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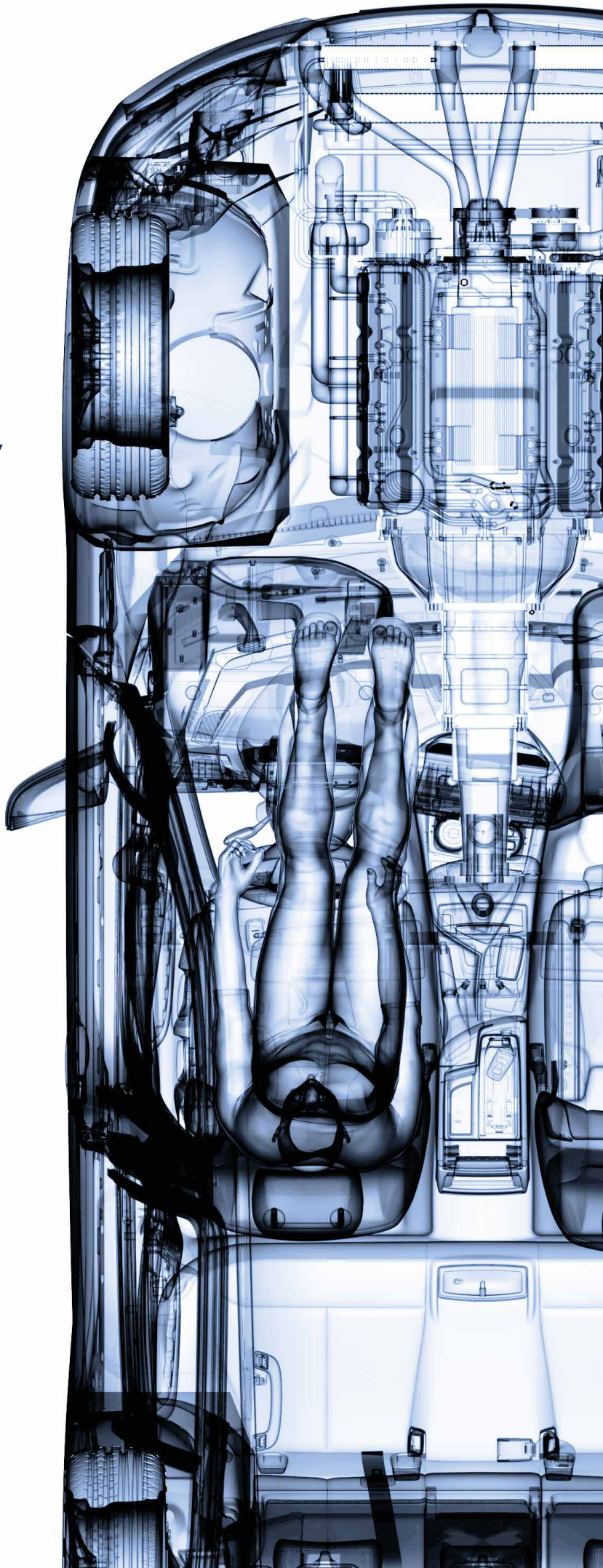
Silopren™ LSR 3366/50

LIQUID SILICONE RUBBER



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Silopren LSR 3366/50 is the next generation self-lubricating, two component liquid silicone rubber for reliable sealing performance, specifically over extended in-service time-frames at elevated service temperatures.

Developed with the needs of Original Equipment Manufacturers, as well as Tier1 and Tier2 automotive manufacturers and suppliers in mind, Silopren LSR 3366/50 features an ultra-low compression set without the need for post cure. Its self-lubricating technology can facilitate assembly in key applications by utilizing an oil bleeding effect to improve slippage, reduce sticking, and provide ease of assembly and installation. This self-lubricating effect is achieved through the incorporation of a bleed fluid which migrates out of the vulcanizate over an extended period of time, a process which typically begins between a few hours and one day after vulcanization.

Silopren LSR 3366/50 is an excellent candidate to consider for use in the manufacture of elastomeric articles requiring self-lubricating properties, such as automotive O-rings, seals and gaskets.

Silopren LSR 3366/50 offers ultra-low compression set properties at long term elevated temperatures without the need for abrasive filler technologies or additives introduced via the color line. This technology can deliver curing and de-molding performance similar to that of Silopren LSR 3286/50.

Key Features and Typical Benefits

- Ultra-low compression set (without post-cure)
- Ability to meet USCAR-2 Spec Class T4 & T5 requirements
- Very high Thermal Stability
- Self-Lubricating properties
- Fast Curing
- Low viscosity
- No post-curing required
- Easy pigmentability

Typical Applications

- E-Mobility
- Automotive connector seals
- Single wire seals and cavity plugs
- Cable seals
- Mat seals
- Wire harness seals
- Peripheral/radial seals
- Electrical connector seals/gaskets
- Weatherpack seals

Typical Physical Properties

Property	Standard	A-Component	B-Component
Appearance		White	Whitish
Oil Content		3%	3%
Viscosity, Pa*s ($\dot{\gamma}$ =10 $^{s-1}$ at 20 ˚C)	DIN 53018	350	220

The pot-life of the mixture of the two components (closed vessel) at 20 ˚C is three days. Increased temperature reduces pot-life.

Property	Standard	Unit	Silopren LSR 3366/50	Silopren LSR 3286/50
Density	DIN 53 479 A	g/cm^3	1.13	1.12
Hardness	DIN 53 505	Shore A	52	50
Tensile Strength	DIN 53 504 S2	N/mm^2	8.6	8.7
Modulus 100%	DIN 53 504 S2	N/mm^2	2.2	2.4
Modulus 200%	DIN 53 504 S2	N/mm^2	3.9	4.0
Modulus 300%	DIN 53 504 S2	N/mm^2	5.6	5.3
Elongation at break	DIN 53 504 S2	%	450	560
Tear Strength	ASTM D 624 die B	N/mm	40	45
Compression Set	ISO 815 (22h at 175 ˚C)	%	10	19
Compression Set	ISO 815 (168h at 175 ˚C)	%	18	38
Compression Set	ISO 815 (1008h at 175 ˚C)	%	29	80
Molded slabs A:B = 1:1, 10min @ 175 ˚C, non-post cured				

Typical properties are average data and are not to be used as or to develop specifications.

USCAR-2 Specification
Performance Specification for Automotive Electrical Connector Systems

The age of "new" T3 class applications is rapidly slowing, with more and more T4 and even T5 applications arriving in the marketplace.

One such driver of this general trend are the increased electrical load requirements, which are in turn raising the temperature requirements into the T4 and in some cases the T5 category classifications as the new "norm". In particular, the EV's cable & connection resistance values are a driving force in these increasing service temperatures.

Silopren LSR 3366/50 can allow compliance with SAE/USCAR-2 Specification Temperature Classifications T4 and T5. As defined by the SAE/USCAR Specification, the components tested must be assigned a class as depicted in the table below. This class is assigned in accordance with the expected environment intended for vehicle application.

Class	Ambient Temperature Range	Typical Application
T1	-40 °C to +85 °C	T1 is not recommended for new applications
T2	-40 °C to +100 °C	Typically suitable for use in passenger compartment
T3	-40 °C to +125 °C	Typically suitable for use in engine compartment
T4	-40 °C to +150 °C	Needed for some on-engine applications near hot components
T5	-40 °C to +175 °C	For use as needed

Silopren LSR 3366/50 Ultra-low Compression Set

The foundational structure of Liquid Silicone Rubber (LSR) enables its very low compression set properties, which are normally in the range of 20-40% (when measured for 22 hours at 175 ˚C).

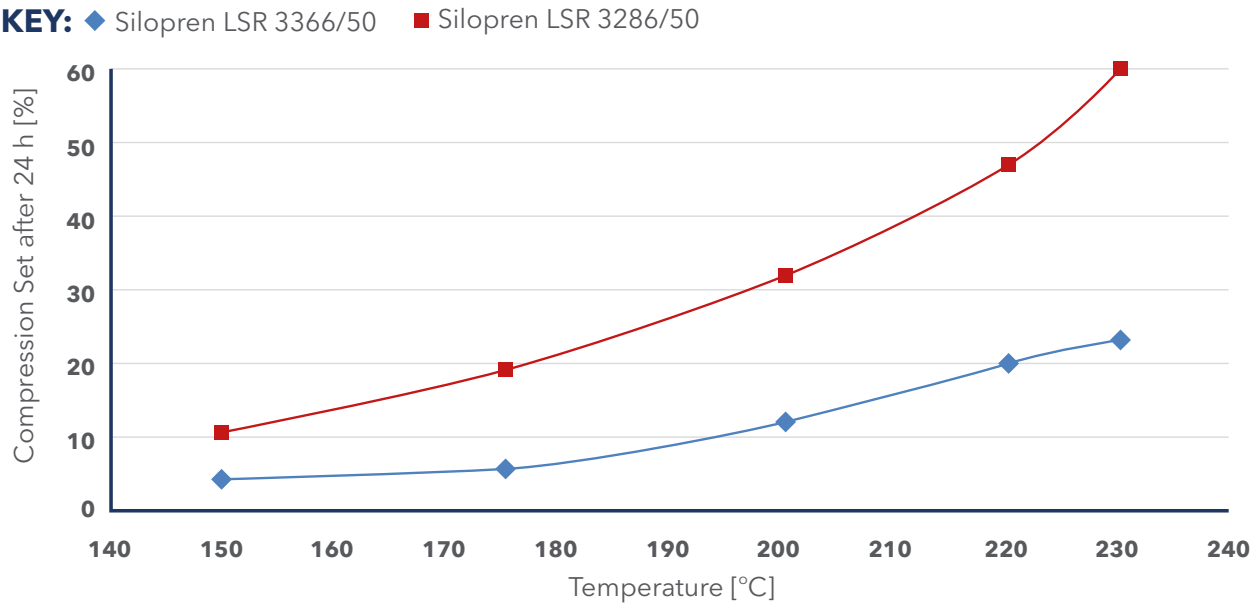
This low compression set combined with its self-lubricating properties are what have principally defined Silopren LSR as an engineering material of choice for applications such as automotive gaskets and seals, which see prolonged application exposure to compressive stress. The ability to withstand compressive stress at elevated temperatures allows Silopren LSR technologies to maintain high sealing forces over the application lifetime.

According to ISO 815, DIN 53517, ASTM D395 and other International Standards, compression set testing measures the ability of rubber to return to its original thickness after prolonged compressive stresses. As a rubber sample is compressed over time between 2 flat parallel plates with a predefined percentage, and kept for a specific time at a certain temperature, it loses its ability to return to its original thickness. This loss of resiliency, also called memory or permanent set, characterizes the capability of an elastomeric product to perform over a long period of time.

Silopren LSR 3366/50 has demonstrated ultra-low compression set characteristics as compared to typical, currently available, self-lubricating technologies, allowing applications to meet SAE/USCAR-2 Specification Temperature Classifications T4 and T5. In comparison, standard self-lubricating LSR technologies have exhibited a long term compression set at elevated temperatures (175 ˚C) in the range of >75% when tested to 1008 hours. In contrast, Silopren LSR 3366/50 exhibited ultra-low compression set properties and demonstrated a compression set value of <40% when tested at 175 ˚C for 1008 hours.

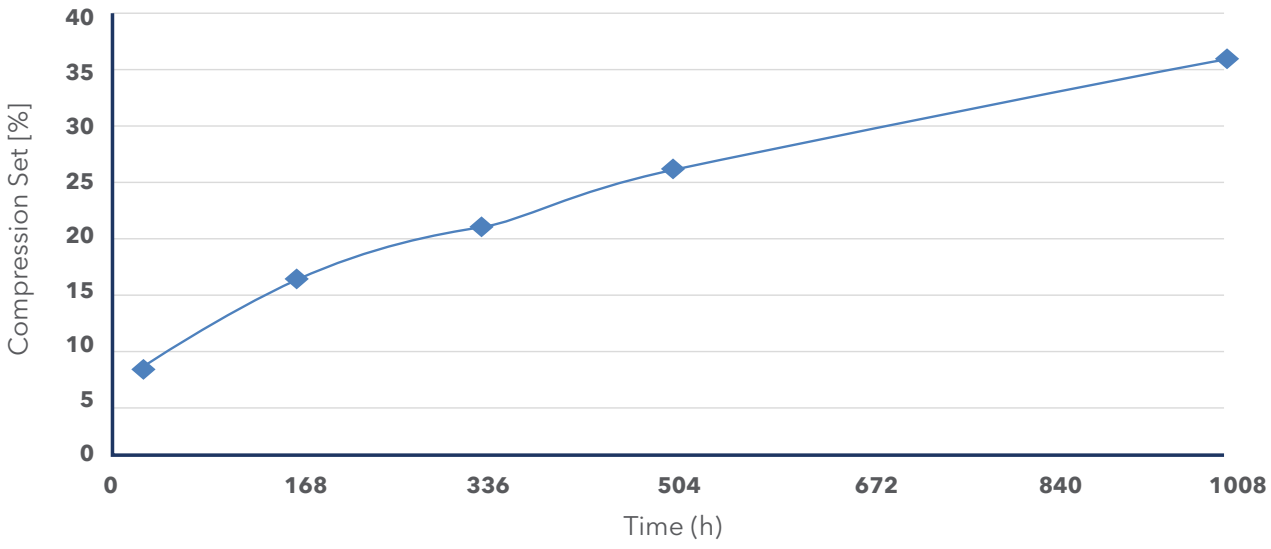
ISO 815-1:2019

Rubber, vulcanized or thermoplastic - Determination of compression set - Elevated temperatures



ISO 815-1:2019

Rubber, vulcanized or thermoplastic - Determination of compression set
Testing at constant temperature, 1000 h @ 175 °C



Test data. Actual results may vary.

Silopren LSR 3366/50 Pigmenting/Coloring

Silopren LSR 3366/50 offers the ability to meet the high temperature, ultra-low compression set characteristics while maintaining the ability to pigment/color the material.

This is a key feature as many other additive technologies utilized to achieve improved temperature and compression set resistance require abrasive filler technologies or additives to be introduced via the color line, which ultimately dictate the end-use color of the application material.

Silopren LSR 3366/50 utilizes a next generation approach to meet high temperature, ultra-low compression set property requirements while maintaining the ability to be pigmented/colored. This is a particularly attractive attribute to automotive applications utilizing a color coding system in part identification.

As Silopren LSR 3366/50 is whitish in its natural state, colors are slightly muted, but are, however, easily identified without the impact to sealing performance.

	Silopren LSR 3366/50	+ Color [wt.-%]	CS 168 h / 175 °C [%]
	Uncolored	0	19
	CP Green	0.5 1.0 2.0	19 18 18
	CP Red	0.5 1.0 2.0	16 16 17
	CP Black	0.5 1.0 2.0	20 20 20
	CP Red Brown	0.5 1.0 2.0	20 20 19

Recommended color addition is maximum 1-2% by weight

General Considerations for Use

Ready-to-use mixtures (of the components A and B) are typically fed directly to the injection-molding machine from the original drums by means of a metering and mixing unit.

The mixture, consisting of the two components in the ratio 1:1, is injected into the heated mold. At mold temperatures of 170-230 °C, the addition-curable silicone rubber usually cures within a few seconds. The curing process does not generate splitting products. High curing speed and easy demolding can help enable fully automated production of large numbers of articles in short cycle times. Silopren LSR 3366/50 contains 3% of a special silicone fluid, which migrates to the surface of the molded part over time and provides a self-lubricating effect. This process, however, is affected by several factors that are specific for each part, and broadly dependent upon:

- ratio of volume to surface area
- type and concentration of pigment added
- storage time and temperature during storage

Silopren LSR 3366/50 liquid silicone rubber should only be used for the production of technical articles. For further information please contact Momentive Performance Materials Inc.

Packaging

Silopren LSR 3366/50 is available in pail kits (20kg of A and B part -each) and drum kits (200kg of A and B part – each).

Patent Status

Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute the permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

Limitations

Customers must evaluate Momentive Performance Materials products and make their own determination as to fitness of use in their particular applications.

Product Safety, Handling and Storage

Customers should review the latest Safety Data Sheet (SDS) and label for product safety information, safe handling instructions, personal protective equipment if necessary, emergency service contact information, and any special storage conditions required for safety. Momentive Performance Materials (MPM) maintains an around-the-clock emergency service for its products. SDS are available at www.momentive.com or, upon request, from any MPM representative. For product storage and handling procedures to maintain the product quality within our stated specifications, please review Certificates of Analysis, which are available in the Order Center. Use of other materials in conjunction with MPM products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.

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