



MARKEZ® Z1416 PERFLUOROELASTOMER TECHNICAL DATASHEET – REV 1, OCTOBER 2019

GENERAL PURPOSE HIGH TEMPERATURE BLACK PERFLUOROELASTOMER

Z1416 is our most popular general purpose, FFKM compound due to its relative low cost, FDA compliance, and broad range of chemical and temperature resistance. Used as a cost effective alternative to 6375, 4079 and 7075 in countless applications across various industries like Petro-Chem, Paint and Ink applications where resistance to harsh solvents is required. Available in o-rings and custom shapes. Our experienced application engineers welcome the opportunity to assist you in selecting the compound that provides the best value for your application.

FEATURES AND BENEFITS

- Cost effective
- Nearly universal chemical compatibility
- Low compression set
- FDA Compliant CFR 177.2600
- Good dynamic properties - Long service life
- Compatible with steam < 580°F
- Compatible with amines < 100°F

APPLICATION EXAMPLES

- Chemical sprayers, injectors and reactors
- Connectors, Controls & Filters
- Petro-Chem equipment, Sour gas
- Ink handling & spraying equipment
- Inorganic & Organic Acids & Alkine
- Ketones, Esters, Ethers, Aldehydes
- Solvents
 - Acetone, Heptane
 - Glycol ethers, Naphtha
 - Toluene, Turpentine
 - White spirit, Xylene
 - Methyl ethyl ketone (MEK)
 - Dimethylformamide (DMF)
- Lab Instrumentation
- Liquid chromatography equipment
- Mechanical seals
- Painting equipment
- Pumps & Valves
- Aerospace Fuels, Skydrol & Oils
- Semiconductor Applications
 - Dry etch
 - Strip
 - LPCVD
 - Litho/Track
 - ECP
 - Exhaust valves

TYPICAL PHYSICAL PROPERTIES

PROPERTIES	ASTM	TYPICAL VALUE
Color		Black
Material Type	FFKM	FFKM
Hardness: (°IRHD)	D1415	77
	D2240	
Tensile Strength MPa (psi)	D412	14.7 (2,120)
Elongation at Break	D412	165%
Compression Set 72 hrs. @ 200°C (392 °F)	D395	20%
Linear Coefficient of Thermal Expansion (1/°C)		3.5 x 10 ⁻⁴
Min Operating Temp (lower spikes)		-15 °C (5°F)
Max Operating Temp (higher spikes)		320 °C (608°F)



This information is to the best of our knowledge accurate and reliable. However, Marco Rubber makes no warranty, expressed or implied, that parts manufactured from this material will perform satisfactorily in the customer's application. It's the customer's responsibility to evaluate parts prior to use.

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TESTING RESULTS OF MARKEZ® Z1416 UNDER VARIOUS CONDITIONS

CHEMICAL RESISTANCE

CHEMICAL	RATING
Inorganic acid	A
Organic acid	A
Alkalis	A
Amines (RT)	A
Hot amines (>70°C)	C*
Water / Steam	A
Ketons	A
Esters	A
Ethers	A
Adelhydes	A
Alcohols	A
Hydrocarbons	A
Sour gas	A
Lubricants	A
Fluorinated fluids	C

*Markez Z1416 provides excellent chemical compatibility with most chemicals, including Amines below 70° C. **For hot amines over 70° C, use Markez Z1352 compound.**

RATING SYMBOL	VOLUME SWELLING
A	<10%
B	10-30%
C	30-50%
D	>50%

Markez Z1416 shows good compatibility with hot acids with minor physical property changes.

ACIDS

HCL 37%	80°C for 70 hrs.
Tensile strength change, %	-4.0
Elongation change, %	-15.0
Hardness, Shore A	-1.0
Volume change, %	1.6

HF 49%	80°C for 70 hrs.
Tensile strength change, %	5
Elongation change, %	-23
Hardness, Shore A	0
Volume change, %	0.3

Nitric acid 65%	80°C for 70 hrs.
Tensile strength change, %	-30
Elongation change, %	5
Hardness, Shore A	-10
Volume change, %	10

Glacial acetic acid	80°C for 70 hrs.
Tensile strength change, %	-35
Elongation change, %	-3
Hardness, Shore A	-10
Volume change, %	7

ALKALINE AND AMINES

KOH, 50%	125°C for 168 hrs.
Tensile strength change, %	-10.0
Elongation change, %	-15.0
Hardness, Shore A	-2.0
Volume change, %	0.4

N-methyl-diethanolamine (MDEA)	100°C for 168 hrs.
Tensile strength change, %	2
Elongation change, %	0
Hardness, Shore A	-2
Volume change, %	4.6

NH, 28%	100°C for 336 hrs.
Tensile strength change, %	-15
Elongation change, %	-18
Hardness, Shore A	-7
Volume change, %	15

Ethylene diamine	60°C for 336 hrs.
Tensile strength change, %	-10
Elongation change, %	-13
Hardness, Shore A	-8
Volume change, %	20
Volume change, %, (23°C for 504 hrs.)	1.8

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WATER AND STEAM

Water	220°C for 168 hrs.
Tensile strength change, %	-12.0
Elongation change, %	1.0
Hardness, Shore A	-1.0
Volume change, %	2.0

Steam	300°C for 168 hrs.
Tensile strength change, %	11
Elongation change, %	-17
Hardness, Shore A	0
Volume change, %	-0.8

The peroxide curing system used to cross-link the Markez Z1416 compound gives it superior resistance to hot water and steam below 300°C.

AEROSPACE FLUIDS

Fuel B	23°C for 70 hrs.
Tensile strength change, %	4.0
Elongation change, %	-2.0
Hardness, Shore A	1.0
Volume change, %	0.2

Skydrol LD4	125°C for 70 hrs.
Tensile strength change, %	-19.0
Elongation change, %	14.0
Hardness, Shore A	-4.0
Volume change, %	4.6

Reference Oil 300	175°C for 720 hrs.
Tensile strength change, %	-9.0
Elongation change, %	6.0
Hardness, Shore A	-2.0
Volume change, %	0.6

ELECTRICAL PROPERTIES

Dielectric constant and loss factor at 50 Hz frequency
Volume and surface resistivity measured applying 100 V direct tension

Dielectrical Constant	ϵ'	3.5
Loss Factor	$\tan(\delta)$	0.03
Surface resistivity	$R_s(\Omega)$	5×10^{16}
Volume resistivity	$R_v(\Omega \text{ cm})$	6.1×10^{16}

GAS PERMEATION RATE

Permeation rate at 30°C
(cm³ (STP)-mm/m²-atm-d)

Nitrogen	250
Oxygen	450
Helium	5400

COMPRESSION SET, %	ASTM REQUIREMENT	TYPICAL VALUE
70 hrs. @ 200°C	40	20
70 hrs. @ 230°C	40	24
336 hrs. @ 230°C	55	41

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