIONS

Collars for PVC and PE pipes and BLUTOP® pipes / PFA 16 bar

For main pipes DN	Small bulge M 40 x 3		Large bulge M 55 x 3	
	Reference	Weight kg	Reference	Weight kg
75	173886	2.40	202176	2.50
90	173887	2.90	178312	2.90
110	173888	3.10	178313	3.30
125	178297	3.45	178314	3.45
140	173889	3.50	178315	3.60
160	202177	3.70	202178	3.80

TOOLS

bludrill for tapping BLUTOP® pipes

Reference	Weight kg
228099	6.00

Complete tapping tool for BLUTOP® pipes

Diameter	Reference	Weight kg
19	214191	0.19
24	214193	0.20
30	214195	0.26
38	214196	0.27

Multi-tooth core cutting attachment only (for tapping BLUTOP®) pipes

Diameter	Reference	Weight kg
19	215444	0.10
24	215445	0.12
30	215446	0.17
38	215447	0.24

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TOOLS

BLUTOP® PIPE TAPPING ACCESSORIES

BLUTOP® tapping adapters for EIE machines

Description	Weight in kg	Reference
EIE/PAM machine adapter DN 20	0.98	220947
EIE/PAM machine adapter DN 25	1.32	220948
EIE/PAM machine adapter DN 32	1.20	220949
EIE/PAM machine adapter DN 40	1.34	220950

Tools and accessories for EIE/PAM tapping machines

Désignation	Weight in kg	Reference
1 EIE/PAM origin rod (D17 M14 L 402 mm)	0.68	220956
2 TOP rod M14 L 402 for electric screwdrivers	0.65	220899
3 CR66 kit disassembly wrench	0.38	220898
4 14 mm socket for electric screwdrivers	0.34	220951
5 1" flange female adapter disk	0.72	220900
6 2" flange male adapter disk	0.43	220922
7 M14-M12 male/male nipple	0.05	220911
8 M14-M12 male/female taper	0.02	221662
9 Windlass handle	0.45	220921
10 Electric screwdriver extension shaft D12/M14 L 150 mm	0.14	220923
11 Electric screwdriver extension shaft D12/M14 L 45 mm	0.04	220931
12 Bosch 14.4 V electric screwdriver	5.30	220979
13 Drill-bit locking screw	0.02	220952
14 Centring drill-bit DN 8	0.04	220954
15 Bare core-cutting attachment 20 25 32 (40 excluded)	0.05	220955
16 8x28 cotter pin (spline)	0.02	220953

ADAPTER KIT FOR OTHER TAPPING MACHINES

Description	Weight in kg	Reference
17 HUOT adapter kit / DN 20. 25. 32 and 40	2.70	220932
18 Saint-Germain and Staub + PAM adapter kit / DN 20 25. 32	1.47	220933
19 Pamco adapter kit / DN 20. 25. 40	1.62	220934
20 Iseo/Bayard adapter kit / DN 20. 25. 32. 40	2.11	220935
21 AVK adapter kit / DN 20. 25. 32 and 40	2.13	220946
22 HAWLE M/M adapter kit	2.70	225113
23 Adapter kit for VHM machines (2"F)	2.60	228109

The blutop range

INSTALLATION

Blutrak laying trolley for narrow trenches

Description	Weight in kg	Reference
Mother and daughter trolleys + accessories	201	237026
Box	55	NC

EXACT cutting machine

Pipe Cutting System 230 V — 50-60 Hz	Weight in kg	Reference	Range of use DE iron pipe mm	Max pipe wall	Blade diameter
EXACT 170E	5.7	239649	15-170	8	X140

Recommended by Saint-Gobain PAM
- Lightweight, safe, self-guided
- Clean cut and fast cutting
- Perfectly straight
- Power supply

ACCESSORIES

BLUTOP® pipe repair product

Description	Weight in kg	Reference
Can of Aquacoat® BLUTOP	0.75	240992

BLUTOP® lubricating paste

Description	Weight in kg	Reference
BLUTOP® lubricating paste	0.850	214611

Pack of 10 BLUTOP® flexible sleeves

DN/OD	Reference
75	224053
90	223164
110	223163
125	223165
140	—
160	228021

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MECHANICAL SPECIFICATIONS OF PIPES AND FITTINGS

The metallurgical properties of BLUTOP® pipes and fittings are as specified in the EN 545 standard

Property	Unit	Pipes	Fittings
Minimum tensile strength, Sm	MPa	420	420
Minimum rupture strain, A	%	10	5
Maximum Brinell hardness	HB	230	250
Minimum Young's modulus	GPa	170	170

PIPE SPECIFICATIONS

According "Avis Technique CSTB".

DN/OD	75		90		110		125		140		160	
Outside diameter and tolerances (mm)	75	+0.5 - 1.0	90	+0.6 - 1.2	110	+0.7 - 1.0	125	+0.8 - 1.0	140	+0.9 - 1.0	160	+1.0 - 1.0
Mean internal diameter (mm)	68		83		103		118		132		152	
Nominal iron thickness (mm)	3.0		3.0		3.0		3.1		3.1		3.1	
Design thickness (mm) (1)	2.2		2.2		2.2		2.3		2.3		2.3	
Nominal density (kg/m) (2)	5.1		6.1		7.6		8.9		10		11.5	
Nominal mean hydraulic cross-section (mm^2)	3,632		5,411		8,332		10,936		13,685		18,146	

(1) The pipe wall must not be thinner than the design thickness at any point
(2) Guide iron weight, assuming a mean wall thickness of 3.0 mm

TECHNICAL SPECIFICATIONS OF THE DUCTAN® LINING

The table below shows the main properties of DUCTAN®.

Property	Value
Colour	Ultramarine blue (similar to RAL 5002)
Density (dry film)	0.96 g/cm^3
Adherence (ISO 4624)	≥ 10 MPa on shot-blasted steel plate
Shore D hardness	44
Rupture strain (ISO 527)	≥ 400%
Stress cracking (ASTM D1693)	> 1,000h
Induction time before oxidisation at 200°C (EN 728) of DUCTAN® powder	> 10 min in oxygen

Technical specifications

The table below shows the main performance parameters for the DUCTAN® lining applied to the interior of BLUTOP® pipe cylinders.

Property	Criterion
Adherence	• 15 MPa mean value (8 MPa minimum value)
Non-porosity (holiday detector inspection)	• Holiday-free inner surface lining when measured at a voltage of 1,500 V
Reverse impact strength (opposite surface)	• No holiday detector jolts when subjected to a 10 J impact
Smoothness coefficient	< 0.01mm

The table below shows the main in-water ageing performance parameters for the DUCTAN® lining applied to the interior of BLUTOP® pipe cylinders.

Durability – Resistance to thermal ageing in water	Criterion in scratch	Criterion away from scratch
The durability of the DUCTAN® interior corrosion protection is measured following an immersion test in water at a temperature of 50°C, conducted in accordance with EN ISO 2812-2-1995. The exposure time is 480 h. An inverted V (starting from the acute angle) measuring 1 mm in width and at least 50 mm in length is etched into each test specimen. Two areas are assessed	• Maximum blister width on each side of the scratch: <5 mm	Blistering: ID<2 mm and OD<2 mm as per EN ISO 4628-2
	• Maximum corrosion propagation width on each side of the scratch: <5 mm	Corrosion < Ri1 as per EN ISO 4628-3
	–	Mean adherence evaluated by tensile testing in accordance with EN ISO 4624-2003: Requirement ≥ 6 MPa

TECHNICAL SPECIFICATIONS OF THE BIOZINALIUM® COATING

The BioZinalium® coating consists of two layers:
• A layer of zinc-aluminium 85/15 alloy, enriched with copper, with a minimum surface density of 400g/m2, applied by spraying molten metal onto the surface of the iron, using an electric arc spray gun, from ZnAl (Cu) alloy wire.
• A protective layer of Aquacoat® (semi-permeable), a water-based blue acrylic of average thickness 80 microns applied using a spray gun.

TECHNICAL SPECIFICATIONS OF THE EPOXY COATING ON FITTINGS

This performance complies with the requirements of the standard EN 14901.

Performance tests	Criterion
Non-porosity	Holiday free detector jolts at 1,500 V
Impact resistance	Holiday free detector jolts at 1,500 V when the specimen is subjected to a 5 J impact
Durability – Resistance to thermal ageing in water	After applying the test procedure, the coating must have a mean adherence of at least 6 MPa.
Indentation resistance	The indentation depth measured after 48 h must not exceed 30% of the original measured coating thickness. Any increase in indentation depth measured between 24 h and 48 h must be less than that measured between 0 and 24 h and must not exceed 5% of the original measured coating thickness.
Durability – Resistance to thermal ageing in air	The coating must remain non-porous after applying the test procedure

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APPLICATION SCOPE DEPENDING ON SOIL CONDITIONS

The pipes and fittings in the BLUTOP® range are suitable for burying in most types of ground, as defined in the EN 545:2010 standard, Annex D.2.2 "Scope of Application", with the following exceptions:
- acidic peaty ground;
- ground containing waste, ash or slag, or polluted by solid or liquid industrial waste;
- ground below the marine water table with a resistivity of less than 500 Ω cm.

We recommend the PAM Standard TT product range for applications in the above types of ground, and also where stray currents may be encountered.

APPLICATION SCOPE DEPENDING ON WATER CONDITIONS

The products in the BLUTOP® range are suitable for use with all types of potable water in accordance with the European Directive 98/83/EC.

Water properties	Unit	BLUTOP® range
Minimum pH value	-	4
Maximum pH value	-	10
Minimum hardness	°	Not limited
Maximum aggressive CO2 content mg/l	mg/l	Not limited
Maximum sulphate content	mg/l	Not limited
Maximum magnesium content	mg/l	Not limited
Maximum ammonia content	mg/l	Not limited

MAXIMUM COVER DEPTHS FOR BLUTOP® PIPES

Cover depths vary according to the site conditions

Case	Lit de pose	Enrobage	Compaction	Es	Min. 2 alpha
Case 1	Levelled trench floor	Group 4, 3, 2 or 1	Uncompacted	< 0.3 MPa	30°
Case 2	Selected materials	Group 3, 2 or 1	Compacted and inspected	1.0 MPa	60°
Case 3	Selected materials	Groupe 2 or 1	Compacted and inspected q5	1.2 MPa	90°
Case 4	Selected materials	Groupe 1	Compacted and inspected q4	2.0 MPa	90°

Maximum cover depths for BLUTOP® pipes not subjected to rolling loads

Unit	Case 1 m	Case 2 m	Case 3 m	Case 4 m
75	32.9	44.8	50.0	50.0
90	22.8	31.5	37.2	38.7
110	17.1	24.1	28.6	30.5
125	12.3	18.0	21.5	23.8
160	9.1	14.1	17.0	19.9

Maximum cover depths for BLUTOP® pipes subjected to rolling loads

DN/OD	Case 1 m	Case 2 m	Case 3 m	Case 4 m
75	32.9	44.8	50.0	50.0
90	22.8	31.5	37.2	38.7
110	17.0	24.1	28.6	30.4
125	12.2	18.0	21.5	23.8
160	9.0	14.0	17.0	19.8

In addition, although the minimum depth for laying pipes is 0.3 m, due consideration should be given to potential freezing risks.

Technical specifications

QUALITY, STANDARDS AND ACCREDITATION

Quality management

The Saint-Gobain PAM quality management system complies with the ISO 9001 standard and covers the design, manufacture and sale of the BLUTOP® range. Compliance with this quality management system is certified by an independent organisation.

Environmental management

The plants that manufacture the pipes and fittings in the BLUTOP® range are ISO 14001-certified.

European standards

The following European standards apply to the BLUTOP® range:

- *EN 805 – Overall design of the BLUTOP® range*
- *EN 681.1 – Joint gasket*
- *EN 12842 – Fittings in the BLUTOP® range*
- *EN 14901 – Epoxy coating on BLUTOP® fittings and accessories*

In addition, the requirements of the standard EN 545 apply to the BLUTOP® range, except for:

- *Standard DN/OD diameters (in accordance with EN 805-2000)*
- *Standard pressure class: C25 (MAWP: 25 bar)*
- *Thermoplastic lining*

The performance tests to establish the characteristics of the products in the BLUTOP® range are conducted in accordance with the standard EN 545.

The relevant documents are available to view on our website: www.blutop.fr.


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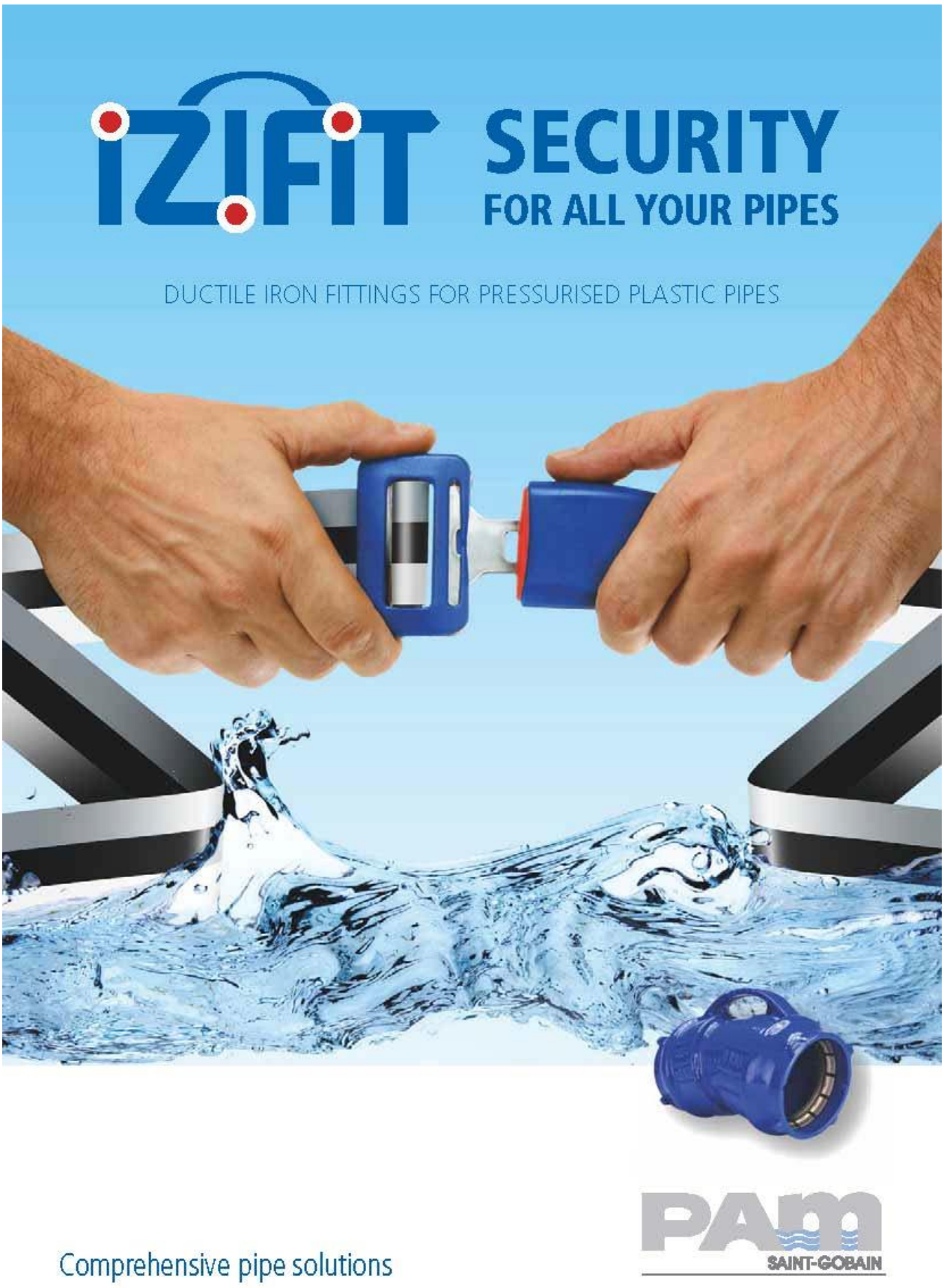
SAINT-GOBAIN


IZIFIT
SECURITY
FOR ALL YOUR PIPES
DUCTILE IRON FITTINGS FOR PRESSURISED PLASTIC PIPES
Comprehensive pipe solutions
PAM
SAINT-GOBAIN

iZ!FiT

A unique range of universal fittings

A single ductile iron fitting for all PE (polyethylene), PVC-U (unplasticised polyvinyl chloride) and PVC-BO (biaxially oriented polyvinyl chloride) pipe systems for transporting **drinking water under pressure**.

Quick

> Ready-to-install fittings with pre-fitted gaskets
> Assembly of fittings and valves with no tightening
> Compliance with work rates

Easy

> Integral handle for the fittings
> Assembly by hand or leverage
> Easy on-site installation
> Essential watertight seal functions guaranteed

Universal

> A unique product for all plastic pipes
> Anchored or non-anchored
> Stock optimisation

So simple!

A strong, reliable system

- IZIFIT® joints have been designed and tested in accordance with very stringent methods and standards (NF T 54-948-2010 for PVC-BO and EN 12842-2012 for PE and PVC-U). Special tests are performed at Saint-Gobain PAM to guarantee unrivalled reliability.

French innovation

- The seals and the anchoring system were designed in France by the Saint-Gobain PAM Research and Development Centre. The unique technology developed and patented by Saint-Gobain PAM enables an **allowable operating pressure** of up to **16 bar**.

A durable systeme

- The **250 µm blue epoxy coating** (in accordance with standard NF EN 14901), the stainless steel and the high-quality EPDM elastomer afford excellent resistance over time.

IZIFIT

3

IZIFIT

Extremely quick and easy

The IZIFIT® solution makes connecting pipes quick and easy.

Ready-to-fit fittings

- IZIFIT® fittings are delivered with their gaskets pre-fitted, making on-site installation easier and helping work to stay on schedule. Saint-Gobain PAM recommends always anchoring PE pipes.

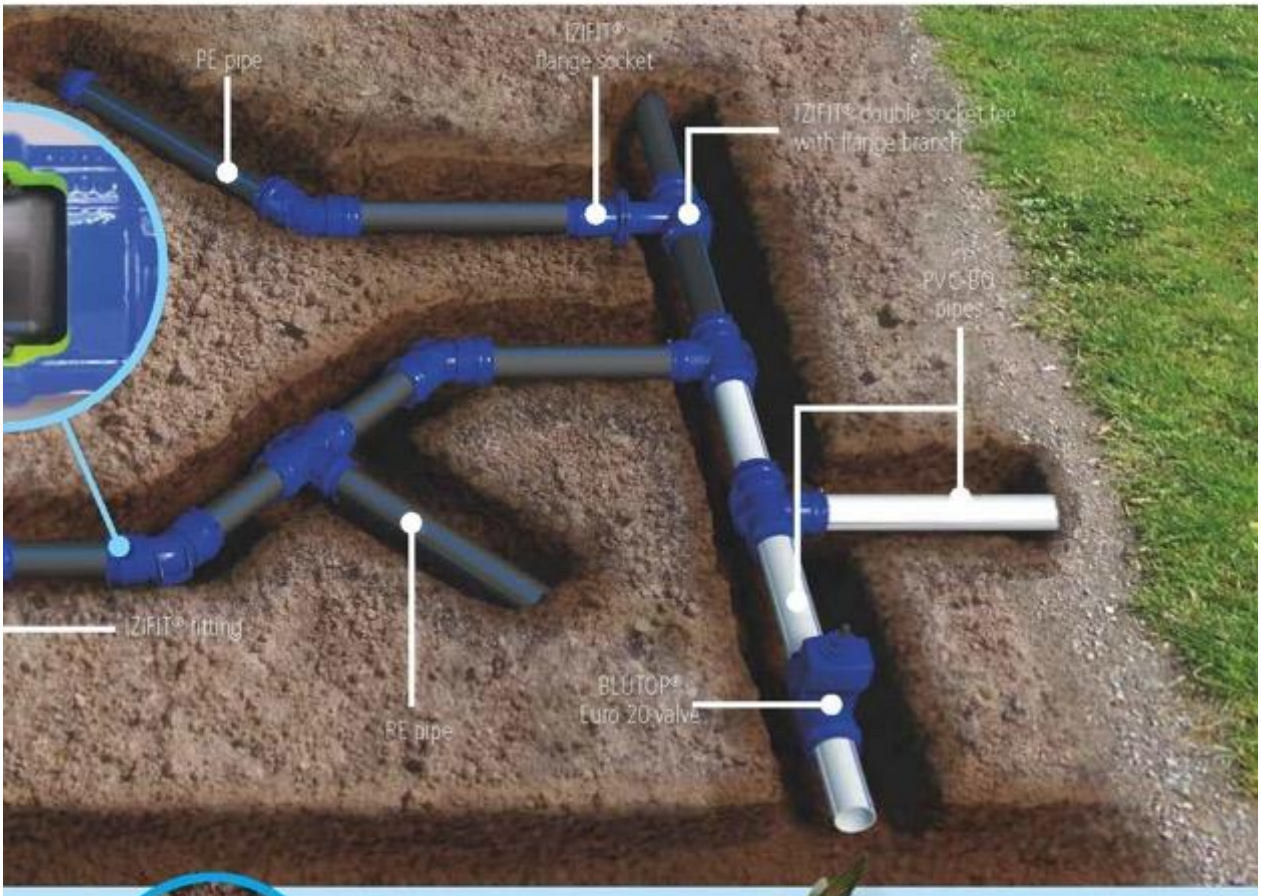
Save time and money

- The anchoring system with metal inserts built into the gasket enables quick and easy installation of fittings and eliminates the need for concrete thrust blocks.

Tolerance and flexibility

- The **angular deviation** tolerated by the IZIFIT® fittings is **6°** regardless of the gasket used. The axial clearance tolerated by the joints enables the pipes to accommodate ground movements while absorbing the corresponding mechanical stresses.

to join pipes



Light and easy to handle

Designed with an integral handle, IZIFIT® fittings are lightweight and portable. They make adjustment work much easier.

Manual leverage assembly

The IZIFIT® junction has been specially designed to reduce to a minimum the force needed for assembly. The integral handle and the multiple contact points on IZIFIT® fittings make assembly easy using leverage and standard work tools.

Safe storage and transport

For transport and storage, the sockets are protected with caps.

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iZiFiT

A unique offer,

IZIFIT® fittings can be fitted to all types of plastic water pipes, including PVC-BO (biaxially oriented polyvinyl chloride). IZIFIT® is a comprehensive range of multi-purpose fittings (bends, tees, flange spigots, tapers, stoppers, semi-sliding collars, etc.), for anchored or non-anchored connections regardless of the fitting and depending on the context.

IZIFIT® bend 1/4 PN 10-16 bar

DN/OD	weight in kg	non-anchored	anchored
63	3.30	KZL63CA	(*)
75	4.40	KTL75CA	KVL75CA
90	5.50	KTL90CA	KVL90CA
110	7.10	KTM11CA	KVM11CA
125	8.80	KTM12CA	KVM12CA
140	9.50	KZM14CA	(*)
160	11.69	KZM16CA	
200	16.42	KZM20CA	
225	19.40	KZM22CA	

IZIFIT® bend 1/8 PN 10-16 bar

DN/OD	weight in kg	non-anchored	anchored
63	3.07	KZL63CB	(*)
75	4.20	KTL75CB	KVL75CB
90	5.10	KTL90CB	KVL90CB
110	6.20	KTM11CB	KVM11CB
125	7.00	KTM12CB	KVM12CB
140	8.65	KZM14CB	(*)
160	10.10	KZM16CB	
200	13.26	KZM20CB	
225	16.01	KZM22CB	

IZIFIT® bend 1/16 PN 10-16 bar

DN/OD	weight in kg	non-anchored	anchored
63	2.57	KZL63CD	(*)
75	3.40	KTL75CD	KVL75CD
90	4.40	KTL90CD	KVL90CD
110	5.50	KTM11CD	KVM11CD
125	6.60	KTM12CD	KVM12CD
140	6.97	KZM14CD	(*)
160	8.44	KZM16CD	
200	11.42	KZM20CD	
225	13.67	KZM22CD	

IZIFIT® bend 1/32 PN 10-16 bar

DN/OD	weight in kg	non-anchored	anchored
75	3.50	KTL75CE	KVL75CE
90	3.80	KTL90CE	KVL90CE
110	5.80	KTM11CE	KVM11CE
125	6.70	KTM12CE	KVM12CE

IZIFIT® non-sliding collar PN 10-16 bar

DN/OD	weight in kg	non-anchored	anchored
63	2.56	KZL63MN	(*)
90	4.00	KTL90MN	KVL90MN
110	4.90	KTM11MN	KVM11MN
125	5.50	KTM12MN	KVM12MN
140	6.61	KZM14MN	(*)
160	8.02	KZM16MN	
200	10.93	KZM20MN	
225	12.88	KZM22MN	

IZIFIT® semi-sliding collar PN 10-16 bar

DN/OD	weight in kg	non-anchored	anchored
75	5.30	KTL75MM	(**)
90	6.30	KTL90MM	
110	7.30	KTM11MM	
125	8.80	KTM12MM	

a comprehensive range

IZIFIT® fittings are delivered with their gaskets fitted.
(*) For diameters 63 and 140 to 225, anchoring with gland (see page 9).
(**) please contact us
(1) PN 10
(2) PN 16
Datas and photographs not contractually binding.

IZIFIT® taper PN 10-16 bar

DN/OD	Ø mm	weight in kg	non-anchored	anchored
75	63	2.89	KZL75VE0B	(*)
90	75	3.70	KTL90VE0C	KVL90VE0C
110	75	4.60	KTM11VE0C	KVM11VE0C
	90	5.00	KTM11VE0D	KVM11VE0D
125	75	5.00	KTM12VE0C	KVM12VE0C
	90	5.20	KTM12VE0D	KVM12VE0D
	110	5.50	KTM12VE0E	KVM12VE0E
140	90	5.51	KZM14VE0D	
	110	5.91	KZM14VE0E	
	125	6.29	KZM14VE0G	
160	75	6.02	KZM16VE0C	
	90	6.37	KZM16VE0D	
	110	6.72	KZM16VE0E	
	125	7.01	KZM16VE0G	
	140	7.43	KZM16VE0H	(*)
200	125	8.97	KZM20VE0G	
	140	9.28	KZM20VE0H	
	160	9.87	KZM20VE0J	
225	110	9.94	KZM22VE0E	
	140	10.50	KZM22VE0H	
	160	10.96	KZM22VE0J	
	200	11.94	KZM22VE0K	

IZIFIT® double socket tee with flange branch PN 10-16 bar

DN/OD		weight in kg	non-anchored	anchored
body	pipe			
63	40	5.14	KZL63TD1A	(*)
	60	6.20	KZL63TD1C	
75	40	5.80	KTL75TD1A	KVL75TD1A
	60	7.80	KTL75TD1C	KVL75TD1C
	65	8.20	KTL75TD1D	KVL75TD1D
90	40	6.80	KTL90TD1A	KVL90TD1A
	60	8.60	KTL90TD1C	KVL90TD1C
	65	8.70	KTL90TD1D	KVL90TD1D
	80	9.40	KTL90TD1E	KVL90TD1E
110	40	7.60	KTM11TD1A	KVM11TD1A
	60	9.40	KTM11TD1C	KVM11TD1C
	65	9.50	KTM11TD1D	KVM11TD1D
	80	11.00	KTM11TD1E	KVM11TD1E
	100	12.20	KTM11TD1F	KVM11TD1F
125	40	9.20	KTM12TD1A	KVM12TD1A
	60	10.80	KTM12TD1C	KVM12TD1C
	65	11.10	KTM12TD1D	KVM12TD1D
	80	11.50	KTM12TD1E	KVM12TD1E
	100	12.20	KTM12TD1F	KVM12TD1F
	125	15.00	KTM12TD1G	KVM12TD1G
140	40	9.34	KZM14TD1A	
	60	11.04	KZM14TD1C	
	80	12.35	KZM14TD1E	
	100	14.03	KZM14TD1F	
	125	16.28	KZM14TD1G	
160	40	10.60	KZM16TD1A	
	60	12.35	KZM16TD1C	
	80	13.73	KZM16TD1E	
	100	15.40	KZM16TD1F	
	125	17.74	KZM16TD1G	
	150	20.16	KZM16TD1J	
200	40	14.32	KZM20TD1A	
	60	16.27	KZM20TD1C	(*)
	80	17.74	KZM20TD1E	
	100	19.67	KZM20TD1F	
	125	22.05	KZM20TD1G	
	150	24.54	KZM20TD1J	
	200 (1)	29.09	KZM20TD1K	
	200 (2)	29.09	KZM20TD2K	
225	60	18.23	KZM22TD1C	
	80	19.71	KZM22TD1E	
	100	21.75	KZM22TD1F	
	150	26.67	KZM22TD1J	
	200 (1)	31.62	KZM22TD1K	
	200 (2)	31.62	KZM22TD2K	

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iZiFiT

A unique offer,

IZIFIT® all socket tee PN 10-16 bar

DN/OD body	DN/OD pipe	weight in kg	non-anchored	anchored
75	75	5.60	KTL75TE0C	KVL75TE0C
90	75	6.40	KTL90TE0C	KVL90TE0C
	90	6.80	KTL90TE0D	KVL90TE0D
110	75	7.50	KTM11TE0C	KVM11TE0C
	90	7.80	KTM11TE0D	KVM11TE0D
	110	8.70	KTM11TE0E	KVM11TE0E
125	75	8.80	KTM12TE0C	KVM12TE0C
	90	9.20	KTM12TE0D	KVM12TE0D
	110	10.00	KTM12TE0E	KVM12TE0E
	125	11.00	KTM12TE0G	KVM12TE0G
140	110	10.55	KZM14TE0E	(*)
	125	11.46	KZM14TE0G	
	140	11.90	KZM14TE0H	
160	110	11.93	KZM16TE0E	
	125	12.66	KZM16TE0G	
	140	13.25	KZM16TE0H	

IZIFIT® flange spigot PN 10-16 bar

DN/OD	DN flange	weight in kg	non-anchored	anchored
63	60	3.62	KZL63BU1C	/
75	60	4.15	KTL75BU1C	
75	65	4.15	KTL75BU1D	
90	80	4.70	KTL90BU1E	
110	100	6.00	KTM11BU1F	
125	125	7.90	KTM12BU1G	
140	125	8.56	KZM14BU1G	
160	150	10.64	KZM16BU1J	
200	200 (1)	14.78	KZM20BU1K	
	200 (2)	14.78	KZM20BU2K	
225	225 (1)	15.51	KZM22BU1K	
	225 (2)	15.51	KZM22BU2K	

IZIFIT® flange socket PN 10-16 bar

DN/OD	DN flange	weight in kg	non-anchored	anchored
63	60	3.88	KZL63BE1C	(*)
75	60	5.30	KTL75BE1C	KVL75BE1C
75	65	5.30	KTL75BE1D	KVL75BE1D
90	80	5.50	KTL90BE1E	KVL90BE1E
110	100	6.70	KTM11BE1F	KVM11BE1F
125	125	8.20	KTM12BE1G	KVM12BE1G
140	125	9.15	KZM14BE1G	(*)
160	150	11.22	KZM16BE1J	
200	200 (1)	15.18	KZM20BE1K	
	200 (2)	15.18	KZM20BE2K	
225	200 (1)	16.38	KZM22BE1K	
	200 (2)	16.38	KZM22BE2K	

IZIFIT® duckfoot bend PN 10-16 bar

DN/OD	DN bride	weight in kg	non-anchored	anchored
75	80	8.30	KTL75DF0E	KVL75DF0E
90	80	8.00	KTL90DF0E	KVL90DF0E
110	80	11.40	KTM11DF0E	KVM11DF0E
125	80	13.60	KTM12DF0E	KVM12DF0E

IZIFIT® fittings are delivered with their gaskets fitted.
(*) For diameters 63 and 140 to 225, anchoring with gland (see page 9).
(1) PN 10
(2) PN 16
Datas and photographs not contractually binding.

a comprehensive range

IZIFIT® stopper PN 10-16 bar

DN/OD	weight in kg	non-anchored	anchored
75	1.60	KTL75BH	KVL75BH
90	2.00	KTL90BH	KVL90BH
110	2.20	KTM11BH	KVM11BH
125	3.00	KTM12BH	KVM12BH
140	3.51	KZM14BH	(*)
160	4.24	KZM16BH	

IZIFIT® gasket PN 10-16 bar

DN/OD	non-anchored		anchored	
	part number	weight in kg	part number	weight in kg
75	JXL75BA	0.059	JIL75CA	0.109
90	JXL90BA	0.067	JIL90CA	0.105
110	JXM11BA	0.081	JIM11CA	0.146
125	JXM12BA	0.108	JIM12CA	0.189

Lubricating paste

packaging	part number
Can 0.850 kg	158128

Anchored gland PN 10-16 bar

DN/OD	weight in kg	part number
63	1.56	JZL63VX
140	2.80	JZM14VX
160	3.10	JZM16VX
200	4.18	JZM20VX
225	4.64	JZM22VX

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IZIFIT

Technical specifications, quality

Mechanical properties of fittings

The metallurgical properties of IZIFIT® fittings are recommended in standard EN 545.

Property	Unit	Fittings
Minimum tensile strength, Rm	MPa	420
Minimum elongation at break, A	%	5
Maximum Brinell hardness	HB	250
Minimum module of elasticity	GPa	170

Allowable operating pressure

Material	PVC-U				PE		PVC-BO	
Joint type	non anchored		anchored		anchored		non anchored	anchored
DN/OD	PN10	PN16	PN10	PN16	PN10	PN16	PN16	PN16
63	10	16	10*	16*	10*	16*	16	-
75	10	16	10	16	10	16	16	10
90	10	16	10	16	10	16	16	10
110	10	16	10	16	10	16	16	10
125	10	16	10	16	10	16	16	10
140	10	16	10*	16*	10*	16*		
160	10	16	10*	16*	10*	16*		
200	10	16	10*	16*	10*	16*		
225	10	16	10*	16*	10*	16*		

Standard EN 12842 Ductile iron fittings for PVC and PE piping systems
* with anchored gland

Technical specifications of epoxy coating of fittings

The main properties of the epoxy coating used for IZIFIT® fittings are given in the table below. These properties satisfy the requirements of standard EN 14901

Performance tests	Criteria
Non-porosity	No electrical puncture with holiday detector at 1,500 V
Impact strength	No electrical puncture with holiday detector at 1,500 V with impact of 5 J
Durability - Thermal ageing resistance in water	After the testing procedure, the coating must have an average adhesion of at least 6 MPa
Indentation hardness	The depth of indentation measured after 48 hours must not exceed 30% of the original measured thickness of the coating. The increase in the measured depth of indentation between 24 hours and 48 hours must be less than that measured between 0 and 24 hours and must not exceed 5% of the original measured thickness of the coating.
Durability - Thermal ageing resistance in air	After the testing procedure, the coating must be free from porosity

and mechanical properties

Application based on soil properties

The fittings in the IZIFIT® range can be buried in most soils, as defined in standard EN 545 2010 Appendix D.2.2 "applications", with the exception of:

- acidic, peaty soils;
- soils containing waste, ash or dairy products or contaminated with industrial waste or wastewater;
- soils under the groundwater table with resistivity of less than 500 Ω cm.

ATTESTATION

APPROVAL CERTIFICATE / ATTESTATION
Issuing unit / BV METZ

Bureau Veritas Metz, on 11th April 2014 / le 11 avril 2014
Surveyor / Inspecteur T. GARCIA

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Quality, standards and certificates

Quality management:

The Saint-Gobain PAM quality management system complies with standard ISO 9001 for the design, manufacture and marketing of the IZIFIT® range.
The compliance of this quality management system is certified by a third party.

Environmental management:

The production sites for the fittings in the IZIFIT® range are ISO 14001-certifed.

Standardisation:

The following French and European standards apply to the IZIFIT® range:

- EN 805 - General design of the range
- EN 681.1 - Gaskets
- EN 12842 - For PE and PVC-U
- NF T54948 - For biaxially oriented PVC pipes
- EN 14901 - Epoxy coating of fittings and accessories

Health compliance certificate:

The organic coatings, the components and the lubricants used for IZIFIT® products are suitable for contact with drinking water in accordance with current regulations in force in the markets concerned (ACS, CLP, WRAS, KTW certificates, etc.)

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SLOVAKIA
SAINT-GOBAIN CONSTRUCTION PRODUCTS
PAM Business Unit
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83102 - BRATISLAVA - Slovakia
Phone: + 421 265 45 69 61

SOUTH AFRICA
SAINT-GOBAIN CONSTRUCTION PRODUCTS
PAM Business Unit
N1 Business Park
Corner Olievenhoutbosch Road
& Old Johannesburg Road
Samrand - PO BOX 700
GERMISTON - South Africa 1400
Phone: +27 12 657 2800

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UNITED ARAB EMIRATES
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UNITED KINGDOM
SAINT-GOBAIN PAM UK
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ILKESTON - DERBYSHIRE - DE7 4QU
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VIETNAM
SAINT-GOBAIN PAM VIETNAM LTD
17/F Nam A Bank Building
201-203 Cach Mang Thang 8, Ward 4 - District 8
HO CHI MINH CITY - Vietnam
Phone: +84 8 39 30 72 73

www.izifit.eu
www.pamline.com

SAINT-GOBAIN PAM
Head office
91, avenue de la Libération
54076 NANCY CEDEX
Phone: 03 83 95 20 00

Marketing - Water, sewerage and municipal castings
21, avenue Camille Cavallier
54705 PONT-A-MOUSSON CEDEX
Phone: 03 83 80 67 89

SAINT-GOBAIN

Ductile Iron Fittings on AS 4130 PE Pipes			
			
DN	Gasket	Anchoring Gland	Picture
75 90 110 125	Anchored IZIFIT Gasket (Full stainless Steel inserts)	No	
140 160	Unanchored Gasket (Full Plastic inserts)	Yes	
200 225	Prefitted EPDM Gasket		

Ductile Iron Fittings on EN 545 BLUTOP Pipes		
		
Gasket	Gasket	Picture
Unanchored BLUTOP Gasket	75	
	90	
	110	
	125	
	140	
	160	
Anchored BLUTOP Gasket	75	
	90	
	110	
	125	
	140	
	160	

A complete range of DI fittings & GV DN75 to DN225 for AS 4130 PE Pipes

Self-anchored range available:

- **DN 75/90/110/125/140 with restrained gasket.**
- **DN 160/200/225 with unrestrained gasket + ¼ turn anchored gland.**

- ✓ Easy handling of light weight fittings & gate valves.
- ✓ Quick & safe assembly, manually using a crowbar.
  - EPDM push on joints = no tightening required.
  - 6° angular deflection.
- ✓ Eliminates the need for concrete thrust blocks.
- ✓ Watertight seal guaranteed to PN16.
- ✓ Excellent resistance over time:
  - High mechanical strength.
  - Fittings coated with 250µm blue epoxy to EN14901.

Standardisation:

- AS 4020 – Water contact
- AS 4130 – Design
- AS 4087/2129 – Flange dimensions
- AS / EN 681.1 – Gaskets
- EN 14901 – Epoxy coating of fittings and accessories

Information:

- www.IZIFIT.eu/en
- www.pamline.com

Saint-Gobain PAM Australia : +61 (0)3 9358 6100

Comprehensive pipe solutions

Advice for Laying

PAM

blutop

Pipework for potable water distribution

SAINT-GOBAIN PAM

Edition 2009-1

THE BLUTOP RANGE

BLUTOP, A COMPLETE RANGE DESIGNED FOR SMALL DIAMETERS

Range of DN/OD 90, 110 and 125 pipes

DN/OD	L	Iron thickness	OD	Weight	PFA	PMA	PEA	References
	m	*mm*	*mm*	*Kg/m*	*bar*	*bar*	*bar*	
90	6	3,0	90	6,1	25	30	35	KXL90H60
110	6	3,0	110	7,5	25	30	35	KXM11H60
125	6	3,0	125	8,6	25	30	35	KXM12H60

blu

Range of fittings
- Elbows, tees, tapers
- Collars, plugs
- Socket flange fittings
- Spigot flange fittings
- Blue epoxy coating applied by powder spraying

Advice for laying Blutop - Edition 2009-1

APPENDIX B - QUALITY CERTIFICATIONS

Copies of the following Quality Certification Certificates are available for downloading from the WSAA Members Website.

TABLE A1 SAINT-GOBAIN PAM (BRAZIL) – MANAGEMENT SYSTEMS

Business Address: Via Doutor Sergio Braga, 452 Barbara, 27330-050 Barra Manasa/RJ Brazil

Quality Systems Standard	ISO 9001:2008
Certification licence no.	BR15/9153
Certifying agency	SGS
First date of certification	29 December 1994
Current date of certification	10 December 2015
Expiry date of certification	14 September 2018

TABLE A2 SAINT GOBAIN PAM (FOUG) – MANAGEMENT SYSTEMS

Business Address: Av des Fonderies, 54704 Foug, France

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 A3 SAINT – GOBAIN PAM – PRODUCT CERTIFICATION

Business Address: Av des Fonderies, 54704 Foug, France

Product Standard/Spec.	ISO 16631:2016
Certificate No.	984/001
Issuing certification body	Bureau Veritas
First date of certification	26 July 2016
Current date of certification	26 July 2016
Expiry date of certification	25 July 2019

TABLE A4 SAINT-GOBAIN PAM – PRODUCT CERTIFICATION

Business Address: Rod. MG 431, KM36, Distrito Calampau, 35680-143 Itauna/MG

Product Standard/Spec.	EN 12842:2012
Certificate No.	CB188/14 6136580
Issuing certification body	Bureau Veritas
Date of Issue:	11 April 2014

TABLE A4 SAINT-GOBAIN PAM – ATTESTATION RE BIOZINALLIUM

Business Address: 91, Avenue de la Liberation, 54076 Nancy Cedex

Product Standard/Spec.	EN 545:2010
Certificate No.	CB188/14 6123960
Issuing certification body	Bureau Veritas
Date of Issue:	6 March 2014

SGS

Certificado BR15/9153

O sistema de gestão de

Saint-Gobain Canalização Ltda.

Via Dr. Sérgio Braga, 452 - Barbará
Barra Mansa - RJ - 27.330-051 - BR

Foi auditado e certificado encontrando-se em conformidade com os requisitos da norma:

ISO 9001:2008

Para as seguintes atividades:

"Projeto, fabricação e comercialização de tubos, conexões, válvulas, acessórios e tampões em ferro fundido dúctil.

Design, manufacturing and selling of ductile iron pipes, fittings, valves, accessories and municipal casting."

Informações adicionais a respeito do escopo e da aplicação dos requisitos da norma ISO 9001:2008 podem ser obtidos consultando a organização.

Este certificado é válido de 10 de dezembro de 2015 até 14 de setembro de 2018
e mantém-se válido sujeito a auditorias de acompanhamento satisfatórias.
Auditoria de Recertificação devida antes de 14 de agosto de 2018
Revisão 2. Certificado desde 29 de dezembro de 1994

Esta é uma certificação multi-site.
Os endereços adicionais estão listados nas páginas subsequentes.

Aprovado por

Vanda Nunes
Diretora

SGS ICS Certificadora Ltda.
Avenida Andrômeda, 832 – 5º. and
06473-000 – Barueri - SP - Brasil
Fone: 11-3883 8680 / Fax: 11-3883 8899
www.br.sgs.com

Página 1 de 2

Gestão da Qualidade NBR ISO 9001
OCS 0009

Accredited by Member of the International Accreditation Forum Multilateral Recognition Arrangement for Quality Management System

BUREAU VERITAS
Certification

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**

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

UKAS MANAGEMENT SYSTEMS
008

Certification body address:
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.**

BUREAU VERITAS

BUREAU VERITAS
Certification

Certificate of Conformity

Awarded to

SAINT-GOBAIN PAM
21, avenue Camille Cavallier – BP 129
54705 PONT-A-MOUSSON CEDEX (France)

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

Ductile iron pipes and fittings for water pipelines
DN/OD 75, 90, 110, 125, 140, 160

Commercial Brand:
BLUTOP

Production site: Avenue des Fonderies 54570 FOUG France

designed and produced by SAINT-GOBAIN PAM
have been evaluated and found in conformity against the requirements
of the following standard:

ISO 16631:2016
Ductile Iron Pipes, fittings, accessories and their joints compatible with plastic (PVC or PE) piping system, for water application and for plastic pipeline connections, repair and replacement

These products belong to family:
PAM

Certification according requirements stated in:

RG-01-03 ACCREDIA Rev.00
TQR-REG-02 Bureau Veritas Rev. 05

Original Emission Date	26/07/2016
Current Emission Date:	26/07/2016
Expiration Date:	25/07/2019

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

TECHNICAL DIRECTOR – ING. FRANCESCO SUTERA

ACCREDIA

Date: 26/07/2016

Certificate N°: **984/001**

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

ATTESTATION

Centre émetteur : Metz

N° CB188/14 6136580 TG n°1

BUREAU VERITAS Industry

APPROVAL CERTIFICATE / ATTESTATION
Issuing unit / BV METZ

Agissant dans le cadre des conditions générales d'intervention de la Division France de Bureau Veritas, et à la demande de la société
Acting within the scope of the general conditions of the division France of Bureau Veritas and at the request of

SAINT GOBAIN PAM
91, Avenue de la Libération
54076 NANCY CEDEX

Certifie, après examen de la documentation technique de Saint-Gobain PAM, et supervision des essais, Les essais de types réalisés sur **les raccords IZIFIT DE 75 à 125 (version non verrouillée et verrouillée)** ont donné des résultats conformes aux exigences des normes suivantes :

- EN12842 2012 pour les tuyaux PE et PVC
- NF T54948 2010 pour les tuyaux PVC bi-orientés

Conditions de réalisation :

	Tuyau PVC			Tuyau PE		Tuyau PVC biorienté		
Caractéristiques du tuyau	PN16	PN10	PN16	PN10	PN16	PN16	PN16	PN16 Avec liner
Version IZIFIT	Non verrouillé	Verrouillé		Verrouillé		Non verrouillé	Verrouillé	Verrouillé
PFA en bar	16	10	16	10	16	16	10	16

Bureau Veritas certifies, that after Saint-Gobain PAM technical documentation examination, and supervision of the tests, the type tests carried out on ***IZIFIT fittings range DE 75 to 125 (not restrained version and restrained version)*** *have given results in accordance with the following standards:*

- *EN 12842 2012 for PVC and PE pipes*
- *NF T 54948 2010 for bi-oriented PVC pipes*

Conditions of implementation:

	PVC Pipe			*PE Pipe*		*Bi-oriented PVC Pipe*		
Pipe characteristics	*PN16*	*PN10*	*PN16*	*PN10*	*PN16*	*PN16*	*PN16*	*PN16 With liner*
IZIFIT version	*Not restrained*	*Restrained*		*Restrained*		*Not restrained*	*Restrained*	*Restrained*
PFA in bar	*16*	*10*	*16*	*10*	*16*	*16*	*10*	*16*

Bureau Véritas Metz, on 11th April 2014 / le 11 avril 2014

Surveyor / Inspecteur T. GARCIA

ATTESTATION

Centre émetteur : Metz

N° CB188/14 6123960-1.TG

BUREAU VERITAS Industry

APPROVAL CERTIFICATE / ATTESTATION

Issuing unit / BV METZ

Agissant dans le cadre des conditions générales d'intervention de la Division France de Bureau Veritas, et à la demande de la société :
Acting within the scope of the general conditions of the division France of Bureau Veritas and at the request of:

SAINT GOBAIN PAM
91, Avenue de la Libération
54076 NANCY CEDEX

Bureau Veritas certifie après examen de la documentation technique que:

- Les tuyaux des gammes **NATURAL et BLUTOP** sont revêtus extérieurement d'au moins 400 g/m² d'alliage de zinc et d'aluminium 85/15 dopé à 0.5% en cuivre, recouvert d'une couche de finition. Le nom commercial de ce revêtement extérieur est **BioZINALIUM®**.

- Le revêtement extérieur **BioZINALIUM®** est conforme à la norme EN 545 (2010).

- SAINT-GOBAIN PAM a apporté la preuve de l'efficacité durable du revêtement extérieur **BioZINALIUM®**, pour le domaine d'emploi spécifié à l'annexe D.2.2.de la norme EN 545 (2010).

Bureau Veritas certifies after examination of the technical documentation that:

*- **NATURAL and BLUTOP** pipes are externally coated of at least 400 g/m² of zinc-aluminium alloy 85/15 doped with 0.5% of copper and finishing layer. The brand name of this external coating is **BioZINALIUM®**.*

*- The external coating **BioZINALIUM®** is in conformity with EN 545 (2010) standard.*

*- SAINT-GOBAIN PAM has provided the evidence of the long term performance of external coating **BioZINALIUM®**, for the specified field of use according with the annex D.2.2. of EN 545 (2010) standard.*

St Julien les Metz le 6 mars 2014

St Julien les Metz on 6th March 2014

Document émis par : T. GARCIA
Issued by : T. GARCIA

APPENDIX C - WSA PRODUCT SPECIFICATION

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[1] covers ISO sized ductile iron pipes[2] 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[3].

(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

Pressure Class, PN	
Fitting types (configurations)	
Alternative type of cement for cement mortar lining of pipes[4]	
Restrained flexible joints	
Epoxy or other coatings to EN 598:2007+A1:2009	
Alternative elastomeric material for joint seals	

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.

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.

PRODUCT SPECIFICATION

WSA PS - 245 DUCTILE IRON FITTINGS WITH RESTRAINED FLEXIBLE JOINTS FOR POLYETHYLENE PIPE OF NOMINAL SIZES 90 TO 710 IN PRESSURE APPLICATIONS – WATER SUPPLY AND SEWERAGE

245.1 SCOPE

This specification covers ductile iron fittings with end thrust restraint for use with polyethylene (PE) pipes of DN 90 to DN 710 inclusive in pressure applications for water supply[1] and sewerage.

245.2 REQUIREMENTS

(a) Ductile iron fittings shall comply with EN 12842:2012[2] except that:

  (i) fittings shall be polymeric coated to AS/NZS 4158:2003/Amdt 1:2005;

  (ii) fittings shall comply with AS/NZS 4020:2005.

(b) Elastomeric joint seals shall be EPDM complying with AS 1646:2007 and AS 681.1:2008 (EN 681-1:1996).

(c) Joint seals, items of restraining systems and jointing lubricant shall comply with AS/NZS 4020:2005.

245.3 QUALITY ASSURANCE

(a) Fittings shall have product certification (ISO Type 5) to EN 12842:2012. The ISO Type 5 Product Certification Scheme shall meet the criteria described in WSA TN-08[3].

(b) Elastomeric joint seals shall have product certification (ISO Type 5) to AS 1646:2007 and AS 681.1:2008 (EN 681-1:1996).

(c) All products shall be marked in accordance with the conformity assessment body's requirements.

245.4 AGENCY OR PROJECT SPECIFIC REQUIREMENTS

Pressure Class, PN	
Alternative elastomeric material for joint seals	
Need for stiffener inserts for PE pipe	

NOTE:

1 Includes drinking water and recycled water supply.

2 Thrust restraint mechanisms are not recommended for PVC pipes.

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 12842>2012.

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 OF BLUTOP PIPE

External environment	External Coating BioZinalium[1]
Benign	>100 years
Moderately aggressive	>100 years[2]
Aggressive	>75 years[2]

NOTES:

1 BioZinalium® is a copper enriched zinc-aluminum alloy, applied to a weight of 400 g/m^{2}with a finishing layer of Aquacoat®, a water-based blue coloured acrylic.

2. There is no data to support the claim that copper enriched zinc-aluminum alloy systems when used in Australian environments will provide the nominated design life, without PE sleeving.

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

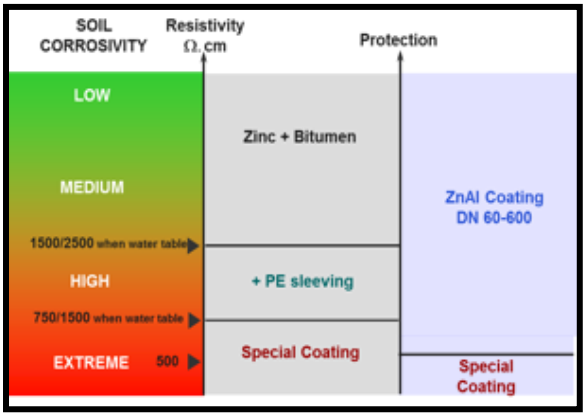

FIGURE D1
RELATIONSHIP BETWEEN SOIL RESISTIVITY AND EXTERNAL CORROSION PROTECTION SYSTEMS

Annex D of EN 545 includes a statement advising that “Evidence of the long-term performance of the above-mentioned solution (e.g. tests and references) should be provided by the manufacturer”. Saint-Gobain PAM has provided a copy of an Approval Certificate / Attestation issued by Bureau Veritas that declares “Saint-Gobain PAM has provided the evidence of the long-term performance of external coating BioZinalium for the specified field of use according with the Annex D2.2 of EN 545 (2010) standard.” A copy of the BV certificate is attached in Appendix B.

APPENDIX E - SUPPLIER CONTACTS

Saint –Gobain PAM

60 Hume Highway
Somerton VIC 3062

Phone: +61 3 9358 6100

Email: customerservice.sga-vic@saint-gobain.com

Melbourne Office

Level 8, 401 Docklands Drive
Docklands VIC 3008

Phone: (03) 8605 7666

Sydney Office

Level 9, 420 George Street
Sydney NSW 2000

GPO Box 915
Sydney NSW 2001

Phone: (02) 9221 5966

www.wsaa.asn.au