HaloPolymer

FKM Fluoroelastomers

November 2014

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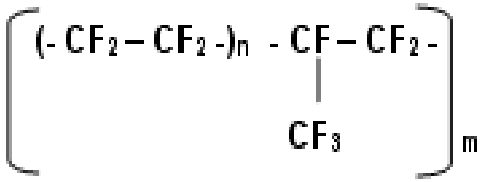
Fluoroelastomers SKF-26 and SKF-32

Fluoroelastomers SKF-26 – copolymer of vinylidene fluoride and hexafluoropropylene,



Fluoroelastomers SKF-32 – copolymer of vinylidene fluoride and chlorotrifluoroethylene

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$$[-CF_2\text{-}CFCl\text{-}(-CH_2\text{-}CF_2\text{-})_n]_m$$

Index designation	Standard specifications as per TU 2294-048-13693708-2010	
	SKF-26	SKF-32
Appearance	White crumb containing separate translucent particles, or white to gray or yellowish-gray sheet. Singular point inclusions are allowable.	
Volatile, %, max.	0.15	0.15
Mooney viscosity ML 4+4 (150°C) ML 4+4 (160°C)	 80-105 -	 - 70-95
Physical properties of cured elastomer		
- Tensile strength, MPa (kgf/cm^2), min.	13.2 (135)	16.0 (163)
- Breaking elongation, %, min.	100	130
NOTE – As agreed with a customer, values of indices 2 and 3 as well as conditions of Mooney viscosity determination (temperature, heating time, test duration) are subject to change.		

Fluoroelastomers SKF 26 and SKF 32 are developed by our Company and produced since 1964

FKM Fluoroelastomers

Elaftor - product range and typical properties

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Product	Chemical Composition	Fluorine Content (%)	Mooney Viscosity (1+10)121 °C	Density	T glass trans. ^{0}C	Application
Elaftor 2031	Copolymers (VF2+HFP) bisphenolic and diamine curing	66-67	33±3	1,83	-17	Standard fluoroelastomer for best compression set and high strength for general moulded goods, special grade injection moulding
Elaftor 2051		66-67	50±5	1,83	-17	Standard fluoroelastomer for best compression set and high strength for general moulded goods,
Elaftor 3031	Terpolymers (VF2+HFP+TFE) bisphenolic and diamine curing)	68-69	35±5	1,87	-13	Fluoroelastomer with improved resistance against chemicals and fluids, special grade for injection moulding.
Elaftor 3041		68-69	45±5	1,87	-13	Fluoroelastomer with improved resistance against chemicals and fluids. Can be used in injection and compression moulding.
Elaftor 3061		68-69	65±5	1,87	-13	Fluoroelastomer with improved resistance against chemicals and fluids.
Elaftor 7041	High fluorine containing Terpolymers (VF2+HFP+TFE) with Cure Site Monomer (CSM) peroxide curing	70-71	45±5	1,91	-5	High fluorine containing fluoroelastomer for highest solvent resistance and lowest permeation rates. Optimised for extruded goods.
Elaftor 7061		70-71	65±5	1,91	-5	High fluorine containing fluoroelastomer for highest solvent resistance and lowest permeation rates.
Elaftor 8000	VF2+TFE+PMVE+CSM	64	57-70		-30	Excellent low-temperature resistance
Elaftor 1000	TFE+PMVE+CSM	72	30-60		+4	Excellent chemical resistance. Heat resistance 300°C

FKM Fluoroelastomers

TU 2294-064-13693708-2012

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Fluoroelastomers Elaftor series 2000

Fluoroelastomer Elaftor series 2000 are copolymers of vinylidene fluoride and hexafluoropropylene. These fluoroelastomers are produced with a wide range of Moony viscosity. Rubbers based on Elaftor 2000 have superior resistance to high temperature and various oils, lubricants and fuels .

$$[\,(\text{-}\,CH_2-CF_2\,\text{-}\,)_n-CF-CF_2-]_m$$
$$\Big|$$
$$CF_3$$

	Elaftor 2031	Elaftor 2041	Elaftor 2051	Elaftor 2061	Elaftor 2071	Elaftor 2081	Elaftor 2001HV
Chemical Composition	Copolymer of vinylidenefluoride and hexafluoropropylene						
Appearance	Granules						
Fluorine content F,% weight.	66						
Moony viscosity ML(1+10)121˚C	27-37	38-45	46-55	56-65	66-75	76-85	130-150 ML(1+10)150°C
Specific gravity, g/cm³	1,83						
T glass transition, ˚C	-17						
Vulcanization: bisphenol, amine							

Fluoroelastomers Elaftor 2000 can be processed by compression molding or extrusion. Injection molding method may be used for low-viscosity fluoroelastomer. Rubbers based on Elaftor 2000 are widely used for manufacturing O-rings, seals, gaskets, valves, diaphragms, hoses and other rubber products.

FKM Fluoroelastomers

TU 2294-064-13693708-2012

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Fluoroelastomers Elaftor series 2000

Typical properties of Elaftor 2000 compounds and vulcanizes

$$[\,(\text{-}\,CH_2-CF_2\,\text{-}\,)_n-\underset{\displaystyle CF_3}{\underset{|}{CF}}-CF_2-\,]_m$$

Fluoroelastomer Elaftor grade	2031	2051	
ML(1+10)121^{0}C	27-35	46-55	
Tg, ^{0}C(DSC)	-17	-17	
Formulation			
VC-30	4	4	
VC-20	2	2	
VC-50	-	-	2,5
Ca(OH)2	6	6	6
MgO	3	3	3
MT black (N-990)	30	30	30
MDR,177^{0}C			
MH, Н*м	18,7	21,5	
ML, Н*м	1,26	2,09	
Ts2, min	1:19	1:03	
$T_{90,}$ min	3:13	2:53	
Physical properties (ISO 37, Compression Set ISO 815 disc)			
Press cure: 177^{0}C x 10min; post cure: 230^{0}C x 24 hours			
TB, MPa	**14,5**	**15**	**14,5**
EB,%	**200**	**195**	**190**
Cs, 200^{0}C*70h, 25%, disc	**22**	**20**	**18**

FKM Fluoroelastomers

TU 2294-018-13693708-2004 ap.#1

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Fluoroelastomers Elaftor series 3000

Elaftor 3000 are produces with a wide range of Moony viscosity (from 24 to 89). Elaftor 3000 is a terpolymer of vinylidene fluoride, hexafluoropropylene and tetrafluoroethylene.

$$(\text{-}\ CF_2 - CF_2\ \text{-})_n - (\text{-}\ CF - CF_2\ \text{-})_m - (\text{-}\ CF_2 - CH_2\ \text{-})_p$$
$$|$$
$$CF_3$$

	Elaftor 3031	Elaftor 3032	Elaftor 3041	Elaftor 3051	Elaftor 3061	Elaftor 3071	Elaftor 3081
Chemical Composition	Terpolymer of vinylidenefluoride, hexafluoropropylene and tetrafluoroethylene						
Appearance	Granules						
Fluorine content F,% weight.	68						
Moony viscosity ML(1+10)121˚C	30-39	24-39	40-49	50-59	60-69	70-79	80-89
Density, g/cm³	1,87						
T glass transition, ˚C	-13						
Vulcanizatiion: bisphenol, amine							

This series Elaftor 3000 contains more fluorine in comparison with Elaftor-2000 and this makes it higher chemical and petrol resistance. Depending on viscosity Elaftor 3000 may be processed by compression molding, injection molding and extrusion methods for manufacturing of O-rings, seals, gaskets, diaphragms, valves hoses, etc. Elaftor 3032 is **specially designed for extrusion (eg tubes).**

FKM Fluoroelastomers

TU 2294-018-13693708-2004 ap.#1

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Fluoroelastomers Elaftor series 3000

$$(\text{-}\ CF_2 - CF_2\ \text{-})_n - (\text{-}\ \underset{\displaystyle CF_3}{\underset{|}{CF}} - CF_2\ \text{-})_m - (\text{-}\ CF_2 - CH_2\ \text{-})_p$$

Typical properties of Elaftor 3000 compounds and vulcanizes

Fluoroelastomer Elaftor grade	**3041**	**3061**
ML(1+10)121^{0}C	41-49	60-69
Tg, ^{0}C(DSC)	-11	-11
Formulation		
VC-30	4	4
VC-20	3	3
Ca(OH)2	6	6
MgO	3	3
MT black (N-990)	30	30
MDR,177^{0}C		
MH, Н*м	19,5	22,4
ML, Н*м	2,1	2,6
Ts2, min	1:08	1:02
$T_{90,}$ min	3:47	3:36
Physical properties (ISO 37, Compression Set ISO 815 disc)		
Press cure: 177^{0}C x 10min; post cure: 230^{0}C x 24 hours		
TB, MPa	**12,8**	**14,5**
EB,%	**240**	**230**
Cs, 200^{0}C*70h, 25%, disc	**45**	**42**

FKM Fluoroelastomers

TU 2294-061-13693708-2014

Fluoroelastomers Elaftor series 7000

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These fluoroelastomers are terpolymer of vinylidene fluoride, hexafluoropropylene and tetrafluorethylene, including functional monomer (cure site monomer). Elaftor 7000 fluoroelastomers contain 70 % fluorine so rubber possess high resistance to oxygen-containing fuels, oil, aromatic hydrocarbon and higher chemical resistance. Among vinyliden containing fluoroelastomers Elaftor 7000 has the lowest rate of fuel permeation. Cure site monomer presence in the chain imparts the ability to cure by peroxide to these elastomers. Due to PO cure Elaftor 7000 based rubbers have improved strength and resistance to steam, acids and oils.
Rubber made of Elaftor 7000 have high strength, resistant to vapor, acids, oils, aromatic hydrocarbons and diluted alkalis.

$$[\,(\text{-}\,CF_2-CF_2\,\text{-})_n-(\text{-}\,CF(CF_3)-CF_2\,\text{-})_k-(\text{-}\,CF_2-CH_2\,\text{-})_p\,]_m$$

	Elaftor 7035	Elaftor 7045	Elaftor 7055	Elaftor 7065
Chemical Composition	Terpolymer of vinylidene fluoride, hexafluoropropylene , tetrafluorethylene, cure site mononer			
Appearance	Granules and sheets			
Fluorine content F,% weight.	70			
Moony viscosity ML(1+10)121˚C	26-35	36-45	46-56	57-73
Density, g/cm^3	1,91			
T glass transition, ˚C	-5			
Vulcanization: peroxide				

Elaftor 7055 and 7065 fluoroelastomers can be processed by compression molding and extrusion. Elaftor 7035 and 7045 fluoroelastomers are processed by both extrusion and injection molding. These fluoroelastomers are used for manufacture hoses, O-rings, seals, gaskets and etc.

FKM Fluoroelastomers

TU 2294-061-13693708-2014

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Fluoroelastomers Elaftor series 7005

$$[\,(\text{-}\,CF_2-CF_2\,\text{-})_n-(\text{-}\,\underset{\displaystyle CF_3}{\overset{\displaystyle |}{CF}}-CF_2\,\text{-})_k-(\text{-}\,CF_2-CH_2\,\text{-})_p\,]_m$$

Typical properties of Elaftor 7005 compounds and vulcanizes

Fluoroelastomer Elaftor grade	**7035**	**7065**
ML(1+10)121^{0}C	26-35	57-73
Tg, ^{0}C(DSC)	-5	-5
Formulation		
Luperox 101XL45	2	2
TAIC 75	4	4
ZnO	3	3
MT black (N-990)	30	30
MDR,177^{0}C		
MH, Н*м	24	27,4
ML, Н*м	1,3	1,53
Ts2, min	0:26	0:26
$T_{90,}$ min	1:20	1:18
Physical properties (ISO 37, Compression Set ISO 815 disc)		
Press cure: 177^{0}C x 10min; post cure: 230^{0}C x 8 hours		
TB, MPa	**22**	**23,6**
EB,%	**230**	**260**
M100, MPa	**6**	**6,1**
Cs, 200^{0}C*70h, 25%, disc	**29**	**27**

FKM Fluoroelastomers

Latices Elaftor 3000 and 7000

TU 2294-047-13693708-2010

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Latices Elaftor 3000 and 7000 are high concentrated water dispersions based on Elaftor.
The main application is protecting covering on different substances, including rubbers. metals, concrete, plastic as well as for dipping fabrics and other materials.

	Latex Elaftor 3000	Latex Elaftor 7000
Polymer base	Terpolymer of vinylidene fluoride, hexafluoropropylene and tetrafluorethylene	Terpolymer of vinylidene fluoride, hexafluoropropylene, tetrafluorethylene and functional monomer
Solids content, min, %	60-70	60-70
Concentration of hydrogen ions (pH)	7-10	7-10
Fluorine content F,% weight.	68	70
Working temperature range,˚C	-35÷ +200	-35 ÷ +200

The covering obtained by latices followed with vulcanization have high chemical resistance, including resistance to fuels and oils. These latices are a good alternative to solutions based on FKM because latices are more ecological and environment friendly and safe to work with. Operating temperature is from minus 35 to +200 °C