



Makrolon 9415

Glass fiber (Normal fiber) reinforced grades / 10 % Glass fiber reinforced MVR (300 °C/1.2 kg) 6.0 cm³/10 min; 10 % glass fiber reinforced; chlorine- and bromine-free flame retardancy; UL 94V-0/1.5 mm and 5VA/3.0 mm; high viscosity; easy release; injection molding - melt temperature 310 - 330 °C; available in opaque colors only

ISO Shortname ISO 7391-PC,MFR,(,)-09-9,GF10

Property	Test Condition	Unit	Standard	typical Value
Rheological properties				
C Melt volume-flow rate	300 °C; 1.2 kg	cm ³ /10 min	ISO 1133	6.0
C Molding shrinkage, parallel	60x60x2 mm; 500 bar	%	ISO 294-4	0.6
C Molding shrinkage, normal	60x60x2 mm; 500 bar	%	ISO 294-4	0.45
Molding shrinkage, parallel/normal	Value range based on general practical experience	%	b.o. ISO 2577	0.4 - 0.6
Melt mass-flow rate	300 °C; 1.2 kg	g/10 min	ISO 1133	7.0
Mechanical properties (23 °C/50 % r. h.)				
C Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	3800
Yield stress	5 mm/min	MPa	ISO 527-1,-2	64
Yield strain	5 mm/min	%	ISO 527-1,-2	4.4
C Stress at break	5 mm/min	MPa	ISO 527-1,-2	45
C Strain at break	5 mm/min	%	ISO 527-1,-2	15
C Tensile creep modulus	1 h	MPa	ISO 899-1	3600
C Tensile creep modulus	1000 h	MPa	ISO 899-1	2900
Flexural modulus	2 mm/min	MPa	ISO 178	3600
Flexural strength	2 mm/min	MPa	ISO 178	105
Flexural strain at flexural strength	2 mm/min	%	ISO 178	5.8
Flexural stress at 3.5 % strain	2 mm/min	MPa	ISO 178	95
C Charpy impact strength	23 °C	kJ/m ²	ISO 179-1eU	150C(N)
C Charpy impact strength	-30 °C	kJ/m ²	ISO 179-1eU	120C(N)
Charpy impact strength	-60 °C	kJ/m ²	ISO 179-1eU	100C
Charpy notched impact strength	23 °C; 3 mm	kJ/m ²	ISO 7391/b.o. ISO 179-1eA	10C
Izod notched impact strength	23 °C; 3 mm	kJ/m ²	ISO 7391/b.o. ISO 180-A	8C
Izod notched impact strength	-30 °C	kJ/m ²	ISO 7391/b.o. ISO 180-A	10C
Izod notched impact strength	23 °C; 3.2 mm	kJ/m ²	b.o. ISO 180-A	10C
C Puncture maximum force	23 °C	N	ISO 6603-2	4000
C Puncture maximum force	-30 °C	N	ISO 6603-2	3700
C Puncture energy	23 °C	J	ISO 6603-2	25
C Puncture energy	-30 °C	J	ISO 6603-2	15
Ball indentation hardness		N/mm ²	ISO 2039-1	128

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Property	Test Condition	Unit	Standard	typical Value
Thermal properties				
C Temperature of deflection under load	1.80 MPa	°C	ISO 75-1,-2	136
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	145
Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	146
C Coefficient of linear thermal expansion, parallel	23 to 55 °C	10 ⁻⁴ /K	ISO 11359-1,-2	0.4
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 (1.5 mm) [UL recognition]	1.5 mm	Class	UL 94	V-0
C Burning behavior UL 94 [UL recognition]	0.75 mm	Class	UL 94	V-2
C Burning behavior UL 94-5V [UL recognition]	3.0 mm	Class	UL 94	5VA
C Oxygen index	Method A	%	ISO 4589-2	35
Thermal conductivity, cross-flow	23 °C; 50 % r. h.	W/(m·K)	ISO 8302	0.22
Resistance to heat (ball pressure test)		°C	IEC 60695-10-2	137
Relative temperature index (Tensile strength) [UL recognition]	1.5 mm	°C	UL 746B	125
Relative temperature index (Tensile impact strength) [UL recognition]	1.5 mm	°C	UL 746B	115
Relative temperature index (Electric strength) [UL recognition]	1.5 mm	°C	UL 746B	125
Glow wire test (GWFI) [UL recognition]	0.75 mm	°C	IEC 60695-2-12	960
Glow wire test (GWFI) [UL recognition]	1.5 mm	°C	IEC 60695-2-12	960
Glow wire test (GWFI) [UL recognition]	3.0 mm	°C	IEC 60695-2-12	960
Glow wire test (GWIT) [UL recognition]	0.75 mm	°C	IEC 60695-2-13	900
Glow wire test (GWIT) [UL recognition]	1.5 mm	°C	IEC 60695-2-13	900
Glow wire test (GWIT) [UL recognition]	3.0 mm	°C	IEC 60695-2-13	900
Application of flame from small burner	Method K and F; 2.0 mm	Class	DIN 53438-1,-3	K1, F1
Application of flame from small burner	2 mm	Class	DIN 4102	B2
Needle flame test	Method K; 1.5 mm	s	IEC 60695-11-5	60
Needle flame test	Method K; 2.0 mm	s	IEC 60695-11-5	120
Needle flame test	Method K; 3.0 mm	s	IEC 60695-11-5	120
Needle flame test	Method F; 1.5 mm	s	IEC 60695-11-5	120
Needle flame test	Method F; 2.0 mm	s	IEC 60695-11-5	120
Needle flame test	Method F; 3.0 mm	s	IEC 60695-11-5	120
Burning rate (US-FMVSS)	>=1.0 mm	mm/min	ISO 3795	passed
Flash ignition temperature		°C	ASTM D1929	470
Self ignition temperature		°C	ASTM D1929	550

Electrical properties (23 °C/50 % r. h.)

C Relative permittivity	100 Hz	-	IEC 60250	3.2
C Relative permittivity	1 MHz	-	IEC 60250	3.2
C Dissipation factor	100 Hz	10 ⁻⁴	IEC 60250	10
C Dissipation factor	1 MHz	10 ⁻⁴	IEC 60250	90
C Volume resistivity		Ohm·m	IEC 60093	1E14
C Surface resistivity		Ohm	IEC 60093	1E16
C Electrical strength	1 mm	kV/mm	IEC 60243-1	36
C Comparative tracking index CTI	Solution A	Rating	IEC 60112	175
Comparative tracking index CTI M	Solution B	Rating	IEC 60112	125M
Electrolytic corrosion		Rating	IEC 60426	A1

Other properties (23 °C)

C Water absorption (saturation value)	Water at 23 °C	%	ISO 62	0.26
C Water absorption (equilibrium value)	23 °C; 50 % r. h.	%	ISO 62	0.10
C Density		kg/m ³	ISO 1183-1	1270
Glass fiber content	Method A	%	b.o. ISO 3451-1	10
Bulk density	Pellets	kg/m ³	ISO 60	640

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Property	Test Condition	Unit	Standard	typical Value
Processing conditions for test specimens				
C Injection molding-Melt temperature		°C	ISO 294	300
C Injection molding-Mold temperature		°C	ISO 294	110
C Injection molding-Injection velocity		mm/s	ISO 294	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

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