

# Makrolon® 6717

Flame retardant grades / High viscosity, branched

MVR (300 °C/1.2 kg) 3.0 cm<sup>3</sup>/10 min; flame retardant; UL 94V-0/2.0 mm; high viscosity; branched; UV stabilized; easy release; injection molding - melt temperature 280 - 320 °C; extrusion; available in transparent, translucent and opaque colors

ISO Shortname

ISO 7391-PC,MFLR,(,)-05-9

Property	Test Condition	Unit	Standard	typical Value
<b>Rheological properties</b>				
C Melt volume-flow rate	300 °C; 1.2 kg	cm <sup>3</sup> /10 min	ISO 1133	3.0
C Molding shrinkage, parallel	60x60x2 mm; 500 bar	%	ISO 294-4	0.7
C Molding shrinkage, normal	60x60x2 mm; 500 bar	%	ISO 294-4	0.75
Molding shrinkage, parallel/normal	Value range based on general practical experience	%	b.o. ISO 2577	0.6 - 0.8
Melt mass-flow rate	300 °C; 1.2 kg	g/10 min	ISO 1133	3.0
<b>Mechanical properties (23 °C/50 % r. h.)</b>				
C Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	2400
C Yield stress	50 mm/min	MPa	ISO 527-1,-2	67
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	65
Strain at break	50 mm/min	%	b.o. ISO 527-1,-2	105
Flexural modulus	2 mm/min	MPa	ISO 178	2400
Flexural strength	2 mm/min	MPa	ISO 178	98
Flexural strain at flexural strength	2 mm/min	%	ISO 178	7.1
Flexural stress at 3.5 % strain	2 mm/min	MPa	ISO 178	75
C Charpy impact strength	23 °C	kJ/m <sup>2</sup>	ISO 179-1eU	N
C Charpy impact strength	-30 °C	kJ/m <sup>2</sup>	ISO 179-1eU	N
Charpy impact strength	-60 °C	kJ/m <sup>2</sup>	ISO 179-1eU	N
Charpy notched impact strength	23 °C; 3 mm	kJ/m <sup>2</sup>	ISO 7391/b.o. ISO 179-1eA	70P
Charpy notched impact strength	-30 °C; 3 mm	kJ/m <sup>2</sup>	ISO 7391/b.o. ISO 179-1eA	14C
Izod notched impact strength	23 °C; 3 mm	kJ/m <sup>2</sup>	ISO 7391/b.o. ISO 180-A	60P
Izod notched impact strength	-30 °C; 3 mm	kJ/m <sup>2</sup>	ISO 7391/b.o. ISO 180-A	15C
C Puncture maximum force	23 °C	N	ISO 6603-2	5500
C Puncture maximum force	-30 °C	N	ISO 6603-2	6400
C Puncture energy	23 °C	J	ISO 6603-2	60
C Puncture energy	-30 °C	J	ISO 6603-2	65
Ball indentation hardness		N/mm <sup>2</sup>	ISO 2039-1	115

# Makrolon® 6717

Property	Test Condition	Unit	Standard	typical Value
<b>Thermal properties</b>				
C Glass transition temperature	10 °C/min	°C	ISO 11357-1,-2	146
C Temperature of deflection under load	1.80 MPa	°C	ISO 75-1,-2	127
C Temperature of deflection under load	0.45 MPa	°C	ISO 75-1,-2	139
C Vicat softening temperature	50 N; 50 °C/h	°C	ISO 306	146
Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	147
C Coefficient of linear thermal expansion, parallel	23 to 55 °C	10 <sup>-4</sup> /K	ISO 11359-1,-2	0.70
C Coefficient of linear thermal expansion, transverse	23 to 55 °C	10 <sup>-4</sup> /K	ISO 11359-1,-2	0.70
C Burning behavior UL 94 [UL recognition]	2.0 mm	Class	UL 94	V-0
C Oxygen index	Method A	%	ISO 4589-2	43
Thermal conductivity, cross-flow	23 °C; 50 % r. h.	W/(m·K)	ISO 8302	0.20
Resistance to heat (ball pressure test)		°C	IEC 60695-10-2	139
Relative temperature index (Tensile strength) [UL recognition]	2.0 mm	°C	UL 746B	125
Relative temperature index (Tensile impact strength) [UL recognition]	2.0 mm	°C	UL 746B	115
Relative temperature index (Electric strength) [UL recognition]	2.0 mm	°C	UL 746B	125
Glow wire test (GWFI)	0.75 mm	°C	IEC 60695-2-12	960
Glow wire test (GWFI)	1.5 mm	°C	IEC 60695-2-12	960
Glow wire test (GWFI)	3.0 mm	°C	IEC 60695-2-12	960
Glow wire test (GWIT)	0.75 mm	°C	IEC 60695-2-13	875
Glow wire test (GWIT)	1.5 mm	°C	IEC 60695-2-13	900
Glow wire test (GWIT)	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
Needle flame test	Method K; 1.5 mm	s	IEC 60695-11-5	120
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	450
Self ignition temperature		°C	ASTM D1929	510
Vertical Bunsen burner test	1.0 mm; 60 s	-	FAR 25.853(a)	passed
Vertical Bunsen burner test	3.0 mm; 60 s	-	FAR 25.853(a)	passed
Vertical Bunsen burner test	1.0 mm; 12 s	-	FAR 25.853(b)	passed
Vertical Bunsen burner test	3.0 mm; 12 s	-	FAR 25.853(b)	passed
Smoke density (with flame)	Ds 4 min	-	ASTM E662	< 200
Smoke toxicity (with flame)	CO	ppm	AITM 3.0005; BSS 7239	200
Smoke toxicity (with flame)	SO2-H2O	ppm	AITM 3.0005; BSS 7239	< 20
Smoke toxicity (with flame)	NO-NO2	ppm	AITM 3.0005; BSS 7239	< 5
Smoke toxicity (with flame)	HF	ppm	AITM 3.0005; BSS 7239	< 5
Smoke toxicity (with flame)	HCL	ppm	AITM 3.0005; BSS 7239	< 1
Smoke toxicity (with flame)	HCN	ppm	AITM 3.0005; BSS 7239	not detectable

# Makrolon® 6717

Property	Test Condition	Unit	Standard	typical Value
<b>Electrical properties (23 °C/50 % r. h.)</b>				
C Relative permittivity	100 Hz	-	IEC 60250	3.1
C Relative permittivity	1 MHz	-	IEC 60250	3.0
C Dissipation factor	100 Hz	10 <sup>-4</sup>	IEC 60250	10
C Dissipation factor	1 MHz	10 <sup>-4</sup>	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	34
C Comparative tracking index CTI	Solution A	Rating	IEC 60112	225
C Comparative tracking index CTI M	Solution B	Rating	IEC 60112	125M
<b>Other properties (23 °C)</b>				
C Water absorption (saturation value)	Water at 23 °C	%	ISO 62	0.30
C Water absorption (equilibrium value)	23 °C; 50 % r. h.	%	ISO 62	0.12
C Density		kg/m <sup>3</sup>	ISO 1183-1	1200
Water vapor permeability	23 °C; 85 % RH; 100 µm film	g/(m <sup>2</sup> ·24 h)	ISO 15106-1	15
Gas permeation	Oxygen; 100 µm film	cm <sup>3</sup> /(m <sup>2</sup> ·24 h·bar)	b.o. ISO 2556	650
Gas permeation	Oxygen; 25.4 µm (1 mil) film	cm <sup>3</sup> /(m <sup>2</sup> ·24 h·bar)	b.o. ISO 2556	2760
Gas permeation	Nitrogen; 100 µm film	cm <sup>3</sup> /(m <sup>2</sup> ·24 h·bar)	b.o. ISO 2556	120
Gas permeation	Nitrogen; 25.4 µm (1 mil) film	cm <sup>3</sup> /(m <sup>2</sup> ·24 h·bar)	b.o. ISO 2556	510
Gas permeation	Carbon dioxide; 100 µm film	cm <sup>3</sup> /(m <sup>2</sup> ·24 h·bar)	b.o. ISO 2556	3800
Gas permeation	Carbon dioxide; 25.4 µm (1 mil) film	cm <sup>3</sup> /(m <sup>2</sup> ·24 h·bar)	b.o. ISO 2556	16900
Bulk density	Pellets	kg/m <sup>3</sup>	ISO 60	660
<b>Material specific properties</b>				
Refractive index	Procedure A	-	ISO 489	1.586
Luminous transmittance (clear transparent materials)	1 mm	%	ISO 13468-2	87
C Luminous transmittance (clear transparent materials)	2 mm	%	ISO 13468-2	86
Luminous transmittance (clear transparent materials)	3 mm	%	ISO 13468-2	85
Luminous transmittance (clear transparent materials)	4 mm	%	ISO 13468-2	84
<b>Processing conditions for test specimens</b>				
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

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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## Disclaimer

### Typical value

These values are typical values only. Unless explicitly agreed in written form, they do not constitute a binding material specification or warranted values. Values may be affected by the design of the mold/die, the processing conditions and coloring/pigmentation of the product. Unless specified to the contrary, the property values given have been established on standardized test specimens at room temperature.

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