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## TEST CERTIFICATE

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This document certifies that the material denoted

**V9T82**

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: 100 bar

Passed by: Dr Michael Lewan

Date: 9<sup>th</sup> November 2015

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Element verify that tensile specimens of FKM grade V9T82 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)
160	2*, 7, 14, 28, 49
170	2*, 6, 14, 25, 45
180	2*, 5, 10, 20, 35

\* liquid-only (i.e. not chemically aged – no H<sub>2</sub>S) for reference purposes.

### V9T82 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

V9T82 swelled moderately (10-13%) early in each exposure test and this reduced the level of 50% modulus and tensile strength. 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.

For 50% modulus, the maximum change across all exposure conditions was +27%, well within the “baseline” lower limit of -50%. Overall maximum changes in tensile strength and elongation at break were -24% and -40%, respectively. There was no evidence to suggest that V9T82 had been chemically aged.

Hence V9T82 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.