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## TEST CERTIFICATE

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This document certifies that the material denoted

**J9523**

from

**TRELLEBORG SEALING SOLUTIONS**

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: 90-110 bar

Passed by: Barry Thomson

Date: 22<sup>nd</sup> November 2013

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Element verify that tensile specimens of perfluoroelastomer grade J9523 (batch 95230002) supplied by TRELLEBORG SEALING SOLUTIONS have been exposed in a multi-phase sour fluid at three elevated temperatures.

### EXPOSURE FLUID COMPOSITION AND DISTRIBUTION

FLUID	CELL VOLUME OCCUPANCY (%)
2/3/95 mol% H <sub>2</sub> S/CO <sub>2</sub> /CH <sub>4</sub>	30
70/20/10 volume% heptane/cyclohexane/toluene	60
Distilled water	10

The tensile testpieces were located in the hydrocarbon oil phase for each exposure test. Test temperatures and sampling intervals used in the NORSOK M-710<sup>1</sup> programme are tabulated below.

TEMPERATURE (°C)	SAMPLING INTERVALS (days)
170	7, 14, 28, 49
185	6, 14, 25, 45
200	5, 10, 20, 35

### J9523 PERFORMANCE SUMMARY

Swell <sup>1</sup>	50% modulus <sup>2</sup>	Tensile strength <sup>2</sup>	Elongation at break <sup>2</sup>	Hardness <sup>3</sup>	NORSOK acceptable
PASS	PASS	PASS	PASS	PASS	YES

<sup>1</sup> Acceptable range is -5% to +25%

<sup>2</sup> Changes within ±50% range, from as-received level

<sup>3</sup> Acceptable range is -20 to +5 units

J9523 swelled moderately (8-15%) early in each exposure test and this reduced the level of 50% modulus and tensile strength; elongation at break increased. The level of 50% modulus was then insensitive to additional exposure time at each temperature, the expected behavior for a material resistant to chemical ageing. Tensile break property levels were adversely affected in a small number of cases by the presence blisters, believed to be due to rapid gas decompression [RGD] effects.

For 50% modulus, the average reduction across all exposure conditions was 52%. Although this is outside the “baseline” lower limit of -50%, the magnitude of the “breach” is not considered significant. Despite the presence of RGD damage in many tensile specimens, overall mean changes in tensile strength and elongation at break were -43% and +18%, respectively. In only three instances did the change in tensile strength exceed the baseline lower boundary; in each case, RGD damage was implicated in the premature breaking of the testpiece. There was no evidence to suggest that J9523 had been chemically aged.

Hence J9523 is considered to meet the requirements of the NORSOK M-710 Rev. 2 standard for sour fluid exposure.

<sup>1</sup> NORSOK M-710, “Qualification of non-metallic sealing materials and manufacturers”, Rev. 2, October 2001.