

OPTICAL CLEAR LIQUID SILICONE RUBBER | LUMISIL® LR 7601 SERIES

# CRYSTAL CLEAR PROCESSING WITH INJECTION MOLDING

For manufacturers needing to process large quantities of liquid silicone rubber while keeping product quality at a consistently high level, injection molding offers critical advantages: fully automated processing, a quality product with no need for secondary finishing, a high degree of dimensional accuracy, and short production cycles.

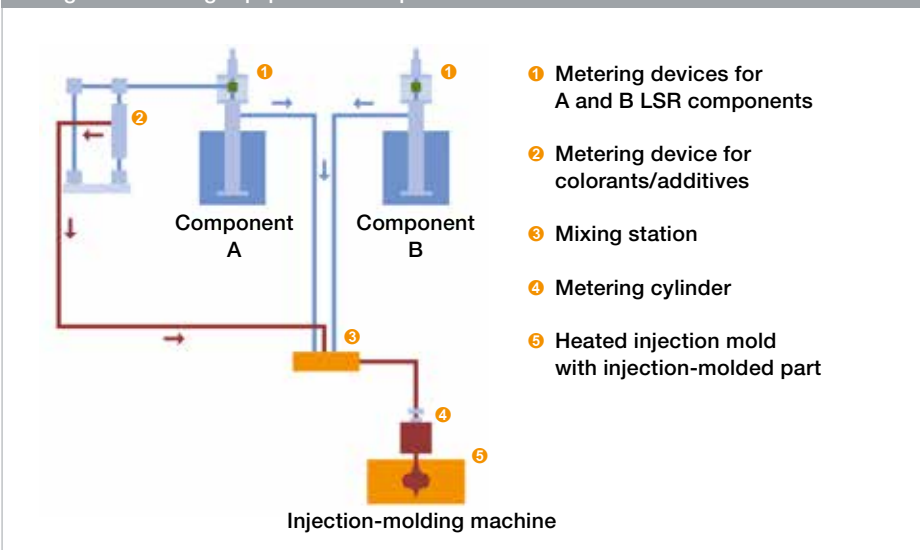
### How Does Injection Molding Work?

Metering devices first pump a 1:1 mixture of the A and B components of the LSR, dispensing it into a mixer – either a static or dynamic kind – and then into the metering cylinder of the injection-molding machine. Once the two components have been blended, the material can be injected into the corresponding mold. A screw conveyor in the injection cylinder is responsible for injecting and metering out the blended material. We recommend the use of a temperature control to keep the temperature in the metering cylinder and mixer from rising above 40 °C.

### The Number One Choice for Transparency and Durability

LUMISIL® LR 7601 is WACKER's line of highly transparent LSR products for optical components with a decreased level of volatile content, thus reducing fogging and linear shrinkage after post curing. Perfectly suited for injection-molding processes, these materials can be used for manufacturing ultra-transparent silicone parts for a wide variety of applications, such as automotive lighting technologies and optical sensors. The most important feature of this new product class is its considerable resistance to heat and UV radiation.

Mixing and Metering Equipment for Liquid Silicone Rubber

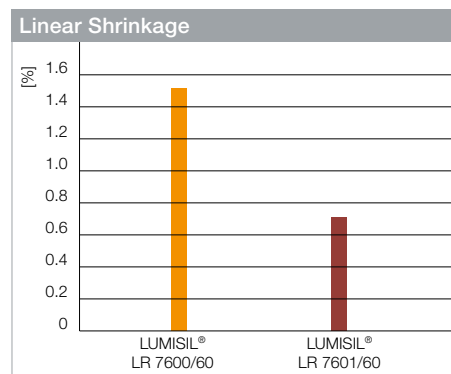
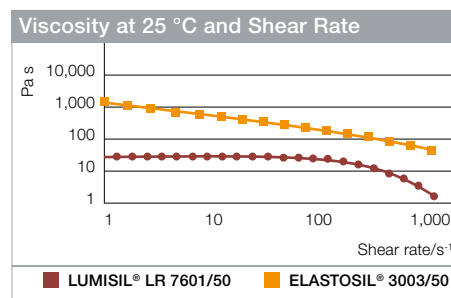


- 1 Metering devices for A and B LSR components
- 2 Metering device for colorants/additives
- 3 Mixing station
- 4 Metering cylinder
- 5 Heated injection mold with injection-molded part

### What Is the Difference between LUMISIL® LR and Standard LSR?

Like many other elastomers, standard silicone rubber grades contain pyrogenic silica. This results in pseudoplasticity, causing the viscosity of the materials to vary with shear force – the greater the shear force, the lower the viscosity. This property makes them easier to process in injection molding, as it allows them to fill out a mold quickly and completely, even when the components are complex and injection pressures are low.

Unlike conventional liquid silicone rubber grades, however, LUMISIL® LR 7601 does not contain any silica fillers. As a result, these products do not exhibit pseudoplasticity as typical LSR grades do, making the viscosity of LUMISIL® LR 7601 virtually independent of shear rate. The following graph shows the differences in viscosity behavior as a function of shear rate.



Non post-cured → post-cured (4 h at 200 °C)

**Preparation Advice for LUMISIL® LR 7601 Products**

The demands that LUMISIL® LR 7601 places on processing equipment are similar to those of conventional LSR products. There are a few differences, however, and these are critical for achieving the ideal results.



- If the machine technology you are working with is designed for standard LSR – an injection cylinder jacket that can be cooled, an LSR conveying screw, and a nonreturn valve in the injection cylinder – it will also work for LUMISIL® LR.
- Always adjust the screw speed and back pressure to match the low viscosity: relatively high screw speeds and negative back pressure allow you to keep the material moving at a constant, reproducible rate.
- You will generally need to be able to adjust the injection-pressure and hold-pressure profiles individually and at multiple intervals; the injection pressure will also typically need to be lower than that used for LSR materials.
- The viscosity of LUMISIL® LR, unlike that of conventional liquid silicone rubber, changes only slightly in response to the shear produced in the mixing and metering processes – this makes an adapted injection profile indispensable when molds are filled.
- In order to prevent bubbles from forming, make sure all cavities are filled to the maximum and that the cavity pressure is high enough.
- We recommend using a vacuum pump to evacuate the mold.

Mechanical Properties				
LUMISIL® LR	7601/50	7601/60	7601/70	7601/80
Hardness [Shore A]	50	60	70	78
Viscosity (D = 1 s <sup>-1</sup> ) [mPa s]	29,000	26,000	31,000	35,000
Viscosity (D = 10 s <sup>-1</sup> ) [mPa s]	28,000	25,000	28,000	31,000
Tensile strength [N/mm <sup>2</sup> ]	5.6	6.3	9.0	8.0
Elongation at break [%]	350	220	90	70
Tear strength* ASTM D 624 B [N/mm]	20	18	10	9
Refractive index n <sub>D</sub> 25	1.41	1.41	1.41	1.41
Linear shrinkage upon curing (15 min./165 °C) [%]	2.7	2.8	2.9	2.5

\* Values without postcuring (curing after 15 min./165 °C)



Wacker Chemie AG, 81737 München, Germany, Tel. +49 89 6279-1741, Fax +49 89 6279-1770, info@wacker.com, www.wacker.com, www.wacker.com/socialmedia



The data presented in this medium are in accordance with the present state of our knowledge but do not absolve the user from carefully checking all supplies immediately on receipt. We reserve the right to alter product constants within the scope of technical progress or new developments. The recommendations made in this medium should be checked by preliminary trials because of conditions during processing over which we have no control, especially where other companies' raw materials are also being used. The information provided by us does not absolve the user from the obligation of investigating the possibility of infringement of third parties' rights and, if necessary, clarifying the position. Recommendations for use do not constitute a warranty, either express or implied, of the fitness or suitability of the product for a particular purpose.