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PLEXIGLAS® molding compounds
PLEXIGLAS® molding compounds are thermoplastics based on polymethyl methacrylate (PMMA), standardized to DIN 7745/ISO 8257. PLEXIGLAS® molding compounds are characterized by a number of chemical, physical and technical properties that are indispensable for manufacturing high-quality parts by injection molding, injection blow molding and extrusion.

Absolutely clear
PLEXIGLAS® crystal-clear molding compound grades are so highly transparent that molded parts and semifinished products manufactured from them provide the maximum possible light transmission of 92%, i.e. show only the physically unavoidable reflection loss of 4% at each surface where light enters and exits. This unique clarity makes it possible to obtain particularly pure colors with an outstanding degree of precision.

Convincing longevity
As confirmed by tests in all of the world’s climates, PLEXIGLAS® molding compounds show unsurpassed resistance to weathering and aging. They do not turn yellow or wear away under chemical attack, show no deterioration of their properties and are not subject to decay. PLEXIGLAS® therefore makes a major contribution to resource conservation. That was also one of the outstanding points in its favor in the Life Cycle Assessment (LCA) performed in accordance with DIN ISO 14040ff.

Recyclable
Owing to their chemical composition, PLEXIGLAS® molding compounds are uniquely suitable for chemical recycling and material recovery.

Tough surface
In addition to their pleasant feel and sound, molded parts and semifinished products made from PLEXIGLAS® (PMMA) present the greatest surface hardness and thus the best scratch resistance of all thermoplastics. This enables them to conserve their high gloss even after prolonged use.

Food contact approvals
The crystal-clear molding compounds PLEXIGLAS® 6N, 7N, 7M, 7H, 8N and 8H conform to FDA Regulation CFR 21 § 177.1010, Commission Regulation (EU) No. 10/2011 repealing Commission Directive 2002/72/EC, as well as to Recommendation XXII of the German Federal Institute for Risk Assessment (BfR, formerly BgVV). They also comply with the German Consumer Goods Ordinance (December 23, 1997). Please consult us with regard to other grades and colored molding compounds.

Certified quality
The Performance Polymers Business Unit of Evonik Industries AG has combined its management systems for environmental protection, safety, health and quality in an integrated management system and is certified in accordance with DIN EN ISO 9001:2008, ISO 14001:2004 and BS OHSAS 18001:2007. Moreover, the quality management system of the Molding Compounds Product Line has satisfied the stringent ISO TS 16949:2009 standard of the automotive industry. All manufacturing processes for PLEXIGLAS® molding compounds are subjected to a continuous improvement process and are monitored by a modern quality management system.

General Remarks
Overview of applications

We encounter PLEXIGLAS® or one of our other molding compounds every day in a multitude of applications and in different market segments.

<table>
<thead>
<tr>
<th>PLEXIGLAS®</th>
<th>Automotive &amp; Transportation</th>
<th>Electronic &amp; Communication</th>
<th>Lighting Technologies</th>
<th>Solar Applications</th>
<th>Industrial &amp; Construction</th>
<th>Home &amp; Garden</th>
<th>Furniture, Exhibition Booth &amp; Shop Fitting</th>
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</table>

*Note on the Automotive & Transportation market segment
There are increasing demands from the automotive industry for material data to be entered in the International Material Data System (IMDS).

The IMDS archives and manages all materials used in vehicle manufacture. This is the only way to fulfill the obligations imposed on automobile manufacturers, and consequently on suppliers, by national and international norms, standards, laws and directives.

Our material data sheets are published in IMDS and are therefore accessible to all IMDS participants. After they have registered free of charge at www.mdsystems.com, they can retrieve the data sheets by entering our company ID 2211.
PLEXIGLAS® molding compounds

Depending on the grade, our standard molding compounds differ in their physical properties such as flow and heat deflection temperature under load. They can be processed by means of all conventional thermoplastic processing methods.

PLEXIGLAS® 6N
- molding compound with good flow and a low heat deflection temperature under load
- application: injection molding of thin-walled parts with long flow paths

PLEXIGLAS® 7N
- molding compound with good flow (somewhat inferior to PLEXIGLAS® 6N) and an adequate heat deflection temperature under load
- application: injection molding of optical and technical items such as nameplates, covers, magnifying glasses, lenses, housewares and many other uses

PLEXIGLAS® 8N
- molding compound with a high heat deflection temperature under load
- slightly inferior flow to PLEXIGLAS® 7N
- application: injection molding of technical items to satisfy higher demands on heat deflection temperature under load (e.g. lighting industry, automotive industry (taillights, etc.))

PLEXIGLAS® 7H
- variant of PLEXIGLAS® 7N with higher molecular weight and improved stress crack resistance. Somewhat tougher than PLEXIGLAS® 7N at the same heat deflection temperature under load.
- application: extrusion of profiles and sheets for lighting engineering

PLEXIGLAS® 7M
- variant of PLEXIGLAS® 7H with improved flow
- application: extrusion of profiles and sheets for lighting engineering

PLEXIGLAS® 8H
- variant of PLEXIGLAS® 8N with higher molecular weight and improved stress crack resistance. Somewhat tougher than PLEXIGLAS® 8N at the same heat deflection temperature under load.
- application: extrusion of profiles and sheets for lighting engineering
PLEXIGLAS® Resist – impact-modified (zk)

Depending on the standard molding compound, the impact-modified grades differ in their key properties, such as optimized flow or stress crack resistance. They are suitable for extruding and coextruding profiles and sheets and for injection molding formed parts.

zkBR-Series
With its special optical characteristics and balanced property spectrum, the zkBR series is the basis for impact-modified PLEXIGLAS® molding compounds.

PLEXIGLAS® Resist zk4BR
PLEXIGLAS® Resist zk5BR
PLEXIGLAS® Resist zk6BR

zkHC-Series
This series is characterized by even higher stress crack resistance than that of PLEXIGLAS® zkBR molding compounds.

PLEXIGLAS® Resist zk4HC
PLEXIGLAS® Resist zk5HC
PLEXIGLAS® Resist zk6HC

zkHF-Series
The special feature of this series of PLEXIGLAS® molding compounds as compared with other impact-modified grades is its excellent flow.

PLEXIGLAS® Resist zk5HF
PLEXIGLAS® Resist zk6HF

zk-Series
These grades show much higher impact strength than the above-mentioned molding compounds.

PLEXIGLAS® Resist zk20
PLEXIGLAS® Resist zk30
PLEXIGLAS® Resist zk40
PLEXIGLAS® Resist zk50
PLEXIGLAS® Heatresist und PLEXIMID®—high heat deflection temperature under load

Products of the PLEXIGLAS® Heatresist and PLEXIMID® groups are crystal-clear molding compounds with different heat deflection temperatures under load.

PLEXIGLAS® Heatresist FT15
PLEXIGLAS® Heatresist FT15 is a new molding compound based on PMMA with a higher heat deflection temperature under load combined with improved flow. PLEXIGLAS® Heatresist FT15 is particularly suitable for injection-molding and extrusion applications with stringent requirements in terms of heat deflection temperature and flow. The special property profile offers benefits particularly when it comes to designing moldings with challenging wall thickness/flow path ratios (e.g. multi-component injection moulding).

PLEXIGLAS® Heatresist hw55
PLEXIGLAS® Heatresist hw55 is particularly suited for injection-molded technical parts for applications subjected to high thermal stress. PLEXIGLAS® Heatresist hw55 is a copolymer based on methyl methacrylate (MMA) with comonomer constituents. These provide a high heat deflection temperature under load for a PMMA molding compound, combined with particularly high chemical resistance and ease of processing.

PLEXIMID® TT50 und TT70
Polymethyl methacrylimide (PMMI) with high heat deflection temperature that is especially suitable for high-temperature applications such as headlamp lenses, drum lenses and in-built furniture lighting. Besides their high transmission and clarity and excellent strength and rigidity, these specialty molding compounds offer extremely stable optical values after long-term exposure to heat.
**PLEXIGLAS® Satinice – light-diffusing (df)**

In all production processes, bead-shaped polymer particles impart light-diffusing properties to products made from PLEXIGLAS® Satinice, with minimal loss of transmitted light. Furthermore, in extrusion processes, matt surfaces can be obtained.

**PLEXIGLAS® Satinice df21–23**
PLEXIGLAS® Satinice df21
PLEXIGLAS® Satinice df22
PLEXIGLAS® Satinice df23

Available in grades PLEXIGLAS® 7H, 7N, 8N and zk6BR.

**PLEXIGLAS® Satinice df33**
Specialty molding compound for extruding and coextruding sheets and profiles, with a very fine matte satin, velvety surface.

Available in grades PLEXIGLAS® 7H and zk6BR.
PLEXIGLAS® LED – for LED lighting

Specialty molding compounds for efficient lighting engineering applications in combination with LEDs. There is a choice of products either for edge lighting with maximum transmission or for backlighting without any disturbing hot spots.

For edge lighting
Components made from the molding compounds of the LD range appear crystal-clear and transparent when unlit. These molding compounds have been optimized for edge lighting and for guiding light across differently sized areas. No additional diffusion films or microstructures are required on the component surface in order to achieve uniform light output over the entire surface.

PLEXIGLAS® LED LD
PLEXIGLAS® LED LD12
PLEXIGLAS® LED LD24
PLEXIGLAS® LED LD48
PLEXIGLAS® LED LD96

Available as PLEXIGLAS® molding compounds 8N.

For backlighting
Molding compound colors for uniform light distribution when backlit with strong LED light, combined with high transmission, and without any disturbing hotspots (spots of light). These properties make it possible to reduce the spacing required between the cover and the LED light source, and to optimize the wall thickness of the component.

PLEXIGLAS® LED White
PLEXIGLAS® LED White 0V606
Molding compounds made from this special color appear white in incident light.

PLEXIGLAS® LED White 0V200
Special color for higher transmission, while retaining the light-diffusing properties.

Both are available in grades PLEXIGLAS® 7N, 7H and zk6BR.
PLEXIGLAS® Optical

Specialty crystal-clear molding compound of high optical purity for applications that call for particularly high transmission efficiency in long light paths. One example is the manufacture of optical light guides for backlight units in TFT-LCD displays. The products of the POQ range differ in their flow properties, which are adjusted to the desired processing technology.

PLEXIGLAS® Optical POQ66
Suitable for extrusion due to its...
• balanced combination of melt elasticity and flow properties
• high heat deflection temperature under load
• good mechanical properties for post-treatment of extruded sheets

PLEXIGLAS® Optical POQ64
Suitable for injection molding and injection-compression molding due to its...
• excellent flow properties
• optimized demolding behavior
• accurate reproduction of mold surfaces

PLEXIGLAS® Optical POQ62
Suitable for injection molding, injection-compression molding and coextrusion due to its...
• outstanding flow properties
• highly accurate reproduction of microstructures
PLEXIGLAS® Hi-Gloss

Molding compounds of the PLEXIGLAS® Hi-Gloss family are particularly suitable for injection-molding technical moldings. Their high brilliance makes it possible to manufacture high-gloss, Class A surfaces. They are usually provided in opaque colors. The color Black 9V022 was specially developed for so-called piano black applications.

Applications: add-on automotive body parts (e.g. pillar panels, spoilers, roof elements), decorative trim in car interiors and exteriors, mirror housings etc.

PLEXIGLAS® Hi-Gloss 8N
• molding compound with high heat deflection temperature under load
• good flow and melt viscosity

PLEXIGLAS® Hi-Gloss FT15
• high heat deflection temperature under load combined with good flow

PLEXIGLAS® Hi-Gloss NTA-1
• slightly impact-modified molding compound with high heat deflection temperature under load based on polymethyl methacrylate (PMMA)

PLEXIGLAS® Hi-Gloss NTA-3
• molding compound with higher heat deflection temperature under load based on polymethyl methacrylate (PMMA)
Special grades

System solution
PLEXIGLAS® cf
The specialty molding compound PLEXIGLAS® cf is a component of the CoverForm® system solution. Together with a solvent-free multi-component reactive system on an acrylate base, PMMA components can be coated directly inside the injection mold. The surfaces obtained in this way are highly resistant to scratching and wear, as well as to a large number of chemicals.

CoverForm® is a new surface technology developed by Evonik and KraussMaffei to meet particularly stringent requirements. The innovative system solution enables the application of a thin functional layer to PMMA moldings directly during the injection molding process, with no need for subsequent coating.

Solar applications
PLEXIGLAS® Solar IM20
Specialty molding compound with customized transmission properties, adjusted to the efficiency range of solar cells. It was developed for injection molding and injection-compression molding of microstructured lenses for concentrated photovoltaics (CPV). PLEXIGLAS® Solar IM20 also offers good flow and low melt viscosity, as well as highly accurate mold surface reproduction.

Infrared-reflecting molding compound
PLEXIGLAS® Heatstop (formerly CoolTouch)
Specialty molding compound that reflects heat rays directly at the surface. PLEXIGLAS® Heatstop is suitable for all thermoplastic processing methods, including coextrusion.

Medical technology grades
CYROLITE®
CYROLITE® products are impact-resistant thermoplastic molding compounds based on methacrylate. They show remarkable clarity and light transmission for a multiphase polymer. Their melt viscosity is similar to that of standard PLEXIGLAS® molding compound. CYROLITE® can be injection molded, extruded, injection blow-molded and extrusion blow-molded.

Please address your inquiries to: cyrolite@evonik.com

Optical grades
PLEXIGLAS® oq
On request, molding compounds PLEXIGLAS® 7N and 8N are supplied in “tested optical quality” for premium articles.

Molding compounds with special additives
Standard molding compounds with special properties are available on request. These include:
• increased UV absorption
• UV transmission
• easy mold release, especially for particularly complex molding shapes to minimize the risk of demolding fracture.

The mold release agent causes no haze.

Auxiliary agents
ACRIFIX® sp Cylinder/Barrel Cleaning Agent
• ACRIFIX® sp is a cylinder/barrel cleaning agent of high molecular weight, based on polymethyl methacrylate (PMMA).
• ACRIFIX® sp is used both for switching from one type of plastic to another and for changing colors. It remains rubbery-elastic even at high temperatures.
Colors and delivery

Colors

PLEXIGLAS® colors
Standard colors are identified by a five-digit number after the color name. The 1st digit stands for the main color (in analogy to RAL):

0 = white  5 = blue
1 = yellow  6 = green
2 = orange  7 = gray
3 = red     8 = brown
4 = purple  9 = black and clear

AMECA*-listed colors are available that can be employed for automotive signal purposes. They meet the requirements of SAE J 576.

*Automotive Manufacturers Equipment Compliance Agency

Special colors
We offer a variety of special colors. Among others, these include further colors for signaling applications and lighting engineering, as well as ones with good hiding power for coextrusion.

Further information on the availability of special colors is available on request (email: plexiglas.polymers@evonik.com).

Delivery

Physical Forms
PLEXIGLAS® molding compounds are supplied in injection molding and extrusion quality as pellets of uniform size.

Packaging
- 25 kg, two-ply polyethylene bag
- 500 kg carton with polyethylene lining
- Further forms of packaging, such as silos, on request

No charge is made for standard packaging. All forms of packaging ensure that the molding compound is delivered in such a way that it normally requires no predrying. If correctly stored, the protection offered by the packaging means that very little moisture is absorbed even after several months’ storage.

Inspection and other certificates
An inspection certificate in line with EN 10204-3.1 can be provided on request.

Availability
PLEXIGLAS® molding compound in crystal-clear and standard colors is normally available at short notice. All other molding compounds are manufactured to order, subject to certain minimum quantities. Color matching and new colors on request, at a charge.
## Properties of selected molding compounds

<table>
<thead>
<tr>
<th>Mechanical properties</th>
<th>Tensile modulus (1 mm/min)</th>
<th>Yield stress (50 mm/min)</th>
<th>Yield strain (50 mm/min)</th>
<th>Nominal strain at break</th>
<th>Stress at break (5 mm/min)</th>
<th>Stress at break (5 mm/mm/min)</th>
<th>Charpy-impact strength (23 °C)</th>
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<table>
<thead>
<tr>
<th>Mechanical properties</th>
<th>Thermal properties</th>
<th>Rheological properties</th>
<th>Optical properties</th>
<th>Other properties</th>
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<tr>
<td>Tensile modulus (1 mm/min)</td>
<td>Vicat softening temperature (B/50)</td>
<td>Melt volume rate, MVR (230/3.8)</td>
<td>Transmittance, $T_{115}$ (3 mm)</td>
<td>Density</td>
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<td>Yield stress (50 mm/min)</td>
<td>Temp. of deflection under load (0.45 MPa)</td>
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<td>Yield strain (50 mm/min)</td>
<td>Flammability UL 94 (1.6 mm thickness)</td>
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<td>Nominal strain at break</td>
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<td>Stress at break (5 mm/min)</td>
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<td>Stress at break (5 mm/min)</td>
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<td>Charpy-impact strength (23 °C)</td>
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* no break

** (260/10)
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Sales Range and technical data subject to alteration.

November 2011
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