



Precision Polymer Engineering

Advanced sealing solutions for critical applications

SOUR GAS RESISTANT ELASTOMERS

What is Sour Gas?

Sour gas is a gas stream that contains hydrogen sulfide (H_2S), a poisonous gas found in oil and gas wells around the world. H_2S 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

PPE 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 PPE 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 (FF/HH)** "Petroleum and natural gas industries – Drilling and production equipment – Wellhead and Christmas tree equipment", fourth edition, 2009-12-15.



	NORSOK M-710 Annex A (2% H_2S)	NORSOK M-710 Annex A (25% H_2S modified)	ISO 10423 (API 6A)
Test vessel composition:			
Gas phase	30%	30%	35%
Oil phase	60%	60%	60%
Water phase	10%	10%	5%
Gas phase composition:			
Volume (%)	2% H_2S 3% CO_2 95% CH_4	25% H_2S 3% CO_2 72% CH_4	10% H_2S 80% CO_2 10% CH_4
Oil phase composition:			
Volume (%)	10% toluene 20% cyclohexane 70% heptane	10% toluene 20% cyclohexane 70% heptane	100% kerosene
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	177°C
Test duration:	8 weeks	8 weeks	160 hours

Table 1: A summary of sour test conditions available from PPE based on the protocols outlined in the test standards. Please consult PPE 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 (2%)	NORSOK M710ww (25%)	ISO 10423 (API 6A)
PPE V74C	75 durometer, low compression set FKM			✓
PPE V76F	71 durometer, high fluorine FKM			✓
EnDura® V91J	90 durometer, versatile FKM	✓	✓	✓
EnDura® V91K	90 durometer, low temperature FKM	✓	✓	✓
EnDura® V91A	90 durometer, ultra-low temperature FKM	✓	✓	✓
EnDura® A90H	90 durometer, Aflas® ¹ based FEPM	✓	✓	
EnDura® Z95X	90 durometer, medium ACN, HNBR	✓		
EnDura® Z85L	85 durometer, low ACN, low temperature HNBR	✓		
Perlast® G92E	90 durometer, FFKM	✓	✓	✓
Perlast® ICE G90LT	90 durometer, low temperature FFKM	✓	✓	✓

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

Custom Sealing Solutions

PPE 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, PPE 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.

PPE 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.

PPE's **Perlast® G92E** (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. PPE was able to manufacture and deliver a range of sizes at short notice, enabling the operator to complete the valve installation on time.



For further information or to download test reports, certificates and material datasheets visit the PPE website: www.prepol.com/h2s



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Europe, Middle East & Africa

Precision Polymer Engineering Ltd
Head Office
Greenbank Road
Blackburn BB1 3EA
England

T: +44 1254 295400
F: +44 1254 680182
E: prepol.sales@idexcorp.com

Americas

PPE LLC
4702 N. Sam Houston Parkway West
Suite 100
Houston TX 77086
USA

T: +1 713 482 0123
F: +1 713 623 2332
E: prepol.sales-usa@idexcorp.com

Asia Pacific

Precision Polymer Engineering LLC
RM 3502-3504, Zhao Feng Plaza
No. 1027 Chang Ning Road
Shanghai 200050
China

T: +86 21 5241 5599 - 113
F: +86 21 5241 8339
E: prepol.sales-asia@idexcorp.com

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