

## FFR75PC

# TECHNICAL DATA SHEET

### TECHNICAL INFORMATION

FLUONOX<sup>®</sup> FFR75PC is a fully fluorinated fluoroelastomer (FFKM) copolymer consisting of PMVE and TFE. It does not contain curatives. It can be cross-linked using organic peroxides in combination with a coagent. FLUONOX<sup>®</sup> FFR75PC shows best chemical resistance among all elastomers. It can be used in a temperature range from -10°C to 250°C.

It is suitable for organic as well as inorganic acids, caustic, amines (e.g. hot amines at high temperatures above 65°C) ketones, aldehydes, esters, ethers, alcohols, fuels, solvents, sour gases, hydrocarbons, steam, hot water, ethylene and propylene oxide and mixed process streams.

In addition, the elastomer matrix of FFR75PC has been developed to improve its resistance to extrusion and rapid gas decompression resistance as requested by the oil and gas industry.

### TYPICAL PROPERTIES

Properties	Test Method	Unit	Nominal Value
Appearance	-	-	Translucent slab
Specific gravity at 23°C (73°F)	ASTM D792	g/cm <sup>3</sup>	1.99
Mooney viscosity ML (1+10) at 121°C (250°F)	ASTM D1646	MU	75
Shelf stability at room temp.	-	-	Excellent
Fluorine content	Internal NMR Method	%	72.3

Note: These are typical properties and not to be used for specification purposes.

### PACKAGING

FLUONOX<sup>®</sup> FFR75PC is available in 250 grams, 500 grams and 1 kg box.

### STANDARD FORMULATION OF COMPOUND

FLUONOX <sup>®</sup> FFR75PC		100
Luperox 101 XL45	phr	1.5
TAIC 100%	phr	1.5
N990 MT	phr	15

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## PHYSICAL AND GENERAL PROPERTIES

Compound Mooney viscosity	Test Method	Unit	Values
ML (1+10) at 121°C	ASTM D1646	MU	75
<b>MDR (12 min at 160°C)</b>			
ML	ASTM D6601	in x lb	1.0
MH		in x lb	20.0
ts2		min	0.7
t <sub>50</sub>		min	1.1
t <sub>90</sub>		min	3.3
<b>MDR (6 min at 177°C)</b>			
ML	ASTM D6601	in x lb	1.2
MH		in x lb	19.3
ts2		min	0.5
t <sub>50</sub>		min	0.6
t <sub>90</sub>		min	1.1
<b>MECHANICAL PROPERTIES AFTER POST CURE</b> Press-cure 10 min at 160°C/Post cure 4 h at 230°C			
100% Modulus	ASTM D412C	MPa	8.0
Tensile Strength		MPa	22.8
Elongation at Break		%	180
Hardness Shore A	ASTM D2240	points	70
<b>Heat aging 70 h at 250°C</b>			
Δ Tensile Strength	ASTM D573	%	-39
Δ Elongation at Break		%	21
Δ Hardness Shore A		points	-2
Δ Weight		%	+0.8
<b>Heat aging 70 h at 275°C</b>			
Δ Tensile Strength	ASTM D573	%	-64
Δ Elongation at Break		%	110
Δ Hardness Shore A		points	-2
Δ Weight		%	-1.2
<b>Compression set</b>			
70 h at 200°C	ASTM D395 Method B	%	22
70 h at 250°C		%	32
<b>Low Temperature Retraction</b>			
TR10	ASTM D1329	°C	-2
<b>Differential Scanning Calorimetry (DSC)</b>			
T <sub>g</sub> onset		°C	-2.9
T <sub>g</sub> midpoint		°C	-3.0

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## FLUID RESISTANCE OVERVIEW PROPERTIES

Fluid	Test Condition	Volume Swelling
Acetonitrile	168h @ 23°C	+1.2%
Methyl ethyl ketone (MEK)	168h @ 23°C	+0.4%
Ethyl acetate	168h @ 23°C	+2.1%
H <sub>2</sub> SO <sub>4</sub> 98%	70h @ 60°C	+0.6%
Ammonia, 28% solution	72h @ 70°C	-0.2%
Toluene	168h @ 70°C	+6.2%
HNO <sub>3</sub>	168h @ 80°C	+4.2%
Ethylenediamine	72h @ 100°C	+9.7%
Diethanolamine	72h @ 100°C	+1.4%
Glacial acetic acid	336h @ 100°C	+5.0%
Diethanolamine	168h @ 150°C	+9.6%
Diethanolamine	72h @ 150°C	+5.9%
Dimethylformamide	168h @ 150°C	+3.5%
1,2 - Dichlorobenzene	168h @ 180°C	+5.6%
Ageing in Steam	168h @ 200°C	+3.1%
Ageing in Water	168h X 200°C	+3.2%

## STEAM & HOT WATER RESISTANCE PROPERTIES

Ageing in Steam 168h at 200°C	Test Method	Unit	Values
Δ Tensile Strength		%	-29
Δ Elongation at Break		%	+1
Δ Hardness Shore A		points	-4
Δ Weight		%	+1.6
Δ Volume	ASTM D471	%	+3.1
Compression Set 168h at 200°C	ISO 815-1 Method A	%	40
Ageing in Water 168h at 200°C	Test Method	Unit	Values
Δ Tensile Strength		%	-22
Δ Elongation at Break		%	-3
Δ Hardness Shore A		points	-3
Δ Weight		%	+1.7
Δ Volume	ASTM D471	%	+3.2
Compression set 168h at 200°C	ISO 815-1 Method A	%	41

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## ACID FLUIDS

<b>H<sub>2</sub>SO<sub>4</sub>, 98%, 70 h at 60°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-11
Δ Elongation at Break		%	-12
Δ Hardness Shore A		points	-2
Δ Weight		%	+0.1
Δ Volume	ASTM D471	%	+0.6
<b>HNO<sub>3</sub>, 65%, 168 h at 80°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-54
Δ Elongation at Break		%	0
Δ Hardness Shore A		points	-2
Δ Weight		%	+2.2
Δ Volume	ASTM D471	%	+4.2
<b>Glacial acetic acid, 336 h at 100°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-34
Δ Elongation at Break		%	-11
Δ Hardness Shore A		points	-1
Δ Weight		%	+1.9
Δ Volume	ASTM D471	%	+5.0

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## ALKALINE FLUIDS AND AMINES

<b>Ethylenediamine, 72 h at 100°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-41
Δ Elongation at Break		%	+23
Δ Hardness Shore A		points	-5
Δ Weight		%	+3.9
Δ Volume	ASTM D471	%	+9.7
<b>Diethanolamine, 168 h at 150°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-59
Δ Elongation at Break		%	-18
Δ Hardness Shore A		points	-6
Δ Weight		%	+4.9
Δ Volume	ASTM D471	%	+9.6
<b>Diethanolamine, 72 h at 150°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-29
Δ Elongation at Break		%	+5
Δ Hardness Shore A		points	-5
Δ Weight		%	+3.4
Δ Volume	ASTM D471	%	+5.9
<b>Diethanolamine, 72 h at 100°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-4
Δ Elongation at Break		%	-1
Δ Hardness Shore A		points	-1
Δ Weight		%	+0.4
Δ Volume	ASTM D471	%	+1.4
<b>Ammonia, 28% solution, 72 h at 70°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-6
Δ Elongation at Break		%	+3
Δ Hardness Shore A		points	-1
Δ Weight		%	+0.2
Δ Volume	ASTM D471	%	+0.5

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## PAINT SPRAY APPLICATIONS

<b>Methyl ethyl ketone (MEK), 168 h at 23°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-28
Δ Elongation at Break		%	-8
Δ Hardness Shore A		points	0
Δ Weight		%	+0.3
Δ Volume	ASTM D471	%	+0.4
<b>Ethyl acetate, 168 h at 23°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-41
Δ Elongation at Break		%	-18
Δ Hardness Shore A		points	0
Δ Weight		%	+0.6
Δ Volume	ASTM D471	%	+2.1
<b>Toluene, 168 h at 70°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-25
Δ Elongation at Break		%	-8
Δ Hardness Shore A		points	-3
Δ Weight		%	+1.8
Δ Volume	ASTM D471	%	+6.2

## POLAR SOLVENTS

<b>Acetonitrile, 168 h at 23°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-18
Δ Elongation at Break		%	-2
Δ Hardness Shore A		points	0
Δ Weight		%	+0.3
Δ Volume	ASTM D471	%	+1.2
<b>Dimethylformamide, 168 h at 150°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-29
Δ Elongation at Break		%	-7
Δ Hardness Shore A		points	-3
Δ Weight		%	+1.4
Δ Volume	ASTM D471	%	+3.5

## FLUID RESISTANCE (MISCELLANEOUS)

<b>1,2 - Dichlorobenzene, 168 h at 180°C</b>	<b>Test Method</b>	<b>Unit</b>	<b>Values</b>
Δ Tensile Strength		%	-30
Δ Elongation at Break		%	-10
Δ Hardness Shore A		points	-3
Δ Weight		%	+3.4
Δ Volume	ASTM D471	%	+5.6

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## SAFETY AND HANDLING

Handling and processing of fluoroelastomer must be done in ventilated areas to prevent personnel exposure to the fumes liberated during curing or use of cured rubber at high temperatures. During the process, some fumes may generate at high temperatures which are harmful to human beings. Fumes should not be inhaled; eye and skin contact must be avoided. In case of skin contact flush skin with cold water immediately. In case of eye contact, flush with water immediately and seek medical help. Smoking tobacco or cigarettes should not be allowed in the working area. Mixing agents that contain metallic particulate such as powdered Aluminium can rapidly decompose at high temperatures; therefore do not use metallic particulate as a mixing agent. Fluoroelastomer should be stored away from heat. It should be kept in a clean and dry area where it can be protected until it is used. Please read the Material Safety Data Sheet before handling the product.

FLUONOX® is the brand name of Gujarat Fluorochemicals Limited (GFL) used for its brand of fluoroelastomer. FLUONOX® can be used in applications duly approved by GFL. Customers who plan to use the word FLUONOX® as the trade mark on or relation to their own fluoroelastomer parts and other products in any style or combination or in any manner whatsoever must contact GFL for prior permission for such use. No consumer/user of GFL fluoropolymer resin is permitted to claim that their products contain FLUONOX® without prior permission from GFL.

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Note warning: Do not use any of FLUONOX® Fluoroelastomer in medical devices that are designed for permanent implantation in the human body. For other medical uses, prior permission of GFL may be sought.

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