



NORSOK M-710 & ISO 10423 (API 6A) TESTED & PASSED | FFKM ELASTOMERS SEALS (O RINGS & GASKETS)

SOUR GAS

RESISTANT ELASTOMERS



BARNWELL

THE SEAL OF APPROVAL

SOUR GAS SUMMARY



What is Sour Gas?

Sour gas is a gas stream that contains hydrogen sulfide (H₂S), a poisonous gas found in oil and gas wells around the world. H₂S is highly corrosive and will react with and degrade polymers including many types of elastomers. Elastomer seals such as O-rings, gaskets and custom molded parts for sour service require specialized materials and test information to ensure the seal will meet the service requirements.

Sour Gas Testing

M Barnwell Services has developed a number of elastomer materials for the oil, gas and chemical processing industries with third party testing to a number of international test standards and conditions. Table 2 opposite shows the M Barnwell Services elastomer sealing materials that have been tested and certified to the various industry standards for sour gas resistance.

Sour Gas Test Standards

Two of the most commonly used standards are as follows:



- ✦ NORSOK M-710 "Qualification of non-metallic sealing materials and manufacturers", rev 2 October 2001. Annex A, test media, conditions, media, and procedures for ageing of elastomeric materials.
- ✦ ISO 10423 Appendix F.1.13.5.2 sour fluid (DD/EE/FF/HH) "Petroleum and natural gas industries – Drilling and production equipment – Wellhead and Christmas tree equipment", fourth edition, 2009-12-15.

	NORSOK M-710 Rev.2* Annex A (2% H ₂ S)	Custom Testing (25% H ₂ S)	API / ISO 10423 F.1.13.5.2	
			DD/EE	FF/HH
Test vessel composition: Gas phase Oil phase Water phase	30% 60% 10%	30% 60% 10%	35% 60% 5%	35% 60% 5%
Gas phase composition: Volume (%)	2% H ₂ S 3% CO ₂ 95% CH ₄	25% H ₂ S 3% CO ₂ 72% CH ₄	10 H ₂ S 5% CO ₂ 85% CH ₄	10 H ₂ S 80% CO ₂ 10% CH ₄
Oil phase composition: Volume (%)	10% toluene 20% cyclohexane 70% heptane	10% toluene 20% cyclohexane 70% heptane	At manufacturers discretion	
Water phase composition: Volume (%)	100% distilled water	100% distilled water	100% deionized water	
Test specimen location:	Oil phase	Oil phase	Oil phase	
Temperature:	Various from 100°C to 200°C	Various from 150°C to 175°C	At operators discretion	
Test pressure:	10 MPa ± 1 (1450 psi ± 145)	3 MPa 435 psi	6.9 MPa ± 0.7 (1000 psi ± 100)	
Test duration:	8 weeks	57 days	160 hours	

Table 1: A summary of sour test conditions available from M Barnwell Services based on the protocols outlined in the test standards. Please consult M Barnwell Services sales or engineering teams for specific details on the upper limit tested on specific grades.

Elastomer Materials Tested to Sour Gas Standards

Material Grade	Description	NORSOK M710 Rev.2 (2%)	Custom Testing (25%)	API 6A & ISO 10423 F.1.13.5.2
MBMS0590	75 durometer, low compression set FKM	—	—	✓
MBMS0056	71 durometer, high fluorine FKM	—	—	✓
MBMS0269	90 durometer, versatile FKM	✓	✓	✓
MBMS0297	90 durometer, low temperature FKM	✓	✓	✓
MBMS0082	90 durometer, ultra-low temperature FKM	✓	✓	✓
MBMS0271	90 durometer, Aflas® based FEPM	✓	✓	✓
MBMS0268	90 durometer, medium ACN, HNBR	✓	—	✓
MBMS0727	87 durometer, low ACN, low temperature HNBR	—	—	—
MBMS0369	85 durometer, low ACN, low temperature HNBR	✓	—	✓
MBMS0410	90 durometer, steam resistant EPDM	—	—	—
MBMS0214	90 durometer, FFKM	✓	✓	✓
MBMS0493	90 durometer, low temperature FFKM	✓	✓	✓

Table 2: A summary of elastomer materials tested to sour gas standards. Please consult with M Barnwell Services sales and engineering teams for available certifications or test data. 1Aflas® is a trademark of the Asahi Glass Company.

Custom Sealing Solutions

M Barnwell Services specializes in providing fully customized sealing solutions for critical oil and gas applications. By pushing the boundaries of elastomer technology, in both high temperature and high concentration sour gas, M Barnwell Services can demonstrate the capabilities of its elastomer materials, which are often beyond the parameters of standard tests. The assurance this information provides is crucial when specifying materials for sealing valves, pumps, compressors, and other oilfield equipment. M Barnwell Services has materials scientists and sealing engineers available to answer questions and develop a customized sealing solution for your sour gas application.

Case study: H2S Resistant Valve Seals

A major oil and gas operator required sour gas resistant seals for critical valves in a large processing plant. HNBR seals were being used in the valves but during scheduled maintenance they had shown signs of incompatibility with sour gas and presented a leak risk. Replacing the seals with HNBR again was not acceptable to the operator. M Barnwell Services **FFKM material** was selected for its overall fluid resistance and its outstanding resistance to sour gas, backed up by various third party test reports including **NORSOK M-710** Annex A in both 2% and 25% H2S. The operator needed the O-rings quickly to avoid costly shutdowns. M Barnwell Services was able to manufacture and deliver a range of sizes at short notice, enabling the operator to complete the valve installation on time.





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GLASGOW

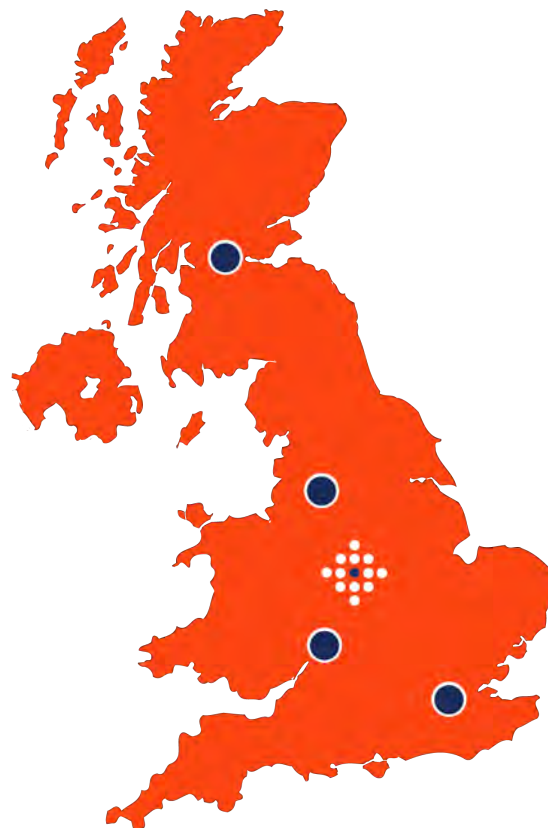
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