NEVSil™

SPECIALTY ELASTOMERS FOR NEW ENERGY VEHICLES

SILICONES ENABLING NEW ENERGY VEHICLE ADVANCEMENTS

MOMENTIVE®

SOLUTIONS FOR A SUSTAINABLE WORLD™

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Momentive Elastomers and New Energy Vehicles/E-Mobility

The future of mobility is being redefined with the paradigm shift from traditional internal combustion technology to the steadily growing and continually evolving New Energy Vehicle (NEV) market. As advancements in e-mobility, hybridization and fuel cells occur, the intrinsic need for advanced materials are ever present and growing. Safety, reliability and performance continue to remain driving forces in the selection and specification of polymers in NEV applications.

Silicone's unique properties enable Momentive's materials to excel in a wide breadth of NEV applications. Momentive's Liquid Silicone Rubber (LSR) and High Consistency Rubber (HCR) based material technologies are engineering enablers, which can provide the ability to meet and exceed demanding application performance requirements of the NEV's today as well as tomorrow. Our breadth of experience makes certain that wherever there is a need, Momentive will have the technical knowledge as well as expertise to help our customers and industry partners to succeed. Some of the key material characteristics inherent to addressing such challenges and to help solve these complex requirements are:

- High thermal stability and temperature resistant
- Low compression set
- Excellent electrical properties
- Comparative Tracking Index (CTI) > 600V
- Equivalent to UL94 V-0 (1mm thickness) flame retardant performance
- Self-lubricating properties
- Low viscosity
- Fast cure
- Low modulus
- Increased crack resistance
- Outstanding resistance to aging
- Easy to color
- Self-bonding
- Thermal conductivity

NEVSil: Specialty Elastomers for New Energy Vehicles

UL94 V-0 Applications

Momentive has developed specialized NEVSil technology for critical sealing applications requiring the ability to pass UL94 V-0 flammability requirements. Momentive's NEVSil flame retardant technology series has been formulated for excellent flame retardant performance equivalent to UL94 V-0 (1mm thickness) and balanced physical properties, particularly with low compression set. The NEVSil flame retardant technology series paves the way for the next generation in flame resistant silicone technologies serving the ever growing NEV market sector.

Key Features:

- UL94 V-0 flammability requirements (1mm thickness)
- Good mechanical properties
- Excellent heat resistance
- Low compression set
- Long pot life at ambient temperature
- Self-lubricating technology available

Typical Applications:

- UL94 V-0 specified flame retardant parts/applications
- High voltage connectors
- Heat resistant molded components: seals, gaskets, O-rings, etc.

UL94 V-0

Product Name	HCR	LSR	UL 94 V0 (1mm)	Appearance	Density [g/cm³]	Durometer [Shore A]	Tensile Strength [MPa]	Elongation [%]	Tear Strength, Die B [N/mm]	Compression Set (22hrs @ 175 °C) [%]
Flame Retardant										
NEVSil FR530[1]	■		PASS	Dark Grey	1.39	37	6.5	520	22	13
NEVSil FR570[1]	■		PASS	Dark Grey	1.39	70	7.5	380	15	16
NEVSil LSR 830		■	PASS	Dark Grey	1.25	35	6	520	10	12
NEVSil LSR 840		■	PASS	Dark Grey	1.25	40	6.5	435	12	12
NEVSil LSR 850		■	PASS	Dark Grey	1.26	45	6	280	12	11
NEVSil LSR 860		■	PASS	Dark Grey	1.33	60	6.8	240	15	13

*Typical physical properties are average data and are not to be used as or to develop product specifications
[1]All properties post-cured, 4hrs @ 200 °C

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Self-Lubricating Silicone Technologies

Momentive has a long track record of success with major tiers and OEMs for use in single-wire seals, radial seals, and matseals or family-seals used in electrical connector applications relevant to the Silopren™ LSR 3000 Series of self-lubricating LSRs. As history looks to repeat itself, Momentive continues to push the advancement of self-lubricating silicone technologies with the establishment of the NEVSil technology line of self-lubricating silicone elastomers. Our breadth of industry knowledge and technical expertise makes certain that wherever there is a need, Momentive will have the expertise to help our customers meet it.

- NEVSil SLFRx0 Series: Self-lubricating UL94 V-0 flame resistant technology
- NEVSil SLHRx0 Series: Self-lubricating high temp/heat performance / qualified in T5 (1008hrs) applications

Product Name	HCR	LSR	UL 94 V-0 (1mm)	Appearance	Density [g/cm³]	Durometer [Shore A]	Tensile Strength [MPa]	Elongation [%]	Tear Strength, Die B [N/mm]	Compression Set (22hrs @ 180 °C) [%]
Flame Retardant/Self-Lubricating										
NEVSil SLFR30[1]	■		PASS	Dark Grey	1.42	31	4.5	650	18.5	13
NEVSil SLFR40[1]	■		PASS	Dark Grey	1.27	40	7.5	590	25	12
Flame Retardant/Excellent High temp/Heat performance / Qualified in T5 (1008hr) Applications										
NEVSil SLHR40[2]	■		-	Off-white	1.16	40	8.5	600	20.5	12
NEVSil SLHR40 (1008hrs data)	■		-	Off-white	1.16	46	8	533	-	20

*Typical physical properties are average data and are not to be used as or to develop product specifications

[1] All properties post-cured, 4hrs @ 200 °C

[2] All properties not post-cured

Momentive's NEVSil technologies are materials to meet demanding self-lubricating applications, which require excellent heat stability performance, coupled with the ability to meet stringent flammability requirements. With ever increasing expectations related to vehicle reliability and service-life, a more stringent focus is applied to long-term sealing force, temperature stability and flammability requirements.

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High Heat/High Temperature Performance Series

Momentive has developed a line of heat resistant and high temperature performance silicone rubber compounds in Shore A hardness, ranging from 30 to 80 Durometer. These products can be considered for use in stringent high temperature environments with short term resistance of 300 °C when catalyzed correctly.

Key Features:

- Outstanding mechanical properties
- Excellent heat resistance
- Low compression set
- Easily blendable to achieve varied durometers

Typical Applications:

- High temperature silicone rubber parts
- O-rings and gaskets
- Boots
- Molded parts

Product Name	Appearance	Density [g/cm³]	Durometer [Shore A]	Tensile Strength [MPa]	Elongation [%]	Tear Strength, Die B [N/mm]	Compression Set (22hrs @ 175 °C) [%]
Property Data							
NEVSil HTHR30[1]	Red	1.12	30	8.5	850	15	20
NEVSil HTHR40[1]	Red	1.13	40	8.5	560	15	12
NEVSil HTHR50[1]	Red	1.16	50	9	440	17	10
NEVSil HTHR60[1]	Red	1.18	60	9.5	390	18	10
NEVSil HTHR70[1]	Red	1.22	70	9.5	330	18	11
NEVSil HTHR80[1]	Red	1.2	80	8.8	280	16	13
Heat Resistant Performance (72hrs @ 250 °C)							
NEVSil HTHR30[1]	Red	1.12	32	5.5	460	13	-
NEVSil HTHR40[1]	Red	1.13	42	5.5	370	12	-
NEVSil HTHR50[1]	Red	1.16	53	5.6	290	15	-
NEVSil HTHR60[1]	Red	1.18	63	5.8	255	17	-
NEVSil HTHR70[1]	Red	1.22	74	5.8	210	17.5	-
NEVSil HTHR801	Red	1.2	85	5.5	175	13	-
Heat Resistant Performance (72hrs @ 316 °C)							
NEVSil HTHR30[1]	Red	1.22	44	4.5	300	10	-
NEVSil HTHR40[1]	Red	1.13	57	4.5	260	7.5	-
NEVSil HTHR501	Red	1.16	68	4.5	185	8.5	-
NEVSil HTHR60[1]	Red	1.18	79	4.5	166	8	-
NEVSil HTHR70[1]	Red	1.22	86	4	75	9.5	-
NEVSil HTHR80[1]	Red	1.2	95	4	55	12	-

*Typical physical properties are average data and are not to be used as or to develop product specifications
[1] All properties post-cured 4hrs @ 200 °C

NEVSil: Specialty Elastomers for New Energy Vehicles

Thermally Conductive Liquid Silicone Rubber

Momentive has developed a line of NEVSil thermally conductive two-component liquid silicone rubbers for injection molding processes. These products are an excellent candidate material to be use in a convenient 1:1 mixing ratio and exhibit high thermal conductivity. Additional capabilities include the opportunity to tailor the NEVSil thermally conductive technologies via our global custom compounding centers to meet our customers demanding application needs in order to optimize thermal management properties.

Key Features:

- Excellent thermal conductivity
- Good processability
- High reactivity
- High stability and flexibility at low temperatures
- Low compression set
- Outstanding electrical insulation

Typical Applications:

- Heat transfer pads and gaskets
- Under hood cooling parts
- Battery Sealing applications

Product Name	Appearance	Thermal Conductivity* [W/m.k]	Density [g/cm³]	Durometer [Shore A]	Tensile Strength [MPa]	Elongation [%]	Tear Strength, Die B [N/mm]	Compression Set (22hrs @ 175 °C) [%]
Thermally Conductive LSR								
NEVSil LSR TC330[1]	**White**	**1.2**	**2.17**	**33**	**1.6**	**240**	**5.5**	**14**
NEVSil LSR TC360[1]	**White**	**1.1**	**2.23**	**60**	**3**	**110**	**6.5**	**11**
Thermally Conductive HCR								
NEVSil TC361[1]	**White**	**1.5**	**2.51**	**60**	**2.4**	**190**	**7**	**-**

*Typical physical properties are average data and are not to be used as or to develop product specifications
[1] All properties after post cure 4hrs @200 °C

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For Fuel Cell Sealing Applications

Momentive has developed a specialized NEVSil LSR technology for use in fuel cell bipolar plate sealing applications. The product possesses a low viscosity, which allows decreased injection pressure and, therefore, protection of the bipolar plate substrates during manufacturing/molding. The material provides good bonding characteristics to both stainless steel and graphite when combined with Momentive's XP81-A6361 primer technology. The NEVSil technologies provide a significant advantage versus RTV products utilized in similar applications due to the cure speed, injection moldability and greatly improved compression set characteristics.

Key Features:

- Non post-cure
- Low Viscosity
- High reactivity
- Fast curing
- Low compression set
- Long pot life at ambient temperature

Typical Applications:

- Sealing bipolar plates (BPP)
- Sealing membrane electrode assembly (MEA)

Product Name	Appearance	Density [g/cm³]	Durometer [Shore A]	Tensile Strength [Mpa]	Elongation [%]	Tear Strength, Die C [N/mm]	Compression set (22hrs @ 120 °C) [%]
Speciality LSR - Fuel Cell Sealing							
NEVSil LSR FC140[1]	**Translucent**	**1.08**	**40**	**5.5**	**350**	**24**	**6.5**
Viscosity in Pa.s gamma = 10 s-1 @ 20 °C DIN 53018		A - Component			B- Component		
		60			70		

*Typical physical properties are average data and are not to be used as or to develop product specifications
[1] All properties not post cured

MOMENTIVE®

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Disclaimer

Learn more about Momentive's silicone solutions for NEVSil portfolio on the web