

3M™ Dyneon™ Fluoroelastomers Formulated to Various Durometers Using N990 Carbon Black

Compound Recipe	55 ± 5 Durometer			60 ± 5 Durometer			70 ± 5 Durometer			80 ± 5 Durometer			90 ± 5 Durometer		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FE 5640Q	100			100			100			100			100		
FE 5642		100			100			100			100			100	
FE 5840Q			100			100			100			100			100
Ca(OH) <sub>2</sub> HP-XL HallStar®	4	6	4	6	6	6	6	6	6	6	6	6	6	6	6
MgO, Elastomag® 170	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
N990	2	3	1	9	10	5	20	25	15	35	40	25	60	60	40
<b>Post Cure, 16 hours, 232°C (450°F)</b>															
Tensile, psi	1110	1230	1490	1490	1515	1790	1945	1965	1925	1840	1915	1850	1830	1970	1775
Elongation, %	240	320	290	240	315	290	240	300	265	185	255	245	150	205	210
Modulus 100%, psi	220	175	230	340	230	350	565	450	595	930	725	730	1325	1060	980
Hardness, Type A	55	52	58	60	57	62	70	69	73	81	80	81	91	89	90
<b>Air Aging, 70 hours, 270°C (518°F), ASTM D573</b>															
Tensile, psi	-12	-14	-29	-9	-5	-44	-26	-22	-49	-22	-18	-46	-17	-27	-53
Elongation, %	+19	+5	+59	+6	+10	+40	-4	+2	+47	-8	-4	+39	-10	-7	+24
Hardness, Type A, pts change	-4	-3	-4	-3	-3	-4	-3	-2	-4	0	+1	-1	-4	0	-2
<b>Compression Set, 70 hours, 200°C (392°F), ASTM D1414</b>															
Compression Set, %, 0.139" O-ring	11	15	30	12	16	31	13	17	33	16	20	35	22	22	38
<b>Specific Gravity, ASTM D297</b>															
	1.85	1.85	1.91	1.85	1.85	1.91	1.86	1.85	1.91	1.85	1.85	1.91	1.85	1.85	1.91

**Carbon Black Comparison Table**  
(for equivalent Durometer)

- 1 part N330 = 2.5 parts N990
- 1 part N550 = 2.4 parts N990
- 1 part N660 = 2.0 parts N990
- 1 part N642 = 1.7 parts N990
- 1 part N774 = 1.9 parts N990
- 1 part N762 = 1.6 parts N990
- 1 part N754 = 1.5 Parts N990

**Warranty, Limited Remedy, and Disclaimer:** Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. User is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application. User is solely responsible for evaluating third party intellectual property rights and for ensuring that user's use of 3M product does not violate any third party intellectual property rights. Unless a different warranty is specifically stated in the applicable product literature or packaging insert, 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OF NON-INFRINGEMENT OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. If the 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

**Limitation of Liability:** Except where prohibited by law, 3M will not be liable for any loss or damages arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

**Technical Information:** Technical information, recommendations, and other statements contained in this document or provided by 3M personnel are based on tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed. Such information is intended for persons with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.

Non-Black Molded Goods Compounds

Ingredient	55 ± 5 Durometer						60 ± 5 Durometer						70 ± 5 Durometer						80 ± 5 Durometer						90 ± 5 Durometer					
	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
3M™ Dyneon™ FE 5642	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Ca(OH) <sub>2</sub> HP-XL HallStar®	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
MgO, Elastomag® 170	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Min-U-Sil® 5 micron	10						20						40						62						85					
Zinc Oxide USP#1		25						45						75						110						155				
NYAD® 400			10						22						45						70						95			
Calcium Carbonate Albacar® 5970				10						22						45						70						95		
Mapico® Tan 10A					15						25						45						72						100	
Barium Sulfate Huberbrite® 10A						20						40						60						85						120
<b>Total</b>	<b>119</b>	<b>134</b>	<b>119</b>	<b>119</b>	<b>124</b>	<b>129</b>	<b>129</b>	<b>154</b>	<b>131</b>	<b>131</b>	<b>134</b>	<b>149</b>	<b>149</b>	<b>184</b>	<b>154</b>	<b>154</b>	<b>169</b>	<b>171</b>	<b>219</b>	<b>179</b>	<b>179</b>	<b>181</b>	<b>194</b>	<b>194</b>	<b>264</b>	<b>204</b>	<b>204</b>	<b>204</b>	<b>209</b>	<b>229</b>

Post Cure, 16 hours, 232°C (450°F)

Tensile, psi	1565	2160	1265	1185	1605	1560	1885	2275	1415	1445	2035	1810	2360	2620	1735	1405	2200	1865	2280	2630	1870	1530	2465	1850	2265	2100	1920	1575	2320	1575
Elongation, %	225	345	285	280	290	320	275	330	255	310	305	325	240	305	205	280	300	350	180	300	160	220	310	300	165	215	125	150	260	225
Modulus 100%, psi	260	240	250	220	245	235	370	320	430	335	390	345	810	510	1130	615	480	450	1220	655	1465	970	860	585	1405	1075	1615	1265	1125	810
Hardness, Type A	56	56	56	54	56	57	60	63	61	60	62	62	72	69	73	70	69	69	80	79	81	78	79	76	88	93	86	85	89	86
Specific Gravity	1.9	2.2	1.9	1.91	2.11	2.10	2.0	2.3	2.0	2.0	2.1	2.2	2.0	2.6	2.1	2.1	2.3	2.4	2.1	2.9	2.2	2.1	2.6	2.5	2.2	3.2	2.3	2.2	2.7	2.7

Air Aging, 70 hours, 270°C (518°F), ASTM D573

Tensile, % change	-41	-4	-13	-11	-20	-19	-43	-5	-21	-2	-31	-22	-47	-20	-26	+8	-32	-24	-49	-29	-29	+3	-45	-17	-43	-37	-28	+3	-52	-17
Elongation, % change	+38	-10	+13	-5	+19	+13	+7	-14	+18	-10	+15	+6	+4	-16	+15	-25	+8	-9	+14	-32	+16	-41	-8	-3	+12	-33	+4	-33	-10	-9
Hardness, Type A, pts change	-6	+2	-4	-1	-4	-4	-2	+3	-3	-1	-3	-1	-3	+6	-2	+2	0	0	+1	+2	-1	+4	+5	+1	+1	+2	+2	+3	+5	0

Compression Set, 70 hours, 200°C (392°F), ASTM D1414

Compression Set, %, 0.139" O-ring	15	17	15	20	16	16								17	26	17	21	22	18							26	52	21	25	38	27
-----------------------------------	----	----	----	----	----	----	--	--	--	--	--	--	--	----	----	----	----	----	----	--	--	--	--	--	--	----	----	----	----	----	----



3M Advanced Materials Division  
 3M Center  
 St. Paul, MN 55144 USA  
 Phone 1-800-810-8499  
 Web www.3M.com/advancedmaterials

Albacar is a registered trademark of Minerals Technologies Inc. or its subsidiaries.  
 Elastomag is a registered trademark of Martin Marietta Magnesia Specialties, LLC  
 HallStar is a registered trademark of HallStar Innovations Corp.  
 Huberbrite is a registered trademark of J.M. Huber Corporation.  
 Mapico is a registered trademark of Huntsman.  
 Min-U-Sil is a registered trademark of U.S. Silica Company.  
 Nyad is a registered trademark of NYCO Minerals, Inc.

3M and Dyneon are trademarks of 3M Company.  
 Used under license by subsidiaries and affiliates.

Please recycle. Printed in USA © 3M 2015.  
 All rights reserved. Issued: 11/15 10708HB  
 98-0504-1137-4 Rev. C