

UV-Curing Silicone Elastomers Enable New Applications

Momentive Performance Materials' new family of silicone rubbers cures with UV light alone, enabling innovative applications that support recent trends. UV-curing technology provides silicone elastomers with greater versatility to meet current marketplace demands that extend beyond the capabilities of conventional thermal-curing materials.

Significant breakthroughs resulting from UV-curing technology include:

- on-demand, high-speed curing at low temperatures
- cost-effective processing
- more efficient processing

These advancements are possible because crosslinking in the UV-curing process is initiated by a photochemical reaction, not by heat.

The low-temperature, UV-curing process can allow:

- the combining of silicone rubbers with temperature-sensitive plastics
- the incorporating of thermally-sensitive ingredients into silicone rubber
- the encapsulations of electronic parts

This new way of curing elastomers lessens the need for costly heat-resistant materials and offers a variety of advantages for both liquid silicone rubbers (LSRs) and high consistency rubbers.

UV-curing Liquid Silicone Elastomers

Because of the lower temperature cure, UV-curing technology typically yields cost-effective, high-quality LSR parts. The process can dramatically reduce cycle times to increase productivity. Even cross sections up to 100 mm, which usually take more than 30 minutes to cure in a heat-curing process, can cure in less than five minutes.

Other typical benefits include:

- less shrinkage
- prevention of air entrapment
- better-controlled scorch performance

The UV-curing LSR technology also has the potential to enable two-component combinations in silicone elastomers, allowing for a variety of material options that are often less expensive. This opens up new design possibilities with a unlimited number of applications, ranging from healthcare products to kitchenware to automotive parts to electronic components and LEDs.

UV-curing Silopren* LSR Products:

Typical Physical Properties of the Uncured Rubber		UV Electro 235-2	UV Electro 225-1	UV LSR 2030	UV LSR 2060
Features		High Voltage 3.5 kV	High Voltage 3.5 kV	Standard low duro	Standard low duro
Viscosity base [Pa*s] at 10s ⁻¹	DIN 53018	120	70	450	900
Viscosity cat [Pa*s] at 10s ⁻¹	DIN 53018	10	10	10	10
Typical Properties of Cured Elastomer					
Hardness [Shore A]	DIN 53505	35	25	28	59
Density [g/cm ³]	DIN 53479 A	1,088	1,065	1,096	1,146
Tensile Strength [MPa]	DIN 53504 S2	4,6	4,5	8	13
Elongation at Break [%]	DIN 53504 S2	520	580	750	500
Tear [N/mm]	ASTM 624 die B	15	9	20	25

Mixing ratio of components Base: Catalyst = 100 :2.

Laboratory Vulcanization Conditions: exposure to a Hg-(Fe-doped) middle pressure lamp for 2 min at 80 mW/cm² intensity.

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

To learn more about UV-curing silicone rubbers, see the product literature below.

Silopren* UV LSR 2030 & UV LSR 2060 liquid silicone rubbers

Silopren* UV Electro liquid silicone rubbers

UV-curing High Consistency Rubbers

In high consistency rubbers, UV-curing technology can reduce the adverse effects of production. Instead of curing in large, high-heat ovens that can range in size from 10-15 meters, the UV-curing solid silicone rubbers (e.g. Addisil* UV EX elastomer) are extruded at ambient temperatures using standard devices and cured with a lamp that is less than 1 meter in length. Eliminating the need for large, high-heat ovens can save on energy, utility costs and space.

Other typical benefits include:

- more precise and complex shapes
- prevention of air bubbles in the extruded articles

The UV-curing high consistency rubber process also offers additional customization options. Some applications that were unthinkable before are now conceivable through UV-curing technology. For example, encapsulation of temperature-sensitive ingredients or components (e.g. electronic parts) is not only possible, but can be achieved in a one-step, co-extrusion process.

UV-curing Addisil HCR products:

Typical Physical Properties of the Uncured Rubber		UV 130 EX	UV 250 EX	UV 260 EX	UV 270 EX
Features		30 Sh A Extrusion grade	50 Sh A Extrusion grade	60 Sh A Extrusion grade	70 Sh A Extrusion grade
Williams Plasticity		180	250	250	260
Typical Properties of the Vulcanizate					
Hardness [Shore A]	DIN 53505	25	50	60	66
Density [g/cm ³]	DIN 53479 A	1,10	1,16	1,17	1,20
Tensile Strength [MPa]	DIN 53504 S2	12	12,1	10.5	9,6
Elongation at Break [%]	DIN 53504 S2	1000	920	580	420
Tear [N/mm]	ASTM 624 die B	38	45	47	29

Mixing ratio of components Base: Catalyst = 100:0.5

Laboratory Vulcanization Conditions: exposure to a Hg-(Fe-doped) middle pressure lamp for 2 min at 60 mW/cm² intensity.

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

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260 Hudson River Road
Waterford, NY 12188 USA
momentive.com