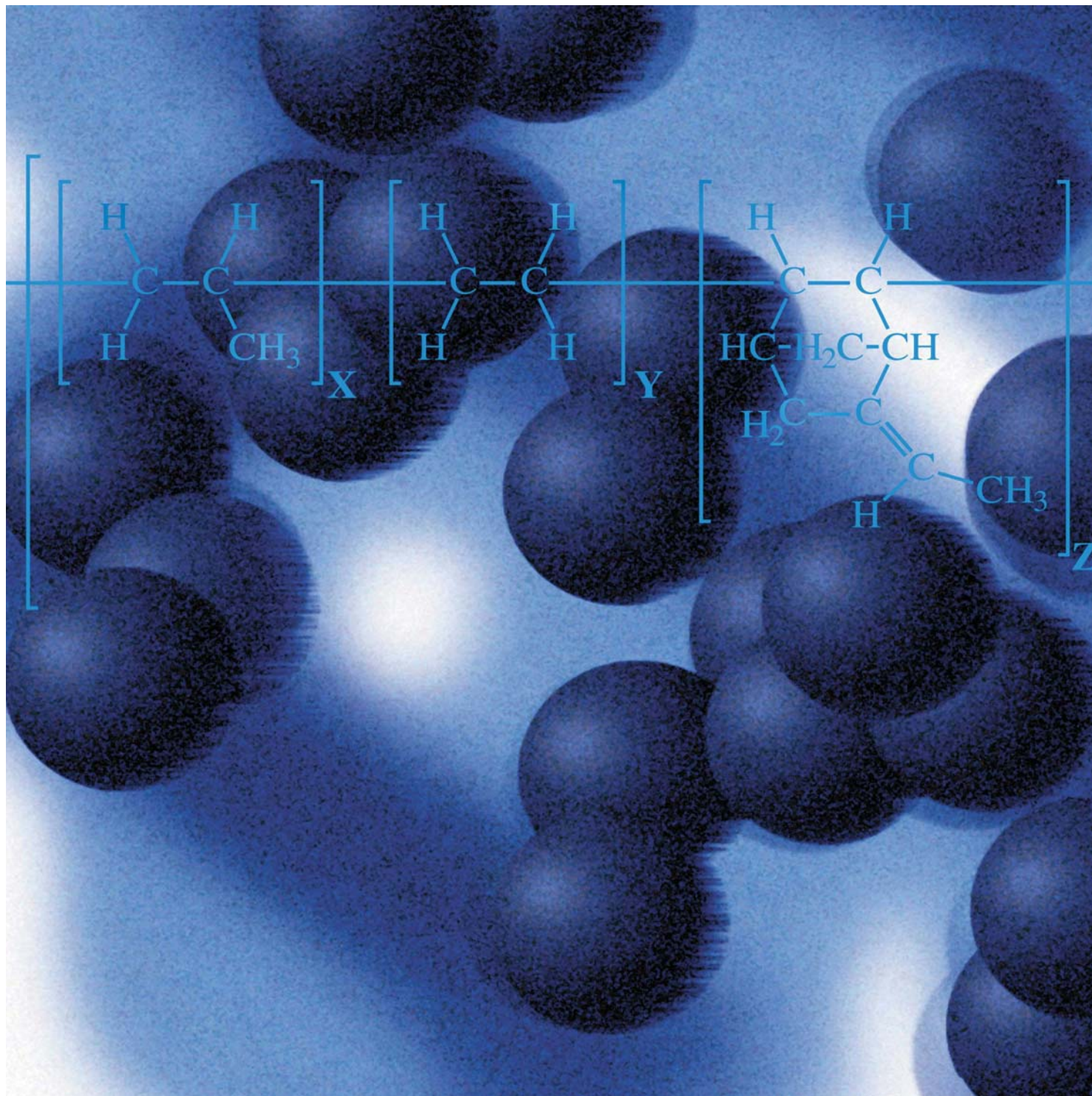


# ROYALENE<sup>®</sup> EPDM Product Data

Compounds for Specifications ASTM D-2000 and SAE J-200

BA Series — CA Series — DA Series



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### Royalene® EPDM Compounds to meet ASTM D-2000 and SAE J200 – BA, CA and DA Grades

A wide range of EPDM compounds are in commercial use in automotive, as well as non-automotive applications. Because of its outstanding resistance to ozone and weather, and its improved heat resistance compared to SBR and Neoprene, EPDM use has grown rapidly and is continuing to increase.

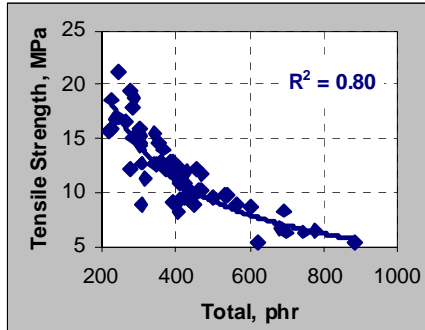
ASTM D-2000 and SAE J200 are frequently used specifications, particularly for automotive parts. Royalene® EPDM formulations and laboratory test data are presented in this bulletin for BA, CA and DA grade compounds. The formulations shown are primarily to serve as bases from which compounders may work to solve their particular problems. However, the compounds have been designed with factory processing in mind, and it is believed that they are practical for many uses.

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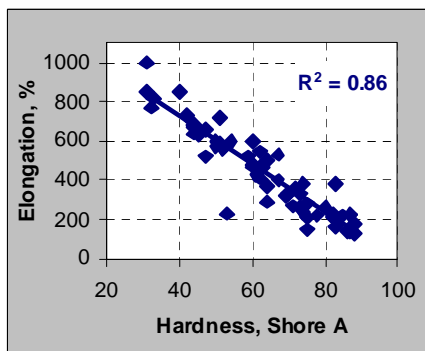


For the compounds shown in this bulletin, the vulcanizate properties vary over a wide range. It is well known that the properties are dependent on the specific components of the formulation, and some examples from this data set are discussed below.



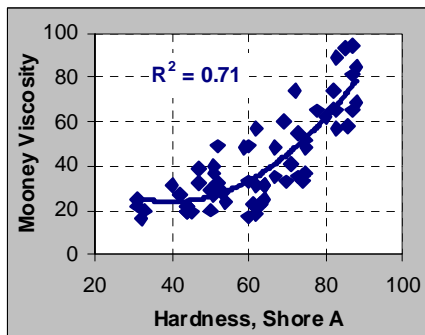
### Effect of Total phr on Tensile Strength

Tensile strength is most sensitive to the total amount of filler and oil in the compound. This chart shows the range of tensile strength as a function of the total phr of the compound. Special compounding will likely be required to obtain properties outside the outlined area. For example, higher molecular weight polymers (higher Mooney viscosity) and more reinforcing carbon blacks typically provide higher tensile strengths.



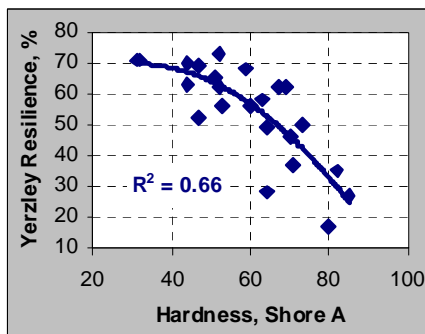
### Correlation of Hardness and Elongation

Elongation is inversely related to hardness. ASTM D2000 allows lower minimum elongation at higher hardness. The chart at the left shows the range of elongation observed at various hardnesses. Special attention to the compound ingredients may be required to obtain properties outside the area outlined.



### Correlation of Hardness and Mooney Viscosity

Mooney viscosity is also affected by vulcanizate hardness. For high hardness compounds, special compounding, e.g. the use of thermoplastic materials, can lower viscosity and aid processing. Many of the high hardness formulations in this bulletin use this approach and, without inclusion of thermoplastic materials, Mooney viscosity values could be even higher for the high hardness compounds shown here.



### Correlation of Hardness and Yertzley Resilience

Resilience is a third property that appears to be dependent on vulcanizate hardness, see Figure 4. Special compounding to use low temperature plasticizers and EPDM's and rubber-rich recipes may raise resilience at a given hardness. Nevertheless, this chart shows the resilience values that may be expected at a given hardness.

Compression set and tear strength do not correlate with black level, oil level, total phr or hardness. The cure system affects compression set, but the data among BA, CA and DA types are not comparable because different conditions are used for each (BA = sulfur cures aged at 70°C; CA = sulfur donor cures aged at 100 and 125°C; CA = peroxide cures aged at 150°C).

**Grade M2BA307C12F17**

Royalene® 400	120.0		
Royalene® 502*	40.0		
Zinc Oxide	5.0		
N762 Carbon Black	120.0		
York White Calcium Carbonate	30.0	Specific Gravity	1.14
Naphthenic Oil	115.0		
Zinc Stearate	1.5	Mooney Viscosity	
Naugex MBT	3.0	ML (1+4) at 100°C	20
Tuex (TMTD)	0.6		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	24
	<u>438.1</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade M2BA307</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	30 ± 5	33	34
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	9.8 (1420)	9.3 (1350)
Elongation, %	400 min.	820	930
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+5	+3
Tensile Strength Change, %	± 30 max.	+3	+13
Elongation change, %	- 50 max.	-21	-15
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	29 <sup>(a)</sup>	40 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix C12 - Ozone Resistance</b>			
D1171, 72 hours at 50 pphm at 40°C			
Quality Retention Rating	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>			
D2137 Method A at -40°C	pass	pass	pass

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

Grade M2BA310C12F17		Grade M4BA310A14C12F17	
Grade M3BA310A14C12F17F19		Grade M5BA310C12F17F19	
Royalene® 400	140.0		
Royalene® 502*	25.0		
Zinc Oxide	5.0		
N650 Carbon Black	60.0	Specific Gravity	1.02
Naphthenic Oil	60.0		
Zinc Stearate	1.5	Mooney Viscosity	
Naugex MBT	3.0	ML (1+4) at 100°C	25
Tuex (TMTD)	0.6		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	27
	<u>308.1</u>		

BASIC REQUIREMENTS	Grade MBA310	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	30 ± 5	31	30
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	13.7 (1980)	12.7 (1840)
Elongation, %	400 min.	850	900
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+6	+5
Tensile Strength Change, %	± 30 max.	-7	+9
Elongation change, %	- 50 max.	-24	-21
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	31 <sup>(a)</sup>	41 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	± 10 max.	+6	+5
Tensile Strength Change, %	no req.	- 25 max.	-7	+9
Elongation change, %	no req.	- 25 max.	-24	-21
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C				
	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>				
D2137 Method A at -55°C				
	no req.	pass	pass	pass

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2BA403C12F17****Grade M8BA403C12**

Royalene® 400	100.0		
Royalene® 512*	50.0		
Zinc Oxide	3.0		
N774 Carbon Black	150.0		
Austin Black	30.0		
Ground Whiting	150.0	Specific Gravity	1.31
Naphthenic Oil	130.0		
Zinc Stearate	1.5	Mooney Viscosity	
Naugex MBTS	3.0	ML (1+4) at 100°C	22
Tuex (TMTD)	0.6		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	2.0	MS at 125°C, t3, minutes	> 30
	621.6		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA403</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	40 ± 5	44	42
Tensile Strength, MPa (psi)	3.0 min. (435) min.	5.8 (840)	5.4 (790)
Elongation, %	300 min.	680	730
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+7	+4
Tensile Strength Change, %	± 30 max.	+6	+6
Elongation change, %	- 50 max.	-22	-22
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	37 <sup>(a)</sup>	42 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 8</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	no req.	pass	pass

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2BA407C12F17****Grade M8BA407B13C12**

Royalene® 400	60.0		
Royalene® 512	70.0		
Zinc Oxide	3.0		
N774 Carbon Black	130.0	Specific Gravity	1.18
York White Calcium Carbonate	50.0		
Naphthenic Oil	130.0	Mooney Viscosity ML (1+4) at 100°C	19
Zinc Stearate	1.5		
Methazate (ZDMC)	1.0		
Tuex (TMTD)	3.0	Mooney Scorch MS at 125°C, t3, minutes	> 30
Sulfur	1.5		
	450.1		

BASIC REQUIREMENTS	Grade MBA407	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	40 ± 5	44	44
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	8.1 (1180)	8.8 (1280)
Elongation, %	300 min.	670	660
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+6	+6
Tensile Strength Change, %	± 30 max.	+11	+5
Elongation change, %	- 50 max.	-9	-15
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	23 <sup>(a)</sup>	30 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

SUFFIX REQUIREMENTS	Grade 2	Grade 8	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix B13 - Compression Set, D395 Method B</b>				
22 hours at 70°C, % Set	no req.	25 max.	23	---
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	no req.	pass	pass

## Grade M2BA410C12F17

## Grade M4BA410A14C12F17

## Grade M3BA410A14B13C12F17F19

## Grade M5BA410C12F17F19

## Grade M6BA410B13C12

Royalene® 400	60.0		
Royalene® 512	70.0		
Zinc Oxide	3.0		
N650 Carbon Black	50.0		
N774 Carbon Black	75.0		
Naphthenic Oil	110.0	Specific Gravity	1.10
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	19
Butazate (ZDBC)	1.5		
Ethyl Tellurac (TeDTC)	0.4	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	27
	<u>376.5</u>		

BASIC REQUIREMENTS	Grade MBA410	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	40 ± 5	45	45
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	13.4 (1940)	12.1 (1750)
Elongation, %	400 min.	630	680
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+6	+3
Tensile Strength Change, %	± 30 max.	-10	+5
Elongation change, %	- 50 max.	-14	-16
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	17 <sup>(a)</sup>	19 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+6	+3
Tensile Strength Change, %	no req.	- 25 max.	-10	+5
Elongation change, %	no req.	- 25 max.	-14	-16
<b>Suffix B13 - Compression Set, D395 Method B 22 hours at 70°C, % Set</b>				
	no req.	25 max.	17	---
<b>Suffix C12 - Ozone Resistance D1171, 72 hours at 50 ppm at 40°C</b>				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>				
	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness D2137 Method A at -55°C</b>				
	no req.	pass	pass	pass

Grade M2BA414C12F17		Grade M4BA414A14C12F17	
Grade M3BA414A14B13C12F17F19		Grade M5BA414C12F17F19	
Royalene® 400	100.0		
Royalene® 512	50.0		
Zinc Oxide	3.0		
N774 Carbon Black	80.0		
HiSil 243 LD	5.0		
Naphthenic Oil	60.0	Specific Gravity	1.06
Zinc Stearate	1.5		
Naugex MBT	3.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	27
Butazate (ZDBC)	1.5		
Ethyl Tellurac (TeDTC)	0.4	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	15
	306.5		

BASIC REQUIREMENTS	Grade MBA414	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	40 ± 5	42	42
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	15.9 (2250)	14.4 (2090)
Elongation, %	400 min.	730	780
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+2	+2
Tensile Strength Change, %	± 30 max.	-13	+5
Elongation change, %	- 50 max.	-19	-18
<b>Compression Set, D395 Method B,</b> 22 hours at 70°C, % Set			
	50 max.	19 <sup>(a)</sup>	20 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+2	+2
Tensile Strength Change, %	no req.	- 25 max.	-13	+5
Elongation change, %	no req.	- 25 max.	-19	-18
<b>Suffix B13 - Compression Set, D395 Method B</b> 22 hours at 70°C, % Set				
	no req.	25 max.	19	---
<b>Suffix C12 - Ozone Resistance</b> D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b> D2137 Method A at -40°C				
	pass	pass.	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b> D2137 Method A at -55°C				
	no req.	pass	pass	pass

**Grade M2BA507C12F17****Grade M8BA507B13C12**

Royalene® 400	50.0		
Royalene® 512	75.0		
Zinc Oxide	3.0		
N650 Carbon Black	140.0		
Austin Black	30.0		
Paraffin Wax	5.0	Specific Gravity	1.12
Naphthenic Oil	130.0		
Stearic Acid	1.0	Mooney Viscosity	
Naugex MBT	1.0	ML (1+4) at 100°C	24
Tuex (TMTD)	1.5		
Methazate (ZDMC)	1.0	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	31
	439.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA507</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	50 ± 5	54	54
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	10.1 (1460)	10.1 (1460)
Elongation, %	300 min.	600	620
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+4	+6
Tensile Strength Change, %	± 30 max.	+3	+2
Elongation change, %	- 50 max.	-23	-19
<b>Compression Set, D395 Method B,</b>			
22 hours at 70°C, % Set	50 max.	21 <sup>(a)</sup>	31 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 8</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix B13 - Compression Set, D395 Method B</b>				
22 hours at 70°C, % Set	no req.	25 max.	21	---
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	no req.	pass	pass

## Grade M2BA510C12F17

## Grade M4BA510A14C12F17

## Grade M3BA510A14B13C12F17F19

## Grade M5BA510C12F17F19

## Grade M6BA510B13C12

Royalene® 400	40.0		
Royalene® 512	80.0		
Zinc Oxide	3.0		
N650 Carbon Black	40.0		
N774 Carbon Black	90.0		
Sunpar 150 Paraffinic Oil	100.0	Specific Gravity	1.10
Zinc Stearate	1.5		
Naugex MBTS	1.0	Mooney Viscosity ML (1+4) at 100°C	20
Tuex (TMTD)	0.6		
Butazate (ZDBC)	2.0		
Ethyl Tellurac (TeDTC)	0.4	Mooney Scorch MS at 125°C, t3, minutes	23
Sulfur	1.5		
	360.0		

BASIC REQUIREMENTS	Grade MBA510	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	50 ± 5	50	48
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.5 (1810)	12.8 (1850)
Elongation, %	400 min.	570	630
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+2	+2
Tensile Strength Change, %	± 30 max.	+1	-2
Elongation change, %	- 50 max.	-19	-24
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	18 <sup>(a)</sup>	15 <sup>(b)</sup>

(a) solid specimen (b) plied specimen

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+2	+2
Tensile Strength Change, %	no req.	- 25 max.	+1	-2
Elongation change, %	no req.	- 25 max.	-19	-24
<b>Suffix B13 - Compression Set, D395 Method B 22 hours at 70°C, % Set</b>				
	no req.	25 max.	18	---
<b>Suffix C12 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C</b>				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>				
	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness D2137 Method A at -55°C</b>				
	no req.	pass	pass	pass

Grade M2BA514C12F17		Grade M4BA514A14C12F17	
Grade M3BA514A14B13C12F17F19		Grade M5BA514C12F17F19	
Royalene® 400	80.0		
Royalene® 512	60.0		
Zinc Oxide	3.0		
N774 Carbon Black	75.0		
N347 Carbon Black	40.0		
HiSil 243LD	5.0		
Sunpar 2280 Paraffinic Oil	75.0	Specific Gravity	1.10
Zinc Stearate	1.5		
Naugex MBTS	1.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	29
Butazate (ZDBC)	2.0		
Ethyl Tellurac (TeDTC)	0.4	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	24
	345.0		

BASIC REQUIREMENTS	Grade MBA514	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	50 ± 5	50	48
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	15.5	15.4
Elongation, %	400 min.	600	660
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+2	+4
Tensile Strength Change, %	± 30 max.	+5	+4
Elongation change, %	- 50 max.	-17	-21
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	17 <sup>(a)</sup>	17 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+2	+4
Tensile Strength Change, %	no req.	- 25 max.	+5	+4
Elongation change, %	no req.	- 25 max.	-17	-21
<b>Suffix B13 - Compression Set, D395 Method B</b>				
22 hours at 70°C, % Set	no req.	25 max.	17	---
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 ppm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>				
D2137 Method A at -55°C	no req.	pass	pass	pass

Grade M2BA517C12F17		Grade M4BA517A14C12F17	
Grade M3BA517A14B13C12F17F19		Grade M5BA517C12F17F19	
Royalene® 400	100.0		
Royalene® 512	50.0		
Zinc Oxide	3.0		
N347 Carbon Black	75.0		
Sunpar 2280 Paraffinic Oil	45.0	Specific Gravity	1.05
Zinc Stearate	1.5		
Naugex MBTS	1.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	37
Butazate (ZDBC)	2.0		
Ethyl Tellurac (TeDTC)	0.4	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	22
	<u>280.0</u>		

BASIC REQUIREMENTS	Grade MBA517	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	50 ± 5	51	51
Tensile Strength, MPa (psi)	17.0 min. (2465) min.	18.8 (2730)	19.4 (2810)
Elongation, %	400 min.	590	650
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+1	+2
Tensile Strength Change, %	± 30 max.	-13	-11
Elongation change, %	- 50 max.	-24	-23
<b>Compression Set, D395 Method B,</b>			
22 hours at 70°C, % Set	50 max.	16 <sup>(a)</sup>	19 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+1	+2
Tensile Strength Change, %	no req.	- 25 max.	-13	-11
Elongation change, %	no req.	- 25 max.	-24	-23
<b>Suffix B13 - Compression Set, D395 Method B</b>				
22 hours at 70°C, % Set	no req.	25 max.	16	---
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 ppm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>				
D2137 Method A at -55°C	no req.	pass	pass	pass

**Grade M8BA603C12**

Royalene® 400	50.0		
Royalene® 622*	97.5		
Zinc Oxide	3.0		
N650 Carbon Black	100.0		
N774 Carbon Black	140.0		
Atomite Whiting	200.0		
Sunpar 2280 Paraffinic Oil	175.0		
Paraffin Wax	5.0	Specific Gravity	1.36
Stearic Acid	1.0		
Naugex MBTS	1.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	17
Butazate (ZDBC)	2.0		
Ethyl Tellurac	0.4	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	25
	<u>777.0</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade M8BA603</b>	<b>Laboratory Test Data, 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	60 ± 5	60
Tensile Strength, MPa (psi)	3.0 min. (435) min.	6.4 (925)
Elongation, %	250 min.	475
<b>Heat Aged, D573, 70 hours at 100°C</b>		
Hardness Change, points	± 15 max.	+3
Tensile Strength Change, %	± 30 max.	+11
Elongation change, %	- 50 max.	-28
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>		
	50 max.	35 <sup>(a)</sup>
<sup>(a)</sup> solid specimen		

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 8</b>	<b>Laboratory Test Data, 30' @160°C Cure</b>
<b>Suffix C12 - Ozone Resistance</b>		
D1171, 72 hours at 50 pphm at 40°C		
Quality Retention Rating	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>		
D2137 Method A at -40°C	no req.	pass
<b>Suffix G11 - Tear Resistance</b>		
D624, Die B, kN/m	no req.	29.7
<b>Suffix G21 - Tear Resistance</b>		
D624, Die C, kN/m	no req.	24.5
D624, Die C at 150°C, kN/m	no req.	16.8

\* Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

**Grade M8BA606B13C12**

Royalene® 400	50.0		
Royalene® 622*	105.0		
Zinc Oxide	3.0		
N650 Carbon Black	85.0		
N774 Carbon Black	150.0		
Ground Whiting	200.0		
Naphthenic Oil	140.0	Specific Gravity	1.37
Paraffin Wax	5.0		
Stearic Acid	1.0	Mooney Viscosity	
Naugex MBTS	1.0	ML (1+4) at 100°C	25
Tuex (TMTD)	1.5		
Methazate (ZDMC)	1.5	Mooney Scorch	
Sulfur	2.0	MS at 125°C, t3, minutes	25
	<u>745.0</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade M8BA606</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	60 ± 5	64	62
Tensile Strength, MPa (psi)	6.0 min. (870) min.	7.0 (1010)	6.3 (910)
Elongation, %	250 min.	290	370
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+6	+6
Tensile Strength Change, %	± 30 max.	+4	+9
Elongation change, %	- 50 max.	-21	-32
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	21 <sup>(a)</sup>	19 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 8</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix B13 - Compression Set, D395 Method B 22 hours at 70°C, % Set</b>			
	25 max.21	---	
<b>Suffix C12 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C</b>			
Quality Retention Rating	100	100	100

\* Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

**Grade M2BA607C12F17****Grade M8BA607B13F17**

Royalene® 622*	130.0		
Zinc Oxide	3.0		
N650 Carbon Black	100.0		
N774 Carbon Black	125.0		
Paraffinic Oil	170.0		
Paraffin Wax	5.0	Specific Gravity	1.16
Stearic Acid	1.0		
Naugex MBTS	1.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	18
Butazate (ZDBC)	2.0		
Ethyl Tellurac (TeDTC)	0.4	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	27
	539.5		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA607</b>	<b>Laboratory Test Data, 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	60 ± 5	62
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	9.8 (1420)
Elongation, %	300 min.	545
<b>Heat Aged, D573, 70 hours at 100°C</b>		
Hardness Change, points	± 15 max.	+3
Tensile Strength Change, %	± 30 max.	+6
Elongation change, %	- 50 max.	-18
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>		
	50 max.	18 <sup>(a)</sup>
<sup>(a)</sup> solid specimen		

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 8</b>	<b>Laboratory Test Data, 30' @160°C Cure</b>
<b>Suffix B13 - Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	no req.	25 max.	18
<b>Suffix C12 - Ozone Resistance</b>			
D1171, 72 hours at 50 ppm at 40°C			
Quality Retention Rating	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>			
D2137 Method A at -40°C	pass	no req.	pass
<b>Suffix G11 - Tear Resistance</b>			
D624, Die B, kN/m	no req.	no req.	47.3
<b>Suffix G21 - Tear Resistance</b>			
D624, Die C, kN/m	no req.	no req.	35.0
D624, Die C at 150°C, kN/m	no req.	no req.	16.8

\* Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

## Grade M2BA610C12F17

## Grade M4BA610A14C12F17

## Grade M3BA610A14B13C12F17F19

## Grade M5BA610C12F17F19

## Grade M6BA610B13C12

Royalene® 512	50.0		
Royalene® 622*	70.0		
Zinc Oxide	3.0		
N650 Carbon Black	120.0		
N774 Carbon Black	40.0		
Sunpar 150 Paraffinic Oil	120.0	Specific Gravity	1.12
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity ML (1+4) at 100°C	23
Tuex (TMTD)	0.6		
Butazate (ZDBC)	1.5		
Ethyl Tellurac (TeDTC)	0.3	Mooney Scorch MS at 125°C, t3, minutes	21
Sulfur	1.5		
	411.4		

BASIC REQUIREMENTS	Grade MBA610	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	60 ± 5	61	59
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.3 (1790)	11.7 (1700)
Elongation, %	350 min.	430	460
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+4	+4
Tensile Strength Change, %	± 30 max.	0	+7
Elongation change, %	- 50 max.	-19	-15
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	16 <sup>(a)</sup>	15 <sup>(b)</sup>

<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+4	+4
Tensile Strength Change, %	no req.	- 25 max.	0	+7
Elongation change, %	no req.	- 25 max.	-19	-15
<b>Suffix B13 - Compression Set, D395 Method B 22 hours at 70°C, % Set</b>				
	no req.	25 max.	16	---
<b>Suffix C12 - Ozone Resistance D1171, 72 hours at 50 ppm at 40°C</b>				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>				
	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness D2137 Method A at -55°C</b>				
	no req.	pass	pass	pass

\* Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

**Grade M2BA614C12F17****Grade M4BA614A14C12F17****Grade M3BA614A14B13C12F17F19****Grade M5BA614C12F17F19****Grade M6BA614B13C12**

Royalene® 512	60.0		
Royalene® 622*	56.0		
Zinc Oxide	3.0		
N650 Carbon Black	100.0		
Sunpar 2280 Paraffinic Oil	75.0	Specific Gravity	1.09
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	31
Butazate (ZDBC)	1.5		
Ethyl Tellurac (TeDTC)	0.3	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	17
	302.4		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA614</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	60 ± 5	62	59
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	14.7 (1230)	15.9 (2300)
Elongation, %	400 min.	470	540
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+2	+4
Tensile Strength Change, %	± 30 max.	-1	-3
Elongation change, %	- 50 max.	-15	-17
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	14 <sup>(a)</sup>	14 <sup>(b)</sup>

<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+2	+4
Tensile Strength Change, %	no req.	- 25 max.	-1	-3
Elongation change, %	no req.	- 25 max.	-15	-17
<b>Suffix B13 - Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>				
	no req.	25 max.	14	---
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C				
	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>				
D2137 Method A at -55°C				
	no req.	pass	pass	pass

\* Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

**Grade M2BA617C12F17****Grade M4BA617A14C12F17****Grade M3BA617A14B13C12F17F19****Grade M5BA617C12F17F19****Grade M6BA617B13C12**

Royalene® 400	40.0		
Royalene® 512	80.0		
Zinc Oxide	3.0		
N650 Carbon Black	35.0		
N330 Carbon Black	35.0	Specific Gravity	1.08
Sunpar 2280 Paraffinic Oil	25.0		
Zinc Stearate	1.5	Mooney Viscosity	
Naugex MBTS	3.0	ML (1+4) at 100°C	57
Tuex (TMTD)	0.6		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	13
	226.1		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA617</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	60 ± 5	62	62
Tensile Strength, MPa	17.0 min.	18.5	18.6
(psi)	(2465) min.	(2680)	(2690)
Elongation, %	400 min.	410	480
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+6	+5
Tensile Strength Change, %	± 30 max.	-7	-11
Elongation change, %	- 50 max.	-20	-17
<b>Compression Set, D395 Method B,</b>			
22 hours at 70°C, % Set	50 max.	17 <sup>(a)</sup>	17 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+6	+5
Tensile Strength Change, %	no req.	- 25 max.	-7	-11
Elongation change, %	no req.	- 25 max.	-20	-17
<b>Suffix B13 - Compression Set, D395 Method B</b>				
22 hours at 70°C, % Set	no req.	25 max.	17	---
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>				
D2137 Method A at -55°C	no req.	pass	pass	pass

**Grade M8BA703C12**

Royalene® 400	50.0		
Royalene® 622*	105.0		
Zinc Oxide	3.0		
N650 Carbon Black	250.0		
N774 Carbon Black	100.0		
Ground Whiting	200.0	Specific Gravity	1.40
Naphthenic Oil	165.0		
Zinc Stearate	1.5	Mooney Viscosity	
Naugex MBTS	3.0	ML (1+4) at 100°C	48
Tuex (TMTD)	0.8		
Butazate	1.5	Mooney Scorch	
Sulfur	2.0	MS at 125°C, t3, minutes	13
	881.8		

<b>BASIC REQUIREMENTS</b>	<b>Grade M8BA703</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	70 ± 5	75	75
Tensile Strength, MPa (psi)	3.0 min. (435) min.	5.9 (850)	5.3 (770)
Elongation, %	150 min.	150	180
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+4	+5
Tensile Strength Change, %	± 30 max.	+5	+23
Elongation change, %	- 50 max.	-27	-33
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	30 <sup>(a)</sup>	38 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 8</b>	<b>Laboratory Test Data, Cures:</b>	
<b>Suffix C12 - Ozone Resistance</b>		<b>30' @160°C</b>	<b>8' @182°C</b>
D1171, 72 hours at 50 ppm at 40°C			
Quality Retention Rating	100	100	100

\* Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

**Grade M8BA706B13C12**

Royalene® 400	50.0		
Royalene® 502*	105.0		
Zinc Oxide	3.0		
N650 Carbon Black	180.0		
N774 Carbon Black	100.0		
Austin Black	100.0	Specific Gravity	1.20
Naphthenic Oil	135.0		
Zinc Stearate	1.5	Mooney Viscosity	
Naugex MBTS	3.0	ML (1+4) at 100°C	52
Tuex (TMTD)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	2.0	MS at 125°C, t3, minutes	14
	681.8		

<b>BASIC REQUIREMENTS</b>	<b>Grade M8BA706</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	70 ± 5	75	75
Tensile Strength, MPa (psi)	6.0 min. (870) min.	6.9 (1000)	6.6 (950)
Elongation, %	150 min.	210	220
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+4	+5
Tensile Strength Change, %	± 30 max.	+12	+23
Elongation change, %	- 50 max.	-29	-23
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	20 <sup>(a)</sup>	23 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 8</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix B13 - Compression Set, D395 Method B</b>			
22 hours at 70°C, % Set	25 max.	20	---
<b>Suffix C12 - Ozone Resistance</b>			
D1171, 72 hours at 50 ppm at 40°C			
Quality Retention Rating	100	100	100

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2BA707C12F17****Grade M8BA707B13C12**

Royalene® 539	100.0	Specific Gravity	1.18
Zinc Oxide	3.0	Mooney Viscosity	
N650 Carbon Black	140.0	ML (1+4) at 100°C	37
N774 Carbon Black	130.0	Mooney Scorch	
Paraffin Wax	5.0	MS at 125 °C, t3, minutes	23
Sunpar 2280 Paraffinic Oil	190.0	Rheometer at 160 °C	
Stearic Acid	1.0	Scorch, ts2, minutes	3.2
Naugex MBTS	1.0	Cure Time, t'c90, minutes	12.3
Tuex (TMTD)	1.5		
Methazate (ZDMC)	1.0		
Sulfur	1.5		
	594.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA707</b>	<b>Laboratory Test Data 15' @160°C</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	70 ± 5	69
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	8.6 (1245)
Elongation, %	200 min.	365
<b>Heat Aged, D573, 70 hours at 100°C</b>		
Hardness Change, points	± 15 max.	+3
Tensile Strength Change, %	± 30 max.	+20
Elongation change, %	- 50 max.	-33
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>		
	50 max.	12 <sup>(a)</sup>
<sup>(a)</sup> solid specimen		

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 8</b>	<b>Laboratory Test Data 30' @160°C</b>
<b>Suffix B13 - Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	no req.	25 max.	12
<b>Suffix C12 - Ozone Resistance</b>			
D1171, 72 hours at 50 pphm at 40°C			
Quality Retention Rating	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>			
D2137 Method A at -40°C	pass	no req.	pass

**Grade M8BA708B13C12**

Royalene® 539	100.0	Specific Gravity	1.19
Zinc Oxide	3.0		
N650 Carbon Black	140.0	Mooney Viscosity	
N774 Carbon Black	130.0	ML (1+4) at 100°C	47
Sunpar 2280 Paraffinic Oil	170.0		
Paraffin Wax	5.0	Mooney Scorch	
Stearic Acid	1.0	MS at 125°C, t3, minutes	19
Naugex MBTS	1.0		
Tuex (TMTD)	1.5	Rheometer at 160°C	
Methazate (ZDMC)	1.0	Scorch, ts2, minutes	2.8
Sulfur	1.5	Cure Time, t'c90, minutes	10.0
	<u>574.0</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade M8BA708</b>	<b>Laboratory Test Data 15'@160°C</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	70 ± 5	72
Tensile Strength, MPa (psi)	8.0 min. (1160) min.	9.6 (1395)
Elongation, %	200 min.	295
<b>Heat Aged, D573, 70 hours at 100°C</b>		
Hardness Change, points	± 15 max.	+6
Tensile Strength Change, %	± 30 max.	+20
Elongation change, %	- 50 max.	-25
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>		
	50 max.	14 <sup>(a)</sup>
<sup>(a)</sup> solid specimen		

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 8</b>	<b>Laboratory Test Data 15'@160°C</b>
<b>Suffix B13 - Compression Set, D395 Method B</b>		
22 hours at 70°C, % Set	25 max.	14
<b>Suffix C12 - Ozone Resistance</b>		
D1171, 72 hours at 50 ppm at 40°C		
Quality Retention Rating	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>		
D2137 Metohd A at -40°C	pass	pass

**Grade M2BA710C12F17**

**Grade M3BA710A14C12F17**

**Grade M3BA710A14B13C12F17F19**

**Grade M5BA710C12F17F19**

**Grade M6BA710B13C12**

Royalene® 539	100.0	Specific Gravity	1.17
Zinc Oxide	3.0		
N650 Carbon Black	100.0	Mooney Viscosity	
N774 Carbon Black	110.0	ML (1+4) at 100°C	45
Sunpar 2280 Paraffinic Oil	140.0		
Stearic Acid	1.5	Mooney Scorch	
Naugex MBTS	3.0	MS at 125°C, t3, minutes	17
Tuex (TMTD)	0.6		
Butazate (ZDBC)	1.5	Rheometer at 160°C	
Ethyl Tellurac (TeDTC)	0.3	Scorch, ts2, minutes	2.7
Sulfur	1.5	Cure Time, t'c90, minutes	6.7
	461.4		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA710</b>	<b>Laboratory Test Data 30'@160°C</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	70 ± 5	69
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.0 (1665)
Elongation, %	250 min.	395
<b>Heat Aged, D573, 70 hours at 100°C</b>		
Hardness Change, points	± 15 max.	+3
Tensile Strength Change, %	± 30 max.	+5
Elongation change, %	- 50 max.	-33
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>		
	50 max.	21 <sup>(a)</sup>

<sup>(a)</sup> solid specimen

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30'@160°C</b>
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	no req.	+ 10 max.	+3
Tensile Strength Change, %	no req.	- 25 max.	+5
Elongation change, %	no req.	- 25 max.	-33
<b>Suffix B13 - Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	no req.	25 max.	21
<b>Suffix C12 - Ozone Resistance</b>			
D1171, 72 hours at 50 pphm at 40°C			
Quality Retention Rating	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>			
D2137 Method A at -40°C	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>			
D2137 Method A at -55°C	no req.	pass	fail <sup>(b)</sup>

<sup>(b)</sup> pass -52

Grade M2BA714C12F17		Grade M3BA714A14C12F17	
Grade M3BA714A14B13C12F17F19		Grade M5BA714C12F17F19	
Royalene® 622*	42.0		
Royalene® 512	70.0		
Zinc Oxide	3.0		
N650 Carbon Black	115.0		
Sunpar 150 Paraffinic Oil	65.0	Specific Gravity	1.11
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	35
Butazate (ZDBC)	1.5		
Ethyl Tellurac (TeDTC)	0.3	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	12
	<u>303.4</u>		

BASIC REQUIREMENTS	Grade MBA714	Laboratory Test Data, Cures:	
		30' @160°C	8' @182°C
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	70 ± 5	67	67
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	14.8 (2140)	14.6 (2120)
Elongation, %	300 min.	400	450
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+5	+4
Tensile Strength Change, %	± 30 max.	+3	+3
Elongation change, %	- 50 max.	-20	-24
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	19 <sup>(a)</sup>	17 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+5	+4
Tensile Strength Change, %	no req.	- 25 max.	+3	+3
Elongation change, %	no req.	- 25 max.	-20	-24
<b>Suffix B13 - Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>				
	no req.	25 max.	19	---
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C				
	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>				
D2137 Method A at -55°C				
	no req.	pass	pass	pass

\* Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

Grade M2BA717C12F17	Grade M4BA717A14C12F17		
Grade M3BA717A14B13C12F17F19	Grade M5BA717C12F17F19		
Royalene® 512	75.0		
Royalene® 400	50.0		
Zinc Oxide	3.0		
N650 Carbon Black	45.0		
N347 Carbon Black	45.0		
Sunpar 2280 Paraffinic Oil	20.0	Specific Gravity	1.11
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	74
Butazate (ZDBC)	1.5		
Ethyl Tellurac (TeDTC)	0.3	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	12
	246.4		

BASIC REQUIREMENTS	Grade MBA717	Laboratory Test Data, Cures:	
Unaged Physical Properties		30' @160°C	8' @182°C
Hardness, Durometer A	70 ± 5	72	70
Tensile Strength, MPa (psi)	17.0 min. (2465) min.	20.5 (2970)	21.2 (3050)
Elongation, %	300 min.	360	420
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+4	+4
Tensile Strength Change, %	± 30 max.	-3	-1
Elongation change, %	- 50 max.	-17	-19
<b>Compression Set, D395 Method B,</b>			
22 hours at 70°C, % Set	50 max.	18 <sup>(a)</sup>	15 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

SUFFIX REQUIREMENTS	Grade 2	Grade 3	Laboratory Test Data, Cures:	
			30' @160°C	8' @182°C
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+4	+4
Tensile Strength Change, %	no req.	- 25 max.	-3	-1
Elongation change, %	no req.	- 25 max.	-17	-19
<b>Suffix B13 - Compression Set, D395 Method B,</b>				
22 hours at 70°C, % Set	no req.	25 max.	18	---
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 ppm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>				
D2137 Method A at -55°C	no req.	pass	pass	pass

**Grade M2BA807C12****Grade M7BA807C12**

Royalene® 400	50.0		
Royalene® 622 <sup>(a)</sup>	105.0		
Zinc Oxide	3.0		
N650 Carbon Black	80.0		
N774 Carbon Black	200.0		
Ground Whiting	150.0		
Paraffin Wax	5.0	Specific Gravity	1.39
Naphthenic Oil	90.0		
Stearic Acid	1.0	Mooney Viscosity	
Naugex MBTS	1.0	ML (1+4) at 100°C	57
Tuex (TMTD)	1.5		
Methazate (ZDMC)	1.5	Mooney Scorch	
Sulfur	2.0	MS at 125°C, t3, minutes	14
	<u>690.0</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA807</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	80 ± 5	83	82
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	8.0 (1160)	8.3 (1200)
Elongation, %	100 min.	160	180
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+2	+2
Tensile Strength Change, %	± 30 max.	+16	+13
Elongation change, %	- 50 max.	-25	-28
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	19 <sup>(b)</sup>	18 <sup>(c)</sup>

<sup>(b)</sup> solid specimen <sup>(c)</sup> plied specimen

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 7</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness <sup>(d)</sup></b>				
D2137 Method A at -40°C	pass	no req.	fail	fail

<sup>(a)</sup> Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

<sup>(d)</sup> Does not meet Suffix F17, data shown for information only.

**Grade M2BA810C12F17**

**Grade M4BA810A14C12F17**

Royalene® 512	100.0		
Zinc Oxide	3.0		
N650 Carbon Black	50.0		
N774 Carbon Black	145.0		
Naphthenic Oil	65.0	Specific Gravity	1.22
A-C-617 Polyethylene Wax	15.0		
Zinc Stearate	1.5	Mooney Viscosity	
Naugex MBTS	3.0	ML (1+4) at 100°C	65
Tuex (TMTD)	0.6		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	12
	<u>386.1</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA810</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	80 ± 5	83	82
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.7 (1840)	12.8 (1860)
Elongation, %	150 min.	200	230
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+3	+2
Tensile Strength Change, %	± 30 max.	+14	+1
Elongation change, %	- 50 max.	-15	-13
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	25 <sup>(a)</sup>	27 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 4</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+3	+2
Tensile Strength Change, %	no req.	- 25 max.	+14	+1
Elongation change, %	no req.	- 25 max.	-15	-13
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 ppm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	pass	pass	pass

**Grade M2BA814C12F17****Grade M4BA814A14C12F17**

Royalene® 512	100.0		
Zinc Oxide	3.0		
N650 Carbon Black	60.0		
N774 Carbon Black	60.0		
Naphthenic Oil	40.0		
A-C-617 Polyethylene Wax	15.0	Specific Gravity	1.15
Zinc Stearate	1.0		
Naugex MBTS	1.0	Mooney Viscosity	
Tuex (TMTD)	0.6	ML (1+4) at 100°C	74
Butazate (ZDBC)	2.0		
Ethyl Tellurac (TeDTC)	0.3	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	10
	284.4		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA814</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	80 ± 5	82	78
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	17.7 (2560)	17.9 (2600)
Elongation, %	200 min.	230	240
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+1	+2
Tensile Strength Change, %	± 30 max.	+1	+3
Elongation change, %	- 50 max.	-17	-21
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	25 <sup>(a)</sup>	25 <sup>(b)</sup>

(a) solid specimen (b) plied specimen

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 4</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+1	+2
Tensile Strength Change, %	no req.	- 25 max.	+1	+3
Elongation change, %	no req.	- 25 max.	-17	-21
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 ppm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	pass	pass	pass

**Grade M7BA903C12**

Royalene® 512	100.0		
Zinc Oxide	3.0		
N762 Carbon Black	320.0		
York White Calcium Carbonate	100.0		
Naphthenic Oil	120.0		
A-C-617 Polyethylene Wax	15.0	Specific Gravity	1.39
Paraffin Wax	5.0		
Stearic Acid	1.0	Mooney Viscosity	
Naugex MBTS	1.0	ML (1+4) at 100°C	58
Tuex (TMTD)	1.5		
Methazate (ZDMC)	1.0	Mooney Scorch	
Sulfur	2.0	MS at 125°C, t3, minutes	18
	<u>669.5</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade M7BA903</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	90 ± 5	86	85
Tensile Strength, MPa (psi)	3.0 min. (435) min.	7.1 (1040)	6.3 (920)
Elongation, %	75 min.	140	100
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+1	+2
Tensile Strength Change, %	± 30 max.	+6	+22
Elongation change, %	- 50 max.	-29	-31
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	34 <sup>(a)</sup>	47 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 7</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix C12 - Ozone Resistance</b>			
D1171, 72 hours at 50 pphm at 40°C			
Quality Retention Rating	100	100	100

**Grade M2BA907C12****Grade M7BA907C12**

Royalene® 512	100.0		
Zinc Oxide	3.0		
N762 Carbon Black	300.0		
Naphthenic Oil	100.0		
A-C-617 Polyethylene Wax	15.0	Specific Gravity	1.28
Paraffin Wax	5.0		
Stearic Acid	1.0	Mooney Viscosity	
Naugex MBTS	1.0	ML (1+4) at 100°C	65
Tuex (TMTD)	1.5		
Methazate (ZDMC)	1.0	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	16
	<u>529.0</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA907</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	90 ± 5	87	85
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	10.2 (1480)	9.7 (1410)
Elongation, %	100 min.	140	160
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+5	+2
Tensile Strength Change, %	± 30 max.	+2	+6
Elongation change, %	- 50 max.	-29	-31
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	25 <sup>(a)</sup>	38 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 7</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 pphm at 40°C				
Quality Retention Rating	100	100	100	100

**Grade M2BA910C12F17****Grade M4BA910A14C12F17**

Royalene® 512	100.0		
Zinc Oxide	3.0		
N650 Carbon Black	70.0		
N762 Carbon Black	160.0		
Naphthenic Oil	65.0		
A-C-617 Polyethylene Wax	15.0	Specific Gravity	1.25
Paraffin Wax	5.0		
Stearic Acid	1.0	Mooney Viscosity	
Naugex MBTS	1.0	ML (1+4) at 100°C	85
Tuex (TMTD)	1.5		
Methazate (ZDMC)	1.0	Mooney Scorch	
Sulfur	1.5	MS at 125°C, t3, minutes	12
	424.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MBA910</b>	<b>Laboratory Test Data, Cures:</b>	
		<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	90 ± 5	88	90
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	11.4 (1650)	10.8 (1570)
Elongation, %	125 min.	130	140
<b>Heat Aged, D573, 70 hours at 100°C</b>			
Hardness Change, points	± 15 max.	+1	+2
Tensile Strength Change, %	± 30 max.	+3	-8
Elongation change, %	- 50 max.	-17	-21
<b>Compression Set, D395 Method B, 22 hours at 70°C, % Set</b>			
	50 max.	20 <sup>(a)</sup>	20 <sup>(b)</sup>
<sup>(a)</sup> solid specimen <sup>(b)</sup> plied specimen			

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 4</b>	<b>Laboratory Test Data, Cures:</b>	
			<b>30' @160°C</b>	<b>8' @182°C</b>
<b>Suffix A14 - Heat Aged, D573, 70 hours at 100°C</b>				
Hardness Change, points	no req.	+ 10 max.	+1	+2
Tensile Strength Change, %	no req.	- 25 max.	+3	-8
Elongation change, %	no req.	- 25 max.	-17	-21
<b>Suffix C12 - Ozone Resistance</b>				
D1171, 72 hours at 50 ppm at 40°C				
Quality Retention Rating	100	100	100	100
<b>Suffix F17 - Low Temperature Brittleness</b>				
D2137 Method A at -40°C	pass	pass	pass	pass

**Grade M2CA307A25B35C32F17F18G11G21EA14P20R11**

Royalene® 400	120.0		
Royalene® 502*	40.0		
Zinc Oxide	5.0		
N774 Carbon Black	120.0		
York White Calcium Carbonate	30.0		
Sunpar 2280 Paraffinic	115.0	Specific Gravity	1.11
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	16
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	30+
	443.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade M2CA307</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	30 ± 5	32
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	9.6 (1390)
Elongation, %	500 min.	770

**Heat Aged, D573, 70 hours at 125°C**

Hardness Change, points	± 15 max.	+11
Tensile Strength Change, %	± 30 max.	0
Elongation change, %	- 50 max.	-30

**Compression Set, D395 Method B,**

22 hours at 100°C, % Set

60 max. 41<sup>(a)</sup><sup>(a)</sup> plied specimen**SUFFIX REQUIREMENTS**

<b>Grade 2</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
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**Suffix A25 - Heat Aged, D865, 70 hours at 125°C**

Hardness Change, points	± 10 max.	+5
Tensile Strength Change, %	- 20 max.	-5
Elongation change, %	- 40 max.	-26

**Suffix B35 - Compression Set, D395 Method B**

22 hours at 125°C, % Set

70 max. 64

**Suffix C32 - Ozone Resistance**

D1171, 72 hours at 50 ppm at 40°C

Method B pass pass

**Suffix F17 - Low Temperature Brittleness**

D2137 Method A at -40°C pass pass

**Suffix F18 - Low Temperature Brittleness**

D2137 Method A at -50°C pass pass

**Suffix G11 - Tear Resistance**

D624 Die B, kN/m 17 min. 19.3

**Suffix G21 - Tear Resistance**

D624 Die C, kN/m 17 min. 29.7

**Suffix EA14 - Water Resistance**

D471, 70 hours at 100°C

Volume Change, % ± 5 - 13

**Suffix P20 - Staining Resistance**

D925, Method B pass pass

**Suffix R11 - Resilience**

D945, % 70 min. 71

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2CA310A25B35C32F17F18G21EA14P20R11**

Royalene® 400	150.0		
Royalene® 502*	25.0		
Zinc Oxide	5.0		
N550 Carbon Black	60.0		
Sunpar 2280 Paraffinic Oil	60.0	Specific Gravity	1.01
Zinc Stearate	1.5		
Naugex MBT	3.0	Mooney Viscosity	
Tuex (TMTD)	0.8	ML (1+4) at 100°C	22
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	0.7	MS at 125°C, t3, minutes	34
	<u>308.3</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA310</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	30 ± 5	31
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.7 (1840)
Elongation, %	500 min.	1000
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+5
Tensile Strength Change, %	± 30 max.	+8
Elongation change, %	- 50 max.	-21
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
	60 max.	52 <sup>(a)</sup>

<sup>(a)</sup> plied specimen

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+3
Tensile Strength Change, %	- 20 max.	+5
Elongation change, %	- 40 max.	-26
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	69
<b>Suffix C32 - Ozone Resistance</b>		
D1171, 72 hours at 50 ppm at 40°C Method B	pass	pass
<b>Suffix F17 - Low Temperature Brittleness</b>		
D2137 Method A at -40°C	pass	pass
<b>Suffix F18 - Low Temperature Brittleness</b>		
D2137 Method A at -50°C	pass	pass
<b>Suffix G21 - Tear Resistance</b>		
D624 Die C, kN/m	17 min.	28.0
<b>Suffix EA14 - Water Resistance</b>		
D471, 70 hours at 100°C Volume Change, %	± 5	+ 0.6
<b>Suffix P20 - Staining Resistance</b>		
D925, Method B	pass	pass
<b>Suffix R11 - Resilience</b>		
D945, %	70 min.	71

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2CA407A25B35C32F17F18G11G21EA14P20R11**

Royalene® 400	60.0		
Royalene® 502*	70.0		
Zinc Oxide	5.0		
N774 Carbon Black	115.0		
Austin Black	30.0		
Sunpar 2280 Paraffinic Oil	115.0	Specific Gravity	1.09
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	19
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	30+
	408.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA407</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	40 ± 5	44
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	8.2 (1190)
Elongation, %	400 min.	650
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+4
Tensile Strength Change, %	± 30 max.	+10
Elongation change, %	- 50 max.	-25
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
(a) plied specimen	60 max.	31 (a)
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+4
Tensile Strength Change, %	- 20 max.	+5
Elongation change, %	- 40 max.	-20
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	58
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>		
	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>		
	pass	pass
<b>Suffix F18 - Low Temperature Brittleness D2137 Method A at -50°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	17 min.	19.3
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	17 min.	28.0
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 1.3
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass
<b>Suffix R11 - Resilience D945, %</b>		
	70 min.	70

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2CA410A25B35C32F17F18G11G21EA14P20**

Royalene® 400	80.0		
Royalene® 502*	60.0		
Zinc Oxide	3.0		
N774 Carbon Black	140.0		
Sunpar 2280 Paraffinic Oil	110.0	Specific Gravity	1.10
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	22
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	30+
	406.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA410</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	40 ± 5	44
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.4 (1800)
Elongation, %	400 min.	680
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+6
Tensile Strength Change, %	± 30 max.	-8
Elongation change, %	- 50 max.	-28
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
( <sup>a</sup> ) plied specimen	60 max.	36 ( <sup>a</sup> )
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+5
Tensile Strength Change, %	- 20 max.	-8
Elongation change, %	- 40 max.	-22
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	57
<b>Suffix C32 - Ozone Resistance</b>		
D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass
<b>Suffix F17 - Low Temperature Brittleness</b>		
D2137 Method A at -40°C	pass	pass
<b>Suffix F18 - Low Temperature Brittleness</b>		
D2137 Method A at -50°C	pass	pass
<b>Suffix G11 - Tear Resistance</b>		
D624 Die B, kN/m	17 min.	26.3
<b>Suffix G21 - Tear Resistance</b>		
D624 Die C, kN/m	17 min.	26.3
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 1.0
<b>Suffix P20 - Staining Resistance</b>		
D925, Method B	pass	pass

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2CA414A25B35C32F17F18G21EA14P20**

Royalene® 400	150.0		
Royalene® 502*	25.0		
Zinc Oxide	5.0		
N550 Carbon Black	30.0		
N347 Carbon Black	30.0		
Sunpar 2280 Paraffinic Oil	35.0	Specific Gravity	1.02
Zinc Stearate	1.5		
Naugex MBT	3.0	Mooney Viscosity	
Tuex (TMTD)	0.8	ML (1+4) at 100°C	31
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	0.7	MS at 125°C, t3, minutes	23
	<u>283.3</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA414</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	40 ± 5	40
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	15.1 (2190)
Elongation, %	400 min.	850
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+6
Tensile Strength Change, %	± 30 max.	+1
Elongation change, %	- 50 max.	-19
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
(a) plied specimen	60 max.	46 <sup>(a)</sup>
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+2
Tensile Strength Change, %	- 20 max.	+2
Elongation change, %	- 40 max.	-16
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	59
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>		
	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>		
	pass	pass
<b>Suffix F18 - Low Temperature Brittleness D2137 Method A at -50°C</b>		
	pass	pass
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	17 min.	33.3
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C Volume Change, %</b>		
	± 5	+ 0.6
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M3CA507A25B35C32F17F18G11G21EA14P20R11**

Royalene® 400	50.0		
Royalene® 502*	75.0		
Zinc Oxide	5.0		
N774 Carbon Black	165.0		
Sunpar 2280 Paraffinic Oil	105.0	Specific Gravity	1.14
Zinc Stearate	1.5		
Naugex MBT	3.0	Mooney Viscosity	
Tuex (TMTD)	0.8	ML (1+4) at 100°C	28
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	0.7	MS at 125°C, t3, minutes	15
	<u>408.3</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA507</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	50 ± 5	53
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	11.0 (1590)
Elongation, %	300 min.	650
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+4
Tensile Strength Change, %	± 30 max.	+5
Elongation change, %	- 50 max.	-23
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
( <sup>a</sup> ) plied specimen	60 max.	49 ( <sup>a</sup> )
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+2
Tensile Strength Change, %	- 20 max.	+2
Elongation change, %	- 40 max.	-16
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	62
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>		
	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>		
	pass	pass
<b>Suffix F18 - Low Temperature Brittleness D2137 Method A at -50°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	26 min.	36.7
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	26 min.	40.3
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 0.9
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass
<b>Suffix R11 - Resilience D945, %</b>		
	50 min.	56

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M4CA510A25B35C32F17F18G11G21EA14P20R11**

Royalene® 400	40.0		
Royalene® 512	80.0		
Zinc Oxide	3.0		
N650 Carbon Black	40.0		
N774 Carbon Black	90.0		
Sunpar 2280 Paraffinic Oil	100.0	Specific Gravity	1.11
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	27
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	30+
	366.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA510</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	50 ± 5	51
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	14.0 (2020)
Elongation, %	300 min.	580
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+5
Tensile Strength Change, %	± 30 max.	0
Elongation change, %	- 50 max.	-26
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
<sup>(a)</sup> plied specimen	60 max.	30 <sup>(a)</sup>
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 4</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+3
Tensile Strength Change, %	- 20 max.	-1
Elongation change, %	- 40 max.	-19
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	59
<b>Suffix C32 - Ozone Resistance</b>		
D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass
<b>Suffix F17 - Low Temperature Brittleness</b>		
D2137 Method A at -40°C	pass	pass
<b>Suffix F18 - Low Temperature Brittleness</b>		
D2137 Method A at -50°C	pass	pass
<b>Suffix G11 - Tear Resistance</b>		
D624 Die B, kN/m	26 min.	28.0
<b>Suffix G21 - Tear Resistance</b>		
D624 Die C, kN/m	26 min.	31.5
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 1.7
<b>Suffix P20 - Staining Resistance</b>		
D925, Method B	pass	pass
<b>Suffix R11 - Resilience</b>		
D945, %	60 min.	65

**Grade M4CA514A25B35C32F17F18G11G21EA14P20R11**

Royalene® 400	80.0		
Royalene® 512	60.0		
Zinc Oxide	5.0		
N774 Carbon Black	75.0		
N347 Carbon Black	40.0		
HiSil 243LD	5.0		
Sunpar 2280 Paraffinic Oil	75.0	Specific Gravity	1.10
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	32
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	38
	<u>353.0</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA514</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	50 ± 5	52
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	14.5 (2100)
Elongation, %	350 min.	560
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+6
Tensile Strength Change, %	± 30 max.	-6
Elongation change, %	- 50 max.	-27
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
( <sup>a</sup> ) plied specimen	60 max.	32 ( <sup>a</sup> )
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 4</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+3
Tensile Strength Change, %	- 20 max.	-12
Elongation change, %	- 40 max.	-27
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	49
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 ppm at 40°C Method B</b>		
	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>		
	pass	pass
<b>Suffix F18 - Low Temperature Brittleness D2137 Method A at -50°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	26 min.	26.0
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	26 min.	33.3
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C Volume Change, %</b>		
	± 5	+ 0.9
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass
<b>Suffix R11 - Resilience D945, %</b>		
	60 min.	62

**Grade M4CA517A25B35C32F17F18G11G21K11EA14P20**

Royalene® 400	100.0		
Royalene® 502*	50.0		
Zinc Oxide	5.0		
N347 Carbon Black	80.0		
Sunpar 2280 Paraffinic Oil	45.0	Specific Gravity	1.06
Zinc Stearate	1.5		
Naugex MBT	3.0	Mooney Viscosity	
Tuex (TMTD)	0.8	ML (1+4) at 100°C	40
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	0.7	MS at 125°C, t3, minutes	17
	<u>288.3</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA517</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	50 ± 5	51
Tensile Strength, MPa (psi)	17.0 min. (2465) min.	18.8 (2730)
Elongation, %	350 min.	720
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+3
Tensile Strength Change, %	± 30 max.	-6
Elongation change, %	- 50 max.	-28
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
<sup>(a)</sup> plied specimen	60 max.	39 <sup>(a)</sup>
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 4</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+2
Tensile Strength Change, %	- 20 max.	+3
Elongation change, %	- 40 max.	-19
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	53
<b>Suffix C32 - Ozone Resistance</b>		
D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass
<b>Suffix F17 - Low Temperature Brittleness</b>		
D2137 Method A at -40°C	pass	pass
<b>Suffix F18 - Low Temperature Brittleness</b>		
D2137 Method A at -50°C	pass	pass
<b>Suffix G11 - Tear Resistance</b>		
D624 Die B, kN/m	26 min.	28.0
<b>Suffix G21 - Tear Resistance</b>		
D624 Die C, kN/m	26 min.	40.3
<b>Suffix K11 - Adhesion</b>		
D429, Method A, MPa	2.8 min.	5.6
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 1.0
<b>Suffix P20 - Staining Resistance</b>		
D925, Method B	pass	pass

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M3CA607A25B44B35C32F17F18G11G21EA14P20**

Royalene® 400	50.0		
Royalene® 512	75.0		
Zinc Oxide	5.0		
N650 Carbon Black	100.0		
N762 Carbon Black	100.0		
Sunpar 2280 Paraffinic Oil	120.0	Specific Gravity	1.16
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	31
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	30
	463.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA607</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	60 ± 5	64
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	10.1 (1470)
Elongation, %	300 min.	505
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+4
Tensile Strength Change, %	± 30 max.	+10
Elongation change, %	- 50 max.	-32
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
(a) plied specimen	60 max.	29 (a)
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+4
Tensile Strength Change, %	- 20 max.	+10
Elongation change, %	- 40 max.	-32
<b>Suffix B44 - Compression Set, D395 Method B 70 hours at 100°C, % Set</b>		
	50 max.	39
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	46
<b>Suffix C32 - Ozone Resistance, D1171 72 hours at 50 pphm at 40°C, Method B</b>		
	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>		
	pass	pass
<b>Suffix F18 - Low Temperature Brittleness D2137 Method A at -50°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	26 min.	39.5
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	26 min.	35.1
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 1.5
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass
<b>Suffix R11 – Resilience (2) D945, %</b>		
	50 min.	28

(2) Does not meet R11. Data shown for information only.

**Grade M4CA610A25B35C32F17F18G11G21EA14P20**

Royalene® 512	50.0		
Royalene® 622 (a)	70.0		
Zinc Oxide	5.0		
N650 Carbon Black	75.0		
N774 Carbon Black	75.0		
Sunpar 2280 Paraffinic Oil	100.0	Specific Gravity	1.20
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	23
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	33
	388.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA610</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	60 ± 5	63
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	11.9 (1730)
Elongation, %	250 min.	460
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+7
Tensile Strength Change, %	± 30 max.	+10
Elongation change, %	- 50 max.	-33
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
(b) plied specimen	60 max.	22 (b)
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 4</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+6
Tensile Strength Change, %	- 20 max.	+2
Elongation change, %	- 40 max.	-33
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	38
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 ppm at 40°C Method B</b>		
	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>		
	pass	pass
<b>Suffix F19 - Low Temperature Brittleness D2137 Method A at -55°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	26 min.	29.8
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	26 min.	29.8
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C Volume Change, %</b>		
	± 5	+ 1.0
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass
<b>Suffix R11 - Resilience (c) D945, %</b>		
	60 min.	58

(a) Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

(c) Does not meet R11. Data shown for information only.

Grade M4CA614A25B35C32F17F18F19G11EA14P20			
Royalene® 697	40.0	Specific Gravity	1.07
Royalene® 512	80.0	Mooney Viscosity	
Zinc Oxide	5.0	ML (1+4) at 100°C	49
N550 Carbon Black	85.0	Mooney Scorch	
Sunpar 2280 Paraffinic Oil	60.0	MS at 125°C, t3, minutes	8
Stearic Acid	1.0	Rheometer at 160°C	
Naugex MBT	3.0	Scorch, ts2, minutes	1.8
Tuex (TMTD)	0.8	Cure time, t'c90, minutes	7.7
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5		
Sulfur	0.7		
	<u>277.8</u>		

BASIC REQUIREMENTS	Grade MCA614	Laboratory Test Data 15' @160°C Cure
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**Unaged Physical Properties**

Hardness, Durometer A	60 ± 5	58
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	18.3 (2650)
Elongation, %	250 min.	685

**Heat Aged, D573, 70 hours at 125°C**

Hardness Change, points	± 15 max.	+4
Tensile Strength Change, %	± 30 max.	-16
Elongation change, %	- 50 max.	-33

**Compression Set, D395 Method B,**

22 hours at 100°C, % Set (a) plied specimen	60 max.	36 <sup>(a)</sup>
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**SUFFIX REQUIREMENTS**
**Suffix A25 - Heat Aged, D865, 70 hours at 125°C**

	Grade 4	Laboratory Test Data 15' @160°C Cures
Hardness Change, points	+ 10 max.	+4
Tensile Strength Change, %	- 20 max.	-16
Elongation change, %	- 40 max.	-33

**Suffix B35 - Compression Set, D395 Method B**

22 hours at 125°C, % Set	70 max.	55
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**Suffix C32 - Ozone Resistance**

D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass
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**Suffix F17 - Low Temperature Brittleness**

D2137 Method A at -40°C	pass	pass
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**Suffix F18 - Low Temperature Brittleness**

D2137 Method A at -50°C	pass	pass
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**Suffix F19 - Low Temperature Brittleness**

D2137 Method A at -55°C	pass	pass
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**Suffix G11 - Tear Resistance**

D624 Die B, kN/m	26 min.	47.3
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**Suffix EA14 - Water Resistance, D471, 70 hours at 100°C**

Volume Change, %	± 5	+ 0.5
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**Suffix P20 - Staining Resistance**

D925, Method B	pass	pass
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**Grade M3CA707A25B44B35C32F17F18G11G21K11EA14P20**

Royalene® 512	25.0		
Royalene® 622*	97.5		
Zinc Oxide	5.0		
N774 Carbon Black	110.0		
N550 Carbon Black	120.0		
Sunpar 2280 Paraffinic Oil	130.0	Specific Gravity	1.17
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	36
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	23
	500.5		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA707</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
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**Unaged Physical Properties**

Hardness, Durometer A	70 ± 5	74
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	9.5 (1375)
Elongation, %	200 min.	380

**Heat Aged, D573, 70 hours at 125°C**

Hardness Change, points	± 15 max.	+4
Tensile Strength Change, %	± 30 max.	+11
Elongation change, %	- 50 max.	-30

**Compression Set, D395 Method B,**

22 hours at 100°C, % Set ( <sup>a</sup> ) plied specimen	60 max.	25 ( <sup>a</sup> )
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<b>SUFFIX REQUIREMENTS</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
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**Suffix A25 - Heat Aged, D865, 70 hours at 125°C**

Hardness Change, points	+ 10 max.	+4
Tensile Strength Change, %	- 20 max.	+11
Elongation change, %	- 40 max.	-30

**Suffix B44 - Compression Set, D395 Method B**

70 hours at 100°C, % Set	50 max.	35
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**Suffix B35 - Compression Set, D395 Method B**

22 hours at 125°C, % Set	70 max.	41
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**Suffix C32 - Ozone Resistance**

D1171, 72 hours at 50 ppm at 40°C Method B	pass	pass
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**Suffix F17 - Low Temperature Brittleness**

D2137 Method A at -40°C	pass	pass
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**Suffix F18 - Low Temperature Brittleness**

D2137 Method A at -50°C	pass	pass
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**Suffix G11 - Tear Resistance**

D624 Die B, kN/m	26 min.	36.8
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**Suffix G21 - Tear Resistance**

D624 Die C, kN/m	26 min.	31.6
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**Suffix K11 - Adhesion**

D4249, Method A, MPa	1.4 min.	5.2
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**Suffix EA14 - Water Resistance, D471, 70 hours at 100°C**

Volume Change, %	± 5	+ 1.3
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**Suffix P20 - Staining Resistance**

D925, Method B	pass	pass
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\* Royalene 547 is the current polymer to replace the discontinued Royalene 662. A decrease in compound viscosity of ~5 points may be expected. Comparison data is available upon request.

**Grade M4CA710A25B35C32F17G11EA14P20****Grade M5CA710A25B35C32F17G11EA14P20**

Royalene® 539	100.0	Specific Gravity	1.16
Zinc Oxide	3.0	Mooney Viscosity	
N650 Carbon Black	90.0	ML (1+4) at 100°C	41
N774 Carbon Black	110.0	Mooney Scorch	
Sunpar 2280 Paraffinic Oil	150.0	MS at 125°C, t3, minutes	10
Stearic Acid	1.0	Rheometer at 160°C	
Tuex (TMTD)	0.8	Scorch, ts2, minutes	2.0
Naugex SD-1 (DTDM)	0.8	Cure Time, t'c90, minutes	8.2
Butazate (ZDBC)	1.5		
Naugex MBT	3.0		
Sulfur	0.7		
	460.8		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA710</b>	<b>Laboratory Test Data 15' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	70 ± 5	69
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	10.2 (1475)
Elongation, %	200 min.	610
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+1
Tensile Strength Change, %	± 30 max.	+11
Elongation change, %	- 50 max.	-44
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
(a) plied specimen	60 max.	45 <sup>(a)</sup>

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 4</b>	<b>Grade 5</b>	<b>Laboratory Test Data 15' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+1
Tensile Strength Change, %	- 20 max.	- 20 max.	+11
Elongation change, %	- 40 max.	- 40 max.	-44
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>			
	70 max.	50 max.	56
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 ppm at 40°C Method B</b>			
	pass	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>			
	pass	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>			
	26 min.	26 min.	59.0
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+0.8
<b>Suffix P20 - Staining Resistance D925, Method B</b>			
	pass	pass	pass

**Grade M4CA714A25B35C32F17F18G11G21K11EA14P20R11****Grade M5CA714A25B35C32F17F18G11G21K11EA14P20**

Royalene® 512	100.0		
Zinc Oxide	5.0		
N550 Carbon Black	105.0		
Sunpar 228 Paraffinic Oil	70.0	Specific Gravity	1.11
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity	
Tuex (TMTD)	0.8	ML (1+4) at 100°C	48
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	0.7	MS at 125°C, t3, minutes	15
	<u>288.3</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA714</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	70 ± 5	67
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	15.1 (2190)
Elongation, %	200 min.	530
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+2
Tensile Strength Change, %	± 30 max.	+4
Elongation change, %	- 50 max.	-40
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
( <sup>a</sup> ) plied specimen	60 max.	32 ( <sup>a</sup> )

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 4</b>	<b>Grade 5</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+1
Tensile Strength Change, %	- 20 max.	- 20 max.	0
Elongation change, %	- 40 max.	- 40 max.	-28
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>			
	70 max.	50 max.	48
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 ppm at 40°C Method B</b>			
	pass	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>			
	pass	pass	pass
<b>Suffix F18 - Low Temperature Brittleness D2137 Method A at -50°C</b>			
	pass	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>			
	26 min.	26 min.	31.5
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>			
	26 min.	26 min.	52.5
<b>Suffix K11 - Adhesion D429, Method A, MPa</b>			
	2.8 min.	2.8 min.	6.8
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 0.8
<b>Suffix P20 - Staining Resistance D925, Method B</b>			
	pass	pass	pass
<b>Suffix R11 - Resilience D945, %</b>			
	60 min.	---	62

**Grade M6CA807A25B35C32F17G11G21K11EA14P20**

Royalene® 512	100.0		
Zinc Oxide	5.0		
N774 Carbon Black	160.0		
N550 Carbon Black	60.0		
Sunpar 2280 Paraffinic Oil	75.0		
A-C 617 Polyethylene Wax	15.0	Specific Gravity	1.23
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity	
Naugex SD-1 (DTDM)	2.0	ML (1+4) at 100°C	81
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch	
Sulfur	0.5	MS at 125°C, t3, minutes	18
	428.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA807</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	80 ± 5	87
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	11.9 (1720) min.
Elongation, %	150 min.	225
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	-1
Tensile Strength Change, %	± 30 max.	+1
Elongation change, %	- 50 max.	-29
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
( <sup>a</sup> ) plied specimen	60 max.	22 ( <sup>a</sup> )
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 6</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C (<sup>2</sup>)</b>		
Hardness Change, points	+ 10 max.	-1
Tensile Strength Change, %	- 20 max.	+1
Elongation change, %	- 40 max.	-29
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	35
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>		
	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	26 min.	37.7
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	26 min.	31.6
<b>Suffix K11 - Adhesion D4249, Method A, MPa</b>		
	1.4 min.	4.2
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 1.2
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass

(<sup>2</sup>) Used D573 method

**Grade M7CA810A25B35C32F17F18G11G21EA14P20****Grade M8CA810A25B35C32F17F18G11G21EA14P20**

Royalene® 512	100.0		
Zinc Oxide	3.0		
N774 Carbon Black	145.0		
N650 Carbon Black	50.0		
Sunpar 150 Paraffinic Oil	65.0		
A-C 617 Polyethylene Wax	15.0	Specific Gravity	1.21
Zinc Stearate	1.5		
Tuex (TMTD)	3.0	Mooney Viscosity ML (1+4) at 100°C	65
Naugex SD-1 (DTDM)	2.0		
Butazate (ZDBC)	3.0		
Methazate (ZDMC)	3.0	Mooney Scorch MS at 125°C, t3, minutes	18
Sulfur	0.5		
	391.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA810</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	80 ± 5	78
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.8 (1850)
Elongation, %	150 min.	220
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+1
Tensile Strength Change, %	± 30 max.	+14
Elongation change, %	- 50 max.	-32
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
(a) plied specimen	60 max.	22 (a)

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 7</b>	<b>Grade 8</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+1
Tensile Strength Change, %	- 20 max.	- 20 max.	+3
Elongation change, %	- 40 max.	- 40 max.	-27
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>			
	70 max.	50 max.	36
<b>Suffix C32 - Ozone Resistance</b>			
D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass	pass
<b>Suffix F17 - Low Temperature Brittleness</b>			
D2137 Method A at -40°C	pass	pass	pass
<b>Suffix F18 - Low Temperature Brittleness</b>			
D2137 Method A at -50°C	pass	pass	pass
<b>Suffix G11 - Tear Resistance</b>			
D624 Die B, kN/m	26 min.	26 min.	28.0
<b>Suffix G21 - Tear Resistance</b>			
D624 Die C, kN/m	26 min.	26 min.	28.0
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 0.9
<b>Suffix P20 - Staining Resistance</b>			
D925, Method B	pass	pass	pass

**Grade M7CA814A25B35C32F17F18G11G21K11EA14P20**

Royalene® 512	100.0		
Zinc Oxide	5.0		
N550 Carbon Black	65.0		
N347 Carbon Black	65.0		
Sunpar 2280 Paraffinic Oil	50.0		
A-C 617 Polyethylene Wax	15.0	Specific Gravity	1.15
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity	
Tuex (TMTD)	0.8	ML (1+4) at 100°C	89
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	0.7	MS at 125°C, t3, minutes	12
	<u>308.3</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA814</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	80 ± 5	83
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	15.1 (2200)
Elongation, %	150 min.	380
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	+5
Tensile Strength Change, %	± 30 max.	+10
Elongation change, %	- 50 max.	-34
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
( <sup>a</sup> ) plied specimen	60 max.	36 ( <sup>a</sup> )
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 6</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C (<sup>2</sup>)</b>		
Hardness Change, points	+ 10 max.	-5
Tensile Strength Change, %	- 20 max.	+10
Elongation change, %	- 40 max.	-34
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	60
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>		
	pass	pass
<b>Suffix F17 - Low Temperature Brittleness D2137 Method A at -40°C</b>		
	pass	pass
<b>Suffix F18 - Low Temperature Brittleness D2137 Method A at -50°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	26 min.	50.9
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	26 min.	42.1
<b>Suffix K11 - Adhesion D4249, Method A, MPa</b>		
	2.8 min.	5.5
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 1.2
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass

(<sup>2</sup>) Used D573 method

**Grade M6CA907A25B35C32F17G11G21EA14P20**

Royalene® 512	100.0		
Zinc Oxide	5.0		
N762 Carbon Black	270.0		
Sunpar 2280 Paraffinic Oil	65.0		
A-C 617 Polyethylene Wax	15.0		
Paraffin Wax	5.0	Specific Gravity	1.28
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity	
Tuex (TMTD)	0.8	ML (1+4) at 100°C	69
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	0.7	MS at 125°C, t3, minutes	14
	468.3		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA907</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	90 ± 5	88
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	10.2 (1480)
Elongation, %	100 min.	180
<b>Heat Aged, D573, 70 hours at 125°C</b>		
Hardness Change, points	± 15 max.	-3
Tensile Strength Change, %	± 30 max.	+18
Elongation change, %	- 50 max.	-33
<b>Compression Set, D395 Method B, 22 hours at 100°C, % Set</b>		
(a) plied specimen	60 max.	38 <sup>(a)</sup>
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 6</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 125°C</b>		
Hardness Change, points	+ 10 max.	+3
Tensile Strength Change, %	- 20 max.	+14
Elongation change, %	- 40 max.	-33
<b>Suffix B35 - Compression Set, D395 Method B 22 hours at 125°C, % Set</b>		
	70 max.	66
<b>Suffix C32 - Ozone Resistance</b>		
D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass
<b>Suffix F17 - Low Temperature Brittleness</b>		
D2137 Method A at -40°C	pass	pass
<b>Suffix G11 - Tear Resistance</b>		
D624 Die B, kN/m	26 min.	26
<b>Suffix G21 - Tear Resistance</b>		
D624 Die C, kN/m	26 min.	32
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>		
Volume Change, %	± 5	+ 0.9
<b>Suffix P20 - Staining Resistance</b>		
D925, Method B	pass	pass

**Grade M7CA910A25B35C32F17G11G21K11EA14P20**

Royalene® 512	100.0		
Zinc Oxide	5.0		
N774 Carbon Black	160.0		
N550 Carbon Black	60.0		
Sunpar 2280 Paraffinic Oil	60.0		
A-C 617 Polyethylene Wax	15.0		
Paraffin Wax	5.0	Specific Gravity	1.24
Zinc Stearate	1.5		
Naugex MBTS	3.0	Mooney Viscosity	
Tuex (TMTD)	0.8	ML (1+4) at 100°C	94
Naugex SD-1 (DTDM)	0.8		
Butazate (ZDBC)	1.5	Mooney Scorch	
Sulfur	0.7	MS at 125°C, t3, minutes	9
	413.3		

<b>BASIC REQUIREMENTS</b>	<b>Grade MCA910</b>	<b>Laboratory Test Data 30' @160°C Cure</b>
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**Unaged Physical Properties**

Hardness, Durometer A	90 ± 5	87
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	10.8 (1560)
Elongation, %	100 min.	220

**Heat Aged, D573, 70 hours at 125°C**

Hardness Change, points	± 15 max.	+3
Tensile Strength Change, %	± 30 max.	+19
Elongation change, %	- 50 max.	-41

**Compression Set, D395 Method B,**

22 hours at 100°C, % Set ( <sup>a</sup> ) plied specimen	60 max.	41 ( <sup>a</sup> )
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**SUFFIX REQUIREMENTS**

<b>Grade 7</b>	<b>Laboratory Test Data 30' @160°C Cures</b>
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**Suffix A25 - Heat Aged, D865, 70 hours at 125°C**

Hardness Change, points	+ 10 max.	+1
Tensile Strength Change, %	- 20 max.	+5
Elongation change, %	- 40 max.	-32

**Suffix B35 - Compression Set, D395 Method B**

22 hours at 125°C, % Set	70 max.	56
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**Suffix C32 - Ozone Resistance**

D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass
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**Suffix F17 - Low Temperature Brittleness**

D2137 Method A at -40°C	pass	pass
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**Suffix G11 - Tear Resistance**

D624 Die B, kN/m	26 min.	33.3
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**Suffix G21 - Tear Resistance**

D624 Die C, kN/m	26 min.	42.0
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**Suffix K11 - Adhesion**

D4249, Method A, MPa	2.8 min.	5.3
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**Suffix EA14 - Water Resistance, D471, 70 hours at 100°C**

Volume Change, %	± 5	+ 0.6
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**Suffix P20 - Staining Resistance**

D925, Method B	pass	pass
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**Grade M2DA507A26B36C32F19G11G21EA14P20**

Royalene® 400	100.0		
Royalene® 502*	50.0	Specific Gravity	1.11
N650 Carbon Black	70.0		
N762 Carbon Black	65.0	Mooney Viscosity	
Sunpar 2280 Paraffinic	70.0	ML (1+4) at 100°C	32
Naugard Q (TMQ) Antioxidant	1.0		
Saret 517 Coagent	2.0	Mooney Scorch	
DiCup 40KE Peroxide	10.0	MS at 125°C, t3, minutes	19
	368.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA507</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	50 ± 5	47
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	8.9 (1290)
Elongation, %	300 min.	520
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+6
Tensile Strength Change, %	± 30 max.	-2
Elongation change, %	- 50 max.	-8
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>		
	50 max.	19 <sup>(a)</sup>
<sup>(a)</sup> plied specimen		
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C</b>		
Hardness Change, points	+ 10 max.	+2
Tensile Strength Change, %	- 20 max.	-13
Elongation change, %	- 20 max.	0
<b>Suffix B36 - Compression Set, D395 Method B 22 hours at 150°C, % Set</b>		
	40 max.	19
<b>Suffix C32 - Ozone Resistance</b>		
D1171, 72 hours at 50 ppm at 40°C Method B	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>		
D2137 Method A at -55°C	pass	pass
<b>Suffix G11 - Tear Resistance</b>		
D624 Die B, kN/m	17 min.	24.5
<b>Suffix G21 - Tear Resistance</b>		
D624 Die C, kN/m	17 min.	29.8
<b>Suffix EA14 - Water Resistance</b>		
D471, 70 hours at 100°C Volume Change, %	± 5	+1.9
<b>Suffix P20 - Staining Resistance</b>		
D925, Method B	pass	pass

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2DA510A26B36C32F19G11G21EA14P20R11**

Royalene® 400	100.0	Specific Gravity	1.06
Royalene® 502*	50.0		
N650 Carbon Black	80.0	Mooney Viscosity	
Sunpar 2280 Paraffinic	35.0	ML (1+4) at 100°C	39
Naugard Q (TMQ) Antioxidant	1.0		
Drimix 75% TAC Coagent	1.3	Mooney Scorch	
DiCup 40KE Peroxide	10.0	MS at 125°C, t3, minutes	30+
	<u>277.3</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA510</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	50 ± 5	47
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.1 (1760)
Elongation, %	300 min.	660
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+5
Tensile Strength Change, %	± 30 max.	+9
Elongation change, %	- 50 max.	-5
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>		
	50 max.	24 <sup>(a)</sup>
<sup>(a)</sup> plied specimen		
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C</b>		
Hardness Change, points	+ 10 max.	+4
Tensile Strength Change, %	- 20 max.	-11
Elongation change, %	- 20 max.	-6
<b>Suffix B36 - Compression Set, D395 Method B 22 hours at 150°C, % Set</b>		
	40 max.	24
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>		
	pass	pass
<b>Suffix F19 - Low Temperature Brittleness D2137 Method A at -55°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	17 min.	28.0
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	17 min.	33.3
<b>Suffix EA14 - Water Resistance D471, 70 hours at 100°C Volume Change, %</b>		
	± 5	+2.2
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass
<b>Suffix R11 - Resilience D945, %</b>		
	60 min.	69

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2DA514A26B36C32F19G11G21EA14P20R11**

Royalene® 400	40.0	Specific Gravity	1.04
Royalene® 502*	80.0		
N650 Carbon Black	60.0	Mooney Viscosity	
Sunpar 2280 Paraffinic	30.0	ML (1+4) at 100°C	49
Naugard Q (TMQ) Antioxidant	1.0		
Drimix 75% TAC Coagent	1.3	Mooney Scorch	
DiCup 40KE Peroxide	8.0	MS at 125°C, t3, minutes	30+
	220.3		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA514</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	50 ± 5	52
Tensile Strength, MPa (psi)	14.0 min. (2030) min.	15.6 (2260)
Elongation, %	350 min.	560
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+6
Tensile Strength Change, %	± 30 max.	+3
Elongation change, %	- 50 max.	0
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>		
	50 max.	13 <sup>(a)</sup>
<sup>(a)</sup> plied specimen		
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C</b>		
Hardness Change, points	+ 10 max.	+4
Tensile Strength Change, %	- 20 max.	-8
Elongation change, %	- 20 max.	-5
<b>Suffix B36 - Compression Set, D395 Method B 22 hours at 150°C, % Set</b>		
	40 max.	13
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>		
	pass	pass
<b>Suffix F19 - Low Temperature Brittleness D2137 Method A at -55°C</b>		
	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>		
	17 min.	22.8
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>		
	17 min.	40.3
<b>Suffix EA14 - Water Resistance D471, 70 hours at 100°C Volume Change, %</b>		
	± 5	+1.7
<b>Suffix P20 - Staining Resistance D925, Method B</b>		
	pass	pass
<b>Suffix R11 - Resilience D945, %</b>		
	60 min.	73

\* Royalene 563 is the current polymer to replace the discontinued Royalene 502. An increase in compound viscosity of ~3 points may be expected. Comparison data is available upon request.

**Grade M2DA607B36C32G11G21EA14P20****Grade M3DA607B36C32G11G21EA14P20**

Royalene® 539	50.0	Specific Gravity	1.11
Royalene® 512	50.0		
N650 Carbon Black	150.0	Mooney Viscosity	
Unipar 580 Paraffinic Oil	110.0	ML (1+4) at 100°C	37
Naugard 445 Antioxidant	1.0		
Saret 517	1.0	Mooney Scorch	
DiCup 40KE Peroxide	10.0	MS at 125°C, t3, minutes	21
	372.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA607</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	60 ± 5	60
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	10.0 (1450)
Elongation, %	250 min.	355
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+14
Tensile Strength Change, %	± 30 max.	-2
Elongation change, %	- 50 max.	-3
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>		
(a) plied specimen	50 max.	18 <sup>(a)</sup>

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
<b>Suffix B36 - Compression Set, D395 Method B</b>			
22 hours at 150°C, % Set	40 max.	25 max.	18
<b>Suffix C32 - Ozone Resistance</b>			
D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass	pass
<b>Suffix G11 - Tear Resistance</b>			
D624 Die B, kN/m	17 min.	17 min.	29.8
<b>Suffix G21 - Tear Resistance</b>			
D624 Die C, kN/m	17 min.	17 min.	21.0
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 1.7
<b>Suffix P20 - Staining Resistance</b>			
D925, Method B	pass	pass	pass

**Grade M2DA610A26B36C32G11G21EA14P20****Grade M3DA610A26B36C32G11G21EA14P20**

Royalene® 539	25.0		
Royalene® 512	75.0	Specific Gravity	1.10
N650 Carbon Black	75.0		
N762 Carbon Black	40.0	Mooney Viscosity	
Unipar 580 Paraffinic Oil	80.0	ML (1+4) at 100°C	38
Naugard 445 Antioxidant	1.0		
Saret 517	1.0	Mooney Scorch	
DiCup 40KE Peroxide	8.0	MS at 125°C, t3, minutes	21
	305.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA610</b>		<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	60 ± 5		57
Tensile Strength, MPa	10.0 min.		12.4
(psi)	(1459) min.		(1805)
Elongation, %	250 min.		360
<b>Heat Aged, D573, 70 hours at 150°C</b>			
Hardness Change, points	± 15 max.		+10
Tensile Strength Change, %	± 30 max.		-1
Elongation change, %	- 50 max.		+2
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>			
( <sup>a</sup> ) plied specimen	50 max.		19 <sup>(1a)</sup>
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C</b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+10
Tensile Strength Change, %	- 20 max.	- 20 max.	-1
Elongation change, %	- 20 max.	- 20 max.	+2
<b>Suffix B36 - Compression Set, D395 Method B 22 hours at 150°C, % Set</b>			
	40 max.	25 max.	19
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 ppm at 40°C Method B</b>			
	pass	pass	pass
<b>Suffix G11 - Tear Resistance</b>			
D624 Die B, kN/m	17 min.	17 min.	34.1
<b>Suffix G21 - Tear Resistance</b>			
D624 Die C, kN/m	17 min.	17 min.	24.5
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 1.5
<b>Suffix P20 - Staining Resistance D925, Method B</b>			
	pass	pass	pass

**Grade M2DA614A26B36C32F19G11G21EA14P20R11****Grade M3DA614A26B36C32F19G11G21EA14P20R11**

Royalene® 512	100.0	Specific Gravity	1.09
N762 Carbon Black	80.0	Mooney Viscosity	
Sunpar 2280 Paraffinic Oil	40.0	ML (1+4) at 100°C	48
Naugard 445 Antioxidant	1.0	Mooney Scorch	
Drimix 75% TAC Coagent	1.3	MS at 125°C, t3, minutes	30+
DiCup 40KE Peroxide	7.0		
	229.3		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA614</b>		<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>			
Hardness, Durometer A	60 ± 5		59
Tensile Strength, MPa (psi)	14.0 min. (2030) min.		15.9 (2310)
Elongation, %	300 min.		520
<b>Heat Aged, D573, 70 hours at 150°C</b>			
Hardness Change, points	± 15 max.		+4
Tensile Strength Change, %	± 30 max.		-1
Elongation change, %	- 50 max.		-2
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>			
(a) plied specimen	50 max.		19 <sup>(a)</sup>
<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C</b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+3
Tensile Strength Change, %	- 20 max.	- 20 max.	-4
Elongation change, %	- 20 max.	- 20 max.	-4
<b>Suffix B36 - Compression Set, D395 Method B</b>			
22 hours at 150°C, % Set	40 max.	25 max.	19
<b>Suffix C32 - Ozone Resistance</b>			
D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>			
D2137, Method A at -55°C	pass	pass	pass
<b>Suffix G11 - Tear Resistance</b>			
D624 Die B, kN/m	17 min.	17 min.	33.3
<b>Suffix G21 - Tear Resistance</b>			
D624 Die C, kN/m	17 min.	17 min.	49.0
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 0.5
<b>Suffix P20 - Staining Resistance</b>			
D925, Method B	pass	pass	pass
<b>Suffix R11 - Resilience</b>			
D945, %	60 min.	60 min.	68

**Grade M2DA707A26B36C32F19G11G21EA14P20****Grade M3DA707A26B36C32F19G11G21EA14P20**

Royalene® 622*	70.0		
Royalene® 512	50.0		
N650 Carbon Black	100.0	Specific Gravity	1.17
N762 Carbon Black	90.0		
Sunpar 2280 Paraffinic Oil	100.0	Mooney Viscosity	
Naugard Q (TMQ) Antioxidant	1.0	ML (1+4) at 100°C	41
Saret 517	2.0		
Drimix 75% TAC Coagent	1.0	Mooney Scorch	
DiCup 40KE Peroxide	12.0	MS at 125°C, t3, minutes	17
	426.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA707</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	70 ± 5	71
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	9.5 (1380)
Elongation, %	200 min.	270
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+8
Tensile Strength Change, %	± 30 max.	-7
Elongation change, %	- 50 max.	0
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>		
	50 max.	21 <sup>(a)</sup>

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C</b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+5
Tensile Strength Change, %	- 20 max.	- 20 max.	-13
Elongation change, %	- 20 max.	- 20 max.	0
<b>Suffix B36 - Compression Set, D395 Method B 22 hours at 150°C, % Set</b>			
	40 max.	25 max.	21
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>			
	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness D2137, Method A at -55°C</b>			
	pass	pass	pass
<b>Suffix G11 - Tear Resistance D624 Die B, kN/m</b>			
	17 min.	17 min.	22.8
<b>Suffix G21 - Tear Resistance D624 Die C, kN/m</b>			
	17 min.	17 min.	24.5
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 2.2
<b>Suffix P20 - Staining Resistance D925, Method B</b>			
	pass	pass	pass

\* Royalene 539 is the current polymer to replace the discontinued Royalene 622. About 25 phr free oil should be added when replacing 130 phr or Royalene 622 with 100 phr Royalene 539. Comparison data is available upon request.

**Grade M2DA710A26B36C32F19G11G21EA14P20****Grade M3DA710A26B36C32F19G11G21EA14P20**

Royalene® 622*	35.0		
Royalene® 512	75.0	Specific Gravity	1.18
N774 Carbon Black	160.0		
Sunpar 2280 Paraffinic Oil	60.0	Mooney Viscosity	
Naugard Q (TMQ) Antioxidant	1.0	ML (1+4) at 100°C	55
Saret 517	2.0		
Drimix 75% TAC Coagent	1.0	Mooney Scorch	
DiCup 40KE Peroxide	10.0	MS at 125°C, t3, minutes	13
	344.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA710</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	70 ± 5	73
Tensile Strength, MPa	10.0 min.	12.7
(psi)	(1450) min.	(1840)
Elongation, %	200 min.	260
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+8
Tensile Strength Change, %	± 30 max.	-6
Elongation change, %	- 50 max.	-4
<b>Compression Set, D395 Method B,</b>		
22 hours at 150°C, % Set	50 max.	18 <sup>(a)</sup>

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C</b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+4
Tensile Strength Change, %	- 20 max.	- 20 max.	-4
Elongation change, %	- 20 max.	- 20 max.	-4
<b>Suffix B36 - Compression Set, D395 Method B</b>			
22 hours at 150°C, % Set	40 max.	25 max.	18
<b>Suffix C32 - Ozone Resistance</b>			
D1171, 72 hours at 50 ppm at 40°C Method B	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>			
D2137, Method A at -55°C	pass	pass	pass
<b>Suffix G11 - Tear Resistance</b>			
D624 Die B, kN/m	17 min.	17 min.	26.3
<b>Suffix G21 - Tear Resistance</b>			
D624 Die C, kN/m	17 min.	17 min.	29.8
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 0.4
<b>Suffix P20 - Staining Resistance</b>			
D925, Method B	pass	pass	pass

\* Royalene 539 is the current polymer to replace the discontinued Royalene 622. About 25 phr free oil should be added when replacing 130 phr or Royalene 622 with 100 phr Royalene 539. Comparison data is available upon request.

**Grade M2DA714A26B36C32F19G11G21EA14P20R11**

**Grade M3DA714A26B36C32F19G11G21EA14P20R11**

Royalene® 512	100.0	Specific Gravity	1.13
N774 Carbon Black	100.0	Mooney Viscosity	
Sunpar 2280 Paraffinic Oil	35.0	ML (1+4) at 100°C	60
Naugard Q (TMQ) Antioxidant	1.0	Mooney Scorch	
Saret 517	2.0	MS at 125°C, t3, minutes	13
DiCup 40KE Peroxide	9.0		
	247.0		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA714</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	70 ± 5	69
Tensile Strength, MPa	14.0 min.	16.9
(psi)	(2030) min.	(2450)
Elongation, %	200 min.	320
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+7
Tensile Strength Change, %	± 30 max.	-1
Elongation change, %	- 50 max.	-3
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>		
	50 max.	17 <sup>(a)</sup>
<sup>(a)</sup> plied specimen		

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C</b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+3
Tensile Strength Change, %	- 20 max.	- 20 max.	-8
Elongation change, %	- 20 max.	- 20 max.	-3
<b>Suffix B36 - Compression Set, D395 Method B</b>			
22 hours at 150°C, % Set	40 max.	25 max.	17
<b>Suffix C32 - Ozone Resistance</b>			
D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass	pass
<b>Suffix F19 - Low Temperature Brittleness</b>			
D2137, Method A at -55°C	pass	pass	pass
<b>Suffix G11 - Tear Resistance</b>			
D624 Die B, kN/m	17 min.	17 min.	31.5
<b>Suffix G21 - Tear Resistance</b>			
D624 Die C, kN/m	17 min.	17 min.	38.5
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 0.1
<b>Suffix P20 - Staining Resistance</b>			
D925, Method B	pass	pass	pass
<b>Suffix R11 - Resilience</b>			
D945, %	60 min.	60 min.	62

**Grade M2DA807A26B36C32G11G21EA14P20****Grade M3DA807A26B36C32G11G21EA14P20**

Royalene® 512	75.0		
Royalene® 521 <sup>(a)</sup>	25.0		
A-C 617 Low MW Polyethylene	10.0	Specific Gravity	1.23
N762 Carbon Black	220.0		
Sunpar 2280 Paraffinic Oil	70.0	Mooney Viscosity	
Naugard Q (TMQ) Antioxidant	1.0	ML (1+4) at 100°C	62
Saret 517	1.0		
Drimix 75% TAC Coagent	1.3	Mooney Scorch	
DiCup 40KE Peroxide	10.0	MS at 125°C, t3, minutes	20
	413.3		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA807</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	80 ± 5	80
Tensile Strength, MPa (psi)	7.0 min. (1015) min.	9.3 (1350)
Elongation, %	150 min.	260
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+5
Tensile Strength Change, %	± 30 max.	-13
Elongation change, %	- 50 max.	-4
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>		
	50 max.	15 <sup>(a)</sup>

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C <sup>(c)</sup></b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+5
Tensile Strength Change, %	- 20 max.	- 20 max.	-13
Elongation change, %	- 20 max.	- 20 max.	-4
<b>Suffix B36 - Compression Set, D395 Method B</b>			
22 hours at 150°C, % Set	40 max.	25 max.	15
<b>Suffix C32 - Ozone Resistance</b>			
D1171, 72 hours at 50 ppm at 40°C Method B	pass	pass	pass
<b>Suffix G11 - Tear Resistance</b>			
D624 Die B, kN/m	17 min.	17 min.	22.0
<b>Suffix G21 - Tear Resistance</b>			
D624 Die C, kN/m	17 min.	17 min.	26.3
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 0.8
<b>Suffix P20 - Staining Resistance</b>			
D925, Method B	pass	pass	pass

<sup>(a)</sup> Royalene 511 is the current polymer to replace the discontinued Royalene 521. Comparison data is available upon request.

<sup>(c)</sup> used D573 method

**Grade M2DA810A26B36C32G11G21EA14P20****Grade M3DA810A26B36C32G11G21EA14P20**

Royalene® 512	75.0		
Royalene® 521 <sup>(a)</sup>	25.0		
A-C 617 Low MW Polyethylene	10.0	Specific Gravity	1.23
N762 Carbon Black	185.0		
Sunpar 2280 Paraffinic Oil	40.0	Mooney Viscosity	
Naugard Q (TMQ) Antioxidant	1.0	ML (1+4) at 100°C	93
Saret 517	1.0		
Drimix 75% TAC Coagent	1.3	Mooney Scorch	
DiCup 40KE Peroxide	8.0	MS at 125°C, t3, minutes	15
	<u>346.3</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA810</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
<b>Unaged Physical Properties</b>		
Hardness, Durometer A	80 ± 5	85
Tensile Strength, MPa (psi)	10.0 min. (1450) min.	12.6 (1830)
Elongation, %	150 min.	220
<b>Heat Aged, D573, 70 hours at 150°C</b>		
Hardness Change, points	± 15 max.	+2
Tensile Strength Change, %	± 30 max.	-15
Elongation change, %	- 50 max.	-9
<b>Compression Set, D395 Method B, 22 hours at 150°C, % Set</b>		
	50 max.	12 <sup>(b)</sup>

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
<b>Suffix A25 - Heat Aged, D865, 70 hours at 150°C <sup>(c)</sup></b>			
Hardness Change, points	+ 10 max.	+ 10 max.	+2
Tensile Strength Change, %	- 20 max.	- 20 max.	-15
Elongation change, %	- 20 max.	- 20 max.	-9
<b>Suffix B36 - Compression Set, D395 Method B 22 hours at 150°C, % Set</b>			
	40 max.	25 max.	12
<b>Suffix C32 - Ozone Resistance D1171, 72 hours at 50 pphm at 40°C Method B</b>			
	pass	pass	pass
<b>Suffix G11 - Tear Resistance</b>			
D624 Die B, kN/m	17 min.	17 min.	24.5
<b>Suffix G21 - Tear Resistance</b>			
D624 Die C, kN/m	17 min.	17 min.	26.3
<b>Suffix EA14 - Water Resistance, D471, 70 hours at 100°C</b>			
Volume Change, %	± 5	± 5	+ 0.8
<b>Suffix P20 - Staining Resistance D925, Method B</b>			
	pass	pass	pass

<sup>(a)</sup> Royalene 511 is the current polymer to replace the discontinued Royalene 521. Comparison data is available upon request.

<sup>(c)</sup> used D573 method

**Grade M2DA814A26B36C32F19G11G21EA14P20****Grade M3DA814A26B36C32F19G11G21EA14P20**

Royalene® 521 <sup>(a)</sup>	100.0	Specific Gravity	1.16
A-C 617 Low MW Polyethylene	15.0	Mooney Viscosity	
N762 Carbon Black	105.0	ML (1+4) at 100°C	66
Sunpar 2280 Paraffinic Oil	5.0	Mooney Scorch	
Naugard Q (TMQ) Antioxidant	1.0	MS at 125°C, t3, minutes	13
Sartomer SR 350	2.0		
DiCup 40KE Peroxide	8.5		
	<u>236.5</u>		

<b>BASIC REQUIREMENTS</b>	<b>Grade MDA814</b>	<b>Laboratory Test Data 30' @165°C Cure</b>
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**Unaged Physical Properties**

Hardness, Durometer A	80 ± 5	82
Tensile Strength, MPa	14.0 min.	16.8
(psi)	(2030) min.	(2440)
Elongation, %	150 min.	210

**Heat Aged, D573, 70 hours at 150°C**

Hardness Change, points	± 15 max.	+4
Tensile Strength Change, %	± 30 max.	-7
Elongation change, %	- 50 max.	-5

**Compression Set, D395 Method B,**

22 hours at 150°C, % Set	50 max.	8 <sup>(b)</sup>
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<sup>(b)</sup> plied specimen

<b>SUFFIX REQUIREMENTS</b>	<b>Grade 2</b>	<b>Grade 3</b>	<b>Laboratory Test Data 30' @165°C Cures</b>
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**Suffix A25 - Heat Aged, D865, 70 hours at 150°C <sup>(c)</sup>**

Hardness Change, points	+ 10 max.	+ 10 max.	+4
Tensile Strength Change, %	- 20 max.	- 20 max.	-7
Elongation change, %	- 20 max.	- 20 max.	-5

**Suffix B36 - Compression Set, D395 Method B**

22 hours at 150°C, % Set	40 max.	25 max.	8
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**Suffix C32 - Ozone Resistance**

D1171, 72 hours at 50 pphm at 40°C Method B	pass	pass	pass
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**Suffix F19 - Low Temperature Brittleness**

D2137, Method A at -55°C	pass	pass	pass
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**Suffix G11 - Tear Resistance**

D624 Die B, kN/m	17 min.	17 min.	27.2
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**Suffix G21 - Tear Resistance**

D624 Die C, kN/m	17 min.	17 min.	30.6
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**Suffix EA14 - Water Resistance, D471, 70 hours at 100°C**

Volume Change, %	± 5	± 5	+ 0.2
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**Suffix P20 - Staining Resistance**

D925, Method B	pass	pass	pass
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<sup>(a)</sup> Royalene 511 is the current polymer to replace the discontinued Royalene 521. Comparison data is available upon request.

<sup>(c)</sup> used D573 method

## TABLE OF INGREDIENTS

Ingredients	Description	Chemical Name	Supplier
Royalene® 400	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Royalene® 502	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Royalene® 511	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Royalene® 512	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Royalene® 521	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Royalene® 539	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Royalene® 547	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Royalene® 622	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Royalene® 697	EPDM Rubber	Ethylene propylene diene methylene	Lion Copolymer
Butazate	Accelerator	Zinc dibutyldithiocarbamate (ZDBC)	Chemtura Corp.
Methazate	Accelerator	Zinc dimethyldithiocarbamate (ZDMC)	Chemtura Corp.
Naugard 445	Antioxidant	4,4'-Bis( $\alpha,\alpha$ -dimethylbenzyl)diphenylamine	Chemtura Corp.
Naugard Q	Antioxidant	Polymerized 1,2-dihydro-2,2,4-trimethylquinoline	Chemtura Corp.
Naugex SD-1	Accelerator	Dithiodimorpholine (DTDM)	Chemtura Corp.
Naugex MBT	Accelerator	2-Mercaptobenzothiazole	Chemtura Corp.
Naugex MBTS	Accelerator	Benzothiazyl disulfide	Chemtura Corp.
Tuex	Accelerator	Tetramethylthiuram disulfide (TMTD)	Chemtura Corp.
AC-617	Process Aid	Low density polyethylene	Honeywell Spec.
Atomite Whiting	Filler	Ground calcium carbonate	H. M. Royal
Austin Black	Filler	Carbon black	Coal Fillers Inc.
DBQDO	Accelerator	Dibenzoyl-p-quinone dioxime	Lord Corp.
DiCup 40-KE	Peroxide	Dicumyl peroxide	Geo Specialties
Drimix 75% TAC	Coagent	Triallyl cyanurate	Kenrich
Ethyl Tellurac	Accelerator	Tellurium diethyldithiocarbamate (TeDTC)	R.T. Vanderbilt
HiSil 243 LD	Filler	Amorphous precipitated silica	PPG Industries
N347 Black	Filler	Carbon black	Various
N550 Black	Filler	Carbon black	Various
N762 Black	Filler	Carbon black	Various
N774 Black	Filler	Carbon black	Various
Paraffin Wax	Process Aid	Paraffin wax	Various
Saret 517	Coagent	Trifunctional crosslinking agent (scorch retarded)	Sartomer Co.
SR-350	Coagent	Trimethylolpropane trimethacrylate	Sartomer Co.
Stearic Acid	Process Aid	Stearic acid	Various
Sulfur	Curing Agent	sulfur	Various
Sunpar 2280	Process Oil	Paraffinic oil	Sunoco, Inc.
York Whiting	Filler	Natural calcium carbonate	R. E. Carroll
Zinc Oxide	Activator	Zinc oxide	Various
Zinc Stearate	Process Aid	Zinc stearate	Various