AUTOMOTIVE INDUSTRY
Molding, black

Molded parts for automotive oil seals, replacement of carbon black N-990
70 Shore A, NBR, sulfur cure

Specification ASTM D2000

			Control N-990	AKTISIL PF 216	AKTIFIT AM	SILFIT Z 91	SILLITIN Z 86	SILLITIN N 82
Guide formulations of HOFFMANN MINERAL		M 630.0	1	7	3	2	5	6
Krynac 2950 F	)*		100,0	100,0	100,0	100,0	100,0	100,0
Zinkoxyd aktiv			5,0	5,0	5,0	5,0	5,0	5,0
Stearic acid			0,5	0,5	0,5	0,5	0,5	0,5
Agerite Resin D			2,0	2,0	2,0	2,0	2,0	2,0
Corax N 550			60,0	60,0	60,0	60,0	60,0	60,0
Carbon Black N-990			50,0	---	---	---	---	---
AKTISIL PF 216			---	50,0	---	---	---	---
AKTIFIT AM			---	---	50,0	---	---	---
SILFIT Z 91			---	---	---	50,0	---	---
SILLITIN Z 86			---	---	---	---	50,0	---
SILLITIN N 82	)**		---	---	---	---	---	50,0
Mediaplast NB 4			10,0	10,0	10,0	10,0	10,0	10,0
Vulkacit Thiuram/C			2,5	2,5	2,5	2,5	2,5	2,5
Vulkacit CZ/C			2,0	2,0	2,0	2,0	2,0	2,0
Sulfur			0,2	0,2	0,2	0,2	0,2	0,2
Total phr			232,2	232,2	232,2	232,2	232,2	232,2

)* No longer available. Recommended: NBR, 30 % ACN, ML 1+4 (100 °C): 53 MU

)* No longer available. Recommended: SILLITIN N 75

Münchener Straße 75 • DE-86633 Neuburg (Donau)
Phone +49 8431 53-0 • info@hoffmann-mineral.com

			Control N-990	AKTISIL PF 216	AKTIFIT AM	SILFIT Z 91	SILLITIN Z 86	SILLITIN N 82	
		M 630.0	1	7	3	2	5	6	
Mooney Viscosity									
ML (1+4) 100°C	DIN 53523, T3	MU	78	78	74	75	80	82	
ML (1+4) 120°C	DIN 53523, T3	MU	58	62	56	57	63	62	
Mooney Scorch									
ML (5 MU) 120°C	DIN 53523, T4	min	15	16	12	14	13	16	
Rotorless curemeter, 170°C									
M_{min}	DIN 53529, T3	Nm	0.09	0.10	0.09	0.10	0.11	0.10	
M_{max}	DIN 53529, T3	Nm	0.70	0.68	0.64	0.63	0.61	0.60	
t_5	DIN 53529, T3	min	0.61	0.65	0.56	0.60	0.60	0.63	
t_{10}	DIN 53529, T3	min	0.86	0.90	0.76	0.84	0.84	0.88	
t_{90}	DIN 53529, T3	min	3.3	2.8	2.7	2.8	2.7	2.7	
V_{max}	DIN 53529, T3	Nm/min	0.39	0.46	0.36	0.36	0.35	0.36	
Time V_{max}	DIN 53529, T3	min	1.87	1.48	1.86	1.89	1.74	1.68	
Mechanical properties									**ASTM D2000**
Press cure 5 min @ 170°C									**Base values**
Density	DIN EN ISO 1183-1	g/cm³	1.283	1.340	1.343	1.343	1.342	1.340	
Hardness	DIN ISO 7619-1	Shore A	70	67	67	67	67	65	70 ± 5
Tensile strength	DIN 53504, S2	MPa	15.6	15.1	13.6	14.1	13.9	12.6	> 10 / > 14
Modulus 50 %	DIN 53504, S2	MPa	2.2	2.4	2.0	2.0	1.9	1.9	
Modulus 100 %	DIN 53504, S2	MPa	5.0	5.1	3.7	3.7	3.7	3.2	
Modulus 200 %	DIN 53504, S2	MPa	12.2	11.4	7.5	7.4	7.6	6.5	
Modulus 300 %	DIN 53504, S2	MPa	---	14.9	11.7	11.8	12.0	10.7	
Elongation at break	DIN 53504, S2	%	286	309	367	381	377	382	> 250
Rebound	DIN 53512	%	39	39	39	39	39	39	
Tear resistance	DIN ISO 34-1, A	N/mm	9.2	9.6	11.0	10.7	10.8	12.1	
Compression set 22 h @ 100°C, 25 % deflection	DIN ISO 815, B	%	15.7	19.1	15.9	17.6	22.2	23.4	< 25
Air aging, 70 h @ 125°C									**Grade 2 + 3**
Δ Hardness		Shore A	+9	+10	+9	+9	+9	+10	0 / +15
Δ Tensile strength		%	+5.8	+7.8	+9.0	-3.3	+1.8	+3.5	max. -25
Δ Modulus 50 %		%	+103	+93	+105	+81	+91	+96	
Δ Elongation at break		%, rel.	-37	-39	-36	-39	-36	-45	max. -50

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	M 630.0	1	7	3	2	5	6	
Immersion in reference oil IRM 901, 70 h @ 125°C								**Grade 2**
Δ Hardness	Shore A	+9	+10	+10	+8	+9	+10	0 / +10
Δ Tensile strength	%	+13.1	+4.0	+12.0	+2.1	-1.9	+5.9	max. -20
Δ Elongation at break	%, rel.	-22	-32	-27	-24	-26	-28	max. -35
Δ Weight	%	-5.9	-5.6	-5.9	-5.8	-5.7	-5.6	
Δ Volume	%	-7.0	-7.2	-7.4	-7.1	-7.1	-6.9	-15 / +5
Immersion in reference oil IRM 903, 70 h @ 125°C								**Grade 2**
Δ Hardness	Shore A	-4	-2	-4	-5	-4	-4	± 10
Δ Tensile strength	%	+6.4	+6.3	+0.7	+2.7	-4.0	+3.8	max. -15
Δ Elongation at break	%, rel.	-11.0	-10.9	-18.9	-14.2	-13.8	-11.6	max. -30
Δ Weight	%	+4.3	+4.8	+4.5	+4.5	+4.8	+4.9	
Δ Volume	%	+6.6	+7.3	+7.3	+7.2	+7.6	+7.3	0 / +25
Immersion in reference fuel Liquid C, 70 h @ 150°C								**Grade 2**
Δ Hardness	Shore A	-19	-15	-18	-19	-20	-20	0 / -30
Δ Tensile strength	%	-42	-45	-45	-46	-36	-48	max. -60
Δ Elongation at break	%, rel.	-45	-46	-49	-45	-37	-49	max. -60
Δ Weight	%	+27	+27	+26	+26	+27	+26	
Δ Volume	%	+43	+43	+44	+43	+46	+44	0 / +50
Immersion in reference oil IRM 901, 70 h @ 150°C								**Grade 3**
Δ Hardness	Shore A	+10	+10	+10	+10	+10	+10	0 / +10
Δ Tensile strength	%	+7.4	+8.2	+9.1	+6.0	+0.2	+9.6	max. -20
Δ Elongation at break	%, rel.	-21	-25	-21	-23	-26	-28	max. -40
Δ Weight	%	-5.9	-5.8	-5.9	-5.8	-5.7	-5.6	
Δ Volume	%	-7.2	-7.2	-7.5	-7.2	-7.2	-7.1	-15 / +5
Immersion in reference oil IRM 903, 70 h @ 150°C								**Grade 3**
Δ Hardness	Shore A	-7	-5	-7	-8	-7	-6	± 10
Δ Tensile strength	%	-0.1	-2.8	+8.4	+4.0	+5.0	+1.2	max. -35
Δ Elongation at break	%, rel.	-6.6	-8.4	-2.4	-4.3	-4.6	-12.3	max. -35
Δ Weight	%	+6.6	+5.7	+6.4	+6.8	+6.8	+6.9	
Δ Volume	%	+9.5	+8.7	+9.7	+10.1	+10.2	+10.3	0 / +25

More information on this topic:

Molded NBR Parts for Automotive Oil Seals ASTM D2000 - Replacement of Carbon Black N990

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