

DuPont™ Kevlar® engineered elastomer in HNBR

PRODUCT CODE 1F1598

PRODUCT DATA SHEET

Test Compound Formulation	Peroxide Cure Control	Peroxide Cure 2.5 phr Fiber	Peroxide Cure 5.0 phr Fiber	Sulphur Cure Control	Sulphur Cure 2.5 phr Fiber	Sulphur Cure 5.0 phr Fiber
Zetpol® 2020	100.0	95.0	90.0	100.0	95.0	90.0
N550	50.0	50.0	50.0			
Kadox® 911C	5.0	5.0	5.0	5.0	5.0	5.0
Plasthall® TOTM	5.0	5.0	5.0	5.0	5.0	5.0
Stearic Acid	0.5	0.5	0.5	1.0	1.0	1.0
Naugard 445	1.5	1.5	1.5	1.5	1.5	1.5
Vanox® ZMTI	1.0	1.0	1.0	1.0	1.0	1.0
Varox® 802-40KE	8.0	8.0	8.0			
Kevlar® 1F1598		7.5	15.0		7.5	15.0
N774				50.0	50.0	50.0
TMTD				1.5	1.5	1.5
Sulfur Spider				0.5	0.5	0.5
MBT (CAPTAX)				0.5	0.5	0.5
Total	171.0	173.5	176.0	166.0	168.5	171.0

- Kevlar® engineered elastomer product code 1F1598 contains:
 - 33 weight percent reinforcement
 - 67 weight percent modified HNBR (special polymer developed for DuPont by Zeon Chemicals)
- Specific gravity is 1.13
- Nugget-shaped product form
- Packaged in 15 kilogram kraft bags with a low melt (<100°C) EVA liner

Cure and Compound Properties		Peroxide Cure Control	Peroxide Cure 2.5 phr Fiber	Peroxide Cure 5.0 phr Fiber	Sulphur Cure Control	Sulphur Cure 2.5 phr Fiber	Sulphur Cure 5.0 phr Fiber
Mooney Viscosity ASTM D1646-95A, 4 min, 100°C							
Init	[MU]	167.8	196.7	205.3	139.3	160.8	181.8
ML	[MU]	110.2	117.0	124.1	93.2	101.2	106.3
MH	[MU]	110.2	117.0	124.6	93.2	101.6	106.6
ML (1+2)	[MU]	116.9	124.7	131.4	98.6	107.6	113.4
ML (1+4)	[MU]	110.2	117.0	124.2	93.2	101.3	106.4

DUPONT™ KEVLAR® ENGINEERED ELASTOMER IN HNBR

Cure and Compound Properties		Peroxide Cure Control	Peroxide Cure 2.5 phr Fiber	Peroxide Cure 5.0 phr Fiber	Sulphur Cure Control	Sulphur Cure 2.5 phr Fiber	Sulphur Cure 5.0 phr Fiber
Mooney Scorch ASTM D1646-95A, 30 min, 125°C, small rotor							
ML	[MU]	37.4	40.2	43.7	31.7	35.2	38.1
Final	[MU]	40.6	43.5	47.7	46.7	50.3	53.1
Time@ML	[min]	10.8	10.3	8.8	6.8	6.7	6.5
T2	[min]	23.4	21.8	19.1	10.1	10.8	10.6
MDR2000 Std. Test, 30 min, 160°C, 0.5 arc							
ML	[dNm]	2.3	2.4	2.7	1.8	2.0	2.2
MH	[dNm]	31.3	32.0	33.1	21.6	22.0	22.4
ts2	[min]	1.5	1.5	1.4	1.6	1.7	1.6
T'90	[min]	21.2	21.0	20.8	6.5	5.2	4.4
Tensile Strength ASTMD412-92, 23°C							
Original with Grain							
Hardness	[Sh.A]	72	76	79	66	72	74
M10	[MPa]	0.81	1.86	3.35	0.64	1.15	2.91
M25	[MPa]	1.49	5.18	10.46	1.12	2.89	8.25
M50	[MPa]	2.54	9.50	13.45	1.63	6.60	12.38
Tb	[MPa]	22.0	17.5	19.9	22.7	16.7	12.9
Eb	[%]	230	167	210	520	469	75
Original Cross Grain							
M10	[MPa]	0.80	0.89	0.99	0.62	0.74	0.75
M25	[MPa]	1.46	1.73	1.78	1.11	1.30	1.35
M50	[MPa]	2.44	3.12	3.14	1.58	1.85	1.95
Tb	[MPa]	22.1	21.1	20.3	22.1	16.6	14.5
Eb	[%]	228	219	223	513	479	462
With Grain Pulled @ 135°C							
M10	[MPa]	1.06	1.70	2.47	0.66	1.07	2.81
M25	[MPa]	1.78	3.90	7.19	1.09	2.71	6.01
M50	[MPa]	3.11	5.87	8.63	1.61	4.41	6.20
Tb	[MPa]	6.34	9.18	11.15	4.74	6.15	6.31
Eb	[%]	84	98	119	175	206	106
Cross Grain Pulled @ 135°C							
M10	[MPa]		0.90	0.98	0.67	0.78	0.81
M25	[MPa]		1.63	1.71	1.10	1.22	1.24
M50	[MPa]		2.66	2.92	1.61	1.75	1.78
Tb	[MPa]		9.32	8.06	4.23	5.71	5.50
Eb	[%]		137	120	152	226	224
With Grain Hot Air Aged, 70.0 hour, 150°C - tested at 23°C							
Hardness	[Sh.A]	79	82	85	75	80	84
M10	[MPa]	1.10	2.43	4.27	0.90	1.84	7.34
M25	[MPa]	2.17	7.48	14.64	1.68	5.17	14.38
M50	[MPa]	4.20	12.50	19.53	2.68	10.55	17.70
Tb	[MPa]	26.64	23.32	21.04	21.87	17.92	18.13
Eb	[%]	229	191	107	323	202	84

Cure and Compound Properties		Peroxide Cure Control	Peroxide Cure 2.5 phr Fiber	Peroxide Cure 5.0 phr Fiber	Sulphur Cure Control	Sulphur Cure 2.5 phr Fiber	Sulphur Cure 5.0 phr Fiber
Cross Grain Hot Air Aged, 70.0 hour, 150°C - tested at 23°C							
M10	[MPa]	1.04	1.28	1.54	0.90	1.06	1.29
M25	[MPa]	2.07	2.41	2.91	1.65	1.97	2.32
M50	[MPa]	3.73	4.55	5.53	2.65	3.22	3.78
Tb	[MPa]	25.53	23.36	21.95	20.83	17.90	16.52
Eb	[%]	242	204	187	310	236	204
Compressive Modulus ASTM D575-91, Fibers aligned vertically							
Force at 5%		1.37	1.63	1.90	0.91	1.11	1.32
Force at 10%		1.80	2.12	2.43	1.29	1.52	1.76
Force at 15%		2.29	2.70	3.08	1.70	1.96	2.23
Dynamic Properties Measured on MTS, 10 Hz; 5% Prestrain; Cycled at 1.27%, Fibers vertical							
K*	[Mpa]	3.04	4.06	5.36	2.26	3.32	4.44
E'/G'		15.52	20.66	27.24	11.50	16.97	22.60
E''/G''		2.30	3.27	4.91	1.55	2.55	3.58
Tan Delta		0.148	0.158	0.180	0.134	0.150	0.158
Dynamic Properties Measured on MTS, 10 Hz; 145 N Prestress; Cycled at 2.54%, Fibers vertical							
K*	[Mpa]	2.96	3.76	4.61	2.29	3.22	4.11
E'/G'		15.07	19.11	23.15	11.70	16.36	20.87
E''/G''		2.44	3.48	5.32	1.72	2.79	3.76
Tan Delta		0.162	0.182	0.230	0.147	0.170	0.180
Tear Strength Die C ASTM D624-91, 23°C							
Original with Grain							
Tear	[kN/m]	41.2	46.1	46.0	43.4	41.2	44.1
Original Cross Grain							
Tear	[kN/m]	39.8	37.9	38.5	44.2	55.3	61.4
Compression Set Pellet (B) ASTM D395-89, Hot Air, 22.0 hour, 100°C, 25% Deflection							
CS Mean	[%]	6.25	10.05	13.16	28.27	32.92	39.71
Compression Set Pellet (B) Hot Air, 70.0 hour, 100°C, 25% Deflection							
CS Mean	[%]	13.22	14.7	23.02	40.59	47.07	56.9
Gehman ASTM D-1053-92A							
With Grain							
T2	[°C]	-18.5	-17.6	-16.7	-20.2	-19.1	-18.0
T5	[°C]	-23.8	-23.9	-24.2	-23.3	-24.1	-22.7
T10	[°C]	-26.2	-26.4	-26.5	-25.8	-26.4	-25.3
T100	[°C]	-29.9	-31.1	-30.0	-29.5	-30.0	-29.8
Cross Grain							
T2	[°C]	-20.2	-19.0	-17.3	-21.8	-18.0	-16.2
T5	[°C]	-23.9	-24.9	-24.7	-26.3	-21.7	-23.2
T10	[°C]	-26.3	-26.8	-26.9	-28.5	.23.4	-26.0
T100	[°C]	-36.9	-30.6	-32.9	-34.3	-29.3	-29.8

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