Makrolon® 6555 and 6557

- **Polycarbonate (PC)**
- **Flame retardant grades**
- **UL 94V-0/3.0 mm**
- **Medium viscosity**
- **Injection molding**

Short description

Makrolon® 6555:

Global grade; MVR (300 °C/1.2 kg) 9.5 cm³/10 min; chlorine- and bromine-free flame retardant; UL 94V-0/3.0 mm; medium viscosity; easy release; injection molding - melt temperature 280 - 320 °C; available in transparent, translucent and opaque colors

Makrolon® 6557:

Global grade; MVR (300 °C/1.2 kg) 9.5 cm³/10 min; chlorine- and bromine-free flame retardant; UL 94V-0/3.0 mm; medium viscosity; UV stabilized; easy release; injection molding - melt temperature 280 - 320 °C; available in transparent, translucent and opaque colors

Characterization

The Makrolon® 6555 and 6557 injection molding grades are medium viscosity, 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 medium viscosity Makrolon® general purpose grades. The chief difference compared with the general purpose grades is its flame retardance.

The flame retardant Makrolon® grades contain mold release agent (Makrolon® 6557 also contains a UV stabilizer) and a chlorine- and bromine-free flame retardant system that is effective in small quantities.

Abbreviation to DIN EN ISO 1043-1: PC

Designation to DIN EN ISO 7391-1:

Makrolon® 6555:
Thermoplastics ISO 7391-PC,MFR,(,,)-09-9

Makrolon® 6557:
Thermoplastics ISO 7391-PC,MFLR,(,,)-09-9

These are amorphous thermoplastics which, when injection molded, provide a unique combination of strength, stiffness and hardness, together with toughness and breaking strength. The heat resistance of these Makrolon® grades extends up to 135 °C, depending on the type of stress placed on the component. This, together with the low-temperature impact strength that is sufficient for a large number of applications, means that these grades can be used over a broad temperature range (-100 to +135 °C).

Delivery form

Granules, packed in 25-kg polyethylene sacks, big bags, octatainer with a polyethylene inliner or in bulk.

All Makrolon® batches are homogenized after production.

Makrolon® 6555 and 6557 are supplied in transparent, translucent and opaque colors with an outstanding color depth.

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 fields of electrical engineering, lighting engineering, household items, data engineering and traffic systems.

Properties (see also table)

The key characteristic features of molded parts in flame retardant Makrolon® are:

- outstanding light transmission (transparent grades)
- high strength and impact strength
- dimensional stability, very low dimensional changes
- high heat resistance
- flame retardance
- excellent electrical and dielectric properties

Mechanical properties

Molded parts made of flame retardant Makrolon® rank among the rigid materials on account of their strength and hardness, yet also amongst the elastic materials on account of their toughness. The low level of correlation between mechanical properties and temperature is striking; up to 140 °C, the parts remain hard and dimensionally stable.

If parts are to be produced that will be exposed to dynamic loading, we recommend that model tests be conducted beforehand.

Stressing in excess of 20 MPa at 20 °C and in excess of 10 MPa at 60 °C can lead to surface cracking after a period of more than 10^4 hours. If the parts are employed in media other than air, then the permissible values may differ. Over and above this, allowance must be made for reduction factors as a function of the different influencing parameters (e.g. the molded part geometry, gate design and processing conditions). These reduction factors must be specified for each individual case.

Influence of coloring on thoughness

The majority of transparent colors (Makrolon® 6555, 6557) do not cause any change in properties, or at least no major change.
Opaque pigments affect toughness depending on the type and quantity of pigment employed.

Thermal properties

Molded parts made of flame retardant Makrolon® grades are noted for their high heat resistance. At low loading levels (e.g. inherent weight) the parts do not undergo any essential deformation at up to 135 °C. At above 145 °C (glass transition temperature), Makrolon® starts to soften and as of approximately 220 °C it assumes the molten state. Even higher temperatures are required, however, before it attains a flowability that will permit it to be processed on injection molding and extrusion machines. Lengthy periods of heating to temperatures in excess of 320 to 340 °C lead to thermal decomposition, with carbon dioxide being split off, and discoloration.

The coefficient of thermal expansion is lower than for many other thermoplastics. If the material is subject to temperatures in excess of some 80 °C for long periods of time, then a structural change will occur, as a function of the temperature and duration of the thermal treatment, which is characterized by a slight increase in the tensile and flexural strength and a reduction in the notched impact strength. The maximum permitted service temperature for parts made of Makrolon® depends on the shape of the molded part, the type of loading and the specifications. The temperature indices to IEC 60216-1 and UL 746 B can be regarded as practical reference values for the permitted maximum temperatures during long-term service.

Where a component is subject to a high temperature and mechanical loading simultaneously, the creep behavior must be taken into account. Further details on this can be found in the CAMPUS® database.

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® 6555 and 6557 obtain a UL 94V-0/3.0 mm.
Corresponding general purpose Makrolon® grades: UL 94HB.

Further inflammability classifications can be found in the Table.

Electrical properties

The electrical properties of molded parts in flame retardant Makrolon® are not influenced notably by temperature fluctuations or by ambient humidity. The change in the measured values at higher frequencies must be taken into account when Makrolon® is used in the high-frequency sector. A further advantage is that no electrolytic corrosion is caused.

Optical properties

Molded parts made from Makrolon® 6555 and 6557 grades have a high refractive index of 1.586. The virtually colorless, transparent grades possess a light transmission of up to 89 % in the visible range. Ultraviolet light, by contrast, is absorbed and leads to yellowing and a reduction in the impact strength in the course of time.

In all cases where UV radiation is emitted, and particularly when it is emitted in conjunction with high temperatures, a UV stabilized grade should be used (Makrolon® 6557). Finished parts, and particularly lamp covers, can be given subsequent UV protective treatment if required.

Behaviour towards moisture and water (hydrolysis resistance)

Molded parts in flame retardant Makrolon® absorb only 0.10 to 0.17 % water at room temperature with 50 % relative humidity. The physical/technological properties remain virtually unaffected. The dimensional changes are similarly insignificant. With immersion in water and rising temperatures, values of only 0.5 % or so are achieved. The impact strength, notched impact strength and tensile strain at break are reduced through lengthy contact with hot water. This effect can also occur with storage in very moist, hot air. The steam permeability, measured on 100 µm thick film, is 15 g/m² • d. A notable level of permeability also exists for other gases (hydrogen, carbon dioxide, sulfur dioxide, helium and ethylene oxide).

Chemical resistance

Makrolon® is resistant to mineral acids, even in high concentrations, to a large number of organic acids (e.g. carbonic acid, lactic acid, oleic acid and citric acid), to oxidation and reducing agents, neutral and acidic saline solutions, a range of greases and oils, saturated aliphatic and cycloaliphatic hydrocarbons, and also alcohols, with the exception of methyl alcohol. Makrolon® is destroyed by alkaline solutions, ammonia gas and its solution, and amines. Makrolon dissolves in a large number of industrial solvents. Other organic compounds, such as benzene, acetone and carbon tetrachloride, cause it to swell.

Weatherability

Weatherability is generally adequate for a large number of applications and particularly for indoor applications. For stringent requirements, use of the UV stabilized grade, Makrolon® 6557, is recommended. Maximum resistance can be attained in finished parts through the subsequent application of a UV protective coating.

Processing

Injection molding is the standard form of processing. Molded parts in flame retardant Makrolon® can be molded, processed and post-treated in the same way as the general purpose Makrolon® grades.

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.

Even if dried well, the Makrolon® 6555 and 6557 grades, when processed in molds with long flow paths, tend to form bubbles in accumulations of melt at the end of the flow path if only a low injection or holding pressure - or no pressure at all - is effective in these zones.

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, however, these grades display a greater tendency to discoloration than the general purpose grades. It is also possible for their flame retardance to be affected.

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 0.6 and 0.8 %.

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"

Extrusion

Makrolon® 6555 and 6557 can be processed on extruders. In colorless grades of Makrolon® 6555 and 6557 the flame retardant may cause very slight cloudiness in the extrudate.

Secondary finishing/post-treatment (molded parts)

Injection moldings made of the flame retardant Makrolon® grades can be machined without any difficulty. There is only a low tendency towards "smearing" on account of the high softening temperature. Only air or clean water can be employed as cooling agents. Makrolon® components can be readily polished to a high gloss. Only alkali-free polishing pastes may be used, however, in order to prevent any chemical damage to the surface.

The industry supplies products for painting, printing and embossing which are specially tailored to polycarbonate. Makrolon® components can be vacuum metallized.

If parts in Makrolon® are to be glued together[2)], solvents such as methylene chloride (dichloromethane), 1,2-dichloroethane and 1,3-dioxolane are particularly suitable. These can be used to partially dissolve the contact surfaces prior to gluing (see Safety Advice). Two-pack adhesives, such as those based on epoxy resin, silicone (with an amine-free hardening agent) or polyurethane are suitable both for gluing together parts made of Makrolon® and for gluing parts in

Makrolon® to other materials. A condition for the use of adhesives based on epoxy resin, silicone and polyurethane is that these must not contain any components that are incompatible with Makrolon®.

Makrolon® parts can be welded by means of vibration, friction, heated tool or hot gas welding. Ultrasonic welding and riveting are the preferred processes.

2) Details on this can be found in our Technical Information Sheet "The Adhesive Bonding of Makrolon®".

Safety Notice

When handling the recommended adhesives and solvents, it is essential for the advice contained in the Safety Data Sheets for these products to be observed. The Safety Data Sheets will be made available by the individual suppliers. Further up-to-date information on the individual solvents is also available on the internet, in the GESTIS hazardous substances database (GESTIS = information system on hazardous substances for the German statutory accident insurance and accident prevention organizations) at
www.dguv.de/bgia/en/index.jsp.

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® 6555 and 6557 is as follows:

>PC-FR<

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

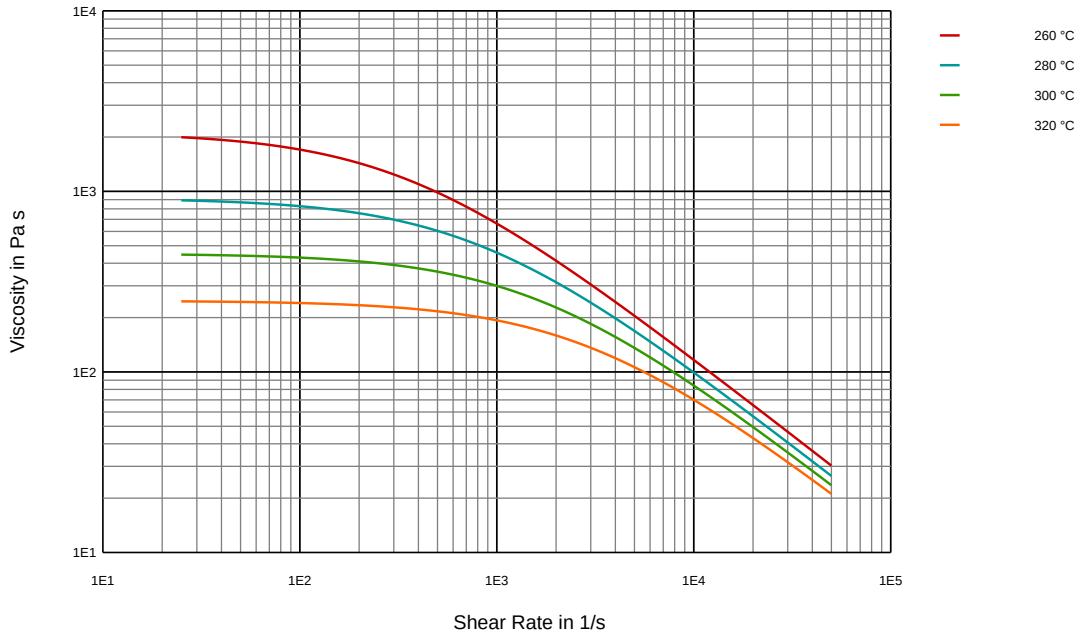

Fig. 1: Melt viscosity as a function of shear rate (Makrolon® 6555, 6557)

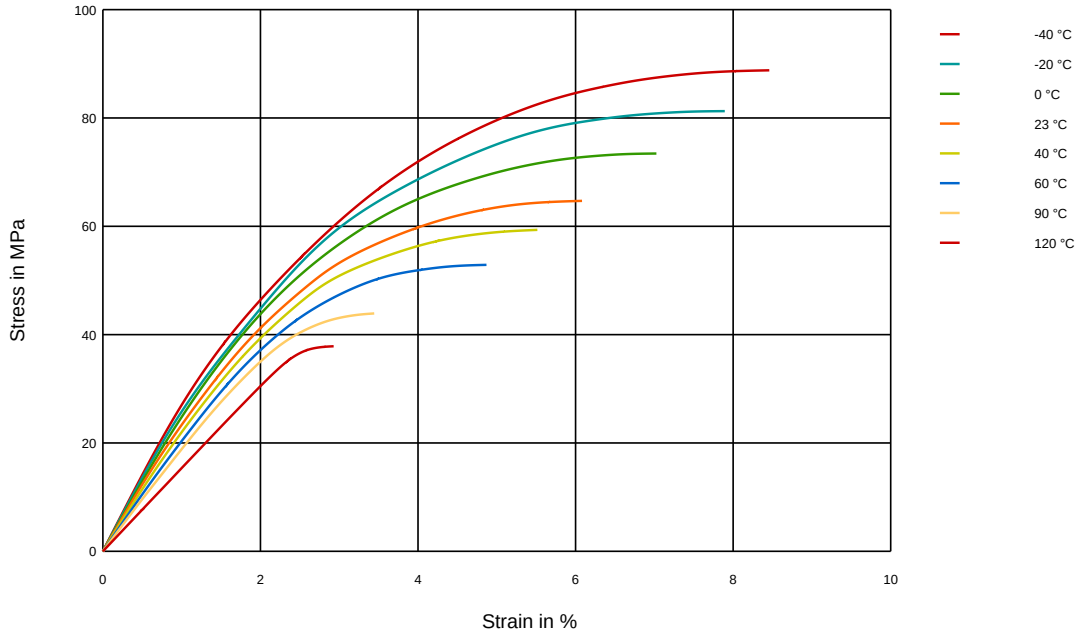

Fig. 2: Isothermal stress-strain curves from the short-time tensile test to ISO 527-1, -2 (Makrolon® 6555, 6557)

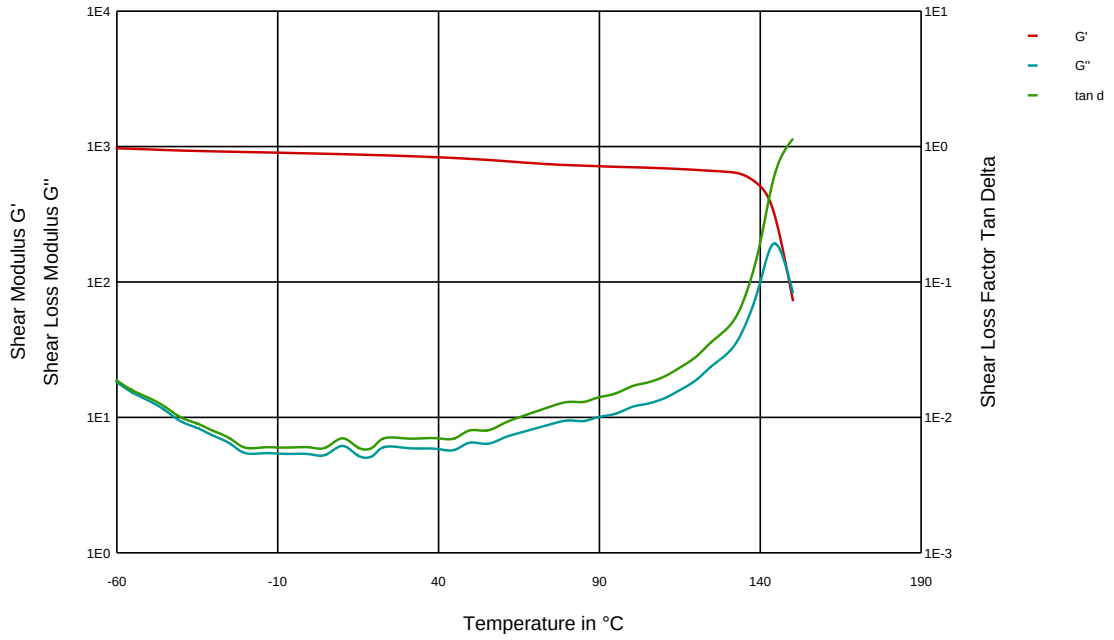

Fig. 3: Shear modulus as a function of temperature to ISO 6721-1, -2 (Makrolon® 6555, 6557)

Typical Values

	Property	Test Condition	Unit	Standard	Makrolon® 6555	Makrolon® 6557
Rheological properties						
C	Melt volume-flow rate	300 °C; 1.2 kg	cm³/10 min	ISO 1133	9.5	9.5
C	Molding shrinkage, parallel	60x60x2; 500 bar	%	ISO 294-4	0.65	0.65
C	Molding shrinkage, normal	60x60x2; 500 bar	%	ISO 294-4	0.7	0.7
	Molding shrinkage, parallel/normal	Value range based on general practical experience	%	b.o. ISO 2577	0.6 - 0.8	0.6 - 0.8
	Melt mass-flow rate	300 °C; 1.2 kg	g/10 min	ISO 1133	10	10
Mechanical properties (23 °C/50 % r. h.)						
C	Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	2400	2450
C	Yield stress	50 mm/min	MPa	ISO 527-1,-2	66	67
C	Yield strain	50 mm/min	%	ISO 527-1,-2	6.1	6.1
C	Nominal strain at break	50 mm/min	%	ISO 527-1,-2	> 50	> 50
	Stress at break	50 mm/min	MPa	ISO 527-1,-2	65	65
	Strain at break	50 mm/min	%	b.o. ISO 527-1,-2	115	115
C	Tensile creep modulus	1 h	MPa	ISO 899-1	2200	2200
C	Tensile creep modulus	1000 h	MPa	ISO 899-1	1900	1900
	Flexural modulus	2 mm/min	MPa	ISO 178	2400	2400
	Flexural strength	2 mm/min	MPa	ISO 178	98	99
	Flexural strain at flexural strength	2 mm/min	%	ISO 178	7.1	7.0
	Flexural stress at 3.5 % strain	2 mm/min	MPa	ISO 178	74	75
C	Charpy impact strength	23 °C	kJ/m²	ISO 179-1eU	N	N
C	Charpy impact strength	-30 °C	kJ/m²	ISO 179-1eU	N	N
	Charpy impact strength	-60 °C	kJ/m²	ISO 179-1eU	N	N
	Charpy notched impact strength	23 °C; 3 mm	kJ/m²	ISO 7391/b.o. ISO 179-1eA	70P	70P(C)
	Charpy notched impact strength	-30 °C; 3 mm	kJ/m²	ISO 7391/b.o. ISO 179-1eA	14C	14C
	Izod notched impact strength	23 °C; 3.2 mm	kJ/m²	b.o. ISO 180-A	80P	80P(C)
	Izod notched impact strength	-30 °C; 3.2 mm	kJ/m²	b.o. ISO 180-A	12C	12C
C	Puncture maximum force	23 °C	N	ISO 6603-2	5400	5400
C	Puncture maximum force	-30 °C	N	ISO 6603-2	6300	6300
C	Puncture energy	23 °C	J	ISO 6603-2	60	60
C	Puncture energy	-30 °C	J	ISO 6603-2	65	65
	Ball indentation hardness		N/mm²	ISO 2039-1	115	116

Typical Values

	Property	Test Condition	Unit	Standard	Makrolon® 6555	Makrolon® 6557
Thermal properties						
C	Glass transition temperature	10 °C/min	°C	ISO 11357-1,-2	145	144
C	Temperature of deflection under load	1.80 MPa	°C	ISO 75-1,-2	125	124
C	Temperature of deflection under load	0.45 MPa	°C	ISO 75-1,-2	137	136
C	Vicat softening temperature	50 N; 50 °C/h	°C	ISO 306	144	143
	Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	145	144
C	Coefficient of linear thermal expansion, parallel	23 to 55 °C	10^{-4}/K	ISO 11359-1,-2	0.65	0.65
C	Coefficient of linear thermal expansion, transverse	23 to 55 °C	10^{-4}/K	ISO 11359-1,-2	0.65	0.65
C	Burning behavior UL 94 (1.5 mm)	1.5 mm	Class	UL 94	V-2	V-2
C	Burning behavior UL 94	3.0 mm	Class	UL 94	V-0	V-0
	Burning behavior UL 94	0.75 mm	Class	UL 94		V-2 (CL)
	Burning behavior UL 94	6.0 mm	Class	UL 94	V-0	V-0
C	Oxygen index	Method A	%	ISO 4589-2	35	35
	Thermal conductivity	23 °C	W/(m·K)	ISO 8302	0.20	0.20
	Resistance to heat (ball pressure test)		°C	IEC 60695-10-2	136	135
	Temperature index (Tensile strength)	20000 h; 1.5 mm	°C	IEC 60216-1	130	130
	Halving interval (Tensile strength)	1.5 mm	°C	IEC 60216-1	5.3	5.3
	Temperature index (Tensile impact strength)	20000 h; 1.5 mm	°C	IEC 60216-1	120	120
	Halving interval (Tensile impact strength)	1.5 mm	°C	IEC 60216-1	7.0	7.0
	Temperature index (Electric strength)	20000 h; 1.5 mm	°C	IEC 60216-1	135	135
	Halving interval (Electric strength)	1.5 mm	°C	IEC 60216-1	6.9	6.9
	Relative temperature index (Tensile strength)	1.5 mm	°C	UL 746B	125	125
	Relative temperature index (Tensile impact strength)	1.5 mm	°C	UL 746B	115	115
	Relative temperature index (Electric strength)	1.5 mm	°C	UL 746B	125	125
	Glow wire test (GWFI)	1.0 mm	°C	IEC 60695-2-12	875	875
	Glow wire test (GWFI)	1.5 mm	°C	IEC 60695-2-12	960	960
	Glow wire test (GWFI)	2.0 mm	°C	IEC 60695-2-12		960
	Glow wire test (GWFI)	3.0 mm	°C	IEC 60695-2-12	960	960
	Glow wire test (GWFI)	4.0 mm	°C	IEC 60695-2-12		960
	Glow wire test (GWFI)	6.0 mm	°C	IEC 60695-2-12	960	
	Glow wire test (GWIT)	1.0 mm	°C	IEC 60695-2-13	875	875
	Glow wire test (GWIT)	1.5 mm	°C	IEC 60695-2-13	875	875
	Glow wire test (GWIT)	2.0 mm	°C	IEC 60695-2-13	875	875
	Glow wire test (GWIT)	3.0 mm	°C	IEC 60695-2-13	875	875
	Glow wire test (GWIT)	4.0 mm	°C	IEC 60695-2-13	875	875
	Glow wire test	1.5 mm	°C	b.o. EDF HN60 E.02	750	750
	Glow wire test	3.0 mm	°C	b.o. EDF HN60 E.02	750	750
	Application of flame from small burner	Method K and F; 2.0 mm	Class	DIN 53438-1,-3	K1, F1	K1, F1
	Needle flame test	Method K; 1.5 mm	s	IEC 60695-2-2	60	60
	Needle flame test	Method K; 2.0 mm	s	IEC 60695-2-2	120	120
	Needle flame test	Method K; 3.0 mm	s	IEC 60695-2-2	120	120
	Needle flame test	Method F; 1.5 mm	s	IEC 60695-2-2	120	120
	Needle flame test	Method F; 2.0 mm	s	IEC 60695-2-2	120	120
	Needle flame test	Method F; 3.0 mm	s	IEC 60695-2-2	120	120
	Burning rate (US-FMVSS)	>=1.0 mm	mm/min	ISO 3795	passed	passed
	Flammability to CSTB	2 mm	Rating	NF P 92-501	M4	M4
	Flammability to CSTB	3 mm	Rating	NF P 92-501	M4	M4
	Flammability to CSTB	4 mm	Rating	NF P 92-501	M4	M4
	Flash ignition temperature		°C	ASTM D1929	460	460
	Self ignition temperature		°C	ASTM D1929	530	530

Typical Values

	Property	Test Condition	Unit	Standard	Makrolon® 6555	Makrolon® 6557
Electrical properties (23 °C/50 % r. h.)						
C	Relative permittivity	100 Hz	-	IEC 60250	3.1	3.1
C	Relative permittivity	1 MHz	-	IEC 60250	3.0	3.0
C	Dissipation factor	100 Hz	10^{-4}	IEC 60250	8	8
C	Dissipation factor	1 MHz	10^{-4}	IEC 60250	90	90
C	Volume resistivity		Ohm·m	IEC 60093	1E14	1E14
C	Surface resistivity		Ohm	IEC 60093	1E16	1E16
C	Electrical strength	1 mm	kV/mm	IEC 60243-1	34	34
C	Comparative tracking index CTI	Solution A	Rating	IEC 60112	225	225
	Comparative tracking index CTI M	Solution B	Rating	IEC 60112	125M	125M
	Electrolytic corrosion		Rating	IEC 60426	A1	A1
Other properties (23 °C)						
C	Water absorption (saturation value)	Water at 23 °C	%	ISO 62	0.30	0.30
C	Water absorption (equilibrium value)	23 °C; 50 % r. h.	%	ISO 62	0.12	0.12
C	Density		kg/m³	ISO 1183-1	1200	1200
	Water vapor permeability	23 °C; 85 % RH; 100 µm film	g/(m²·24 h)	ISO 15106-1	15	15
	Gas permeation	Oxygen; 100 µm film	cm³/(m²·24 h*bar)	b.o. ISO 2556	700	700
	Gas permeation	Oxygen; 25.4 µm (1 mil) film	cm³/(m²·24 h*bar)	b.o. ISO 2556	2760	2760
	Gas permeation	Nitrogen; 100 µm film	cm³/(m²·24 h*bar)	b.o. ISO 2556	130	130
	Gas permeation	Nitrogen; 25.4 µm (1 mil) film	cm³/(m²·24 h*bar)	b.o. ISO 2556	510	510
	Gas permeation	Carbon dioxide; 100 µm film	cm³/(m²·24 h*bar)	b.o. ISO 2556	4300	4300
	Gas permeation	Carbon dioxide; 25.4 µm (1 mil) film	cm³/(m²·24 h*bar)	b.o. ISO 2556	16900	16900
	Bulk density	Pellets	kg/m³	ISO 60	640	640
Material specific properties						
	Refractive index	Procedure A	-	ISO 489	1.586	1.586
	Luminous transmittance (clear transparent materials)	1 mm	%	ISO 13468-2	89	89
C	Luminous transmittance (clear transparent materials)	2 mm	%	ISO 13468-2	89	89
	Luminous transmittance (clear transparent materials)	3 mm	%	ISO 13468-2	88	88
	Luminous transmittance (clear transparent materials)	4 mm	%	ISO 13468-2	87	87
Processing conditions for test specimens						
C	Injection molding-Melt temperature		°C	ISO 294	300	300
C	Injection molding-Mold temperature		°C	ISO 294	80	80
C	Injection molding-Injection velocity		mm/s	ISO 294	200	200

C These property characteristics are taken from the CAMPUS plastics data bank and are based on the international catalogue of basic data for plastics according to ISO 10350.

Impact properties: N = non-break, P = partial break, C = complete break

colored fields = UL recognition

This information and our technical advice - whether verbal, in writing or by way of trials - are given in good faith but without warranty, and this also applies where proprietary rights of third parties are involved. Our advice does not release you from the obligation to check its validity and to test our products as to their suitability for the intended processes and uses. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. Our products are sold in accordance with the current version of our General Conditions of Sale and Delivery.

Under the recommended processing conditions small quantities of decomposition product may be given off during processing.To preclude any risk to the health and well-being of the machine operatives, tolerance limits for the work environment must be ensured by the provision of efficient exhaust ventilation and fresh air at the workplace in accordance with the Safety Data Sheet. In order to prevent the partial decomposition of the polymer and the generation of volatile decomposition products, the prescribed processing temperatures should not be substantially exceeded.

Unless specified to the contrary, the values given have been established on standardized test specimens at room temperature. The figures should be regarded as guide values only and not as binding minimum values. Please note that, under certain conditions, the properties can be affected to a considerable extent by the design of the mold/die, the processing conditions and coloring.

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