Makrolon® 2405

Covestro - Polycarbonates - Polycarbonate

Friday, January 24, 2025

General Information

Product Description
MVR (300°C/1.2 kg) 19 cm³/10 min; general purpose; low viscosity; easy release; injection molding - melt temperature 280 - 320°C; available in transparent, translucent and opaque colors

General			
Material Status	• Commercial: Active		
Regional Availability	• Africa & Middle East • Asia Pacific	• Europe • Latin America	• North America
Features	• General Purpose	• Good Mold Release	• Low Viscosity
Uses	• General Purpose		
RoHS Compliance	• RoHS Compliant		
Appearance	• Clear/Transparent • Colors Available	• Opaque • Translucent	
Processing Method	• Injection Molding		
ISO Shortname	• ISO 7391-PC,MR,(,,)-18-9		

ASTM & ISO Properties [1]

Physical	Typical Value (English)		Typical Value (SI)		Test Method
Density (73°F (23°C))	1.20	g/cm³	1.20	g/cm³	ISO 1183
Apparent (Bulk) Density [2]	0.66	g/cm³	0.66	g/cm³	ISO 60
Melt Mass-Flow Rate (MFR) (300°C/1.2 kg)	20	g/10 min	20	g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)	19	cm³/10min	19	cm³/10min	ISO 1133
Molding Shrinkage					
Across Flow	0.50 to 0.70	%	0.50 to 0.70	%	ISO 2577
Flow	0.50 to 0.70	%	0.50 to 0.70	%	ISO 2577
Across Flow : 536°F (280°C), 0.0787 in (2.00 mm) [3]	0.70	%	0.70	%	ISO 294-4
Flow : 0.0787 in (2.00 mm) [3]	0.65	%	0.65	%	ISO 294-4
Water Absorption					ISO 62
Saturation, 73°F (23°C)	0.30	%	0.30	%	
Equilibrium, 73°F (23°C), 50% RH	0.12	%	0.12	%	

Mechanical	Typical Value (English)		Typical Value (SI)		Test Method
Tensile Modulus (73°F (23°C))	348000	psi	2400	MPa	ISO 527-1/1
Tensile Stress					ISO 527-2/50
Yield, 73°F (23°C)	9430	psi	65.0	MPa	
Break, 73°F (23°C)	9430	psi	65.0	MPa	

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Mechanical	Typical Value	(English)	Typical Value	(SI)	Test Method
Tensile Strain					ISO 527-2/50
Yield, 73°F (23°C)	6.0	%	6.0	%	
Break, 73°F (23°C)	130	%	130	%	
Nominal Tensile Strain at Break					ISO 527-2/50
73°F (23°C)	> 50	%	> 50	%	
Tensile Creep Modulus					ISO 899-1
1 hr	319000	psi	2200	MPa	
1000 hr	276000	psi	1900	MPa	
Flexural Modulus [4] (73°F (23°C))	341000	psi	2350	MPa	ISO 178
Flexural Stress [4]					ISO 178
73°F (23°C)	14100	psi	97.0	MPa	
3.5% Strain, 73°F (23°C)	10600	psi	73.0	MPa	
Flexural Strain at Flexural Strength [5]					ISO 178
73°F (23°C)	7.1	%	7.1	%	

Films	Typical Value	(English)	Typical Value	(SI)	Test Method
Water Vapor Transmission Rate					ISO 15106-1
73°F (23°C), 85% RH, 3.9 mil (100 µm)	0.97	g/100 in²/24 hr	15	g/m²/24 hr	
Carbon Dioxide Permeability					ISO 2556
73°F (23°C), 1.0 mil (25.4 µm)	18900	cm³/m²/bar/24 hr	18900	cm³/m²/bar/24 hr	
Gas Permeation					ISO 2556
Carbon Dioxide : 3.9 mil (100.0 µm)	4000	cm³/m²/bar/24 hr	4000	cm³/m²/bar/24 hr	
Nitrogen : 1.0 mil (25.4 µm)	630	cm³/m²/bar/24 hr	630	cm³/m²/bar/24 hr	
Nitrogen : 3.9 mil (100.0 µm)	130	cm³/m²/bar/24 hr	130	cm³/m²/bar/24 hr	
Oxygen : 1.0 mil (25.4 µm)	3150	cm³/m²/bar/24 hr	3150	cm³/m²/bar/24 hr	
Oxygen : 3.9 mil (100.0 µm)	700	cm³/m²/bar/24 hr	700	cm³/m²/bar/24 hr	

Impact	Typical Value	(English)	Typical Value	(SI)	Test Method
Charpy Notched Impact Strength [6]					ISO 179/1eA
-22°F (-30°C), Complete Break	6.7	ft·lb/in²	14	kJ/m²	
73°F (23°C), Partial Break	31	ft·lb/in²	65	kJ/m²	
Charpy Unnotched Impact Strength					ISO 179/1eU
-76°F (-60°C)	No Break		No Break		
-22°F (-30°C)	No Break		No Break		
73°F (23°C)	No Break		No Break		
Notched Izod Impact Strength [6]					ISO 180/A
-22°F (-30°C), Complete Break	7.1	ft·lb/in²	15	kJ/m²	
73°F (23°C), Partial Break	31	ft·lb/in²	65	kJ/m²	
Multi-Axial Instrumented Impact Energy					ISO 6603-2
-22°F (-30°C)	47.9	ft·lb	65.0	J	
73°F (23°C)	40.6	ft·lb	55.0	J	
Multi-Axial Instrumented Impact Peak Force					ISO 6603-2
-22°F (-30°C)	1350	lbf	6000	N	
73°F (23°C)	1150	lbf	5100	N	

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Hardness	Typical Value	(English)	Typical Value	(SI)	Test Method
Ball Indentation Hardness	16700	psi	115	MPa	ISO 2039-1
Thermal	**Typical Value**	**(English)**	**Typical Value**	**(SI)**	**Test Method**
Deflection Temperature Under Load					
66 psi (0.45 MPa), Unannealed	279	°F	137	°C	ISO 75-2/B
264 psi (1.8 MPa), Unannealed	255	°F	124	°C	ISO 75-2/A
Glass Transition Temperature [7]	291	°F	144	°C	ISO 11357-2
Vicat Softening Temperature					
--	295	°F	146	°C	ISO 306/B120
--	293	°F	145	°C	ISO 306/B50
Ball Pressure Test (277°F (136°C))	Pass		Pass		IEC 60695-10-2
CLTE					ISO 11359-2
Flow : 73 to 131°F (23 to 55°C)	3.6E-5	in/in/°F	6.5E-5	cm/cm/°C	
Transverse : 73 to 131°F (23 to 55°C)	3.6E-5	in/in/°F	6.5E-5	cm/cm/°C	
Thermal Conductivity [8] (73°F (23°C))	1.4	Btu·in/hr/ft²/°F	0.20	W/m/K	ISO 8302
RTI Elec (0.06 in (1.5 mm))	257	°F	125	°C	UL 746B
RTI Imp (0.06 in (1.5 mm))	239	°F	115	°C	UL 746B
RTI Str (0.06 in (1.5 mm))	257	°F	125	°C	UL 746B
Electrical	**Typical Value**	**(English)**	**Typical Value**	**(SI)**	**Test Method**
Surface Resistivity	1.0E+16	ohms	1.0E+16	ohms	IEC 60093
Volume Resistivity (73°F (23°C))	1.0E+16	ohms·cm	1.0E+16	ohms·cm	IEC 60093
Electric Strength					IEC 60243-1
73°F (23°C), 0.0394 in (1.00 mm)	860	V/mil	34	kV/mm	
Relative Permittivity					IEC 60250
73°F (23°C), 100 Hz	3.10		3.10		
73°F (23°C), 1 MHz	3.00		3.00		
Dissipation Factor					IEC 60250
73°F (23°C), 100 Hz	5.0E-4		5.0E-4		
73°F (23°C), 1 MHz	9.0E-3		9.0E-3		
Comparative Tracking Index					IEC 60112
Solution A	250	V	250	V	
Solution B	125	V	125	V	
Flammability	**Typical Value**	**(English)**	**Typical Value**	**(SI)**	**Test Method**
Flame Rating					UL 94
0.11 in (2.7 mm)	HB		HB		
0.014 in (0.36 mm)	V-2		V-2		
0.030 in (0.75 mm)	V-2		V-2		
Glow Wire Flammability Index					IEC 60695-2-12
0.030 in (0.75 mm)	1560	°F	850	°C	
0.06 in (1.5 mm)	1610	°F	875	°C	
0.12 in (3.0 mm)	1710	°F	930	°C	

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Flammability	Typical Value	(English)	Typical Value	(SI)	Test Method
Glow Wire Ignition Temperature					IEC 60695-2-13
0.030 in (0.75 mm)	1610	°F	875	°C	
0.04 in (1.0 mm)	1610	°F	875	°C	
0.06 in (1.5 mm)	1610	°F	875	°C	
0.12 in (3.0 mm)	1610	°F	875	°C	
Oxygen Index [9]	27	%	27	%	ISO 4589-2
Application of Flame from Small Burner [10]					DIN 53438-1, -3
78.7 mil (2.00 mm)	K1, F1		K1, F1		
Burning Rate [11] (> 39.4 mil (> 1.00 mm))	passed		passed		ISO 3795
Flash Ignition Temperature	896	°F	480	°C	ASTM D1929
Needle Flame Test					IEC 60695-11-5
59.1 mil (1.50 mm) [12]	5.0	sec	5.0	sec	
59.1 mil (1.50 mm) [13]	60.0	sec	60.0	sec	
78.7 mil (2.00 mm) [12]	5.0	sec	5.0	sec	
78.7 mil (2.00 mm) [13]	120.0	sec	120.0	sec	
0.12 in (3.00 mm) [12]	10.0	sec	10.0	sec	
0.12 in (3.00 mm) [13]	120.0	sec	120.0	sec	
Self Ignition Temperature	1022	°F	550	°C	ASTM D1929
Optical	**Typical Value**	**(English)**	**Typical Value**	**(SI)**	**Test Method**
Refractive Index [14]	1.585		1.585		ISO 489
Light Transmittance					ISO 13468-2
39.37 mil (1000 µm)	89.0	%	89.0	%	
78.74 mil (2000 µm)	89.0	%	89.0	%	
118.1 mil (3000 µm)	88.0	%	88.0	%	
157.5 mil (4000 µm)	87.0	%	87.0	%	
Haze (118.1 mil (3000 µm))	< 0.800	%	< 0.800	%	ISO 14782
Additional Information	**Typical Value**	**(English)**	**Typical Value**	**(SI)**	**Test Method**
Electrolytical Corrosion (73°F (23°C))	A1		A1		IEC 60426

Processing Information

Injection	Typical Value	(English)	Typical Value	(SI)
Drying Temperature - Dry Air Dryer	248	°F	120	°C
Drying Time - Dry Air Dryer	2.0 to 3.0	hr	2.0 to 3.0	hr
Suggested Max Moisture	< 0.020	%	< 0.020	%
Suggested Shot Size	30 to 70	%	30 to 70	%
Rear Temperature	482 to 500	°F	250 to 260	°C
Middle Temperature	518 to 536	°F	270 to 280	°C
Front Temperature	536 to 554	°F	280 to 290	°C
Nozzle Temperature	554 to 572	°F	290 to 300	°C
Processing (Melt) Temp	536 to 608	°F	280 to 320	°C
Mold Temperature	176 to 248	°F	80 to 120	°C
Back Pressure	725 to 2180	psi	5.00 to 15.0	MPa
Vent Depth	9.8E-4 to 3.0E-3	in	0.025 to 0.075	mm

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Injection Notes
Hold Pressure (% of Injection Pressure): 50 - 75%
Peripheral Screw Speed: 0.05 - 0.2 m/s
Standard Melt Temperature: 300°C

Notes

[1] Typical properties: these are not to be construed as specifications.

[2] Pellets

[3] 60x60x2mm, 500 bar

[4] 0.079 in/min (2.0 mm/min)

[5] 2.0 mm/min

[6] 3 mm

[7] 10°C/min

[8] Across Flow

[9] Procedure A

[10] Method K and F

[11] US-FMVSS

[12] Method K

[13] Method F

[14] Method A