

Vinidex

Systems & Solutions

Ductile Iron Pipe & Fittings Systems





SAINT-GOBAIN
PAM
**World No. 1
in Ductile Iron
Pipe**



**AS/NZS
2280**



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Introduction

The Vinidex Saint Gobain PAM ductile iron pipe system has a superior product design to traditional DI pipe systems supplied into the Australian market. It is a high quality and competitive alternative to these DI pipe systems.

The system is supported by Vinidex who provide Australian corporate strength and have 50 years of success in supplying the Australian market. Vinidex has a commitment to stocks, and has systems and procedures in place to ensure the safe and efficient distribution of the products.

The Vinidex Saint Gobain PAM DI pipe system is manufactured in accordance with AS2280 and ISO/EN standards for DI pipes and fittings.

The AS2280 standard replicates the requirements of ISO/EN in most aspects with the International standards providing some additional benefits in coating systems.

All Ductile Iron (DI) Soc – Sp pipe systems offered by Vinidex for the Australian market are manufactured by Saint-Gobain PAM. Saint-Gobain is the largest DI pipe and fittings manufacturer in the world with manufacturing capability in most continents around the world. All Saint-Gobain manufacturing operations are 100% owned, operated, managed by Saint-Gobain.

All manufacturing operations are integrated with a Worldwide Quality System that ensures the high European quality standards are applied worldwide. These plants operate under the same quality control systems worldwide and have EN545 European, ISO and Australian Watermark product and quality systems certification.

Saint Gobain plants all around the world are fully accredited and certified to ISO 14001 Environmental Management Systems. St Gobain ductile iron pipes are 100% recyclable.

All coating systems have been tested and are AS4020 Compliant in all aspects for 'Materials in Contact with Drinking Water'.



Pipe Benefits

This new pipe system technology is now available to the Australian water market and will provide many benefits to the industry. These include:

- A superior product coating design to traditional DI pipe systems supplied into the Australian market. This includes high tech coating systems that can negate the need for protective polyethylene sleeving at installation.
- DI fittings systems and maintenance systems readily available now in the Australian market from a number of sources including Vinidex Superlink® DI fittings.
- Provides a high quality competitive alternative to DI pipe systems supplied into the Australian market.
- The system is supported by Vinidex who provide Australian corporate strength and have 50 years of success in supplying the Australian market. Vinidex has a commitment to stocks, and has systems and procedures in place to ensure the safe and efficient distribution of the products.
- The Vinidex Saint Gobain PAM pipe system has undergone WSAA appraisal and has Australian standards product certification.
- Have product approvals with most major Australian water companies.
- Vinidex and Saint Gobain have experience in supplying major projects here and overseas. AS2280 pipes for the Australian market are now in full production with stocks on the ground.

Performance benefits also include;

- Material and energy efficient options available – environmentally more sustainable
- High impact strength
- High toughness
- Excellent damage tolerance
- High fatigue strength

Jointing

Pipe jointing will be made in EPDM in accordance with AS1646

Fittings

The existing ranges of Vinidex Ductile Iron Superlink® pressure fittings available in the Australian market are fully compatible with Saint Gobain Pam DI pipe system pipes.



Linings & Coatings

INTERNAL PROTECTION

Vinidex Saint Gobain PAM ductile iron pipes will be internally lined with cement mortar. The cement mortar lining is in accordance with the Australian Standard AS3972 with the thickness given in following table:

DN	Nominal thickness	Minimum value at one point
DN100 to DN600	5 mm	3.5 mm
DN750	6 mm	4.5 mm

The basic internal protection for Vinidex Saint Gobain PAM pipes is a cement mortar lining applied by centrifugal action. This process has the advantage of producing a sound mortar with a smooth internal surface.

This results in the following properties:

- High mortar compactness
- Good bonding to metal
- Low surface roughness

Cement mortar has a very smooth inner surface, which enhances flow and reduces head losses. This mortar guarantees hydraulic performance is maintained over time (absence of deposits).

The roughness coefficient (COLEBROOK formula) for a pipe alone is $k = 0.03$ mm. Vinidex Saint Gobain PAM recommends using $k = 0.1$ mm in practice when designing a pipe system in order to take any peculiar head losses in the complete main into account.

The cement mortar lining protects both pipes and drinking water:

- **Protective mechanism.** The cement lining does not act merely as a barrier, but protects the iron through a passivation mechanism: during the filling, water gradually soaks into the mortar and absorbs alkaline compounds; by the time it reaches the metal wall, it is consequently non-corrosive.
- **Crack plugging.** Craze (hydraulic shrinking), or even small cracks occurring during transport, storage or laying, close up through the combined effect of two reactions: rapid mortar swelling on exposure to water and low hydration of the cement's constituents.

SPECIAL LINING SYSTEMS

European Directive 98/83/CEE sets out the quality criteria for waters intended for human consumption. Whether arising from particular geological context, resulting from treatments, or being conveyed for very lengthy periods in pipelines, aggressive or corrosive waters are a threat to most materials with which they come into contact (aggressive water has a lime-carbonic acid imbalance). Corrosive waters have a low pH (usually below 5.5). When such circumstances are feared or known to exist, ductile iron pipes may need a passive lining, such as PUR (polyurethane lining in accordance with EN 15655) which will allow the system operator to benefit from all the properties of ductile iron, even under adverse conditions.



EXTERNAL PROTECTION

The following table shows the different coatings used by Vinidex Saint-Gobain PAM. The coating is chosen according to the nature of the soil.

- A metallic 200 g/m² zinc + a bituminous varnish or equivalent anticorrosive paint (Standard PAM® Range)
- A metallic alloy zinc/aluminium 400g/m² + a blue epoxy (Natural® Range)
- A Polyurethane PUX 700µm coating with a spray-applied

SOILS CORROSIVENESS	Resistivity $\Omega \times \text{cm}$	COATING BASIC	DI pipe Protections	NATURAL RANGE COATING
Low / normal		Std PAM Range AS2280 / ISO 2531 Metallic Zinc coating (200 g/m ²) + bituminous paint		Natural Range ISO 2531 Zinc Aluminium coating (400 g/m ²) + epoxy paint
1500/2500 (poorly drained soil)			+ PE sleeve	
High				
750/1500 (poorly drained soil)				
Extreme	500		Special PUX coating	Special Pux coating

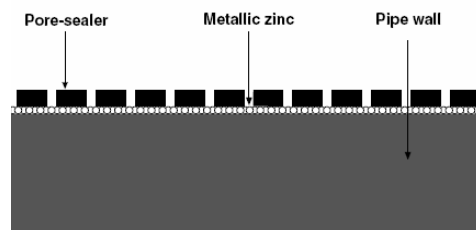
The coating of Vinidex Saint Gobain PAM pipes consists of a layer of metallic zinc or Zn/Al spray applied and covered with a finishing bitumen or epoxy paint. This is an active coating suitable for the vast majority of soils.

Zinc metallization is an active protection due to the galvanic effect of the zinc/iron electrochemical couple. Its mechanism is twofold:

- Formation of a stable protective layer:

In contact with the surrounding soil, the metallic zinc slowly transforms into a dense, adherent, impermeable and continuous zinc salts.

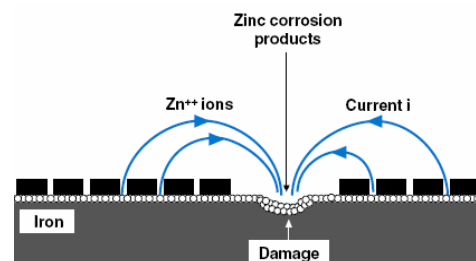
This acts as a protective barrier. The pore sealer, whilst permitting galvanic protection and self-healing, favors the formation of a stable and insoluble layer of zinc conversion products.



- Self-healing of damage:

One of the particular features of the external zinc coating is its ability to restore the continuity of the protective layer where small areas of local damage exist.

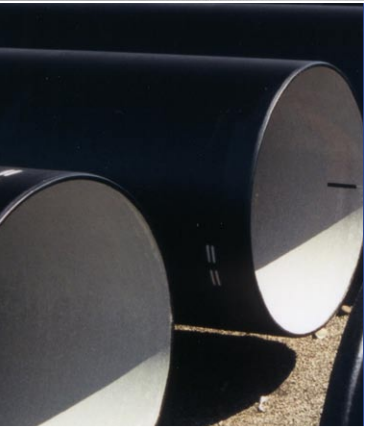
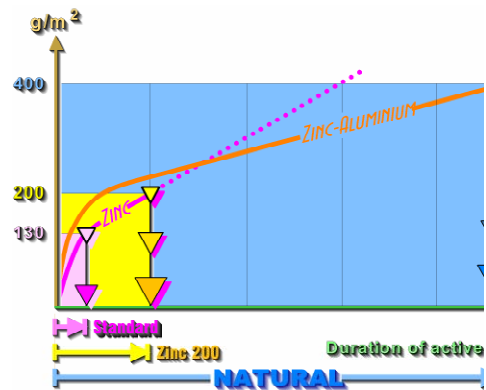
The Zn⁺⁺ ions migrate through the pore sealer to plug the damage and then convert into stable, insoluble zinc corrosion products.



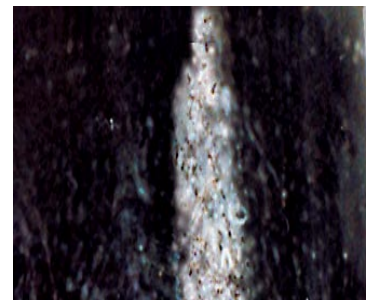
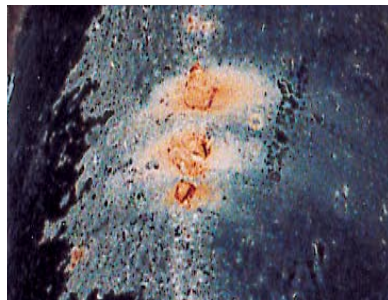
Linings & Coatings

Vinidex Saint Gobain PAM has chosen to raise the zinc quantity to 200 g/m (instead of the 130 g/m prescribed by the standards). 50% of extra zinc ensures a significant increase in the galvanic protection's life span.

In experiments carried out at the Saint Gobain PAM Research Centre, two identical notches were practiced on samples and then immersed in a highly corrosive medium.



Zinc Spray	Non-zinc coated:	Zinc coated:
	The damage worsened and the corrosion (red marks) Zinc spray extends beyond the notch	A white line of zinc salts shows that the damage is perfectly plugged.



AS2280 Pipe Classes & Pipe Dimensions

Vinidex Saint Gobain PAM DI pipe system pipes are classified in terms of their nominal working pressure at 20°C. Pressure classes are identified by their PN designation as shown in the table below:



AS2280 PN35

NB (mm)	L	DE (mm)	Dint (mm)	P (mm)	Mass Kg/m	AOP MPa	MAOP MPa	ASTP MPa
300	5.75	345	322	102	61.9	3.5	4.2	4.38
375	5.75	426	401	127	87.1	3.5	4.2	4.38
450	5.75	507	480	127	114.9	3.5	4.2	4.38
500	5.75	560	532	127	135.4	3.5	4.2	4.38
600	5.75	667	636	127	180.3	3.5	4.2	4.38
750	5.75	826	790	154	266.4	3.5	4.2	4.38

TABLE TERMS

- Allowable Operating Pressure (AOP)
- Maximum Allowable Operating Pressure (MAOP)
- Allowable Site Test Pressure (ASTP)
- Length (L)
- Mean External (DE)
- Mean Internal (Dint)
- Socket Depth (P)

AS2280 PN20

NB (mm)	L	DE (mm)	Dint (mm)	P (mm)	Mass Kg/m	AOP MPa	MAOP MPa	ASTP MPa
300	5.75	345	325	102	52.4	2.0	2.4	2.5
375	5.75	426	406	127	67.1	2.0	2.4	2.5
450	5.75	507	486	127	85.6	2.0	2.4	2.5
500	5.75	560	538	127	99.4	2.0	2.4	2.5
600	5.75	667	643	127	130.2	2.0	2.4	2.5
750	5.75	826	798	154	190.1	2.0	2.4	2.5

Australian & International Series



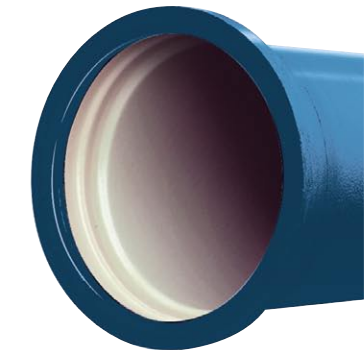
INTERNATIONAL SERIES

Ductile iron socket and spigot PAM STANDARD ductile iron pipes will be centrifugally cast in accordance with the European standard EN 545 (2006) and with ISO 2531 (1998).

Each pipe is subjected to a hydrostatic works test, in accordance with the European Standard EN 545 (2006).

Size range 60mm – 2000mm

NOTE: International pipe specifications and dimensions available on request



AUSTRALIAN STANDARD SERIES AS2280.

Ductile iron socket and spigot PAM pipes will be centrifugally cast in accordance with the Australian standard AS2280.

Each pipe is subjected to a hydrostatic works test, in accordance with the Australian standard AS2280.

Size range 100mm – 750mm

Sustainability, Quality & The Environment

The quality management system introduced by Vinidex & Saint Gobain PAM has been certified as complying with EN / ISO 9001 by the independent third party (Bureau Veritas Certification). This involves specific internal rules concerning the design, manufacture and sale of ductile iron products in accordance with high quality standards. A ductile iron pipe system is a 100% recyclable product.

ISO 14001 - The Saint Gobain PAM's environmental management system complies with ISO 14001 Standard.

SUSTAINABLE DEVELOPMENT COMMITMENT

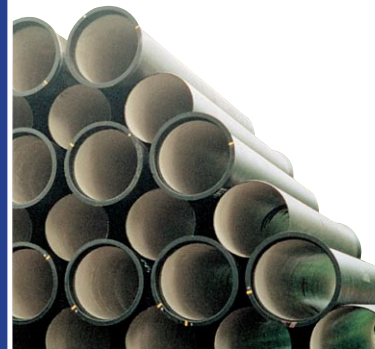
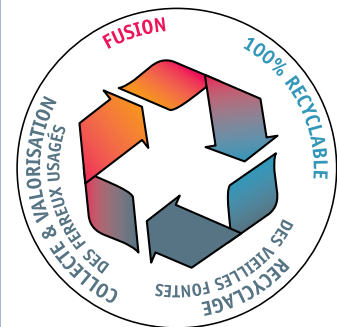
Saint-Gobain PAM is the world leader in water cycle pipeline systems. Whilst this is a cause of great pride for all those that work with and for the company, it is also an immense responsibility.

Sustainable development lies at the heart of its corporate culture. Saint-Gobain PAM rapidly embraced the pioneering principles of sustainable development formulated by the Brundtland Commission. Since 1987, this international commission has encouraged today's generations to 'meet the needs of the present without compromising the ability of future generations to meet their own needs'.

Its state-of-the-art technologies and focus on research and development have enabled it to consistently provide its customers with quality, sustainable, reliable and ergonomic solutions.

BENEFITS OF ISO 14001 FOR CUSTOMERS:

- The assurance of having a supplier committed to sustainable development
- The certainty that this ambition is controlled, but also measured
- The guarantee of products and services that meet the requirements of respect for the environment





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