

VINIDEX PTY LTD

PRODUCT APPRAISAL REPORT PA 1515

FRIALEN PE100 ELECTROFUSION FITTINGS FOR PRESSURE APPLICATIONS

AS/NZS 4129:2008 “Fittings for polyethylene (PE) pipes for pressure applications”

Publication Date – 17 February 2016



WATER SERVICES
ASSOCIATION OF AUSTRALIA

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Overview of WSAA

The Water Services Association of Australia (WSAA) is the peak industry body that supports the Australian Urban Water Industry. Its members and associate members provide water and sewerage services to approximately 20 million Australians and many of Australia's largest industrial and commercial enterprises.

The Association facilitates collaboration, knowledge sharing, networking and cooperation within the urban water industry. It is proud of the collegiate attitude of its 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 influences, to monitor emerging issues of importance to the urban water industry. WSAA is regularly consulted and its advice sought by decision makers when developing strategic directions for the water industry.

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

The Association's main activities focus on four areas:

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

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1 EXECUTIVE SUMMARY

The FRIATEC FRIALEN range of PE100 electrofusion fittings has been appraised for water supply, recycled water, and pressure sewerage applications. FRIALEN electrofusion fittings are manufactured by FRIATEC AG in Mannheim, Germany, and distributed throughout Australia by Vinidex Pty Ltd.

Both Vinidex Pty Ltd and FRIATEC AG are members of the ALIAXIS group of companies with headquarters in Brussels, Belgium. ALIAXIS is a global producer of plastic pipe and fittings systems for building, infrastructure, plumbing, rural and industrial markets.

Vinidex is an Australian manufacturer of thermoplastic pipe and fittings systems. Vinidex manufactures and distributes plastic piping systems used in the transportation of fluids, energy and data for infrastructure development, agriculture, mining and building. Founded in 1960, Vinidex now has factories and distribution centres located in Sydney, Wagga Wagga, Melbourne, Brisbane, Toowoomba, Townsville, Launceston, Perth, Adelaide and Darwin.

FRIATEC AG was founded in 1863 in Mannheim, Germany. Originally established as a brickyard, in 1888 the company introduced chemical stoneware, and in the years that followed, the company diversified to become a leading manufacturer of plastic products.

FRIATEC AG has been granted StandardsMark for the FRIALEN range of electrofusion fittings by SAI Global for compliance with AS/NZS 4129:2008 *"Fittings for polyethylene (PE) pipes for pressure applications"*. The Certification Certificate is attached in Appendix A. The range of fittings included in this appraisal is listed in Section 4 and in Appendix A Table A4 of this report.

The FRIALEN range of electrofusion fittings are suitable for use with polyethylene (PE) pipes manufactured in accordance with AS/NZS 4130 *"Polyethylene (PE) pipes for pressure applications"* for the conveyance of potable water, recycled water, and sewage in buried and above ground applications.

FRIALEN electrofusion fittings are in compliance with AS/NZS 4020: 2005 *"Testing of products for use in contact with drinking water"*.

The FRIALEN electrofusion range includes:

- Electrofusion couplers, reducers, tees, elbows and caps in sizes DN 20 to DN 630 depending on the individual product.
- Electrofusion branch saddles and tapping tees

The FRIALEN electrofusion range is rated to PN 16 and is used in the civil, mining and irrigation sectors. PN 25 and PN 10 rated fittings are also available for specialist applications.

The FRIATEC FRIALEN range of electrofusion fittings has several unique features:

- Embedded heating coil for improved fusion,
- Longer fusion zone for more security and
- Long insertion depth for a perfect result.

The FRIATEC FRIALEN range of electrofusion fittings are designed on the basis of 50 year extrapolated material test data. For correctly manufactured and installed systems, the actual life cannot be predicted, but can reasonably be expected to be well in excess of 100 years before major rehabilitation is required. Pipe life expectancy can vary with the quality of installation workmanship, system operating conditions, operating environment and other site specific factors.

A summary of the product range is shown in Section 3 of this Report.

1.1 Recommendations

It is recommended that WSAA members, subject to any specific requirements of the member, accept or authorise the FRIATEC FRIALEN range of electrofusion range as detailed in this report for use in for water supply recycled water, and pressure sewerage applications

provided pipeline design and installation is in accordance with the relevant WSAA Code and the manufacturer’s installation requirements.

2 THE APPLICANT

Vinidex is an Australian manufacturer of thermoplastic pipe and fittings systems. Vinidex manufactures and distributes plastic piping systems used in the transportation of fluids, energy and data for infrastructure development, agriculture, mining and building. Founded in 1960, Vinidex now has factories and distribution centres located in Sydney, Wagga Wagga, Melbourne, Brisbane, Toowoomba, Townsville, Launceston, Perth, Adelaide and Darwin.

On the 1st August 2014, Vinidex was acquired by the Aliaxis group of companies. The Aliaxis Group is a leading global manufacturer and distributor of primarily plastic fluid handling systems used in residential and commercial construction, as well as in industrial and public infrastructure applications. Vinidex is now wholly owned by Aliaxis Australia Holdings Pty Ltd.

Key Aliaxis Group facts:

- Head office in Brussels, Belgium
- Family owned
- €2.9 billion annual revenue
- Presence in 40 countries
- Over 100 manufacturing and commercial entities
- Employs 15,700 people around the world



ALIAxis GROUP BRANDS WORLDWIDE

North America	Europe	Asia
<p>canplas Founded in 1966</p> <p>IPEX IPEX, with more than 50 years of experience in plastics</p> <p>HARRINGTON 1959 : Harrington Industrial Plastics LLC was founded</p>	<p>Nicoll 1956 : Nicoll starts to manufacture fittings from PVC tubes</p> <p>GIRPI GIRPI originates in 1957 in Marseille with the production of PVC waste fittings</p> <p>REDI REDI SpA in Italy with more than 40 years of experience in producing plastic fittings</p> <p>Jimfen Jimfen was started in 1965 in Alicante (Spain)</p> <p>SANT SANIT was founded 60 years ago as a handicraft business</p> <p>MARLEY Marley Plastics was founded in United Kingdom in 1966</p> <p>MARLEY Marley Deutschland GmbH has more than 50 years of experience</p> <p>FRIATEC Recently celebrating 150 years of Friatec, active in plastics since 1979</p> <p>FIP In 1954, FIP produced the first plastic valve in Europe by injection moulding technology</p>	<p>PALING Paling founded in 1971 in Malaysia</p> <p>ashirvad PIPES Ashirvad Pipes founded in India in 1975</p>
Latin America	Australasia	Africa
<p>Durman Since Durman created in 1959 in Costa Rica, it developed across almost all Latin America</p> <p>vinilit More than 40 years of experience in Vinilit (Chile)</p>	<p>MARLEY Marley New Zealand started in 1957</p> <p>Philmac Established in 1929, Philmac (Australia), developed first all-plastic compression fittings for polyethylene pipe in 1968</p> <p>EXP More than 30 years of experience</p> <p>DWX More than 70 years of experience in the plumbing business</p>	<p>MARLEY Marley Pipe systems was launched in South Africa in 1963</p>

3 THE MANUFACTURER

FRIATEC AG is located at Steinzeugstrasse 50 Friedrichsfeld, Mannheim, Germany and a specialist manufacturer of products made of corrosion and abrasion resistant materials. The company was founded in 1863 in Mannheim, Germany, originally as a brickyard, before developing its first innovation, chemical stoneware, in 1888. In the mid 1900's FRIATEC AG started processing plastics and combining modern and traditional materials to produce chemical devices and facilities. FRIATEC AG has been a member of the ALIAXIS group of companies since 2003.

4 THE PRODUCT

The FRIALEN range of electrofusion fittings are suitable for use with polyethylene (PE) pipes manufactured in accordance with AS/NZS 4130 *"Polyethylene (PE) pipes for pressure applications"* for the conveyance of potable water, recycled water, and sewage in buried and above ground applications.

FRIALEN electrofusion fittings are manufactured by FRIATEC AG in Mannheim, Germany from PE100. FRIALEN electrofusion fittings have StandardsMark product certification by SAI Global for compliance with AS/NZS 4129:2008 *"Fittings for polyethylene (PE) pipes for pressure applications"*. This includes compliance with AS/NZS 4020: 2005 *"Testing of products for use in contact with drinking water"*. Certification and schedules are shown in Appendix A.

The FRIALEN electrofusion range includes:

- Electrofusion couplers, reducers, tees, elbows and caps in sizes DN 20 to DN 630 depending on the individual product.
- Electrofusion branch saddles and tapping tees.

The full range is shown in Appendix A Table A4 and in the StandardsMark Schedule.

The FRIALEN electrofusion range is rated to PN 16 and is commonly used in the civil, mining and irrigation sectors. PN 25 and PN 10 rated fittings are also available for specialist applications.

The FRIALEN range of electrofusion fittings are nominated to have several unique features:

(a) Embedded heating coil for improved fusion:

FRIALEN safety fittings are designed with embedded heating coils. FRIALEN claim consistent heat transfer is provided during fusion and optimum homogenous connection of the PE materials. Other advantages claimed include:

- fusion result is not affected by oxidised layer in the fitting
- symmetrical fusion ellipse
- excellent and fast bridging of the gap between pipe and fitting

(b) Longer fusion zone for more security:

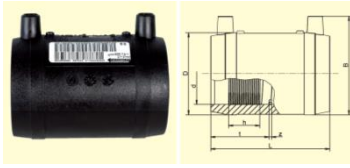
FRIALEN safety fittings have a longer fusion zone that exceeds the requirements of the Australian and European Standard. This should allow a considerably greater solidity and reliability of the fusion joint. Other advantages include:

- enlarged force transferring area
- greater installation safety
- higher long-term solidity of the jointing

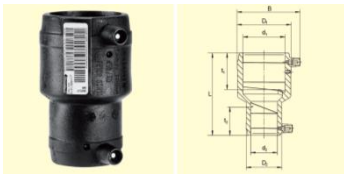
(c) Long insertion depth for a perfect result:

The long insertion depth of the pipe ends inside the coupler contributes considerably to the reliability and safety of pipe connections. FRIALEN safety fittings ensure that:

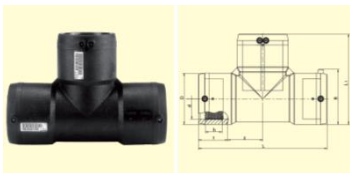
- angle deviations are safely absorbed
- bending stresses are better compensated
- melt pressures are evenly built up

FRIATEC Electrofusion Couplers

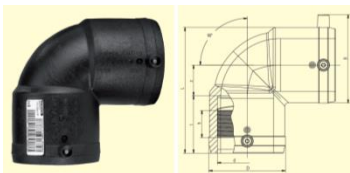
FRIALEN electrofusion couplers are available in SDR17, SDR11 and SDR7.4, in sizes DN20 to DN630, with and without centre stop.

FRIATEC Electrofusion Reducers

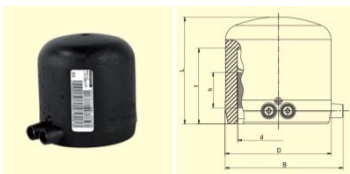
FRIALEN electrofusion reducing couplers are available in SDR11, in sizes DN 32 x DN 20 to DN 160 x DN 110.

FRIATEC Electrofusion Tees

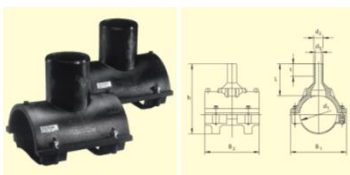
FRIALEN electrofusion equal tees are available in SDR11, in sizes DN 32 to DN 225.

FRIATEC Electrofusion Elbows

FRIALEN electrofusion elbows are available in SDR11, in sizes DN 25 to DN 225. Deflection angles of 90°, 45°, 30° and 11° are available.

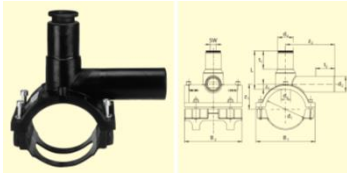
FRIATEC Electrofusion Caps

FRIALEN electrofusion end caps are available in SDR11, in sizes DN 20 to DN 225.

FRIATEC Electrofusion Branch Saddles

FRIALEN electrofusion branch saddles are available in SDR11, in sizes DN 63 x DN 32 to DN 315x DN 90. Underclamp and top loading options are available.

FRIATEC Electrofusion Tapping Tees



FRIALEN electrofusion tapping tees are available in SDR11, in sizes DN 40 x DN 20 to DN 225x DN 63, with underclamp. Top loading options are available for specialist installations.

The full range of Friatec electrofusion fittings is listed in Appendix A Table A4.

4.2 Electrofusion welding

The FRIALEN Electrofusion System Brochure and FRIALEN Assembly instructions are available from Vinidex in electronic form. These documents describe electrofusion welding and welding systems for the FRIALEN Electrofusion fittings.

For electrofusion welding of FRIALEN fittings the FRIAMAT fusion machines are available from Vinidex. The FRIAMAT fusion machines are universal suitable for connection to fittings which have 4 mm pins. The Friatec machines read the barcode attached to the fitting in order to get the correct fusion parameters, it supervises all functions fully automatically during the welding process and stores the data. All reputable electrofusion fitting brands are supplied with a barcode sticker which conforms to an international standard (ISO 12176.4:2003) which can be read by the Friatec machine. Any standard 5Kva generator will be adequate to provide enough power to weld all sizes of fittings.

(Welding devices are not included in this appraisal.)

5 SCOPE OF THE APPRAISAL

The range of FRIATEC fittings is described in Section 3 and also shown in Appendix A Table A4. Products in this application are included in the StandardsMark Schedule. Note that the StandardsMark Schedule contains some duplicated numbers due to one being suitable for gas only and the other is suitable for both water and gas. More information is available from the SAI Global website at:

<http://register.saiglobal.com/client/schedule.aspx?setID=SF01&custID=AS125036&appCertNo=SMKP20677>

6 APPRAISAL CRITERIA

6.1 Quality Assurance Requirements

The WSAA product appraisal network accepts electrofusion fittings manufactured in compliance with AS/NZS 4129:2008 *"Fittings for polyethylene (PE) pipes for pressure applications"* 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.

6.2 Performance Requirements

The FRIALEN range of electrofusion fittings has been appraised for compliance with AS/NZS 4129:2008.

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-208 Polyethylene (PE) Moulded Pressure Fittings for Pressure Applications - Water Supply and Sewerage

- WSA PS-329 Tapping Saddles, Electrofusion, for Use with Polyethylene (PE) Mains for Pressure Applications - Water Supply

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

7 COMPLIANCE WITH APPRAISAL CRITERIA

7.1 Compliance with Quality Assurance Requirements

The Frialen range of electrofusion fittings are manufactured under a Quality Management System certified as fulfilling the requirements of ISO 9001, Certificate Registration Number 01 100 060216/01, issued in Germany by TÜV Rheinland, which is supported by IAF and affiliated with JAS-ANZ. This certificate was originally issued on 12/05/2015 and is currently valid until 11/05/2018.

As part of the appraisal application Vinidex has submitted the Friatec international list of accreditation showing accreditation in 15 individual countries. This list is included in Appendix B.

As part of the appraisal application Vinidex has submitted the Friatec Quality Management Manual prepared for their Technical Plastics Division and dated February 2015. This manual represents the quality processes and responsibilities of the Business Unit Plastics with the Technical Plastics Division in accordance with the guideline DIN EN ISO 9001:2008. A copy of this report is retained on file by WSAA.

As part of the appraisal application Vinidex has submitted a BSI Assessment Report (Kitemark Audit report) which concluded with the following remarks:

Production process has been audited from incoming material delivery, non-conform injection moulding wiring of products, in-process inspections, packaging and final release. Set up verifications are carried out and verified by quality control. Records have been IT- documented. In-process inspections are carried out 3 times in a shift on each part There were no non-conform parts during the audit. Generally Non-conform are segregated and identified properly to eliminate mistakes. Tests have been carried out as defined in the control plans. The measuring devices used in production are having identified calibration status. The operators in production are qualified for their activities. The production parts are identified during packaging with labels:

- Friatec
- PE 100 SDR---
- EN 1555 EN 12201
- Part No MB d160 (as applicable Made in Germany).

The work environment is acceptable. House-keeping and safety equipment are properly maintained. During the site visit the identified observations have been rectified except, MFT 2000 device will be calibrated by an external agency within a month.

Considering the audit results the Lead Assessor is pleased to recommend the Kitemark approval. The above BSI report is retained on file by WSAA.

Friatec Aktiengesellschaft has been issued with StandardsMark Licence No SMKP20677 by SAI Global for DuraFuse and Frialen electrofusion fittings complying with AS/NZS 4129:2008 - *"Fittings for polyethylene (PE) pipes for pressure applications"*. This certificate was originally issued on 19 December 2007 and is currently valid until 19 December 2017. The Schedule to this Licence includes the fittings shown in Table 5.1 above.

Friatec Aktiengesellschaft has been issued with WaterMark Certificate of Conformity – Level 1 Certificate No WMKA20677 by SAI Global for DuraFuse and Frialen electrofusion fittings complying with AS/NZS 4129:2008 - *"Fittings for polyethylene (PE) pipes for pressure"*

applications". This certificate was originally issued on 3 April 2008 and is currently valid until 2 April 2018. The Schedule to this Licence is similar to that shown in Table 5.1 above.

Vinidex Pty Ltd has a "Quality Management System" certified by SAI Global for compliance with ISO 9001:2008 Certificate No. QEC0570 for the design, manufacture and distribution of plastics pipes, conduits and associated fittings. This certificate was originally issued on 19/02/1991 and is currently valid until 13/05/2016.

8 COMPLIANCE WITH PERFORMANCE CRITERIA

The ISO Type 5 Certificate of Conformity (StandardsMark) for product compliance with AS/NZS 4129 provides some confidence that the Friatec electrofusion fittings are manufactured for compliance with the nominated standards and requirements.

8.1 Effect on Water

Refer: AS/NZS 4129:2008 Clause 1.12

Vinidex has submitted an Australian Water Quality Centre Report ID 114152 dated 17 January 2013 for Friaten Safety Fittings with a material definition of 'Thermoplastic'. The Report results state:- *compliance of Friaten Safety Fittings to AS/NZS 4020 when tested at the 'in the product' exposure with a 0.1 scaling factor at 20°C. Product range to include DN20 – DN1200.*

8.2 Type Testing

Refer: AS/NZS 4129:2008 Clause 3.5 & Table 3.2

To demonstrate Type Testing compliance WSAA requests appraisal applicants submit typical European Type Test reports and the relationship with Clause 3.5 and Table 3.2 of AS/NZS 4129:2008.

For Mechanical Characteristics Vinidex has submitted two European reports dating from 2013 and 2014 for coupler fittings manufactured from PE 100 by BorSafe in HE3490-IM and Eltex TUB121 – (E01). The type testing was carried out by FRIALEN (in house) and Belgian Research Centre for Pipes and Fittings (BECETEL) and a brief of the reports is shown below:

FRIALEN in-house 4 page Type Test Report No. 615 073-70 (2013) tested Couplers (UB) 280mm (DN250) manufactured from compound Eltex TUB 121 – PE 100 – (E01).

The testing was for compliance with EN 12201.3 *Plastic piping systems for water supply-Polyethylene (PE)* which is similar to AS/NZS 4129 but not identical. The report conclusion states the following:

- The results of the geometrical and marking characteristics are in accordance with the standard and drawing.
- The pressure tests reached more than the required time without a failure.
- Decohesion tests performed after the sustained pressure test showed a ductile break at all samples.
- All tests of the decohesive resistance of samples prepared according the requirements "Fitness for Purpose" under normal and extreme conditions showed a ductile break.

The tests that generally correspond with AS/NZS 4129:2008 Table 3.2 are:

TEST	REQUIREMENT	METHOD	AS METHOD	CONFORMS
Hydrostatic strength at 20°C	Failure time \geq 100	EN 921	ISO 1167	YES
Hydrostatic strength at 80°C	Failure time \geq 165	EN 921	ISO 1167	NOT TESTED
Hydrostatic strength at 80°C	Failure time \geq 1000	ISO 1167	ISO 1167	YES

Decohesive strength	% brittle failure decohesion $\leq L_2/3\%$	EN 12201.5	ISO 13594 OR ISO 13595	YES
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The full Frialen Type test report is shown in Appendix 'D'.

BECETEL 17 page Test Report No. 12636 (23 October 2014) describes testing of a range (195) of black fittings all SDR11, in sizes – 20mm to 200mm manufactured from compound BorSafe HE3490-IM. The BECETEL BELAC laboratory has accreditation to EN ISO/IEC 17025 (181 Test).

Test program: "Friatec AG requested Becetel to perform the type test evaluation of Frialen PE 100 electrofusion couplers, size groups 1 and 2 according to the certification rules of NF136, revision 17 of 29 April 2013 (type test, family A1 – electrofusion fittings)".

The test program is detailed and summarised in tables and all the results are further summarised as follows:

"The test results obtained on the above mentioned FRIALEN PE100 electrofusion couplers with removable stop MB and slideover electrofusion couplers UB, produced with compound BorSafe HE3490-IM, fulfil the corresponding requirements of the certification rules of NF136." NF136 nominates EN 12201-3 Plastic piping systems for water supply-Polyethylene (PE) which is similar to AS/NZS 4129 but not identical.

TEST	REQUIREMENT	METHOD	AS METHOD	CONFORMS
Appearance / Dimensions	Visual & measurement - typical.	EN 1555-3, Cl's 5.1, 5.2, 5.3, 5.4 & 6.2	AS/NZS 4129	YES
Electrical Resistance	Friatec specification	Friatec	Manufacturer to nominate	YES
MFR	MFR $\pm 20\%$	EN ISO 1133-1	ISO 1333	YES
Thermal stability 200°C	>20 minutes	EN ISO 1133-1	ISO 1133	YES
IOT		ISO 11357-6	ISO TR 10837	YES
Hydrostatic strength at 20°C	Failure time ≥ 100	ISO 1167	ISO 1167	YES
Hydrostatic strength at 80°C	Failure time ≥ 1000	ISO 1167	ISO 1167	YES
Decohesive strength	% brittle failure decohesion $\leq 33.3\%$	ISO 13596	ISO 13594 & ISO 13595	YES

Vinidex has provided the following explanation and documentation to demonstrate compliance with AS/NZS 4129:

"AS/NZS 4129 requires a pressure test at 80C, 5.4 MPa for ≥ 165 h. This is not a requirement of the EN standards for Type Testing but for batch release test. A confirmation is attached confirming that each batch of fittings is submitted to an internal batch release test according to these parameters as final inspection. The Manufacturers Test Certificate 3.1 certificate is attached which summarizes all results of the BRT."

Copies of the Becetel and Frialen test reports are held on file by WSAA.

The Frialen documentation for saddles complies with AS/NZS 4129, Figure 3.2 – *Characteristic Dimensions for Tapping Tees*.

8.3 Compliance with Material Requirements

8.3.1 Polyethylene Resins

Refer: AS/NZS 4129:2008 Clause 3.2.4

Eltex TUB 121 is listed on PIPA Industry Guidelines POP004A - Supplementary list – *Materials specific to electrofusion and moulded fittings* and meets the requirements of AS/NZS 4131 and if nominated also the requirements of POP013. This material is nominated as AS/NZS 4020 certified and compliant with temperature re-rating.

HE3490-IM is listed on PIPA Industry Guidelines POP004A - Supplementary list – *Materials specific to electrofusion and moulded fittings* and meets the requirements of AS/NZS 4131. This material is nominated as AS/NZS 4020 certified, but **compliance not demonstrated with POP013 for temperature re-rating**. Vinidex has provided BECETEL Report No. 9246 concerning the evaluation of BORSAFE HE3490-IM dated 16 February 2009. This report concluded with regard to the calculations of regression curves that according to ISO 12162 – *Thermoplastics materials for pipes and fittings for pressure applications – classification and designation – overall service (design) coefficient*. The BORSAFE HE3490-IM is classified as MRS 10. With reference to Table 1, Section 6 – CLASSIFICATIONS in AS/NZS 4131 a classification of MRS 10 defines the material as PE 100.

8.3.2 Stainless steel inserts

Refer: AS/NZS 4129:2008 Clause 1.14.1.2 (b)

Friatec transition fittings with stainless steel inserts are not included in the standard range.

8.3.3 Zinc plated steel inserts

Refer: AS/NZS 4129:2008 Clause 1.14.1.3

Friatec transition fittings with zinc plated steel inserts are for gas only and not included in this appraisal.

8.3.4 Brass inserts

Refer: AS/NZS 4129:2008 Clause 1.14.1.2 (a)

Friatec UAN and UAM transition fittings are made from ECO BRASS which is nominated as resistant to dezincification. ECO BRASS is a lead free brass alloy developed by and patented by Mitsubishi Shindoh. The website states that ECO BRASS eliminates the problems of stress corrosion cracking and dezincification corrosion and is recommended for water supply devices such as faucets, valves, fittings etc.

AS/NZS 4129 specifies brass material comply with AS 2345 – Dezincification resistance of copper alloys. ECO BRASS. Vinidex has submitted Test Report No. TT2496 from The Plumbing Testing Laboratory, NATA Accreditation No. 14285 called DEZINCIFICATION RESISTANCE TEST REPORT for compliance with AS 2345:2006 Appendix C. This report demonstrates compliance for the brass material - extruded bar CW724R [CuZn21Si3P]. The test report stated zero depth of dezincification and for the type of dezincification – none.

8.3.5 Screw Threads

Refer: AS/NZS 4129:2008 Clause 1.8

Friatec transition fittings with brass inserts have pipe threads in compliance with EN 10226-1 which is compatible with the WSAA requirement of ISO 7.1. The ISO 7.1 specification for sealing pipe threads requires male threads to be tapered and female threads to be parallel and EN 10226-1 carries the same specification.

9 FITTING INSTRUCTIONS, TRAINING AND INSTALLATION

WSAA has published the Polyethylene Pipeline Code - WSA 01 with significant input and peer review of the Plastics Industry Pipe Association of Australia (PIPA). WSAA recommend for overall design, installation, pipeline testing and installer training requirements for PE pipeline systems

agencies refer to the WSAA Polyethylene Pipeline Code - WSA 01 available from the bookshop at the WSAA web site www.wsaa.asn.au.

Satisfactory completion of a recognised PE pipeline installation training program is a recommended pre-requisite for all PE pipeline installers and supervisors.

Vinidex can provide a 32 page Frialen Assembly Instructions for fittings up to DN 225. The 'Table of Contents' provides the following:

- Safety
- Areas of application
- Regulations and processing instructions
- Couplers, Elbows, T-Pieces d 20 - d 225
- Pressure Tapping Tees, Pressure Tapping Valves
- Valve Tapping Saddles
- Shut-off Saddles
- Spigot Saddles
- Reinforcement and repair saddles
- FRIALOC® PE shut-off valve
- Ball Valves
- Tapping Ball Valves
- Transition Fittings
- Repair Sleeves for pipes d 32 – d 63, SDR 11
- Updates of assembly instructions

This instruction information is available from Vinidex and WSAA is holding a copy on the WSAA website.

Additional product information and additional installation instructions and technical Information is available at www.frialen.com including the following:

- FRIALEN® Large Pipe Technique for laying large pipes and relining pipe networks
- FRIAFIT® Sewage System
- FRIAMAT® Electrofusion Units
- FRIATOOLS® Scraper Tools
- FRIATOP Clamping Unit
- FWFIT Clamping and Drilling Unit

10 PRODUCT MARKING

Refer: AS/NZS 4129:2008 Clause 3.7

The Frialen range of electrofusion fittings are product certified to be marked in accordance with the requirements of AS/NZS 4129:2008 as per the following:

- Manufacturers Name – Adhesive label on fitting body and packaging.
- Date or Batch Code - Adhesive label on fitting
- Nominal size (DN) of the pipe to which it is suited - Adhesive label on fitting body and packaging.
- Material grade and type - Adhesive label on fitting body and packaging.
- Nominal Classification: e.g. Design SDR - Adhesive label on fitting body and packaging.
- Applicable fusion range of pipe - Adhesive label on fitting
- StandardsMark symbol – (I>>>>I) - Adhesive label on packaging.
- Licence Number: SMKP20677 - Adhesive label on packaging.

11 PACKAGING AND TRANSPORTATION

FRIALEN® Safety Fittings are packed in an individual plastic bag and labelled as described above in the Product Marking:

IMPORTANT!

- FRIALEN® Safety Fittings are identified by a batch marking.
- This reads from left to right: Example:
 - Production week (KW) (stamp 1+2)
 - Production year (stamp 2)
 - Material identification letter (stamp 3)
- Some component parts are directly identified in reading direction.

Vinidex has provided the following storage conditions:

IMPORTANT!

The FRIALEN® Fitting can be stored and processed for a long time, provided the general storage specifications are adhered to. When properly stored (in closed rooms or containers (boxes) and/or not exposed to UV radiation as well as effects of weather like humidity etc.), a storage and processing period of more than 4 years can be assumed.

WARNING!

Improperly stored component parts may not be processed because this may result in leaking fusion joints.

IMPORTANT!

Before installing the FRIALEN Fittings, please check if the parts are in perfect condition when delivered. Damaged parts may not be installed.

Traceability

An automatic component traceability is possible when using e.g. traceability capable FRIAMAT® Electrofusion Units with a special barcode which contains the specific data of the fitting, e.g. manufacturer, dimension, material, batch. These data on component traceability can be electronically archived together with the fusion process data.

IMPORTANT!

Manual electrofusion units (without barcode reader), e.g. FWS 225, are no longer state-of-the-art. Processing of FRIALEN® Safety Fittings with these units is thus no longer possible.

12 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 Vinidex/Friatec warranty, is included in their terms and conditions of sale.

13 WATER AGENCY EXPERIENCE WITH THE PRODUCT OR FIELD TESTING REPORT

A field testing report of the Frialen electrofusion fittings has not been submitted at this time, see Section 17 – 'Future Work' below.

While electrofusion fittings are a mature and widely installed product, the Australian water industry has had varied experience with the performance of these fittings. They are approved by many Water Agencies simply based on product certification and the knowledge that they are capable of performing well provided the installation is carried out correctly by competent well-trained installers.

Many Water Agencies are cautious about the use of electrofusion fittings due to the lack of confidence in the installers. Because of the history of erratic installation quality it is imperative

that satisfactory completion of a recognised PE pipeline installation training program be a minimum pre-requisite for all PE pipeline installers. In addition it is recommended that for PE pipelines where electrofusion fittings are being used, an attentive site supervision regime be adopted using qualified, experienced supervisors until the individual installer or contractor can demonstrate competence in all aspects of installation.

14 DISCUSSION

Electrofusion jointing of PE pipelines offers a permanently sealed and jointed system provided the electrofusion process is carried out correctly. The electrofusion jointed PE pipeline has the potential to have life expectancy equal to and in some cases well beyond other pipeline materials and jointing systems. The PE material is corrosion resistant and correctly made joints are permanently fused to provide a high level of joint integrity against leakage and/or infiltration over the long-term. Similar to other plastic pipe systems, PE is susceptible to fatigue from cyclic pressure changes and additional design considerations must be made if used in a pumped pipeline. Refer to WSAA Technical Note TN4, plus design material available from Vinidex and Friatec.

PE pipelines are susceptible to permeation of specific organic chemicals (as are other pipeline systems) and care must be exercised if designing for installation in contaminated ground and/or brownfield sites. Seek further advice from Vinidex and Friatec regarding such installations.

The appraisal concludes that:

- The Frialen electrofusion fittings are 'fit for purpose' and suitable for use in water supply and sewer gravity, pressure and vacuum systems.
- The Frialen electrofusion fittings are suitable for use with PE pipe conforming to AS/NZS 4130.
- The ISO Type 5 StandardsMark Licence for the Frialen electrofusion range of fittings has been addressed to the satisfaction of WSAA Appraisal Network

15 OUTCOMES OF EXPERT PANEL PRODUCT REVIEW

There are no items pending as a result of the Expert Panel peer review process.

16 LIFE EXPECTANCY

The FRIATEC FRIALEN range of electrofusion fittings are designed on the basis of 50 year extrapolated material test data. For correctly manufactured and installed systems, the actual life cannot be predicted, but can reasonably be expected to be well in excess of 100 years before major rehabilitation is required. Pipe life expectancy can vary with the quality of installation workmanship, system operating conditions, operating environment and other site specific factors.

17 FUTURE WORKS

Vinidex has undertaken to arrange a field installation and test report of the Frialen electrofusion fittings with a WSAA member water agency. The report signed off by the water agency is required to be submitted to WSAA by 1 July 2016.

18 RECOMMENDATIONS

It is recommended that WSAA members, subject to any specific requirements of the member, accept or authorise the FRIALEN electrofusion range as detailed in this report for use in for water supply recycled water, and sewerage pressure applications provided pipeline design and installation is in accordance with the relevant WSAA Code and the manufacturer's installation requirements.

19 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.

20 ISSUE OF REPORT

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

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

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

21 LIMITS ON RELIANCE ON INFORMATION AND RECOMMENDATIONS

21.1 Disclaimer of liability

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

22 NEED FOR INDEPENDENT ASSESSMENT

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

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

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

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

23 NO UPDATING

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

APPENDIX A - QUALITY CERTIFICATIONS

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

TABLE A1 VINIDEX PTY LTD– MANAGEMENT SYSTEMS

Australian Sites as shown on Schedule	
Quality Systems Standard	ISO 9001:2008
Certification licence no.	QEC0570
Certifying agency	SAI Global
First date of certification	19 February 1991
Current date of certification	8 May 2013
Expiry date of certification	13 May 2016

TABLE A2 FRIATEC – MANAGEMENT SYSTEMS

Friatec Aktiengesellschaft Technical Plastics Division	
Quality Systems Standard	ISO 9001:2008
Certification licence no.	01 100 060216/01
Certifying agency	TÜV Rheinland
First date of certification	NA
Current date of certification	12/05/2015
Expiry date of certification	11/05/2018

TABLE A3 FRIATEC – PRODUCT CERTIFICATION

Friatec Aktiengesellschaft	
Product Standard/Spec.	AS/NZS 4129:2008
StandardsMark License No.	SMKP20677
Issuing certification body	SAI Global
First date of certification	19 December 2007
Current date of certification	5 December 2012
Expiry date of certification	18 December 2017



CERTIFICATE OF REGISTRATION

This is to certify that:

Vinidex Pty Ltd

ABN 42 000 664 942

(Refer to Attachment to Certificate of Registration dated 7 June 2013 for additional certified sites)

operates a

QUALITY MANAGEMENT SYSTEM

which complies with the requirements of

ISO 9001:2008

for the following scope

The design, manufacture and distribution of polyethylene, polypropylene and unplasticised PVC pipes, conduits and associated fittings for the water supply, sewerage, drainage, electrical, mining, gas, rural and communications industries.

Certificate No: QEC0570

Issued: 7 June 2013
Expires: 13 May 2016

Originally Certified: 19 February 1991
Current Certification: 8 May 2013

Samer Chaouk
Head of Policy, Risk and Certification

Paul Butcher
Global Head – Assurance Services



ATTACHMENT TO CERTIFICATE OF REGISTRATION

These sites are registered under Certificate No: QEC0570 issued on 7 June 2013.

Vinidex Pty Ltd

ABN 42 000 664 942

Extrusion 254 Woodpark Road Smithfield NSW 2164 AUSTRALIA

Injection Moulding 254 Woodpark Road Smithfield NSW 2164 AUSTRALIA

101 Byrnes Road Wagga Wagga NSW 2650 AUSTRALIA

3846 Marjorie Street Berrimah NT 0828 AUSTRALIA

49 Enterprise Street Bohle QLD 4818 AUSTRALIA

14 Enterprise Street Bohle QLD 4818 AUSTRALIA

Lot 2, Witmack Road Charlton QLD 4350 AUSTRALIA

224 Musgrave Road Coopers Plains QLD 4108 AUSTRALIA

9 - 11 Kurna Avenue Edinburgh SA 5111 AUSTRALIA

15 Thistle Street South Launceston TAS 7249 AUSTRALIA

Unit 1 10 Duerdin Street Notting Hill VIC 3168 AUSTRALIA

231 - 245 St Albans Road Sunshine VIC 3020 AUSTRALIA

Sainsbury Road O'Connor WA 6163 AUSTRALIA

These registrations are dependent on Vinidex Pty Ltd maintaining their scope of registration to ISO 9001:2008.

Registered by:
SAI Global Certification Services Pty Ltd (ACN 108 716 669) 286 Sussex Street Sydney NSW 2000 Australia with
SAI Global Limited 286 Sussex Street Sydney NSW 2000 Australia ("SAI Global") and subject to the SAI Global Terms and Conditions
for Certification. While all due care and skill was exercised in carrying out this assessment, SAI Global accepts responsibility only for



Certificate

Standard **ISO 9001:2008**

Certificate Registr. No. 01 100 060216/01

Certificate Holder:



FRIATEC Aktiengesellschaft
Technical Plastics Divison
Steinzeugstraße 50
68229 Mannheim
Germany

Scope:

Development, Manufacturing and Sales of Products
for gas-, water-, sewage systems
- FRIALEN®, FRIAFIT®, FRIALOC®, FRIAGRIP®, FRIATOOLS®

Proof has been furnished by means of an audit that the
requirements of ISO 9001:2008 are met.

Validity:

The certificate is valid in conjunction with the main certificate from
2015-05-12 until 2018-05-11.

2015-05-11

TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

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www.tuv.com





STANDARDSMARK
LICENCE

SAI Global hereby grants:

Friatec Aktiengesellschaft

Steinzeugstrasse 50, Friedrichsfeld, Mannheim, Germany

StandardsMark Licence

Manufactured to:

AS/NZS 4129:2008 - Fittings for polyethylene (PE) pipes for pressure applications

"the StandardsMark Licensee" the right to use the STANDARDSMARK as shown below only in respect of the goods described and detailed in the Schedule which are produced by the Licensee or on behalf of the Licensee* and which comply with the appropriate Standard referred to above as from time to time amended. The Licence is granted subject to the rules governing the use of the STANDARDSMARK and the Terms and Conditions for certification and licence. The Licensee covenants to comply with all the Rules and Terms and Conditions.

Certificate No:SMKP20677

Issued: 5 December 2012
Expires: 18 December 2017

Originally Certified: 19 December 2007
Current Certification: 5 December 2012

Paul Butcher
Global Head – Assurance Services

Semer Chaouk
Head of Policy, Risk and Certification



* For details of manufacture, refer to the licensee

The STANDARDSMARK is a registered certification trademark of SAI Global Limited (A.C.N. 050 844 642) and is issued under licence by SAI Global Certification Services Pty Limited (ACN 108 716 669) ("SAI Global") 680 George Street, Sydney NSW 2000, GPO Box 5420 Sydney NSW 2001. This certificate remains the property of SAI Global and must be returned to SAI Global upon its request. Refer to www.saiglobal.com, for the list of product models.



TABLE A4 FRIATEC – PRODUCT SCHEDULE

COUPLER SDR 11 PE100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
20	MB	16	11	612680	88401
25	MB	16	11	612681	88402
32	MB	16	11	612682	88403
40	MB	16	11	612683	88404
50	MB	16	11	612684	88405
63	MB	16	11	612685	88406
75	MB	16	11	612686	88407
90	MB	16	11	612687	88408
110	MB	16	11	612688	88409
125	MB	16	11	612689	88410
140	MB	16	11	612690	88411
160	MB	16	11	612691	88412
180	UB	16	11	612672	88413
200	UB	16	11	612673	88414
225	UB	16	11	612674	88415
250	UB	16	11	612675	88416
280	UB	16	11	615073	88417
315	UB	16	11	612670	88418
355	UB	16	11	615074	88419
400	UB	16	11	615075	88420
450	UB	16	11	615076	88421
500	UB	16	11	615124	88422
COUPLER SDR 17 PE100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
50	MB	10	17	612664	
63	MB	10	17	612665	88448
75	MB	10	17	612666	88449
90	MB	10	17	612667	88450
140	AM	10	17	615001	88453
560	UB	10	17	615706	88465
630	UB	10	17	615726	88466

SILDE OVER COUPLER SDR 7.4 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
20	MB	25	7.4	612680	88401
25	MB	25	7.4	612681	88402
32	MB	25	7.4	612682	88403
40	MB	25	7.4	612683	88404
50	MB	25	7.4	612684	88405
63	MB	25	7.4	612685	88406
75	MB	25	7.4	612686	88407

LONG COUPLER SDR 11 PE100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
32	FRIALONG	16	11	615376	88442
40	FRIALONG	16	11	615737	88443
50	FRIALONG	16	11	615608	88444
63	FRIALONG	16	11	615738	88445

RELINING SLIDE-OVER COUPLER SDR 17 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
110/100	REM		17	615569	
160/150	REM		17	615571	
315/300	REM		17	615576	

REDUCING COUPLER SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
32 x 20	MR	16	11	615386	88476
32 x 25	MR	16	11	615502	88477
40 x 20	MR			615387	88478
40 x 32	MR	16	11	615388	88480
50 x 20	MR			612069	88481
50 x 32	MR	16	11	612070	88483
50 x 40	MR	16	11	612071	88484
63 x 32	MR	16	11	615389	88486
63 x 40	MR	16	11	615390	88487
63 x 50	MR	16	11	612072	88488

REDUCING COUPLER SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
90 x 50	MR	16	11	615391	88491
90 x 63	MR	16	11	615392	88492
110 x 63	MR	16	11	615393	88494
110 x 90	MR	16	11	615693	88495
125 x 90	MR	16	11	615694	88496
160 x 110	MR	16	11	615695	88499

90° EQUAL TEE SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
32 x 32 x 32	TA(KIT)	16	11	612161	88505
40 x 40 x 40	TA(KIT)	16	11	612162	88506
50 x 50 x 50	TA(KIT)	16	11	612163	88507
63 x 63 x 63	TA(KIT)	16	11	612164	88508
75 x 75 x 75	T	16	11	612165	88509
90 x 90 x 90	T	16	11	612166	88510
110 x 110 x 110	T	16	11	612167	88511
125 x 125 x 125	T	16	11	612168	88512
160 x 160 x 160	T	16	11	615277	88513
180 x 180 x 180	T	16	11	615691	88514
225 x 225 x 225	T	16	11	615692	88516

90° ELBOW SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
25	W90°	16	11	612091	88631
32	W90°	16	11	612093	88632
40	W90°	16	11	612095	88633
50	W90°	16	11	612097	88634
63	W90°	16	11	612099	88635
75	W90°	16	11	612101	88636
90	W90°	16	11	612103	88637
110	W90°	16	11	612105	88638
125	W90°	16	11	612107	88639
160	W90°	16	11	615276	88641
180	W90°	16	11	615689	88642

90° ELBOW SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
225	W90°	16	11	615690	88644

45° ELBOW SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
32	W45°	16	11	612092	88614
40	W45°	16	11	612094	88615
50	W45°	16	11	612096	88616
63	W45°	16	11	612098	88617
75	W45°	16	11	612100	88618
90	W45°	16	11	612102	88619
110	W45°	16	11	612104	88620
125	W45°	16	11	612106	88621
160	W45°	16	11	615275	88623
180	W45°	16	11	615687	88624
225	W45°	16	11	615688	88626

30° ELBOW SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
90	W30°	16	11	615272	88607
110	W30°	16	11	615273	88608
125	W30°	16	11	615274	88609
160	W30°	16	11	615340	88610
180	W30°	16	11	616261	88611

11° ELBOW SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
110	WS11°	16	11	616139	88597
125	WS11°	16	11	616140	88598
160	WS11°	16	11	616141	88599
180	WS11°	16	11	616142	88600
225	WS11°	16	11	616143	88601

END CAP SDR 11 PE 100					
SIZE	Frialen Model	PN Water	SDR	Friatec Code	VX Code
20	MV	16	11	612025	88758
25	MV	16	11	612026	88759
32	MV	16	11	612027	88760
40	MV	16	11	612028	88761
50	MV	16	11	612029	88762
63	MV	16	11	612030	88763
75	MV	16	11	612031	88764
90	MV	16	11	612032	88765
110	MV	16	11	612033	88766
125	MV	16	11	612034	88767
160	MV	16	11	612035	88769
180	MV	16	11	616183	88770
225	MV	16	11	616185	88772

MALE BRASS ADAPTOR INSERT LONG SPIGOT SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
32x1"	UAN	16	11	616152	88711
40x1¼"	UAN	16	11	616153	88712
50x1½"	UAN	16	11	616154	88713
63x2"	UAN	16	11	616155	88714

FEMALE BRASS ADAPTOR INSERT LONG SPIGOT SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
32x1"	UAM	16	11	616156	88718
40x1¼"	UAM	16	11	616157	88719
63x2"	UAM	16	11	616159	88721

SPIGOT SADDLE - WITH UNDERCLAMP SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
63 x 32	SA	16	11	612757	88848
63 x 50	SA	16	11	612759	88850
75 x 50	SA	16	11	615020	88854
90 x 32	SA	16	11	615285	88856
90x63	SA	16	11	612819	88859

SPIGOT SADDLE - WITH UNDERCLAMP SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
110x32	SA	16	11	615334	88861
110x50	SA	16	11	615031	88863
110x63	SA	16	11	612760	88864
110x90	SA	16	11	615411	88865
125x32	SA	16	11	615087	88866
125x63	SA	16	11	612761	88869
125x90	SA	16	11	615412	88870
160x32	SA	16	11	612886	88876
160x63	SA	16	11	612762	88879
160x90	SA	16	11	615413	88880
180x63	SA	16	11	612763	88884
180x90	SA	16	11	615414	88885
180x110	SA	16	11	615948	88886
180x125	SA	16	11	615740	88887
200x63	SA	16	11	612764	88888
225x63	SA	16	11	612765	88890
225x90	SA	16	11	615415	88891
225x110	SA	16	11	616044	88892
225x125	SA	16	11	616045	88893
225x160	SA	16	11	616046	88894
250x90		16	11	615850	88896
280x90		16	11	615850	88897
315x90		16	11	615850	88898

SPIGOT SADDLE - TOP LOADING SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
250-560 x 32	SA-TL			615465	88899
250-560 x 63	SA-TL			615466	88900

SHUT OFF SADDLE SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
60x1½"	SPA	16	11	612753	
90x2½"	SPA	16	11	612667	88909
110x2½"	SPA	16	11	612750	88910
125x2½"	SPA	16	11	612751	88911
160x2½"	SPA	16	11	612752	88912
180x2½"	SPA	16	11	612754	88913
200x2½"	SPA	16	11	612755	88914
225x2½"	SPA	16	11	612756	88915
250x2½"	SPA	16	11	615395	88916

SHUT OFF SADDLE - TOP LOADING SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
250-315 (560)	SPA-TL	16	11	615395	

TAPPING VALVE - WITH UNDERCLAMP					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
50x32"	DAV	16	11	615955	88917
63x32"	DAV	16	11	615341	88918
63x40"	DAV	16	11	615342	88919
75x32"	DAV	16	11	615956	
90x32"	DAV	16	11	615344	
90x50"	DAV	16	11	615346	
90x63"	DAV	16	11	615347	
110x32"	DAV	16	11	615348	
110x50"	DAV	16	11	615350	
110x63"	DAV	16	11	615351	
125x32"	DAV	16	11	615352	
125x50"	DAV	16	11	615354	
125x63"	DAV	16	11	615355	
140x63"	DAV	16	11	615930	
160x32"	DAV	16	11	615356	
160x50"	DAV	16	11	615358	
160x63"	DAV	16	11	615359	
180x32"	DAV	16	11	615361	

TAPPING VALVE - WITH UNDERCLAMP					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
180x50"	DAV	16	11	615363	
180x63"	DAV	16	11	615364	
200x32"	DAV	16	11	615366	
200x50"	DAV	16	11	615368	
200x63"	DAV	16	11	615369	
225x32"	DAV	16	11	615374	
225x50"	DAV	16	11	615376	
225x63"	DAV	16	11	615377	

TAPPING SADDLE - WITH UNDERCLAMP SDR 11 PE 10					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
40 x 20	DAA	16	11	612630	88963
50 x 25	DAA	16	11	612702	88966
50 x 32	DAA	16	11	615080	88967
63 x 20	DAA	16	11	612631	88968
63 x 25	DAA	16	11	612633	88969
63 x 32	DAA	16	11	612632	88970
63 x 40	DAA	16	11	612623	88971
75 x 40	DAA	16	11	612813	88976
90 x 32	DAA	16	11	612634	88981
90 x 40	DAA	16	11	615656	88982
90 x 50	DAA	16	11	612636	88983
90 x 63	DAA	16	11	612701	88984
110 x 20	DAA	16	11	615659	88985
110 x 32	DAA	16	11	612637	88986
110 x 40	DAA	16	11	615662	88987
110 x 50	DAA	16	11	612638	88988
110 x 63	DAA	16	11	612624	88989
125 x 32	DAA	16	11	612649	88991
125 x 50	DAA	16	11	612639	88993
125 x 63	DAA	16	11	612309	88994
140 x 50	DAA	16	11	615037	88998
160 x 32	DAA	16	11	612641	89001

TAPPING SADDLE - WITH UNDERCLAMP SDR 11 PE 10					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
160 x 50	DAA	16	11	612642	89003
160 x 63	DAA	16	11	612650	89004
180 x 32	DAA	16	11	612651	89006
180 x 50	DAA	16	11	612644	89008
180 x 63	DAA	16	11	612652	89009
200 x 32	DAA	16	11	612654	89011
200 x 50	DAA	16	11	612645	89013
200 x 63	DAA	16	11	612659	89014
225 x 32	DAA	16	11	612657	89016
225 x 50	DAA	16	11	612646	89018
225 x 63	DAA	16	11	612655	89019

PRESSURE TAPPING TEE - TOP LOADING WITH EXTRA LONG OUTLET SPIGOT SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
250-315 (400)	DAA-TL	16	11	615339	

REPAIR SADDLE - WITH UNDERCLAMP					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
63	RS	16	11	612519	89028
90	VVS	16	11	615164	89030
110	VVS	16	11	615165	89031
125	VVS	16	11	615166	89032
160	VVS	16	11	615168	89034
180	VVS	16	11	615169	89035
200	VVS	16	11	615170	89036
225	VVS	16	11	615171	89037

TRANSITION SADDLE - WITH UNDERCLAMP BRASS FEMALE THREAD					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
63 x 1½"	VAM-RG	16	11	612743	89039
75 x 1¼"	VAM-RG	16	11	615213	89040
90 x 1½"	VAM-RG	16	11	612798	89041
90 x 2"	VAM-RG	16	11	612778	89042
110 x 1½"	VAM-RG	16	11	612732	89044

TRANSITION SADDLE - WITH UNDERCLAMP BRASS FEMALE THREAD					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
110 x 2"	VAM-RG	16	11	612733	89045
125 x 1½"	VAM-RG	16	11	612734	89047
125 x 2"	VAM-RG	16	11	612735	89048
160 x 1½"	VAM-RG	16	11	612728	89051
160 x 2"	VAM-RG	16	11	612729	89052
180 x 1½"	VAM-RG	16	11	612774	89054
180 x 2"	VAM-RG	16	11	612776	89055
225 x 2"	VAM-RG	16	11	612827	89057

TRANSITION COUPLING - POLYETHYLENE TO STEEL SDR 11 PE 100					
Size	Frialen Model	PN Water	SDR	Friatec Code	VX Code
32x1"	USTRS		11	612780	89115
40x1¼"	USTRS		11	612781	89116
50x1½"	USTRS		11	612782	89117
63x2"	USTRS		11	612783	89118
90x3"	USTR		11	612784	89119
160x6"	USTR		11	612787	89122

More information is available from the SAI Global website at:

<http://register.saiglobal.com/client/schedule.aspx?setID=SF01&custID=AS125036&appCertNo=SMKP20677>

APPENDIX B - WSA PRODUCT SPECIFICATION

WATER SERVICES ASSOCIATION of Australia

PRODUCT SPECIFICATION

WSA PS - 208 PLASTICS MOULDED FITTINGS FOR PRESSURE APPLICATIONS WITH PE PIPE – WATER SUPPLY AND SEWERAGE

208.1 SCOPE

This specification covers plastics¹ moulded

- (a) electrofusion fittings;
- (b) mechanical compression joint fittings;
- (c) elongated spigot fittings for butt fusion and for use with electrofusion socketed fittings; and
- (d) short² spigot fittings for butt fusion
in pressure applications with PE pipes in water supply³ and sewerage.

208.2 REQUIREMENTS

- (a) Plastics¹ moulded material of the fitting body⁴ shall comply with AS/NZS 4129:2008/Amdt 1:2013.
- (b) Mechanical joint elastomeric seals shall be EPDM complying with AS 1646:2007 and AS 681.1:2008 (EN 681-1:1996).
- (c) Joint seals, flange gaskets⁵ and jointing lubricant shall comply with AS/NZS 4020:2005.

208.3 QUALITY ASSURANCE

- (a) Plastics moulded fittings shall have product certification (ISO Type 5) to AS/NZS 4129:2008/Amdt 1:2013.
- (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) Flange gaskets shall have certificates of compliance to WSA 109:2011.
- (d) All products shall be marked in accordance with the conformity assessment body's requirements.

208.4 AGENCY OR PROJECT SPECIFIC REQUIREMENTS

Pressure Class ⁶ , PN	
Type of fitting e.g. mechanical or electrofusion	
Fitting types (configurations)	
Flange standard (e.g. AS/NZS 4331.1:1995 or AS/NZS 4087:2011/Amdt 1:2012 or AS ISO 9624:2008)	
Alternative elastomeric material for joint seals	

NOTES:

- 1 Plastics moulded material of the fitting body shall be in accordance with Table 1.1 of AS/NZS 4129:2008/Amdt 1:2013.
- 2 The dimensions of short spigot fittings for butt fusion shall conform to the requirements given in Table 3 (see Figure 2) in EN 12201-3:2001+A1:2012.

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- 3 Includes water supply and recycled water supply.
- 4 All fittings to AS/NZS 4129:2008/Amdt 1:2013 for applications other than fuel gas are required to comply with AS/NZS 4020:2005. Fittings may be used for drinking water, recycled water and sewerage pipework. Individual colour identification for each application is not required.
- 5 Flange gaskets and O-rings should be supplied to [WSA PS-312](#).
- 6 Pressure Class and type of fitting shall be as specified in the Project Specification or on the Design Drawings.

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PRODUCT SPECIFICATION**WSA PS - 329 TAPPING SADDLES, ELECTROFUSION, FOR USE WITH
POLYETHYLENE (PE) MAINS FOR PRESSURE APPLICATIONS – WATER
SUPPLY AND PRESSURE SEWERAGE****329.1 SCOPE**

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

329.2 REQUIREMENTS

(a) Tapping bands shall comply with AS/NZS 4129:2008/Amdt 1:2013.

329.3 QUALITY ASSURANCE

(a) Tapping bands shall have product certification (ISO Type 5) to AS/NZS 4129:2008/Amdt 1:2013.

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

329.4 AGENCY OR PROJECT SPECIFIC REQUIREMENTS

Nominal pipe size, DN, and off-take size, mm	
Pressure Class, PN	
Series RP or Series RC internal outlet thread ²	

NOTES:

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

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APPENDIX C - SUPPLIER CONTACTS

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For additional Vinidex offices see attachment to Vinidex Certificate of Registration in Appendix 'A' above.

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