

# Makrolon® ET3117

## Grades / Extrusion

MVR (300 °C/1.2 kg) 6.0 cm³/10 min; Extrusion; high viscosity; UV stabilized; easy release; multi wall sheets / profiles; corrugated sheet

## ISO Shortname

ISO 7391-PC,ELS,(,,)-09-9

Property	Test Condition	Unit	Standard	typical Value
<b>Rheological properties</b>				
C Melt volume-flow rate	300 °C/ 1.2 kg	cm³/10 min	ISO 1133	6.0
Melt mass-flow rate	300 °C/ 1.2 kg	g/10 min	ISO 1133	6.5
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
<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	65
C Yield strain	50 mm/min	%	ISO 527-1,-2	6.3
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	%	b.o. ISO 527-1,-2	130
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	2400
Flexural strength	2 mm/min	MPa	ISO 178	98
Flexural strain at flexural strength	2 mm/min	%	ISO 178	7.0
Flexural stress at 3.5 % strain	2 mm/min	MPa	ISO 178	74
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 impact strength	-60 °C	kJ/m²	ISO 179/1eU	N
Charpy notched impact strength	23 °C/ 3 mm	kJ/m²	ISO 21305/based on ISO 179/1eA	80P
Charpy notched impact strength	-30 °C/ 3 mm	kJ/m²	ISO 21305/based on ISO 179/1eA	14C
Izod notched impact strength	23 °C/ 3 mm	kJ/m²	ISO 21305/based on ISO 180/A	70P
Izod notched impact strength	-30 °C/ 3 mm	kJ/m²	ISO 21305/based on ISO 180/A	20C(P)
C Puncture impact properties - maximum force	23 °C	N	ISO 6603-2	5600
C Puncture impact properties - maximum force	-30 °C	N	ISO 6603-2	6500
C Puncture energy	23 °C	J	ISO 6603-2	60
C Puncture energy	-30 °C	J	ISO 6603-2	70
Ball indentation hardness		N/mm²	ISO 2039-1	112

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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	140
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	0.65
C Coefficient of linear thermal expansion, normal	23 to 55 °C	10 <sup>-4</sup> /K	ISO 11359-1,-2	0.65
C Burning behavior UL 94 (1.5 mm) [UL recognition]	1.5 mm	Class	UL 94	HB
C Burning behavior UL 94 [UL recognition]	0.75 mm	Class	UL 94	V-2
C Oxygen index	Method A	%	ISO 4589-2	28
Thermal conductivity, through-plane	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]	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)	0.75 mm	°C	IEC 60695-2-12	875
Glow wire test (GWFI)	1.5 mm	°C	IEC 60695-2-12	875
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	875
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/ 2.0 mm	s	IEC 60695-11-5	5
Needle flame test	Method K/ 3.0 mm	s	IEC 60695-11-5	10
Needle flame test	Method F/ 1.5 mm	s	IEC 60695-11-5	60
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	480
Self ignition temperature		°C	ASTM D1929	550
<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	95
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	250
Comparative tracking index CTI M	Solution B	Rating	IEC 60112	125M
Electrolytic corrosion		Rating	IEC 60426	A1

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Property	Test Condition	Unit	Standard	typical Value
<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/m³	ISO 1183-1	1200
Water vapor permeability	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)	b.o. ISO 2556	650
Gas permeation	Oxygen/ 25.4 µm (1 mil) film	cm³/(m²·24 h-bar)	b.o. ISO 2556	2760
Gas permeation	Nitrogen/ 100 µm film	cm³/(m²·24 h-bar)	b.o. ISO 2556	120
Gas permeation	Nitrogen/ 25.4 µm (1 mil) film	cm³/(m²·24 h-bar)	b.o. ISO 2556	510
Gas permeation	Carbon dioxide/ 100 µm film	cm³/(m²·24 h-bar)	b.o. ISO 2556	3800
Gas permeation	Carbon dioxide/ 25.4 µm (1 mil) film	cm³/(m²·24 h-bar)	b.o. ISO 2556	16900
Bulk density	Pellets	kg/m³	ISO 60	660
<b>Material specific properties</b>				
Refractive index	Procedure A	-	ISO 489	1.586
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
<b>Processing conditions for test specimens</b>				
C Injection molding - Melt temperature		°C	ISO 294	300
C Injection molding - Mold temperature		°C	ISO 294	80
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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### Non Medical and non Food Contact Grade

This product is not designated for the manufacture of a pharmaceutical/medicinal product, medical device or of intermediate products for medical devices<sup>1</sup>). This product is also not registered for Covestro for the use in other specifically regulated applications, in particular applications requiring regulatory registration, approval or notification (e.g. including cosmetics, plant protection, food processing, food contact and others). If the intended use of the product is for the manufacture of a pharmaceutical, medical device or of intermediate products for medical devices or for other specifically regulated applications which may lead to a regulatory obligation of Covestro, Covestro must be contacted in advance to provide its agreement to sell such product for such purpose. Nonetheless, any determination as to whether a product is appropriate for use in a pharmaceutical, medical device or intermediate products for medical devices or for the use in other specifically regulated applications, must be made solely by the purchaser of the product without relying upon any representations by Covestro, irrespective of the existence of any regulatory obligation for the registration, approval or notification. 1) Please see the "Guidance on Use of Covestro Products in a Medical Application" document.

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Covestro AG  
Polycarbonates Business Unit  
Kaiser-Wilhelm-Allee 60  
51373 Leverkusen  
Germany  
plastics@covestro.com  
www.plastics.covestro.com