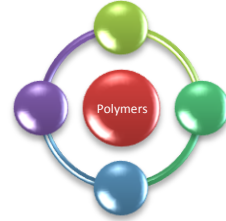




Technical Reference Bulletin Elastomer Library

C&M Rubber Co. has a longstanding business relationship with many polymer suppliers, including Momentive (Formerly GE Silicone), Wacker Silicone, US Silicones, LLC, Valley Rubber Co. and Dow Corning-STI. We have in-house capability to mix a silicone compound for your specific application. We can color match to the Pantone© Formula Guide and produce a custom compound with the durometer (hardness) granularity of ± 5 points. C&M Rubber Co. has a wide breadth of knowledge in developing compounds that can tolerate a wide range of temperatures, tear resistance, and compression set. From one pound to fifty-pound batches, C&M Rubber Co. can recommend and mix just the right elastomeric compound for your application.



Elastomers

The tables below are a list of elastomeric materials that C&M Rubber Co. is currently using to produce items for current customers. This list is not intended to be a complete list of available options, rather an example of just some of the materials we commonly use.

Material Name	Durometer	Notes	Food Contact
Momentive SE-6035 - Base	35	Used in blend of 6035 & 6075 to provide custom durometer between 35 & 70 Durometer	Yes
Momentive SE-6075 - Base	75		
Momentive SE-6335 - High Strength	30	High strength – may use in blend of 6035, 6075 or other bases	Yes
Momentive SE-5559 U – Flame Retard.	57	Additive for flame retardency – Color brown only	No
Momentive SE-6916HA – Heat Age Stabilizer	N/A	Additive for Silplus® elastomers	N/A
Momentive Tufel® II - Platinum Cure	Various	Fast cure times- Popular with medical applications	Yes
Dow HS-30 – High Strength	30	Use alone or in blend with other bases	Yes
Dow HS-50 – High Strength	50	Use alone or in blend with other bases	Yes
Dow HS-70 – High Strength	70	Use alone or in blend with other bases	Yes
Dow GP-50 – Base	52	Smooth shiny surface finish	Yes
Dow NPC 40– No Post Cure	40	No post cure required	No
Dow NPC 80– No Post Cure	80	No post cure required	No
Dow Silastic® 160-60 Semi Conductive	60	Resistance values of 10.0 Ohm/Cm	No
Dow Silastic® LCS-755	55	Low Compression Set	Yes
Dow LS-2840 – Fluorosilicone	40	MIL-R-25988B, Class 1, Grade 40	No
Dow LS-2860 – Fluorosilicone	80	MIL-R-25988B, Class 1, Grade 60	No
Shin-Etsu SG-135 U – Base	35	General Purpose Silicone Base	
Shin-Etsu SG-175-U – Base	75	General Purpose Silicone Base	
Neoprene, NBR, EPDM, Millable Urethane & Nitrile	30-95	Custom mix house for non-silicone compounds	Call

If you are developing a product or component that requires UL and/or NSF Certification for food contact, C&M Rubber Co. will assist your organization in processing the required paperwork to apply for these certifications.

Common Elastomer Product Descriptions

Outlined below are selections of common elastomer product descriptions that may be helpful in an initial selection of a silicone or flourosilicone material for your project. It is not intended to be exhaustive, but give you a starting point for your investigation of common silicone bases and additives. For more complete information, contact C&M Rubber Co. for more specific information regarding your product requirement.

Momentive Performance Materials

PRODUCT DESCRIPTION - Silicone

SE 6035 and SE 6075 are general purpose Silplus® stocks which have durometers of 35 and 70 respectively. They are designed to accept moderate to high levels of reinforcing or extending fillers and additives for property variation. They can also be blended to provide durometers between 35 and 70. These silicone bases accept coloring pastes well allowing for custom color matching.

KEY PERFORMANCE PROPERTIES

Simplicity and accuracy in compounding

Formulation versatility to achieve end use requirements

Easily compounded and fabricated using conventional techniques.

CFR 177.2600 – FDA indirect food contact –Rubber articles intended for repeated use- FDA Reg, 21CFR177.2600

RoHS - Polybrominated Diphenylethers (PBDEs), PolyBrominated Biphenyls (PBBs), lead, mercury, hexavalent chromium or cadmium are neither used as raw materials nor intentionally added to the Momentive Materials-Silicones products listed above. Thus we believe that these products meet Directive 2002/95/EC (“RoHS”), as amended by Commission Decision 2005/618/EC.

	Arsenic	Barium	Cadmium	Chromium	Lead	Murcury	Silver	Selenium
Grade	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
SE 6035	<1	<1	<1	<1	<1	<1	<1	<1
SE 6075	<1	<1	<1	<1	<1	<1	<1	<1

TYPICAL PRODUCT DATA

Typical Properties of Uncured Compounds

Properties	SE-6035	SE-6075
Specific Gravity	1.10 ± 0.03	1.21 ± 0.03
Appearance	Translucent	Translucent
Polymer Classification (ASTM D-1418)	VMQ	VMQ
Williams Plasticity (ASTM D-926)	180	425

Specifications

Typical Product Data values should not be used as specifications.

(A= Typical Physical Properties, B = Momentive Control Specifications)

Formulation		A	B	A	B
SE-6035		100	100		
SE-6075				100	100
DBPH-50		0.8	0.8	0.8	0.8
ASTM Reference Method	Press Cure 10 Min. @ 177°C (350°F) Post Cure 1 Hr. @200° C (400° F)				
D2240	Shore A Hardness	34	30 ±5	74	75±5
D412	Tensile Strength, psi	1320	900	1350	1000
	MPa	9.1	6.2	9.3	6.9
	Elongation, %	750	450	420	150
D624	Tear Die, ppi	95	40	150	70
	kN/m	16.7	7.0	26.3	12.3
	Specific Gravity	1.10	1.10 ± .03	440	350-550
D-926	Williams Plasticity	170	125-225	440	350-550

Typical Properties of Cured Compound

Formulation of Test Specimens		A	B	A	B
SE-6035		100	100		
SE-6075				100	100
Curing Agent					
Bis(2,4 Dichlorobenzoyl) Peroxide level (50% active)		1.2		1.2	
Cure conditions 10 min. @ 142°C (287°F) 2,5 Dimethyl-2,5 Di(t-butyl peroxy)Hexane 100% active level			0.4		0.4
Cure conditions 10 min. @ 177°C (350°F)					

ASTM Reference Method	Physicals	Typical Values			
	Press Cure	A	B	A	B
D-2240	Hardness, Shore A	33	32	65	68
D-412	Tensile Strength, psi (MPa)	1100 (7.6)	1220 (9.1)	1440 (9.9)	1350 (9.3)
D412	Elongation %	820	750	520	450
D-624	Tear Resistance, Die B psi (kN/m)	75 (13.2)	95 (16.7)	150 (26.3)	150 (26.3)
D-395	Compression Set % 22 Hrs. @ 177°C (350°F)	35	29	35	26
Heat Aging 70 Hrs @ 225°C (437°F)					
D-573	Hardness, Shore A	5	10	11	8
	Tensile Strength, psi	0	-38	-34	-26
	Elongation %	-25	-52	-45	-40
Oil Resistance ASTM#1 70 Hrs. @ 149°C (300°F)					
D-471	Shore A, points change	-8	-6	-7	-5
	Tensile Strength, % change	-20	-30	-25	-30
	Elongation, % change	-20	-15	-25	-35
	Volume, % change	5	5	6	5
ASTM#3 70 Hrs. @ 149°C (300°F)					
	Volume, % change	50	50	40	45
Water Resistance 70 Hrs. @ 100°C (212°F)					
D-471	Shore A, points change	0	0	0	0
	Volume, % change	-1	0	0	-1

Additives

SILPLUS® Elastomeric System includes additives to modify the processing and/or cured physical properties of the compounding bases. For additional information, contact C&M Rubber Co.

- ✓ Heat Age Stabilizer- Used to improve the heat age resistance
- ✓ Flame Retardant – Used with compounding bases or blends to improve the flame retardance of the compositions.
- ✓ Tensile Strength Enhancer – Used to optimize tensile strength when extending fillers are used.

Dow Corning STI

Product Description – Silicone

SILASTIC® HS-30, HS-50 and HS-70 silicone rubber products are high strength stocks with high tensile and tear strengths, good resilience, toughness and abrasive resistance. These products are translucent and easily pigmented to most any color shade desired. Blending of these stocks results in intermediate hardness's between 30 and 70 durometer. These silicone bases accept coloring pastes well allowing for custom color matching. The silicone bases contain FDA-permitted ingredients for food contact use and are RoHS Compliant.

Typical Properties

Methods	Physicals	SILASTIC HS-30	SILASTIC HS-50	SILASTIC HS-70
ASTM D 792	Specific Gravity @ 25° (77°F)	1.13	1.17	1.22
ASTM D 2240	Durometer Shore A-2	31	52	72
ASTM 412	Tensile Strength, psi (MPa)	1240 (8.54)	1290 (8.89)	1365 (9.40)
ASTM 412	Elongation, %	1000	600	450
ASTM 624	Tear Strength, die B, ppi (kN/m)	200 (35.0)	195 (34.1)	200 (35.0)
ASTM 2137	Brittle Point, degrees	-73°C (-100°F)	-73°C (-100°F)	-73°C (-100°F)

SILASTIC® HS-50

SILASTIC® HS-50 silicone rubber can be compounded with appropriate modifiers to meet the requirements of AMS-3347, ZZ-R-765B class 3b Grade 50 (will require waiver on crack growth), and ASTM D 200 9GE 512.

SILASTIC® HS-70

SILASTIC® HS-70 silicone rubber can be compounded with appropriate modifiers to meet the requirements of AMS-3349A (will require a waiver on resilience) and ZZ-R-765C Class 3b Grade 70.

While these products are recommended for these specifications, Dow Corning STI does not perform testing required to certify acceptance to these specifications. If requested, Dow Corning STI will perform certification tests. Contact C&M Rubber Co. for test charges.

Information for Manufacturers of Food Grade and Health Care Products

The components of these products are listed in 21 CFR 177.2600. This FDA regulation deals with rubber articles intended for repeated use in contact with food. The regulation contains limitations on extractibles which apply to the finished fabricated article. For this reason, compliance with such limitations is the responsibility of the user

Dow Corning STI

Product Description - Fluorosilicone

SILASTIC® LS2840 fluorosilicone rubber is a general purpose, 40 durometer base that exhibits excellent fluid resistance to hydrocarbon and silicone fluids. Additionally, it is serviceable over a wide temperature range.

Properties include:

- ✓ Excellent swelling resistance
- ✓ Serviceable from -63°C to 175°C (-81°F to 347°F)
- ✓ High tensile and tear strength
- ✓ Low compression set

Methods	Physicals	Measurement
	Appearance	Off-White
ASTM D792	Specific Gravity ²	1.43
ASTM D2240	Durometer Shore A-2	40
ASTM D412	Tensile Strength, MPa (psi)	9.31 (1350)
ASTM D412	Elongation, %	450
ASTM D624	Tear Strength, Die B KM/M (ppi)	24.5 (140)
ASTM D395	Compression Set, 22 hrs/177°C (350°F),%	12
ASTM D471	Volume swell in ASTM reference Fuel B, 24 hrs/23°C (73°F),%	17
CTM 0157	Shrink, %	4.6
ASTM D2137	Brittle Point	-68°C (-90°F)

Product Description

SILASTIC® LS2860 fluorosilicone rubber is a general purpose, 60 durometer base that exhibits excellent fluid resistance to hydrocarbon and silicone fluids. Additionally, it is serviceable over a wide temperature range.

Properties include:

- ✓ Excellent swelling resistance
- ✓ Serviceable from -63°C to 175°C (-81°F to 347°F)
- ✓ High tensile and tear strength
- ✓ Low compression set

Methods	Physicals	Measurement
	Appearance	Off-White
ASTM D792	Specific Gravity ²	1.45
ASTM D2240	Durometer Shore A-2	60
ASTM D412	Tensile Strength, MPa (psi)	8.79 (1275)
ASTM D412	Elongation, %	325
ASTM D624	Tear Strength, Die B KM/M (ppi)	24.5 (140)
ASTM D395	Compression Set, 22 hrs/177°C (350°F),%	16
ASTM D471	Volume swell in ASTM reference Fuel B, 24 hrs/23°C (73°F),%	17
CTM 0157	Shrink, %	4.7
ASTM D2137	Brittle Point	-63°C (-81°F)

ShinEtsu Silicone

Product Description

SG-135 is a 35 durometer general purpose silicone base and is one of a series of easy processing bases produced by ShinEtsu. It can be used in a variety of applications requiring finishing by molding, extruding or calendaring. Typical applications include:

- ✓ Roll Covers
- ✓ Spark plug boots
- ✓ Diaphragms
- ✓ O-ring and gaskets
- ✓ Articles which are required to meet various military and industrial specifications

Typical Properties

Methods	Physicals	Measurement
	Color	Natural
	Catalyzed with	DBPH ⁽¹⁾
Press Cured Properties		
	Specific Gravity ²	1.11
ASTM D2240	Durometer Shore A	28
ASTM D412	Tensile Strength, (psi)	1950
ASTM D412	Elongation, %	945
ASTM D624	Tear Strength, Die B (ppi)	185
ASTM D412	100% Modulus, (psi)	63
Post Cured, 4 Hrs @ 205°C		
ASTM D2240	Durometer Shore A	34
ASTM D412	Tensile Strength, (psi)	1652
ASTM D412	Elongation, %	885
ASTM D412	100% Modulus, (psi)	79
ASTM D624	Tear Strength, Die B (ppi)	157
ASTM D395	Compression Set %, 22 hrs. @177°C (351°F)	26
(1) 2,5-dimethyl-2,5-di(t-butylperoxy) hexane 100% active, 1 phr KEP-12 – Press Cured 10 Min. @ 177°C (350°F)		

Regulatory Information –EPA Regulations	
RCRA Hazardous Waste Number	Not Listed (40 CFR 261.33)
RCRA Hazardous Waste Classification (40 CFR 261.21)	None
CERCLA Hazardous Substance (40 CFR 302.4)	Unlist specific per RCRA, Sec. 3001 CWA, Sec.311(b)(4); CWA, Sec. 307(a), CAA, Sec 112
CERCLA Reportable Quantity (RQ)	Not Applicable
SARA 311/312 Codes	None
SARA Toxic Chemical (40 CFR 372.65)	None
SARA EHS (Extremely Hazardous Substance) (40CFR 355)	Not Listed
Air Contaminant (29 CFR 1910.1000, Table Z-1,Z-1-A)	None
California Proposition 65 Chemicals contained in this product	Toluene <0.01%
Restriction of Hazardous Substances (RoHS)	Compliant

Product Description

SG-175 is a 75 durometer general purpose silicone base and is one of a series of easy processing bases produced by ShinEtsu. It can be used in a variety of applications requiring finishing by molding, extruding or calendaring. Typical applications include:

- ✓ Roll Covers
- ✓ Spark plug boots
- ✓ Diaphragms
- ✓ O-ring and gaskets
- ✓ Articles which are required to meet various military and industrial specifications

Typical Properties

Methods	Physicals	Measurement
	Color	Natural
	Catalyzed with	DBPH ⁽¹⁾
Press Cured Properties		
	Specific Gravity ²	1.22
ASTM D2240	Durometer Shore A	70
ASTM D412	Tensile Strength, (psi)	1590
ASTM D412	Elongation, %	400
ASTM D624	Tear Strength, Die B (ppi)	152
ASTM D412	100% Modlus, (psi)	326
Post Cured, 4 Hrs @ 205°C		
ASTM D2240	Durometer Shore A	76
ASTM D412	Tensile Strength, (psi)	1635
ASTM D412	Elongation, %	353
ASTM D412	100% Modlus, (psi)	392
ASTM D624	Tear Strength, Die B (ppi)	128
ASTM D395	Compression Set %, 22 hrs. @177°C (351°F)	16
<small>(1) 2,5-dimethyl-2,5-di(t-butylperoxy) hexane 100% active, 1 phr KEP-12 – Press Cured 10 Min. @ 177°C (350°F)</small>		
Hot Air, aged 70 hrs @ 225°C		
ASTM D573	Hardness, points change	+5
	Tensile Strength % change	-29
	Elongation, %	-26
#1 Oil, Aged 70 hrs. @ 149°C		
ASTM D471	Hardness, points change	-5
	Tensile Strength % change	-17
	Elongation, % change	-11
	Volume, % change	+6
#3 Oil, Aged 70 hrs. @ 149°C		
	Volume, % change	+44

These results are not to be used in setting specifications.

Regulatory Information –EPA Regulations

RCRA Hazardous Waste Number	Not Listed (40 CFR 261.33)
RCRA Hazardous Waste Classification (40 CFR 261.21)	None
CERCLA Hazardous Substance (40 CFR 302.4)	Unlist specific per RCRA, Sec. 3001 CWA, Sec.311(b)(4); CWA, Sec. 307(a), CAA, Sec 112
CERCLA Reportable Quantity (RQ)	Not Applicable
SARA 311/312 Codes	None
SARA Toxic Chemical (40 CFR 372.65)	None
SARA EHS (Extremely Hazardous Substance) (40CFR 355)	Not Listed
Air Contaminant (29 CFR 1910.1000, Table Z-1,Z-1-A)	None
California Proposition 65 Chemicals contained in this product	Toluene <0.01%
Restriction of Hazardous Substances (RoHS)	Compliant