



KATON[®] FKM FK5

High Performance Specfluoroelastomer

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KATON[®] FKM FK5 Series

specfluoroelastomer

KATON® FKM FK5 Series is a new medium viscosity peroxide curable fluoroelastomer with a unique structure, patented by Maxmold Polymer, that affords excellent resistance to aggressive oils, amine containing fluids, bases, and steam.

KATON® FKM FK5 Series exhibits superior resistance to a wide variety of chemicals (such as aggressive oils, amine containing fluids, bases and steam), coupled with excel-lent processability.

KATON[®] FKM FK5 Series can be cross-linked using organic peroxides in conjunction with a co-agent.

KATON[®] FKM FK5 Series is excellent in :

- ATF fluids
- Steam
- Fluids containing amine additives
- High PH packages
- · Good mechanical properties
- Lack of mold fouling
- Excellent mold release

KATON [®]FKM FK5 Series can be used for compression, in-jection and transfer molding of shaft seals, valve seals, O-rings, gaskets or any item requiring superior chemical resistance.

KATON [®]**FKM FK5 Series** can be combined with the cure system and other typical fluoroelastomer compounding ingredients. Mixing can be accomplished with two-roll mills or internal mixers. Finished goods may be produced by a variety of rubber processing methods. This material can be extruded into hoses or profiles and can be calendered to make sheet stocks or belting.



General

Material Status	Commercial: Active			
Availability	• Europe	North America	• Taiwan	
	 Base Resistant 	 Good Processability 	• Oil Res	sistant
Features	 Crosslinkable 	 Good Chemical Resistance 	 Steam 	Resistant
	Good Flow	 Good Mold Release 	• Mediur	n Viscosity
	Belts/Belt Repair	• Hose	 Sheet 	
Uses	 Blending 	Profiles	• Valves	Valve Parts
	Gaskets			
Appearance	 Black/White 			
Forms	• Slab			
Processing Method	 Calendering 	 Compression Molding 	 Injectio 	n Molding
	 Compounding 	Extrusion	Resin	Fransfer Molding

Physical	Typical value unit	Tes	t mathod
Mooney Viscosity (ML 1+10,121°C)	40MU	No	Standard
Fluorine Content	65 %	No	Standard
Working Temperature	-15°C~250°C	AS	TM D573

Notes

Typical properties: these are not to be construed as specifications.



Original properties		
Color	Black	
ML (1+10') @ 121°C	48	
Fluorine content (%)	65	
Specific gravity (g/cc)	1.82	
Packaging / Form	Slabs	
Solubility	Ketones and esters	
Compression set		
O-ring # 214	41%	
6 mm Buttons	28%	
Mechanical prosperities		
Press Cure:	10 min @ 170°C	
Press Cure: Post Cure:	10 min @ 170°C 8 h @ 230°C	
Press Cure: Post Cure: 100 % Modulus	10 min @ 170°C 8 h @ 230°C MPa 7.0	
Press Cure: Post Cure: 100 % Modulus Tensile Strength	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5	
Press Cure: Post Cure: 100 % Modulus Tensile Strength Elongation at Break%	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5 207	
Press Cure: Post Cure: 100 % Modulus Tensile Strength Elongation at Break% Hardness Shore A	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5 207 75	
Press Cure: Post Cure: 100 % Modulus Tensile Strength Elongation at Break% Hardness Shore A ASTM 3 + benzylamide (1%) 168b 150°C	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5 207 75	
Press Cure: Post Cure: 100 % Modulus Tensile Strength Elongation at Break% Hardness Shore A ASTM 3 + benzylamide (1%) 168h 150°C	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5 207 75	
Press Cure: Post Cure: 100 % Modulus Tensile Strength Elongation at Break% Hardness Shore A ASTM 3 + benzylamide (1%) 168h 150°C Tensile Strength	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5 207 75 -16%	
Press Cure: Post Cure: 100 % Modulus Tensile Strength Elongation at Break% Hardness Shore A ASTM 3 + benzylamide (1%) 168h 150°C Tensile Strength Elongation at Break (Shore A)	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5 207 75 -16% +1%	
Press Cure: Post Cure: 100 % Modulus Tensile Strength Elongation at Break% Hardness Shore A ASTM 3 + benzylamide (1%) 168h 150°C Tensile Strength Elongation at Break (Shore A) Hardness	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5 207 75 -16% +1% -6%	
Press Cure: Post Cure: 100 % Modulus Tensile Strength Elongation at Break% Hardness Shore A ASTM 3 + benzylamide (1%) 168h 150°C Tensile Strength Elongation at Break (Shore A) Hardness Volume	10 min @ 170°C 8 h @ 230°C MPa 7.0 MPa 21.5 207 75 -16% +1% -6% +2.6%	

Fuel	C	168	h 23'	°C

Tensile Strength	-28%	
Elongation at Break (Shore A)	3%	
Hardness	-6%	
Volume	+5.5%	

Spec FKM ASTM D1418 D2240 Designation: FKM-FK5 ISO 1629 Designation: FKM ASTM D2000/SAE J200 Type Class: HK





Volume swell in hydrocarbons



As in conventional FKM, FK5 exhibits superior resistance to both aliphatic and aromatic hydrocarbons (Figures 1 and 2) due to their inherent polar structure. On the other hand, the absence of polarity in TFE/P polymers along with the use of propylene as a co-monomer shows significant swelling in hydrocarbons.

Volume Swell in Methanol





Hydrogen sulfide (Sour Gas) resistance



Excellent H2S resistance is achieved with FK5 (Figure 4), comparable to TFE/P polymers and FFKM and is by far superior to conventional FKM, both bisphenol and peroxide cured materials.

Amine additive resistance





Low temperature



Looking more closely at low temperature performance (Figure 7) is a comparison of the temperature of retraction among elastomer types. The TR-10 test provides a temperature value that is an indicator of the ability of an elastomer to hold a dynamic seal. Copolymer FKM, Peroxide Cured FKM, and FK5 all have values below 0°C and could be candidates in deepwater and northern ocean applications while TFE/P and FFKM have TR-10 values above 0°C that limits these polymers' functional usage in lower temperature applications. Considering the choices available, FK5 provides more design options in low temperature environments than TFE/P or FFKM polymers.

Physical Properties



The tensile strength (Figure 8) of a typical 75 Shore A hardness FK5 compound is approximately 40% greater than BAF cured copolymer FKM. The increased strength is typical of microemulsion polymerization and peroxide cured FKM. The elongation at break (Figure 9), like tensile, is increased in microemulsion peroxide cured FKM vs. copolymer FKM. These properties allow for the development of high hardness compounds with improved elongation and are a highly desirable characteristic in a number of seal designs.



Explosive Decompression Resistance

FKM type &	5 can be compound	ed to resist explosive decompression. Results are show	n in below.
Subject :	Rapid Gas Decompression (RGD) testing per NORSOK M-710 Rev.2,Annex B.		
Testing :	Туре:	Rapid Gas Decompression	
	Media:	10% Carbon Dioxide (CO2), 90% Methane (CH ₄).	
	Test Temperature:	100 ± 2 °C	
	Test Pressure:	150 +10/-5 bar (2176 psi +145/-73 psi)	
	Sample Type:	Number 325 O-Ring: 5.33 mm cross sectional diameter	er (CSD)
		37.47 mm inner diameter (ID)	
Exposure Period and Number of Cycles :			
		1) Saturate minimum 68 hours at test temperature and	test pressure
		2) Decompress test vessel at 30 ± 2 bar per minute	
		3) Hold 100°C test temperature and zero pressure for	1 hour +10/-0
		minutes	
		4) Resume 150 bar test pressure	
		5) Cycle 10 each, 23 +/1 I hour for each cycle.	
6) Repeat steps 2 through 5 (for a total of 10 Rapid G <mark>as Decorr</mark>		as Decompression	
		{RGD} sequences)	
		7) Following 10th rapid decompression, reduce pressu	ire as before and
		cool to room temperature for 24+4/-0 hours	
		8) Section O-Rings with a razor blade and photograph	as soon as
		practical after removal from sample test fixtures	

Specification: 30 ± 2 bar/min (300 ± 20 seconds). Actual time: 315 Seconds from 2190 to 100 PSI



Figure 21 A4 Material installed on Tooling Before Test



Figure 22 A4 Material installed on Tooling After Test



KATON[®] FK5 after test



OTHERS FK5 after test

*KATON $^{\ensuremath{\text{B}}}$ FK5 structure stongrt then others in expolsive decompression test.

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AED Testing---Graph1 Pressure Temperature vs.Time



Temperature and Pressure log for 10 through 23 January 2014

AED Testing----Graph2 Typical Decompression Cycle



Specification : 20 to 40 bar/min (300+150/-75 seconds) , Remain at zero PSI for 3600 seconds.

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