



TEST CERTIFICATE

ISSUED BY THE
MATERIALS TESTING DEPARTMENT

Page 1 of 1 Date: 8 March, 2000 CERTIFICATE No 2716 Issue 1

Authorised by  P R McCarthy J H Greenwood
 J Busby P W Davis

Fuel Permeation and Swelling Test on Generation 2 Thin Walled Petroplas Pipe: Super Unleaded Fuel.

ERA Project No. : 044630029
Customer : Friatec Plasmec (Pty) Ltd
Customer Order No : Fax from Mr Boyazis of 20 August 1999
Customer Sample Ref : F2 BATCH No 9985456 SD11 = SF2P = PLASMEC PETROPLAS
: HDPE OD 63
Test Specification : Institute of Petroleum Specification Clause 4.5 and ERA in-house test procedures T3009/63 and T3010/63.
Test Component : Specimens of pipe received on 17 August 1999 measuring approximately 460mm in length by 63mm outside diameter.
ERA Test Sample Number : Triplicated Tests: VDZ001, VDZ002 and VDZ003.
Sample Conditioning : Filled with Super Unleaded Fuel, stored as stated below, and weighed every seven days.
Fuel loss : Permeation rates at 23°C were approximately 0.06, 0.08 and 0.11 g/m².day respectively. Resolution of measurement: 0.1g. Due to the low rates of permeation it could not be confirmed that steady state permeation had been established.
Test Temperature : 181 days duration at 23°C ± 2°C.
Pipe swelling : Values under steady state conditions at 23°C were 0.1, 0.1 and 0.1% respectively. Resolution of measurement 0.1%.
Results/Compliance : PASS on requirement to sustain these conditions.
Date of Test : 8 September 1999 to 7 March 2000.

Ref: bc63/bc63admin/jp/test certs/vdzsul

This certificate is issued in accordance with the conditions of accreditation granted by the United Kingdom Accreditation Service. Copyright of this certificate is owned by ERA Technology Ltd and may not be reproduced other than in full except with the prior written approval of ERA Technology Ltd.



TEST CERTIFICATE
ISSUED BY THE
MATERIALS TESTING DEPARTMENT

Page 1 of 1 Date: 8 March, 2000 CERTIFICATE No 2715 Issue 1

Authorised by J.H. Anwar P R McCarthy J H Greenwood
 J Busby P W Davis

Fuel Permeation and Swelling Test on Generation 2 Thin Walled Petroplas Pipe: ASTM 'C' + 15% Methanol.

ERA Project No. : 044630029
Customer : Friatec Plasmec (Pty) Ltd
Customer Order No : Fax from Mr Boyazis of 20 August 1999
Customer Sample Ref : F2 BATCH No 9985456 SD11 = SF2P = PLASMEC PETROPLAS
: HDPE OD 63
Test Specification : Institute of Petroleum Specification Clause 4.5 and ERA in-house test procedures T3009/63 and T3010/63.
Test Component : Specimens of pipe received on 17 August 1999 measuring approximately 460mm in length by 63mm outside diameter.
ERA Test Sample Number : Triplicated Tests: VDZ004, VDZ005 and VDZ006.
Sample Conditioning : Filled with 85 % ASTM 'C' + 15% Methanol , stored as stated below, and weighed every seven days.
Fuel loss : Permeation rates under steady state conditions at 23°C were 0.47, 0.44 and 0.45 g/m².day respectively. Resolution of measurement: 0.1g.
Test Temperature : 181 days duration at 23°C ± 2°C.
Pipe swelling : Values under steady state conditions at 23°C were 1.0, 1.0 and 1.1% respectively. Resolution of measurement 0.1%.
Results/Compliance : PASS on requirement to sustain these conditions.
Date of Test : 8 September 1999 to 7 March 2000.

Ref. bC63/bc63admin/jp/test certs/vdzastm

This certificate is issued in accordance with the conditions of accreditation granted by the United Kingdom Accreditation Service. Copyright of this certificate is owned by ERA Technology Ltd and may not be reproduced other than in full except with the prior written approval of ERA Technology Ltd.



Certificate of Compliance

Issued to : Friatec Plasmec (Pty) Ltd, South Africa

Item : Underground petroleum pipework for positive pressure and suction delivery fuel lines, also suitable for fill pipes, vent lines, vapour recovery and secondary containments.

Type Reference : Petroplas SF2P™ Generation 2, 63 mm diameter pipe for use with designated Frialen electrofusion welding connections.

This is to certify that samples of the product defined above have been tested by ERA Technology Ltd and found to comply with the following requirements :

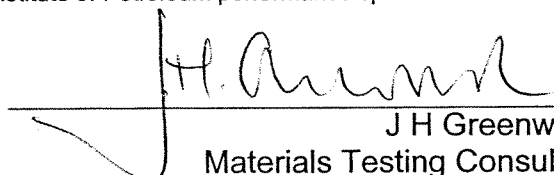
Shell International Petroleum Company Limited Pipework Performance Specification and /supplier Evaluation, Version 2, March 1988.

Full details are given in ERA report number : 2000-0115

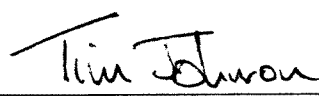
Note 1: The minimum bend radius is declared as 30 x diameter.

Note 2: The pipes shall be marked in accordance with the Institute of Petroleum performance specification.

Certificate prepared by :


J H Greenwood
Materials Testing Consultant
Materials Testing Department

Certificate approved by :


T D Johnson
Manager
Plant & Power Engineering Division

Certificate number : BC63/0115/2000/002

Dated : 23 March 2000

ERA Technology Ltd, Cleeve Road, Leatherhead, Surrey KT22 7SA
ERA Technology Inc, 16203 Park Row, Suite 175, Houston, Texas 77084, USA