Pascalor
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Sour-gas ageing tests for elastomers

Technical briefing, with a source comparison and report template

DOCUMENT	VERSION	DATE	TYPE
PP-TB-004	0.1	2026-10-23	Technical briefing

Status. Technical briefing prepared from public sources. Contains no Pascalor test data. Sources were read on 23 October 2026. Check every figure against the current edition of the standard before you rely on it.

1. Purpose and status of this document

Hydrogen sulfide (H2S) attacks many elastomers, and different rubbers fail in different ways. Sour-ageing tests expose seal materials to representative fluids at raised temperatures and measure what changes. This briefing explains how those tests are laid out and how to read a report. It is based on public sources named in section 8. It does not reproduce any standard and it contains **no Pascalor test data**. Where sources disagree we show both. Sour-gas testing involves toxic gas and is done in specialist laboratories only.

2. Summary

- Ageing tests soak specimens in a three-phase mixture of hydrocarbon liquid, water and gas that contains H2S and CO2, at temperatures above the service temperature, and measure property change over time.
- Results from three or more temperatures can be used to extrapolate service life with the Arrhenius relationship.
- Acceptance is based on limits for volume swell, hardness change, and changes in tensile properties, plus a visual check. Limits vary by source and by operator.
- NACE MR0175 / ISO 15156 does not qualify elastomers. ISO 23936-2, NORSOK M-710 and NACE (AMPP) TM0187 are the usual references.
- H2S behaviour depends strongly on the cure system and polymer. Fluoroelastomers cured with bisphenol, amine or strongly basic systems are prone to attack. This is why sour compounds are usually engineered, not off the shelf.

3. What is tested

The test medium described by the sources is a mixture, not a single fluid. One supplier source gives the sour medium as 30 vol % gas (3 % CO2, 2 % H2S, 95 % CH4), 10 vol % distilled water and 60 vol % hydrocarbon (70 % heptane, 20 % cyclohexane, 10 % toluene). The sweet medium is the same except that the gas is 3 % CO2 and 97 % CH4, with no H2S. Another source gives the ISO 23936-2 hydrocarbon as 70 % heptane and 30 % cyclohexane. Compare these carefully if you are comparing reports.

Specimens are weighed and measured before exposure. After exposure, volume and mass are re-measured, tensile properties are tested and the specimen is inspected. One supplier source says a minimum of 30 specimens is tested in the NORSOK route.

4. Test routes as summarised in public sources

PARAMETER	NORSOK M-710 (SOURCE C)	ISO 23936-2 (SOURCE C)	API 6A, AS GIVEN BY SOURCE C
Gas (H2S:CO2:CH4)	2:3:95 at 30 vol %	2:3:95 at 30 vol %, and a second mixture 10:80:10 at 35 vol % (the source marks this as unclear)	10:5:85 at 30 vol % (the source marks this as unclear)
Liquid (60 vol %)	70 % heptane, 20 % cyclohexane, 10 % toluene	70 % heptane, 30 % cyclohexane	70 % heptane, 20 % cyclohexane, 10 % toluene
Water	10 % distilled	10 % de-ionised	5 % distilled
FKM temperatures	210, 220, 230 °C	195, 210, 220 °C	200 °C
HNBR temperatures	150, 160, 170 °C	136, 151, 166 °C	150 °C
Pressure	100 bar	100 bar	70 bar
Exposure	2 to 35 days	7, 14, 21, 35 days	160 hours
Specimens	5	5	5

Sources B and D say the ageing temperatures are all above the polymer's maximum service temperature. Source D gives 10 MPa (100 bar) and a minimum of 30 specimens for the NORSOK route, and does not give temperatures. Source B gives 10 MPa or 6 MPa for ISO 23936-2 Annex A and says temperatures follow API 6A / ISO 10423 temperature classes. **The sources disagree on pressure and specimen count for ISO 23936-2 and NORSOK.** The table is a map of questions, not a set of requirements. Source letters follow PP-TB-001 (A James Walker, B CDI, C ETS, D Trelleborg).

5. How results are judged

Source C reports the same evaluation limits for all three routes, described as "Parker acceptance criteria":

PROPERTY	LIMIT AS REPORTED
Volume swell	+25 % / -5 %
Hardness change	+10 / -20 points
Tensile strength, elongation, modulus	within ±50 %
Visual	no dissolution, cracking, blistering or deformation

These limits are reported as a supplier's criteria. They may not be the numbers in the standard, and operators often set their own. **Acceptance levels belong to the specification, not to the test method.** If you receive a report, check which limits it used.

For life estimates, ISO 23936-2 Annex D describes the Arrhenius approach. Property change is measured at several times for each of three temperatures, then extrapolated down to the service temperature (Source B).

6. Why compound design matters here

These points are general engineering knowledge and need to be proven by test for any compound.

- **Cure system.** Peroxide-cured compounds based on suitable polymers behave differently from bisphenol-cured ones. The cure chemistry affects attack by amines, bases and sulfides.

- **Acid acceptors and fillers.** Metal oxides and some fillers can react with H2S or leave residues. The choice of acid acceptor can help or hurt.
- **Polymer choice.** HNBR, FKM, FEPM and FFKM each have a role. Choose from the actual temperature, the fluid mix and the decompression risk, not from habit.
- **Combined duty.** A compound tuned for sour ageing may not survive rapid gas decompression, and the reverse. Specify both if both are needed.

7. Report template

Result fields are blank on purpose.

A. Identification

FIELD	ENTRY
Report number, date, laboratory, accreditation scope	
Customer	
Compound name, polymer family, hardness	
Cure and post-cure	
Lot and recipe revision	

B. Method

FIELD	ENTRY
Standard and edition; deviations	
Specimen type, size and number	
Gas composition and volume fraction	
Hydrocarbon composition and volume fraction	
Water type and volume fraction	
Pressure	
Temperatures	
Exposure times	
Measurement methods (swell, hardness, tensile)	

C. Results (one row per temperature and time)

TEMP	TIME	VOLUME CHANGE %	MASS CHANGE %	HARDNESS CHANGE	TENSILE CHANGE %	ELONGATION CHANGE %	MODULUS CHANGE %	VISUAL

D. Conclusion

FIELD	ENTRY
Acceptance limits used and their source	

FIELD	ENTRY
Pass or fail at each condition	
Service life estimate and method (if any)	
Signed by, role, date	

8. Sources and verification

SOURCE	USED FOR	STATUS
ETS technical note ORD5774	Source C: comparison table and acceptance criteria	Supplier summary. Our extraction of its tables was imperfect. Verify
CDI Energy Products technical report	Source B: Annex A summary, Arrhenius approach	Supplier summary. Verify
Trelleborg, NORSOK M-710 sealing material qualification	Source D: media composition, pressure, specimens	Supplier summary. Edition unclear
AMPP store, NACE TM0187	Existence and title of TM0187	Catalogue entry
ISO 23936-2, NORSOK M-710, API 6A, NACE TM0187	Primary requirements	**Buy and read the current editions**

Sources were read on 23 October 2026. Web pages change.