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TEST CERTIFICATE

This document certifies that

V91J

from

Precision Polymer Engineering Limited (PPE)

meets the requirements of

NORSOK M-710 Rev. 2 in respect of Sour fluid resistance

Test fluid: 2% Hydrogen sulphide/hydrocarbon oil/water

Test pressure: 100 bar (10 MPa)

Passed by: Dr Keyur Somani

Date: 22nd December 2014

Element verify that tensile specimens of PPE elastomer compound V91 J (BATCH 30070/09/1) have been exposed in a multi-phase sour fluid at 121-175°C for up to 8 weeks. The oil phase was aromatic and the test gas mixture contained 2_{mol}% H_2S. Material performance was assessed by tracking changes in volume, hardness and tensile property levels, all measured at room temperature. The point of reference for tensile is the end of the first soak period at the highest temperature.

Test Conditions

Exposure fluid composition and distribution

Volume (%)	Composition
30	2/3/95 mol% $H_2S/CO_2/CH_4$
10	Distilled water (de-ionised)
60	70% heptane, 20% cyclohexane, 10% toluene

Test temperatures and sampling intervals used in the NORSOK M-710[1] programme are shown in the table below; test pressure was 100 bar.

Exposure test conditions

Temperature (°C)	Intervals (days)
121	7, 14, 28, 35, 42, 50
150	7, 14, 28, 42, 56
175	7, 14, 28, 40, 54

Summary for V91J

Temperature (°C)	End of exposure period (NORSOK acceptance range)					ACCEPTANCE TO NORSOK M-710
	Volume swell	Hardness change	Modulus at 50%	Tensile Strength	Elongation at Break	
	+25/ -5%	+10/ -20 units	±50%			YES/NO
121	8.5	-11	-16	-1	13	YES
150	13.9	-15	5	16	-3	
175	17.0	-20	-16	-13	21	

The changes in room temperature tensile property levels are within the allowable range after exposure periods at 121-175 °C of up to 8 weeks. Swelling and hardness change levels are also acceptable.

[1] NORSOK M-710, "Qualification of non-metallic sealing materials and manufacturers", Rev. 2, October 2001