Makrolon 3208

General purpose grades / High viscosity	MFR 4.5 g/10 min; General purpose; High viscosity; EU/FDA quality; Good hydrolysis resistance; Extrusion; Injection molding; Available in transparent, translucent and opaque colors; Suitable for medical devices
ISO Shortname	ISO 7391-PC,G,67-05-9

	Property	Test Condition	Unit	Standard	Value
Rheological properties					
C	Melt volume-flow rate	300 °C; 1.2 kg	cm³/(10 min)	ISO 1133	4.0
	Molding shrinkage, parallel/normal	Value range based on general practical experience	%	acc. ISO 2577	0.6 - 0.8
	Melt mass-flow rate	300 °C; 1.2 kg	g/(10 min)	ISO 1133	4.5
Mechanical properties (23 °C/50 % r.h.)					
C	Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	2350
C	Yield stress	50 mm/min	MPa	ISO 527-1,-2	65
C	Yield strain	50 mm/min	%	ISO 527-1,-2	6.4
C	Nominal strain at break	50 mm/min	%	ISO 527-1,-2	> 50
	Stress at break	50 mm/min	MPa	ISO 527-1,-2	70
	Strain at break	50 mm/min	%	acc. ISO 527-1,-2	115
C	Tensile creep modulus	1 h	MPa	ISO 899-1	2200
C	Tensile creep modulus	1000 h	MPa	ISO 899-1	1900
	Flexural modulus	2 mm/min	MPa	ISO 178	2300
	Flexural strength	2 mm/min	MPa	ISO 178	98
	Flexural strain at flexural strength	2 mm/min	%	ISO 178	7.2
	Flexural stress at 3.5 % strain	2 mm/min	MPa	ISO 178	73
C	Charpy impact strength	23 °C	kJ/m²	ISO 179-1eU	N
C	Charpy impact strength	-30 °C	kJ/m²	ISO 179-1eU	N
	Charpy notched impact strength	23 °C; 3 mm	kJ/m²	acc. ISO 179-1eA	75P
	Charpy notched impact strength	-30 °C; 3 mm	kJ/m²	acc. ISO 179-1eA	16C
	Izod notched impact strength	23 °C; 3.2 mm	kJ/m²	acc. ISO 180-A	90P
	Izod notched impact strength	-30 °C; 3.2 mm	kJ/m²	acc. ISO 180-A	16C
C	Puncture maximum force	23 °C	N	ISO 6603-2	5800
C	Puncture maximum force	-30 °C	N	ISO 6603-2	6700
C	Puncture energy	23 °C	J	ISO 6603-2	65
C	Puncture energy	-30 °C	J	ISO 6603-2	70
	Ball indentation hardness		N/mm²	ISO 2039-1	110
Thermal properties					
C	Glass transition temperature	10 °C/min	°C	ISO 11357-1,-2	148
C	Temperature of deflection under load	1.80 MPa	°C	ISO 75-1,-2	130
C	Temperature of deflection under load	0.45 MPa	°C	ISO 75-1,-2	142
C	Vicat softening temperature	50 N; 50 °C/h	°C	ISO 306	150
	Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	151
C	Coefficient of linear thermal expansion, parallel	23 to 55 °C	10⁻⁴/K	ISO 11359-1,-2	0.65
C	Coefficient of linear thermal expansion, transverse	23 to 55 °C	10⁻⁴/K	ISO 11359-1,-2	0.65
C	Burning behavior UL 94 (1.6 mm) [UL listed]	1.5 mm	Class	UL 94	HB
C	Burning behavior UL 94 [UL listed]	3.0 mm	Class	UL 94	HB
	Burning behavior UL 94 [UL listed]	6.0 mm	Class	UL 94	HB
C	Oxygen index	Method A	%	ISO 4589-2	27
	Thermal conductivity	23 °C	W/(m·K)	ISO 8302	0.20
	Resistance to heat (ball pressure test)		°C	IEC 60335-1	140
	Relative temperature index (Tensile strength) [UL listed]	1.5 mm	°C	UL 746 B	125
	Relative temperature index (Tensile impact strength) [UL listed]	1.5 mm	°C	UL 746 B	115
	Relative temperature index (Electric strength) [UL listed]	1.5 mm	°C	UL 746 B	125
	Glow wire test (GWFI)	1.0 mm	°C	IEC 60695-2-12	850
	Glow wire test (GWFI)	1.5 mm	°C	IEC 60695-2-12	850
	Glow wire test (GWFI)	2.0 mm	°C	IEC 60695-2-12	850
	Glow wire test (GWFI)	3.0 mm	°C	IEC 60695-2-12	900
	Glow wire test	1.5 mm	°C	acc. EDF HN60 E.02	850
	Glow wire test	3.0 mm	°C	acc. EDF HN60 E.02	850
	Application of flame from small burner	Method K and F; 2.0 mm	Class	DIN 53438-1,-3	K1, F1

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	Property	Test Condition	Unit	Standard	Value
	Incandescent bar test		Rating	IEC 60707-BH	BH2/< 30 mm
	Burning rate (US-FMVSS)	>=1.0 mm	mm/min	ISO 3795	passed
	Flash ignition temperature	Procedure B	°C	ASTM D1929	470
	Self ignition temperature	Procedure B	°C	ASTM D1929	540
	Electrical properties (23 °C/50 % r.h.)				
C	Relative permittivity	100 Hz	-	IEC 60250	3.1
C	Relative permittivity	1 MHz	-	IEC 60250	3.0
C	Dissipation factor	100 Hz	10^{-4}	IEC 60250	5
C	Dissipation factor	1 MHz	10^{-4}	IEC 60250	95
C	Volume resistivity		Ohm·m	IEC 60093	1E14
C	Surface resistivity		Ohm	IEC 60093	1E16
C	Electric strength	1 mm	kV/mm	IEC 60243-1	33
C	Comparative tracking index CTI	Solution A	Rating	IEC 60112	275
	Comparative tracking index CTI M	Solution B	Rating	IEC 60112	125
	Electrolytic corrosion		Rating	IEC 60426	A1
	Other properties (23 °C)				
C	Water absorption (Saturation value)	Water at 23 °C	%	ISO 62	0.30
C	Water absorption (Equilibrium value)	23 °C; 50 % RH	%	ISO 62	0.12
C	Density		kg/m³	ISO 1183	1200
	Water permeation	23 °C; 85 % RH; 100 µm film	g/(m²·24 h)	ISO 15106-1	15
	Gas permeation	Oxygen; 100 µm film	cm³/(m²·24 h*bar)	acc. ISO 2556	700
	Gas permeation	Oxygen; 25.4 µm (1 mil) film	cm³/(m²·24 h*bar)	acc. ISO 2556	2760
	Gas permeation	Nitrogen; 100 µm film	cm³/(m²·24 h*bar)	acc. ISO 2556	130
	Gas permeation	Nitrogen; 25.4 µm (1 mil) film	cm³/(m²·24 h*bar)	acc. ISO 2556	510
	Gas permeation	Carbon dioxide; 100 µm film	cm³/(m²·24 h*bar)	acc. ISO 2556	4300
	Gas permeation	Carbon dioxide; 25.4 µm (1 mil) film	cm³/(m²·24 h*bar)	acc. ISO 2556	16900
	Bulk density	Pellets	kg/m³	ISO 60	660
	Material specific properties				
C	Viscosity number		cm³/g	ISO 1628-4	67
	Refractive index	Procedure A	-	ISO 489	1.587
	Haze for transparent materials	3 mm	%	ISO 14782	< 0.8
	Luminous transmittance (clear transparent materials)	1 mm	%	ISO 13468-2	89
C	Luminous transmittance (clear transparent materials)	2 mm	%	ISO 13468-2	89
	Luminous transmittance (clear transparent materials)	3 mm	%	ISO 13468-2	88
	Luminous transmittance (clear transparent materials)	4 mm	%	ISO 13468-2	87
	Processing conditions for test specimens				
C	Injection molding-Melt temperature		°C	ISO 294	310
C	Injection molding-Mold temperature		°C	ISO 294	90
C	Injection molding-Injection velocity		mm/s	ISO 294	200

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