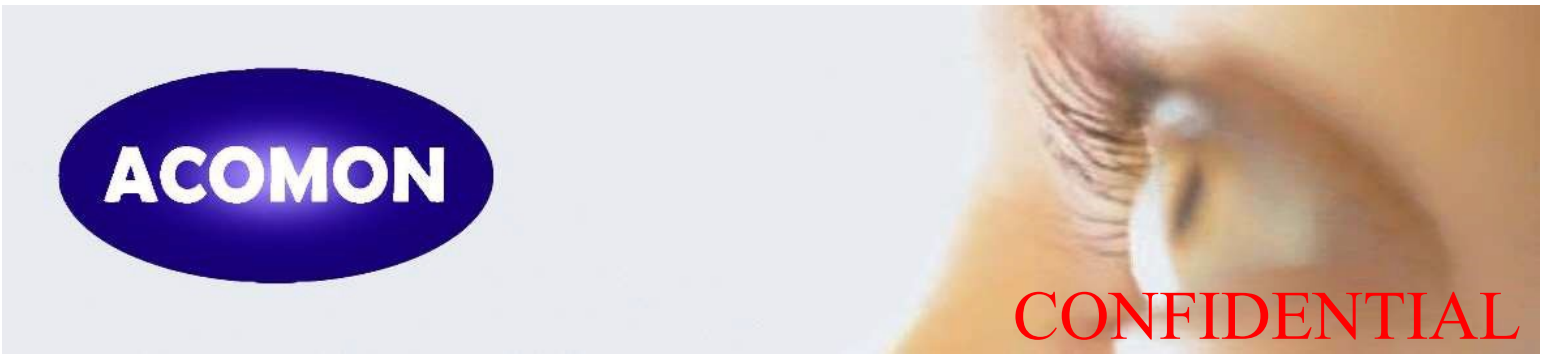

Jan 2024 Technical Data Sheet

RAVolution™ LE
For vacuum casting applications with low heat generation

INTRODUCTION

RAVolution™ LE is a special grade of RAVolution™ LH, the bi-component polyurethane resin specifically developed for vacuum casting operations.

Different from the original grade, RAVolution™ LE must be used for the production of articles with special requirements such as:

- Uneven thickness and/or larger than 8-10mm parts in the final prototype
- High weight, like the preparation of batch sizes over 1kg in resin weight
- Special design and geometry that imply an optimal resin flow inside the mould

RAVolution™ LE exhibits a lower reactivity accompanied by a significant reduction of heat generated by the polymer conversion, features that help in avoiding the common drawbacks when producing parts with big dimensions or complicated designs such as:

- difficult or incomplete mould filling
- bubbles and flow lines generation
- resin overheating leading to yellowing and in extreme case, burning of the polymer which can be accompanied by silicone mould damage.

While the processability of RAVolution™ LE is significantly different from the original grade RAVolution™ LH, both share the same outstanding properties:

- Polymer optical properties: excellent color, high Abbe value, high clarity, low haziness
- Superior polymer ageing behavior, UV resistant
- Suitable for in-mass colored and tinted parts
- Available in packages to cut all UV + part of the HEV* blue light for better personal protection
- Excellent coatability

* **UV+420cut**™ are registered trademarks of Mitsui Chemicals Inc.
* High Energy Visible light. See: www.uv420cut.com

MONOMER PROPERTIES OF RAVolution™ LE

Property	RAVolution™ IS LH	RAVolution™ PO LE
Appearance	Yellow, clear liquid	Bluish, clear liquid
Odor at room temperature	None to mild odor	None to mild odor
Specific gravity, 20ºC, g/cm^3	1.098	1.050
Viscosity, 25°C, cSt (Ubbelhode)	Max 300	Max 450
Color, APHA	Max. 30	Not Applicable
Refractive index n_D^{20}, num	1.500	1.461
Water, %	Not Applicable	<0.05%

RAVolution™ LE is available in several packaging sizes 1kg (both components), 3kg (polyol) and 5kg (isocyanate).

It is recommended to store **RAVolution™** at ambient temperature or if not, to let it reach room temperature before opening and usage.
Both the components are highly hygroscopic, therefore once a container is opened it's strictly recommended to close after use and seal tightly under dry nitrogen to prevent any moisture uptake, which could impact the processability of the resin and the quality of the final polymer negatively.
The shelf life is 12 months from manufacturing date in un-opened containers.
Safety: detailed information is provided in pertinent SDS.
While using, wear gloves and avoid any skin contact.
The preparation under fuming hoods or in well ventilated environments is necessary.

Casting process – operating procedures

RAVolution™ LE differs from the LH version only in the polyol component and requires a specific resin preparation and curing.

Resin reactivity	RAVolution™ LE
Mixing ratio (IS LH – PO LE)	72-28 (100 – 40)
Mixture Clearing time, (minutes)	<10
Gel Time, (100 grams – minutes)	<30

Casting conditions:

- Use components at ambient temperature
- Degas components separately for at least 5 minutes, optimal @10 minutes; absolute pressure must be lower than 100 mbar
- Mix components for a minimum of 3 minutes, optimal @5 minutes
- Pour into pre-heated silicone moulds @ 70°C
- Cure overnight @ 70°C: the resin does not affect the silicone molds' lifetime negatively
- Post cure treatment is suggested, but not mandatory for a high conversion rate of RAVolution™; in case, post cure @ = 70°C (1h) → 80°C (2hs) → 100°C (2hs)

POLYMER PROPERTIES OF RAVolution™ LE

Polymer specimens conditioned at 23°C, 50% of relative humidity.

Property	Method	Result
Yellow Index, num	ASTM D1925	<0.30
Total Transmittance, %	ASTM D1003	>92
Refractive index n_D^{20}, num	ASMT D542	1.513
Hardness - Shore D1, num	ASTM D2240	100
Density, g/cm3	ASTM D792	1.140
Shrinkage %, num	ASTM D792	5.1
Heat Deflection temperature (HDT),°C	ASMT D648	76
Impact resistance - IZOD, Kj/m^2	ASTM D256	70
Glass transition, °C	ISO 11357-2: 2014	90
ΔH_{pol} - residual, J/g	ISO 11357-2: 2014	<1.0
Young flexural modulus E, MPa	ASTM D4065: 2020	3300
Ultimate tensile strength UTS, MPa	ISO 527: 1993	85
Linear Shrinkage, mm/m	-	6