SP AusNet
A member of Singapore Power Group

5 June 2009

Mike Raine
Fusion Plast Australia
3 Colorado Court
Morphett Vale SA 5162

Dear Mike,

RE: Approval of Fusion Plast Electro Fusion Fittings

This letter is to notify Fusion Plast Australia that the Electro Fusion products listed below have been approved for use on SP AusNet's gas network.

- Electro fusion end cap
- Electro fusion coupling
- Electro fusion reducing coupling
- Multiseal tapping tee U/P
- Electro fusion elbows
- Electro fusion equal tee
- Electro fusion reducing tee

All fittings approved are black PE100 SDR 11 of the dimensions compatible with the pipe used by SP AusNet.

SP AusNet's accredited contractors will be notified of this approval.

Fusion Plast Australia is to notify SP AusNet of any future design changes which will affect the installation and operation of these products.

If you have any further questions regarding this approval, please don't hesitate to contact me.

Yours sincerely,

Mark Annetts
Asset Management Engineer
Gas Network Asset Engineering
SP AusNet

cc Todd Henderson, Nithi Nithianandan (SP AusNet)

TECHNICAL SERVICES
TEST REPORT

Project No: 4129071-09 **File No:** RR2009 **Date:** 18.05.09

Requested by: M Annetts, SP AusNet, Gas Network Asset Engineering

Subject: Approval Testing of Fusematic PE100 125mm x 32mm saddle and two Fusematic PE 100 125mm caps

An electrofusion polyethylene assembly has been tested to AS/NZS 4129 "Fittings for polyethylene pipes for pressure applications".

The test specimen consisted of 125 mm PE80B pipe, where both ends of the pipe were fused to 125 mm PE100 end caps and a Fusematic PE100 125x32 mm saddle was electrofused to the pipe in the middle. The 32 mm off-take saddle was used for pressurising the assembly. The PE pipe was tapped using the saddle's cutter prior to testing.

Experimental:

The assembly was tested according to ISO 1167.1 "Determination of the resistance to internal pressure" as specified in AS/NZS 4129 "Fittings for polyethylene pipes for pressure applications".

Subsequently the integrity of the fusion bond was evaluated. Fusion bond integrity of the saddle/pipe joint was determined as specified in AS/NZS 4129 ("Fittings for PE pipes for pressure applications").

The fusion bond integrity of PE/cap joints was also determined as specified in AS/NZS 4129, "Fittings for Polyethylene Pipes for Pressure Applications", according to ISO 13954-1997 (Electrofusion Joint Integrity Test procedure, LABS-WI-4.9.154A).

Decohesion Tear test (ISO/DIS 15956): The saddle is bodily torn off the pipe, and the extent of failure mode of separation noted. (The saddle is supported in the plane of its clamping flanges on each side of the pipe in a jig mounted in a tensile testing machine, and a compressive force is applied to a close-fitting mandrel passing through the pipe, the compression cross head speed was 30 mm/min, see Fig 4.)

In the Decohesion Tear test of cap/socket (ISO13954), the socket/cap is torn off the pipe, and the extent of brittle mode of separation noted. (The socket/cap is horizontally clamped in a jig mounted vice in a tensile testing machine, the end of the pipe is inserted in the tensile tester. A tensile load along the longitudinal axis of the test piece at a speed of 25 mm/min is applied until complete separation or pipe yields.)

SP AusNet Technical Services
SPI Networks (Gas) Pty Ltd ABN 43 086 015 036
28 Raglan Road, Auburn NSW 2144
Call 02 9721 9000 Fax 02 9738 5798

Test conditions:

Temperature: 80°C
Pipe hoop stress: 5.5 MPa for PE (equivalent to an internal pressure of 1104 kPa)
Test duration: 165 hours.

The equipment used for testing were IPT digital pipe tester model 1274, with pressure Transducer model 1322, pressure gauge model 1359 and failure control unit model 1327. The pressure gauge used to verify the IPT pressure gauge model 1359 was NATA certified Dobbie Analog Pressure Gauge, scale 0 – 2500 kPa, whose next calibration is due on 18.03.2010.

Results:

Joint integrity for PE assembly:

The test continued for 134 hours instead of 165 hours required because the pipe burst. During this 134 hours period, the assembly remained leak-tight. The pipe (PE80B) failure was found to be due to application of excessive hoop stress. The PE80B used for testing was found to have been manufactured at the lower extremity of wall thickness of 10 mm, which must have also contributed to the failure of the pipe. Based on an internal pressure of 1104 kPa and wall thickness of 10 mm pipe, the hoop stress applied to the assembly became 6.3 MPa instead of 4.5 MPa (equivalent to an internal pressure of 900 kPa).

Fusion integrity test on the saddle electrofusion weld and on both caps electrofusion welds were found to be satisfactory, indicating failure in the ductile mode. The bond did not separate as the pipe had yielded before separation occurred.

Conclusion:

The Fusematic PE100 samples submitted for leak-tight testing were satisfactory for the duration of the testing, which had to be terminated at 134 hour because of the PE80B pipe burst. The failure was due to excessive hoop stress applied to the pipe.

Fusion integrity test on the quality of the welds were found to be satisfactory.

Hendra Satyo
Senior Scientist Plastics

Ibrahim Tas
Manager Technical Services

Photographs:

Fig. 1 Burst PE 80B pipe

Fig.2 Thin wall thickness of PE 80B approx. 10 mm

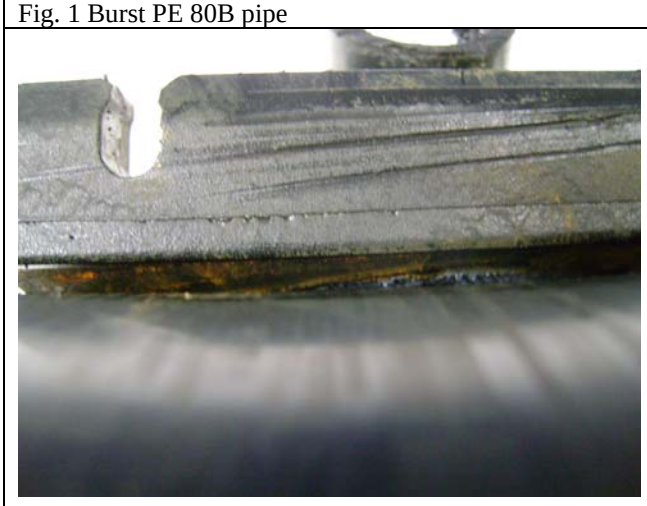

Fig.3 Fusematic saddle/pipe joint failed in ductile mode

Fig.4 Compression method of testing the saddle/pipe joint sample

Fig. 5 Fusematic cap/pipe joints failed in ductile mode

Fig.6 Tensile method of testing the cap/pipe joint samples