

# 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
<b>Total</b>	<b>171.0</b>	<b>173.5</b>	<b>176.0</b>	<b>166.0</b>	<b>168.5</b>	<b>171.0</b>

- 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
<b>Mooney Viscosity ASTM D1646-95A, 4 min, 100°C</b>							
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
<b>Mooney Scorch ASTM D1646-95A, 30 min, 125°C, small rotor</b>							
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
<b>MDR2000 Std. Test, 30 min, 160°C, 0.5 arc</b>							
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
<b>Tensile Strength ASTMD412-92, 23°C</b>							
<b>Original with Grain</b>							
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
<b>Original Cross Grain</b>							
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
<b>With Grain Pulled @ 135°C</b>							
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
<b>Cross Grain Pulled @ 135°C</b>							
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
<b>With Grain Hot Air Aged, 70.0 hour, 150°C - tested at 23°C</b>							
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
<b>Cross Grain Hot Air Aged, 70.0 hour, 150°C - tested at 23°C</b>							
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
<b>Compressive Modulus ASTM D575-91, Fibers aligned vertically</b>							
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
<b>Dynamic Properties Measured on MTS, 10 Hz; 5% Prestrain; Cycled at 1.27%, Fibers vertical</b>							
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
<b>Dynamic Properties Measured on MTS, 10 Hz; 145 N Prestress; Cycled at 2.54%, Fibers vertical</b>							
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
<b>Tear Strength Die C ASTM D624-91, 23°C</b>							
<b>Original with Grain</b>							
Tear	[kN/m]	41.2	46.1	46.0	43.4	41.2	44.1
<b>Original Cross Grain</b>							
Tear	[kN/m]	39.8	37.9	38.5	44.2	55.3	61.4
<b>Compression Set Pellet (B) ASTM D395-89, Hot Air, 22.0 hour, 100°C, 25% Deflection</b>							
CS Mean	[%]	6.25	10.05	13.16	28.27	32.92	39.71
<b>Compression Set Pellet (B) Hot Air, 70.0 hour, 100°C, 25% Deflection</b>							
CS Mean	[%]	13.22	14.7	23.02	40.59	47.07	56.9
<b>Gehman ASTM D-1053-92A</b>							
<b>With Grain</b>							
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
<b>Cross Grain</b>							
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

**For more information contact:**

United States and South America  
DuPont Advanced Fiber Systems  
Customer Inquiry Center  
5401 Jefferson Davis Highway  
Richmond, VA 23234  
Tel: (800) 453-8527  
(804) 383-4400  
FAX: (800) 787-7086  
(804) 383-4132  
e-mail: [afscdt@usa.dupont.com](mailto:afscdt@usa.dupont.com)

Europe  
DuPont Advanced Fiber Systems  
P.O. Box 50  
CH-1218 Le Grand-Saconnex  
Geneva, Switzerland  
Tel: +41-22-717-51 11  
Fax: +41-22-717-60 21

Asia  
DuPont (China) R&D Company, Ltd.  
Zhangjiang Hi-Tech Park  
600 Cai Lun Road  
Pudong New District  
Shanghai, 201203, China  
Tel: 86-21-2892-1031  
Fax: 86-21-2892-1272

Canada  
E. I. du Pont Canada Company  
Advanced Fiber Systems  
P.O. Box 2200  
Streetsville Postal Station  
Mississauga, Ontario, L5M 2H3  
Canada  
Tel: (800) 387-2122  
Fax: (905) 821-5057

Japan  
DuPont Toray Company, Ltd.  
1-1-1 Nihonbashi-Honcho  
Chuo-ku, Tokyo 103-0023  
Japan  
Tel: 81-3-3245-5080  
Fax: 81-3-3242-3183

[www.kevlar.com](http://www.kevlar.com)

*This information is provided by DuPont free of charge. It is based upon technical data which DuPont believes to be reliable and is intended for use by persons having their own independent skill and expertise in connection with the selection and use of products. DuPont assumes no responsibility for results obtained or damages incurred from the use of the information contained in this communication either in whole or in part. The information, suggestions and data contained herein are intended only as an informational guide to assist you in making preliminary selections of materials and are not intended to be all-inclusive or final. Nor are such information, suggestions, or data intended to substitute for any testing you may need to conduct to determine for yourself the suitability of a particular material for a particular purpose. DuPont makes no guarantee of results and assumes no obligation or liability whatsoever in connection with this information. Such information or suggestions are to be used and*

*relied upon at user's own discretion and risk. DUPONT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AND DISCLAIMS ANY AND ALL DIRECT AND INDIRECT LIABILITY FOR DAMAGES OR LOSSES RESULTING FROM OR RELATING TO THE USE OF ANY INFORMATION, SUGGESTIONS, ESTIMATES OR MATERIALS IN CONNECTION HEREWITH. None of this information is to be considered as a license to operate under, or recommendation to infringe on any trademarks or patents.*

*Copyright © 2008 E. I. du Pont de Nemours and Company. All rights reserved. The DuPont Oval Logo, DuPont®, The miracles of science® and Kevlar® are registered trademarks or trademarks of DuPont or its affiliates. All other trademarks are the property of their respective owners.  
02/08 K-17593*



**The miracles of science™**