

SEALING SOLUTIONS

PRELIMINARY DATA

EPM 893

for Hydrogen & CCUS Applications



A PFAS-free solution in high pressure, low-temperature CO_2 & H_2 applications

EPM 893 is an ethylene propylene compound designed to provide Rapid Gas Decompression (RGD) resistance in demanding hydrogen and Carbon Capture, Utilization and Storage (CCUS) applications. It supports performance in environments with temperatures as low as -60°C (-76°F) and pressures up to 90 MPa (13,053 psi), including H_2 refueling systems and CCUS infrastructure.

Excellent RGD performance, and chemical compatibility in H_2: 'Where it Can't Fail'

EPM 893 has demonstrated perfect passing results under free-flow rapid gas decompression (RGD) test conditions in 100% hydrogen at 2,175 psi (150 bar) and 212°F (100°C), based on the interpretation criteria outlined in ISO 23936-2 Annex B, an industry-recognized standard for evaluating elastomer performance in these environments.

The compound has also been successfully tested in accordance with ISO 17268/SAE J2600, used to evaluate components for hydrogen refueling applications. Testing was conducted in 100% hydrogen across a temperature range of -60°C (-76°F) to 130°C (266°F), supporting the performance requirements of H_2 refueling station applications.

Compatibility with supercritical CO_2

EPM 893 has been tested under ISO 23936-2 Annex A aging conditions up to 302°F (150°C) at 2900 psi (200 bar). It has also consistently passed RGD testing under modified ISO 23936-2 Annex B conditions up to 266°F (130°C) at 2900 psi (200 bar).

Features and Benefits

- Continuous operating temperature down to -76°F (-60°C)
- Exceptional RGD and chemical resistance to H_2 & CO_2 at low temperature & high pressure
- RGD resistance at pressures up to 2,900 psi (200 bar) in both H_2 and supercritical CO_2
- Superior RGD resistance reduces maintenance and increases MTBF (mean time between failures)
- Passes NACE-TM0192 test requirements
- Proven chemical compatibility: Showed no visual signs of degradation or significant changes in volume and tensile strength after fluid age testing in O_2, H_2, sCO_2 and Amines.

Applications

- H_2 & CO_2 mechanical seals
- H_2 & CO_2 valves & instrumentation
- H_2 & CO_2 underground storage
- H_2 refueling dispensers and storage vessels
- CO_2 compressors & pipeline infrastructure
- CO_2 pumps

Availability

- O-rings
- G-T® rings
- Custom-molded shapes



Table 1: Typical Properties

EPM 893	
Original Properties (ASTM Standard)	**Typical**
Color	Black
Hardness, Shore A (button), Points (D2240)	86
O-ring Properties (ASTM Standard)	
Tensile Strength @ Break, psi [MPa] (D1414)	1885 [13]
Elongation @ Break, % (D1414)	147
Modulus @ 100% Elongation, psi [MPa] (D1414)	1102 [7.6]
Compression Set @ 25% Deflection, 22 Hours @ 250°F (121°C) in Air, % of Original Deflection (D1414)	14
Compression Set @ 25% Deflection, 70 Hours @ 250°F (121°C) in Air, % of Original Deflection (D1414)	17
Thermal Properties	
(*) Service Temperature Range, °F [°C]	-89°F to 302°F [-67°C to 150°C]
TR10/50, °F [°C] (D1329)	-67 [-55]
DSC, Tg, °F [°C] (D7426)	-72 [-58]
Rapid Gas Decompression	
ISO 23936-2 Annex B and NORSOK M710, 90/10 Methane/CO_2 @ 212°F [100°C], 2,175 psi [150 bar], Decompression Rate: 290 psi/min [20 bar/min], Cycles: 8, -312 O-rings	(0,0,0,0) Pass
ISO 23936-2 Annex B and NORSOK M710, 100% H_2 @ 212°F [100°C], 2,175 psi [150 bar], Decompression Rate: 290 psi/min [20 bar/min], Cycles: 8, -312 O-rings	(0,0,0,0) Pass
Modified ISO 23936-2 Annex B and NORSOK M710, 100% CO_2 @ 266°F [130°C], 2900 psi [200 bar], Decompression Rate: 20 bar/min [290 psi/min], Cycles: 8, -312 O-rings	(0,0,0,0) Pass
NACE TM0192:2012, 100% CO_2 @ Ambient Temperature, 750 psi [52 bar], Soak Time: 24 hrs, Cycles: 1 (< 1 min), Unconstrained Fixture, -325 O-rings	TM0192 Rating: 1 [00000000, 00000000, 00000000] Pass

(*) Each application should be evaluated individually, as actual performance may vary depending on operating conditions and service environment. Please reach out to your Greene Tweed representative for addressing your specific needs.

All test results are preliminary.

Table 2: Ozone Aging

ISO 1431-1 procedure A	Result: Pass
120 hrs @ 50 pphm @ 104°F [40°C], 20% elongation	No Cracks

Table 3: Oxygen Bomb Aging

ASTM D572 (*)	Result: Pass		
Hardness Change [Points]	Tensile Strength [Delta %]	Elongation @ Break [Delta %]	100% Modulus [Delta %]
+1.0	-6.9	-2.1	+2.2

(*) 100% O_2 @ 158 °F [70 °C], 300 psi [20.7 bar], 168 hrs

Table 4: H_2 Resistance Test

ISO 17268/SAE J2600 (*)	Result: Pass		
Temperature	Weight Change [%]	Volume Change [%]	Visual Surface Change
266 °F [130 °C]	-0.9	-0.1	No
185 °F [85 °C]	-1.0	-0.2	No
68 °F [20 °C]	0.1	0.1	No
-40 °F [-40 °C]	0.1	-0.2	No
-76 °F [-60 °C]	-0.6	-0.2	No
Criteria	**Max -10%**	**-1 to 25%**	**No Cracks**

(*) 100% H_2 at 13,053 psi [900 bar], 168 hours, -312 O-rings

Table 5: sCO_2 Aging

Modified ISO 23936-2 Annex A (*)	Result: Pass				
Days Aging	Volume Change [%]	Hardness Change [Points]	Tensile Strength [Delta %]	Elongation @ Break [Delta %]	100% Modulus [Delta %]
2	-0.5	1.0	2.6	4.2	-3.4
7	-0.6	1.0	8.1	6.0	-1.7
14	-0.6	2.0	1.1	0.0	8.0
28	-1.2	3.0	-0.1	-3.6	18.4
Criteria	**+25%/-5%**	**+5/-20 pts**	**+/- 50%**	**+/- 50%**	**+/- 50%**

(*) 100% CO_2 @ 302°F [150°C], 2900 psi [200 bar], 28 days, -214 O-rings

Table 6: Amines Fluid Aging

Modified ISO 23936-2 Annex A (*)	Result: Pass				
Days Aging	Volume Change [%]	Hardness Change [Points]	Tensile Strength [Delta %]	Elongation @ Break [Delta %]	100% Modulus [Delta %]
DEA	1.0	2	5	7	-5
MEA	6.0	1	12	39	-23
MDEA	2.0	1	9	14	-15
Passing Criteria	**+25%/-5%**	**+5/-20 pts**	**+/- 50 %**	**+/- 50 %**	**+/- 50 %**

(*) 50% in water @ 194°F [90°C], vapor pressure of the liquid, 168 hrs, -214 O-rings

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