Katon®

KATON® FKM FK5

High Performance Specfluoroelastomer

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 accom-plished 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 calen-dered to make sheet stocks or belting.

General

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

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

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

Technical Data

Katon®

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
Post Cure:	8 h @ 230°C
100 % Modulus	MPa 7.0
Tensile Strength	MPa 21.5
Elongation at Break%	207
Hardness Shore A	75

ASTM 3 + benzylamide (1%) 168h 150°C

Tensile Strength	-16%
Elongation at Break (Shore A)	+1%
Hardness	-6%
Volume	+2.6%

Fuel C 168h 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

Figure 1

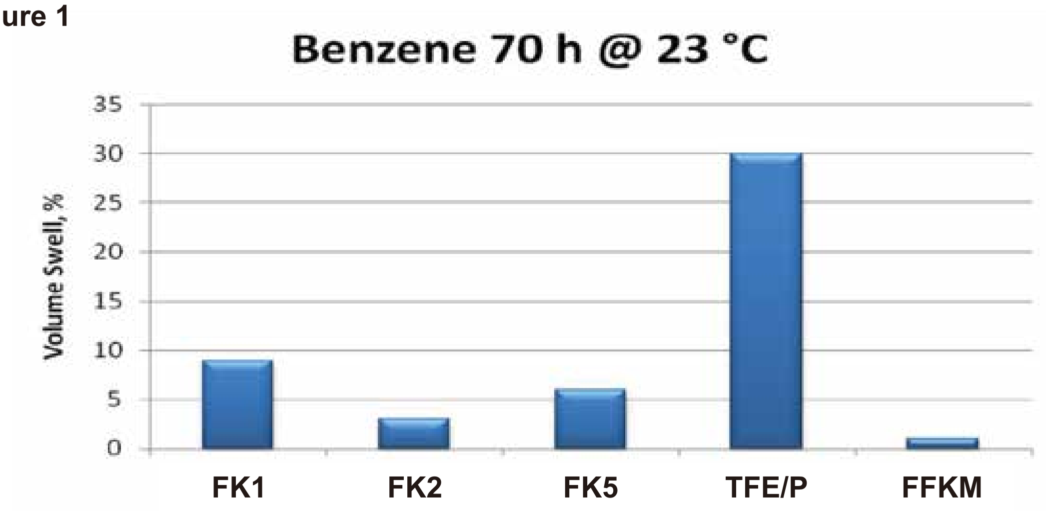
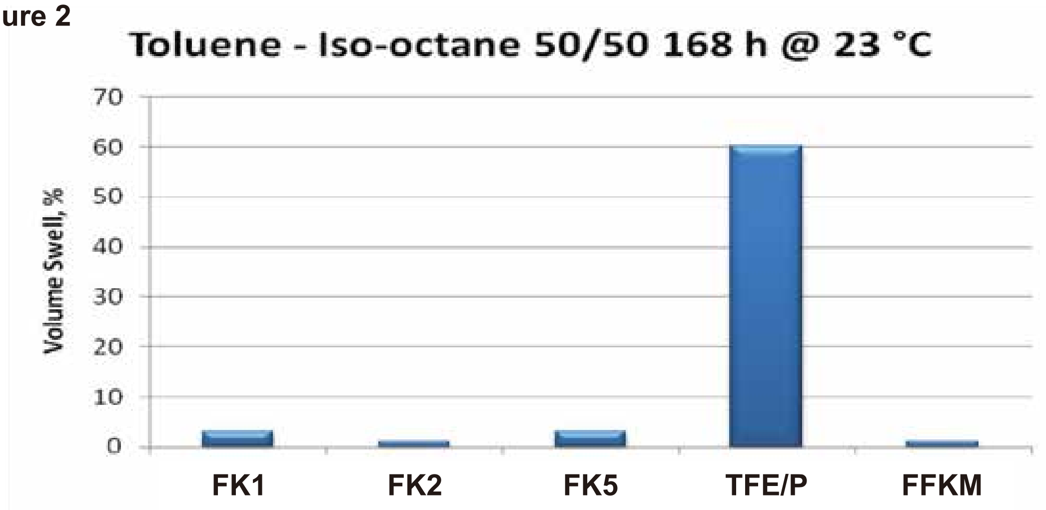


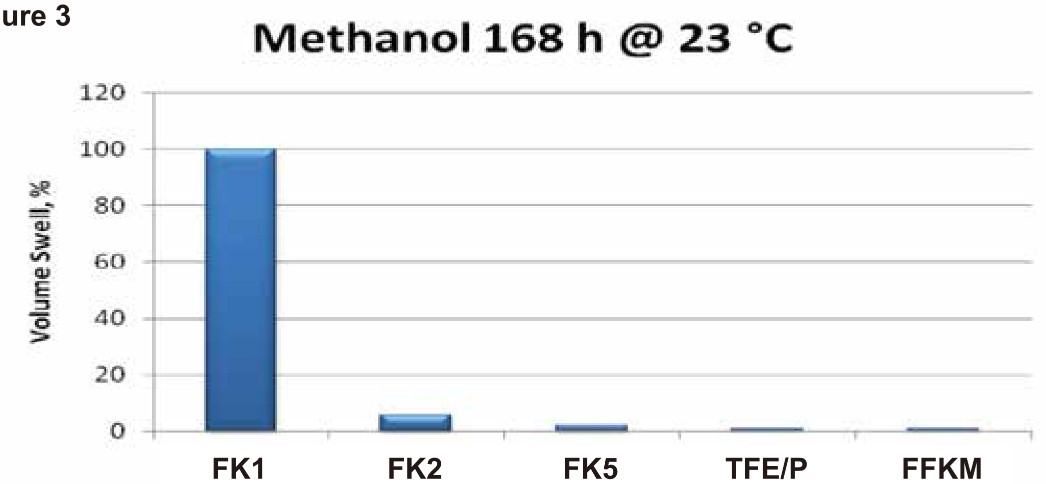
Figure 2



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

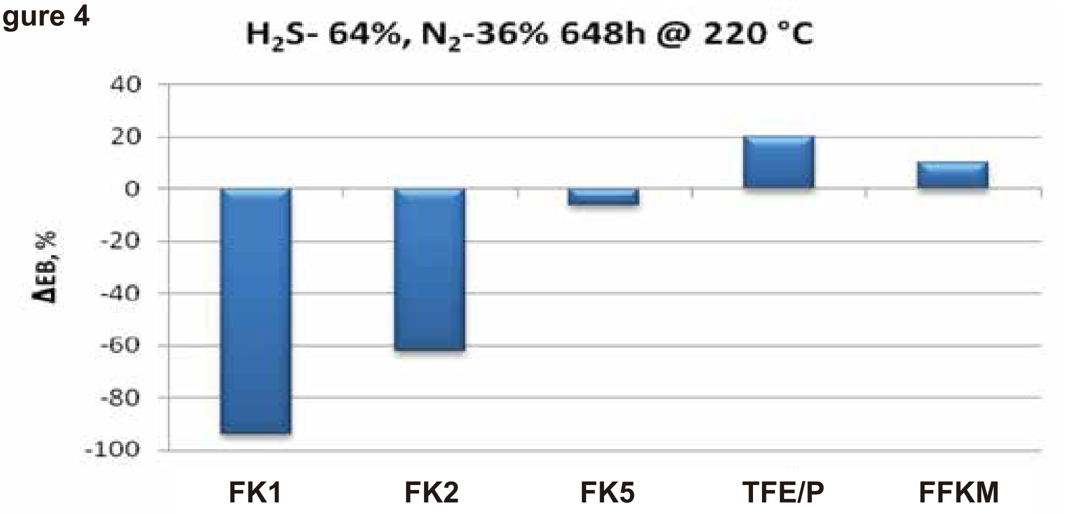
Figure 3



FK5 shows a comparable swelling behavior in methanol (Figure 3) to TFE/P polymers and high fluorine content terpolymers.

Hydrogen sulfide (Sour Gas) resistance

Figure 4



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

Figure 5

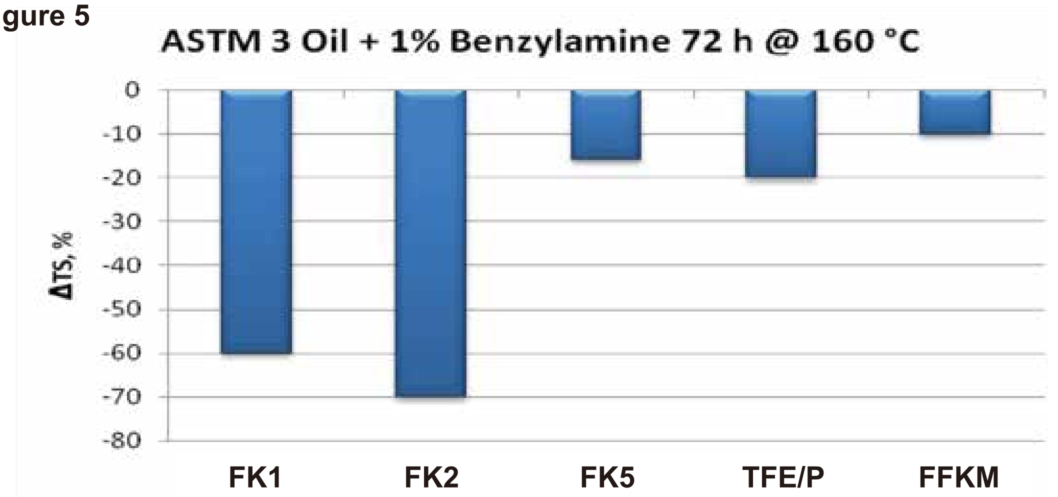
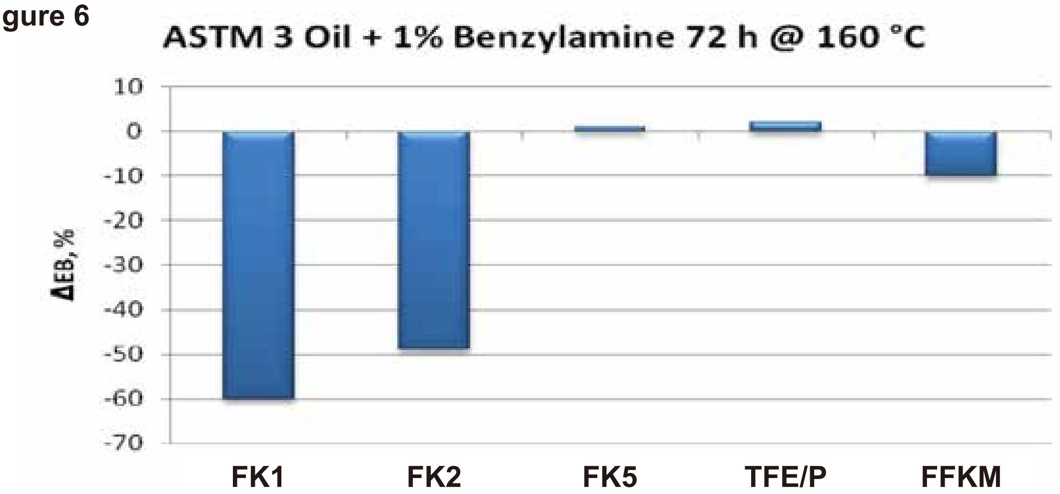


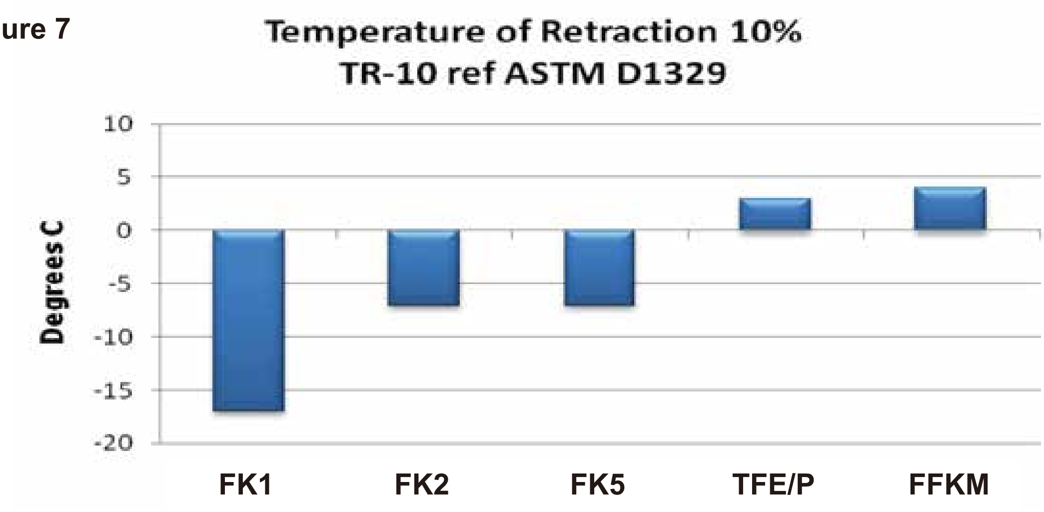
Figure 6



Also in the case of amines (Figures 5 and 6), such as benzylamine, excellent resistance is achieved when using FK5, comparable to TFE/P polymers and FFKM and is by far superior to conventional FKM both bisphenol and peroxide cured materials.

Low temperature

Figure 7



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

Figure 8

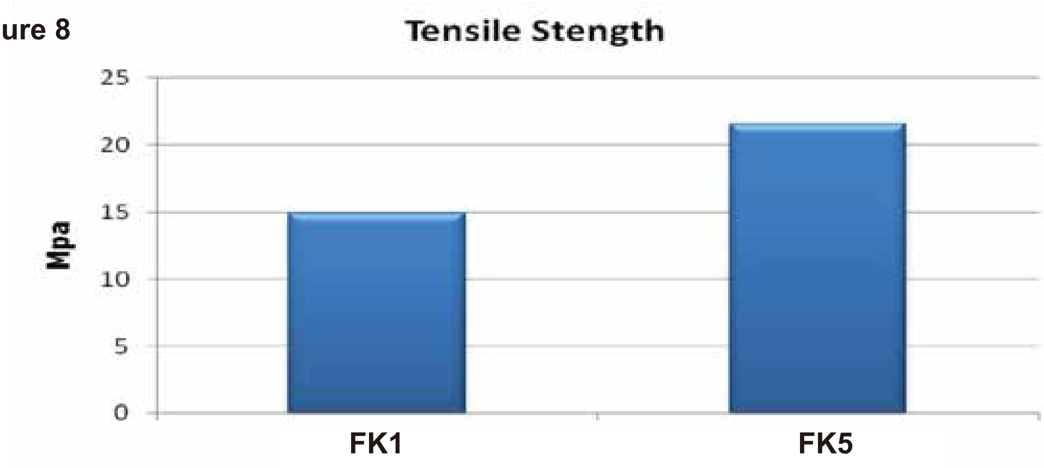
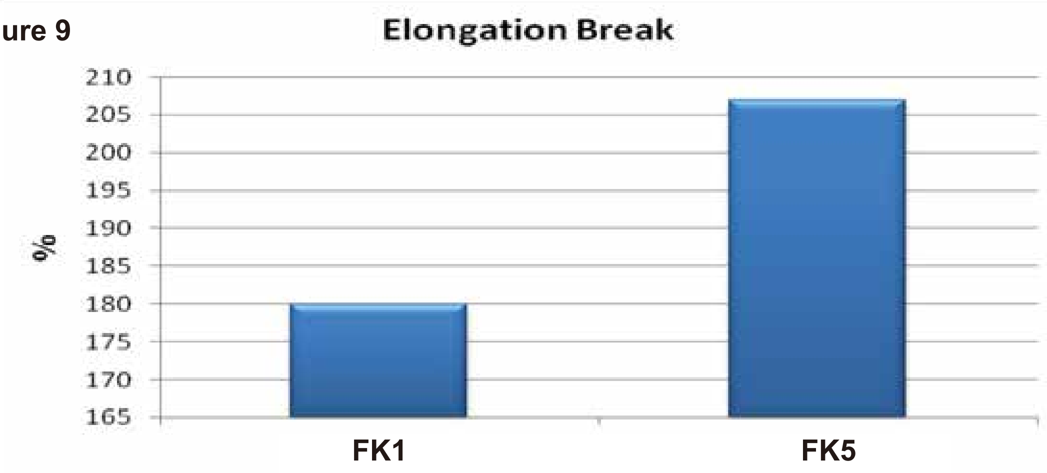


Figure 9



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 compounded to resist explosive decompression. Results are shown in below.

Subject : Rapid Gas Decompression (RGD) testing per NORSOK M-710 Rev.2,Annex B.

Testing :

Type:	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 (CSD) 37.47 mm inner diameter (ID)

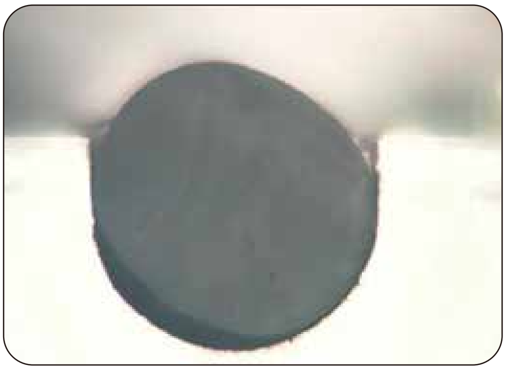
Exposure Period and Number of Cycles :

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 l hour for each cycle.
6) Repeat steps 2 through 5 (for a total of 10 Rapid Gas Decompression {RGD} sequences)
7) Following 10th rapid decompression, reduce pressure 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

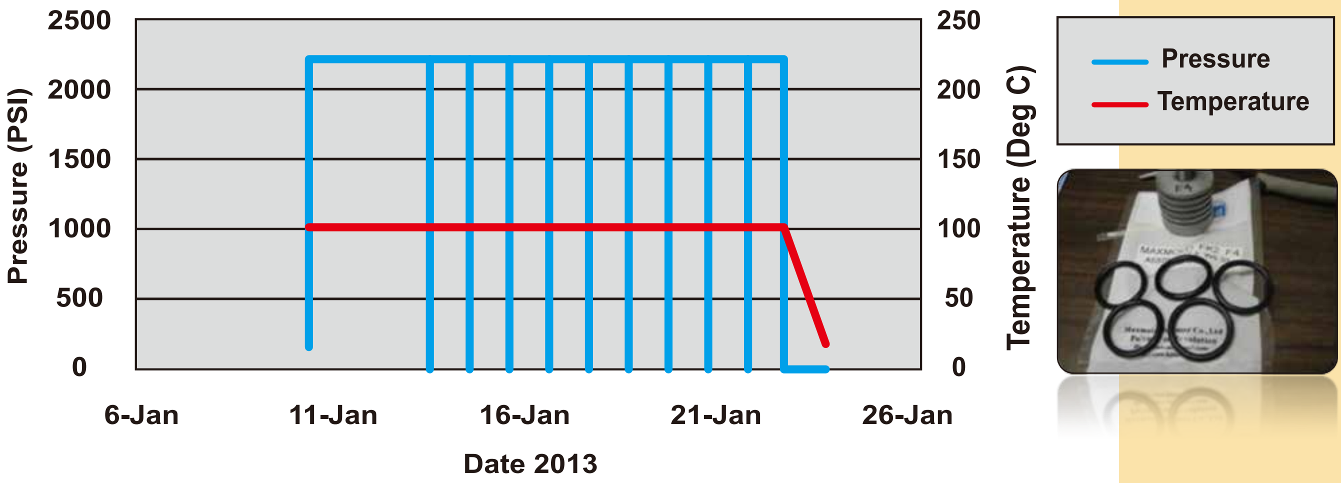


KATON® FK5 after test

OTHERS FK5 after test

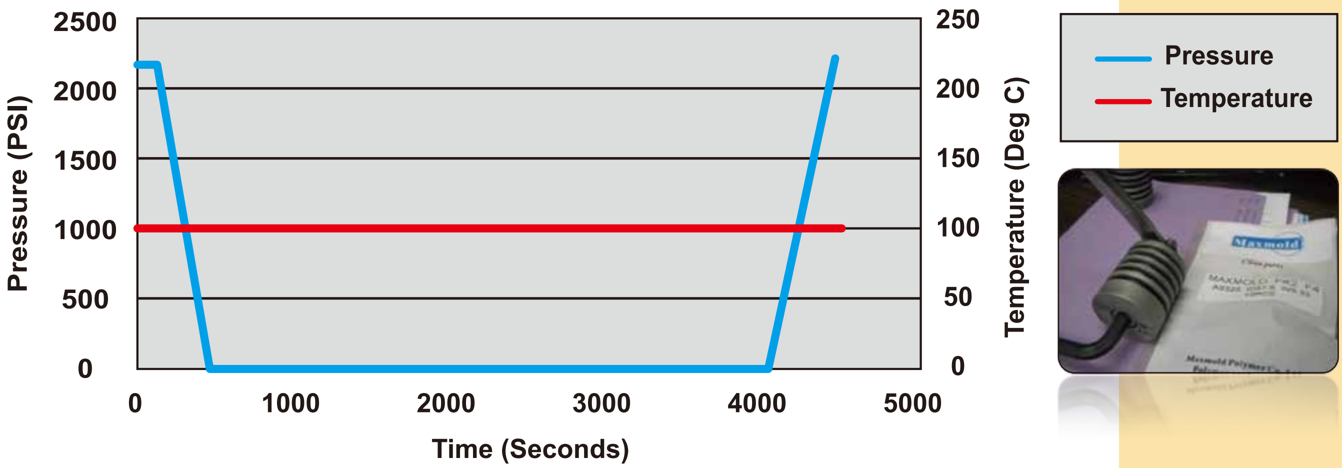
*KATON® FK5 structure stongrt then others in expolsive decompression test.

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.

Maxmold Polymer Co., LTD

ADD	No. 18, Ln. 434, Sec. 4, Zhonghua Rd., Xiangshan Dist., Hsinchu City 30094, Taiwan
TEL	886-3-538-0817
FAX	886-3-538-0827
E-mail	service@maxmold.com
Wed	www.mamxold.com