Makrolon® 6265 and 6267

- **Polycarbonate (PC)**
- **Flame retardant grades**
- **UL 94V-0/1.5 mm**
- **Low viscosity**
- **Injection molding**

Short description

Makrolon® 6265:
Global grade; MVR 19 cm³/10 min; Flame retardant; UL 94V-0/1.5 mm; Low viscosity; Easy release; Injection molding - Melt temperature 280 - 320 °C; Available in opaque colors only

Makrolon® 6267:
APAC and EMEA/LA regions; Formerly Developmental Product Makrolon DP1-1872; MVR 19 cm³/10 min; Flame retardant; UL 94V-0/1.5 mm; Low viscosity; UV stabilized; Easy release; Injection molding - Melt temperature 280 - 320 °C; Available in opaque colors only

Characterization

The Makrolon® 6265 and 6267 injection molding grades are easy flowing, linear polycarbonates based on bisphenol A which incorporate small quantities of flame retardant.
In terms of flow behavior, processability and mechanical, thermal and electrical properties, they are very similar to the Makrolon® 24.. grades. The chief difference compared with the general purpose grades is their flame retardance.

The flame retardant Makrolon® grades contain mold release agent (Makrolon® 6267 also contains a UV stabilizer) and a flame retardant or flame retardant system that is effective in very small quantities. The melt temperature should not exceed 320 °C during processing, however, since the good flame retardance of these grades could otherwise be impaired.

Abbreviation to DIN EN ISO 1043-1: PC

Designation to DIN EN ISO 7391-1:

Makrolon® 6265:
Thermoplastics ISO 7391-PC,MFR,(,,)-18-9

Makrolon® 6267:
Thermoplastics ISO 7391-PC,MFLR,(,,)-18-9

Delivery form

Granules, packed in 25-kg polyethylene sacks, FIBC (flexible intermediate bulk containers – big bags), large cartons with a polyethylene inliner or in bulk.

All Makrolon® batches are homogenized after production.

Makrolon® 6265 and 6267 are supplied in opaque colors. These products are not available in transparent colors. The natural-colored grades are opaque.

The production plants for Makrolon® have been certificated to DIN ISO by the appropriate quality organizations. The certificates can be found in the INTERNET at http://www.bayermaterialscience.com
(Customer Services / Certificates).

Registered customers can access Safety Data Sheet on the Internet (bayerone.bayer.com). It can also be sent on request.
The Safety Data Sheet includes data on labeling, transport and storage, as well as information on handling, product safety and toxicological and ecological profiles.

Applications

Components for the field of electrical engineering, lighting engineering, household items, data engineering and traffic systems.

Properties (see also table)

The key characteristic features of molded parts in Makrolon® 6265 and 6267 are:

- high strength and impact strength
- dimensional stability, very low dimensional changes
- high heat resistance
- flame retardance
- excellent electrical and dielectric properties

Burning behaviour

The flame retardant Makrolon® grades attain a superior classification to the general purpose Makrolon® grades in a series of fire tests.

When tested in accordance with UL 94, Makrolon® 6265 and 6267 obtain a UL 94V-0/1.5 mm classification. Corresponding general purpose Makrolon® grades: UL 94V-2 or UL 94HB.

Further inflammability classifications can be found in the Table.

Processing

Pre-treatment / drying[1)]

Makrolon® must be dried prior to processing. For injection molding, no more than 0.02 % residual moisture may be present in the granules and, for extrusion, no more than 0.01 %. Moisture in the melt leads to surface defects as well as to an increased reduction in molecular weight.

Makrolon® should be dried in suitable dryers at 120 °C.

The drying time for moist granules is largely a function of the nature and type of the drying unit and can total 2 to 12 hours depending on the drying capacity. Drying times of 2 to 4 hours are sufficient in modern high-speed dryers. One means of dispensing with pre-drying is for the moisture to be removed during melting with the aid of a degassing unit, as has been standard practice in extrusion for a long time.

Injection molding[1)]

The flame retardant Makrolon® grades can be injection molded in the same way as the general purpose Makrolon® grades. Under standard processing conditions, the flame retardant has not been seen to have any influence on the processing characteristics of the material.

With melt temperatures in excess of 320 °C, these grades display a greater tendency towards discoloration and surface defects than the general purpose grades, and their flame retardancy could also be affected. In some cases, the mold surface finish is not as smooth as for the general-purpose grades. In addition to this, it is possible for streaks or slight color shadows to become visible, depending on the geometry of the molded part, the design of the gate and the processing conditions.

Makrolon® can be processed on all modern injection molding machines. Shut-off nozzles are suitable given sufficient, uniform heating. At high melt temperatures, melt can flow out of open nozzles. Molding shrinkage is more or less identical in all directions and amounts to between 0.5 and 0.7 %.

The melt temperatures generally employed during processing are between 280 and 320 °C.

Material damage has to be expected with excessively high processing temperatures or excessively long residence times in the cylinder and hot runner. This can lead to a reduction in toughness and/or to surface defects in the form of streaks.

It should be possible for the molds to be heated intensively and uniformly, and the mold temperature should be at least 80 °C to ensure parts with a low inherent stress and a good surface. No demolding difficulties are encountered at up to 120 °C. It will not generally be necessary to employ mold release agents when Makrolon® grades with easy mold release are used.

When Makrolon® is processed under the recommended processing conditions it is possible for small quantities of decomposition products to be emitted. In accordance with the Safety Data Sheet, compliance with the specified exposure limits at the workplace must be guaranteed through adequate extraction and ventilation at the workplace, so as not to impair the health and well-being of the machine operators.

The specified processing temperatures must not be exceeded by any significant extent in order to prevent greater partial decomposition of the polymer and the splitting off of volatile breakdown products.

1) Details on this can be found in our Technical Information Sheet.

"Determining the dryness of Makrolon® by the TVI test"
"Processing data for the injection molder"
"The injection molding of high-quality molded parts"

Recycling

Rejects and production waste can be reground, observing the drying and processing advice for virgin material, and made into new moldings. It is essential to check the property level and the color of molding compounds that contain regrind in respect of the envisaged application. The permissible regrind content must be established on a case-by-case basis.

When using regrind, it should be borne in mind that the granule geometry, which differs from that of extrusion granules, will influence the feed and plastication behavior. For this same reason, physical mixtures of regrind and granules tend to segregate on account of the movement they experience during transport, conveying and metering operations.

When Makrolon® is reprocessed, care should be taken to ensure that no foreign materials or dirt are incorporated. Waste that contains pollutants and mixed waste can be chemically recycled or incinerated with energy recovery.

Non-recyclable Makrolon® waste can be disposed of in an environmentally compatible manner through the correct form of incineration and subsequent dumping of the slag.

Parts should be identified in accordance with DIN EN ISO 11469; the marking to be applied to parts in Makrolon® 6265 and 6267 is as follows:

>PC-FR<

Details on this can be found in our Technical Information Sheet "Part Identification of Thermoplastics for Recycling".

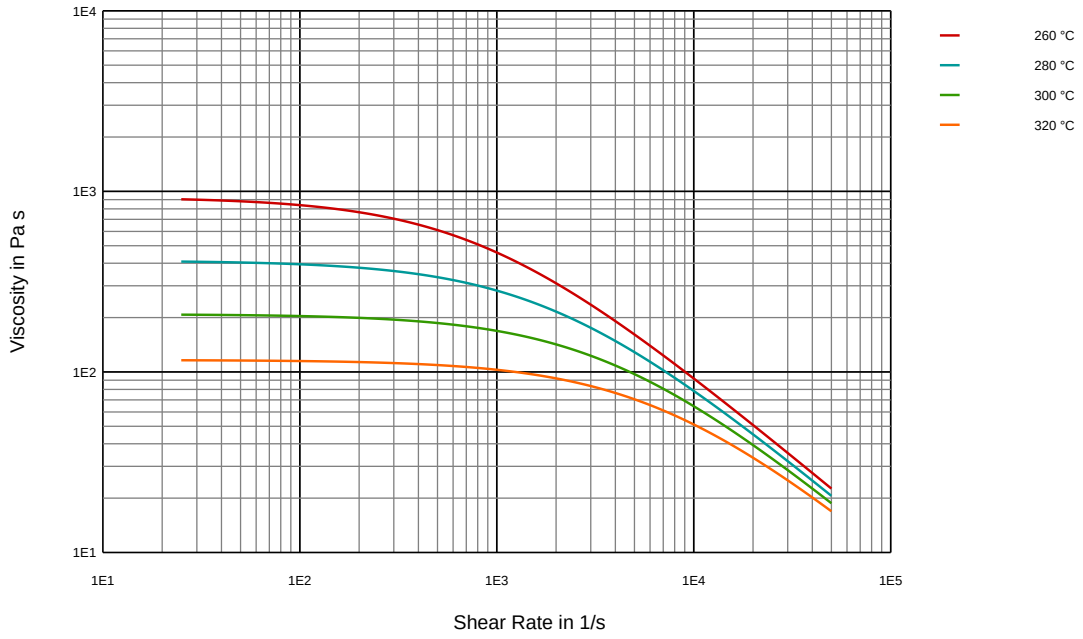

Fig. 1: Melt viscosity as a function of shear rate (Makrolon® 6265, 6267)

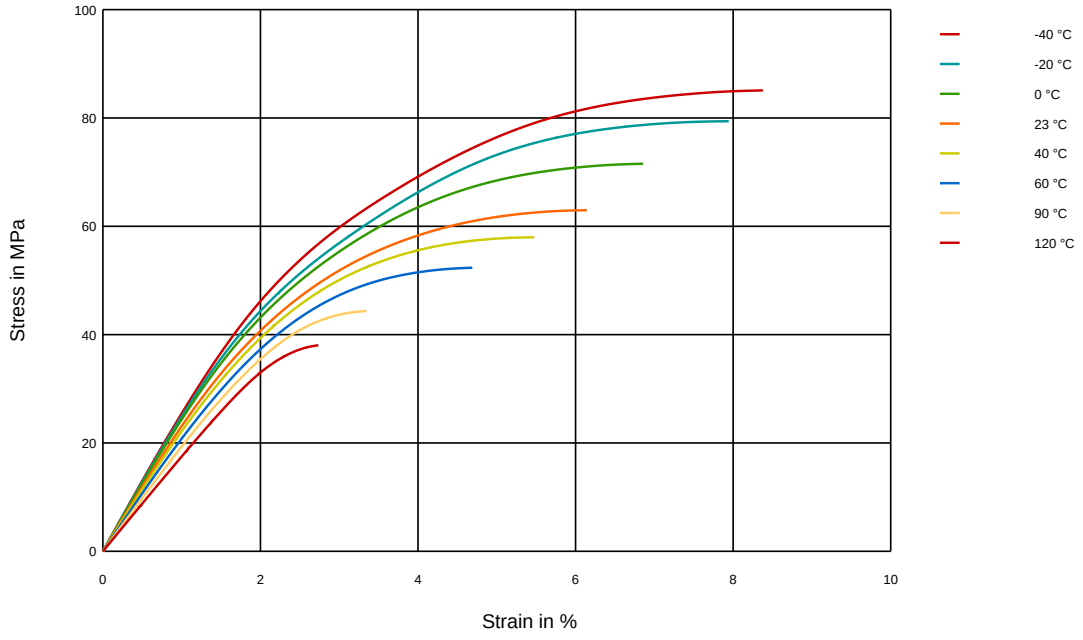

Fig. 2: Isothermal stress-strain curves from the short-time tensile test to ISO 527-1, -2 (Makrolon® 6265, 6267)

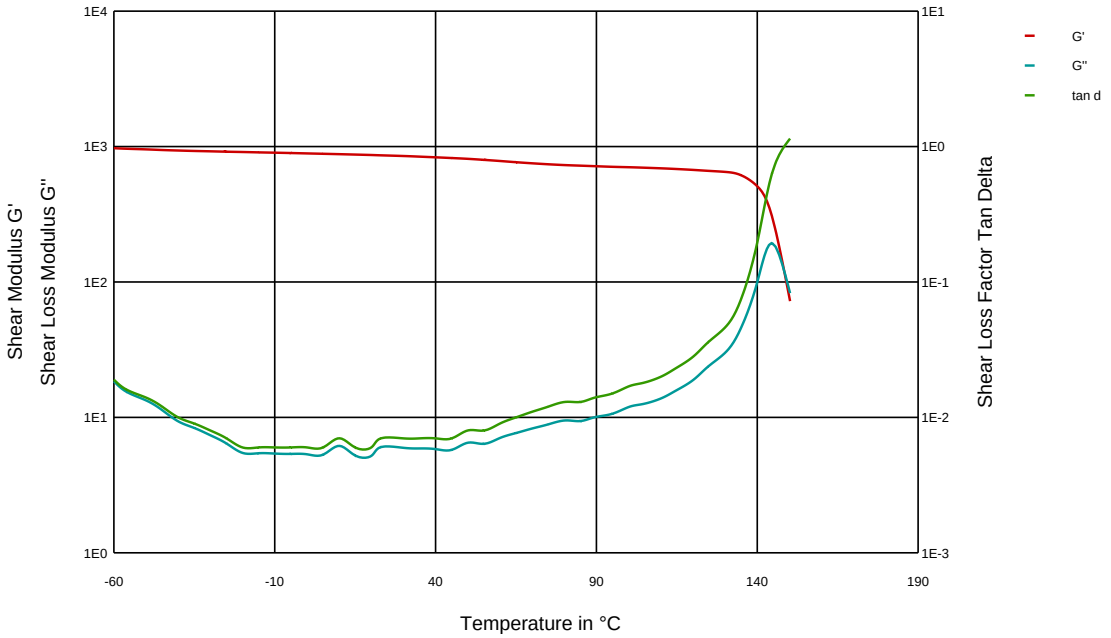

Fig. 3: Shear modulus as a function of temperature to ISO 6721-1, -2 (Makrolon® 6265, 6267)