# 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; flame retardant; 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 | cm³/10 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/m² | ISO 179-1eU | 150C(N) |
| C | Charpy impact strength | -30 °C | kJ/m² | ISO 179-1eU | 120C(N) |
| | Charpy impact strength | -60 °C | kJ/m² | ISO 179-1eU | 100C |
| | Charpy notched impact strength | 23 °C; 3 mm | kJ/m² | ISO 7391/b.o. ISO 179-1eA | 10C |
| | Izod notched impact strength | 23 °C; 3 mm | kJ/m² | ISO 7391/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/mm² | ISO 2039-1 | 128 |

# Makrolon® 9415

| | 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/m³ | ISO 1183-1 | 1270 |
| | Glass fiber content | Method A | % | b.o. ISO 3451-1 | 10 |
| | Bulk density | Pellets | kg/m³ | ISO 60 | 640 |

# Makrolon® 9415

| | 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

# Makrolon® 9415

## Disclaimer

Typical value

These values are typical values only. Unless explicitly agreed in written form, the 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.

General

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance, information and recommendations to determine to your own satisfaction whether our products, technical assistance and information are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by Covestro. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale which are available upon request. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with any claim of any patent relative to any material or its use. No license is implied or in fact granted under the claims of any patent. With respect to health, safety and environment precautions, the relevant Material Safety Data Sheets (MSDS) and product labels must be observed prior to working with our products.

Disclaimer Non Medical Grade

This product is not designated for the manufacture of a medical device or of intermediate products for medical devices (1). [This product is also not designated for Food Contact (2), including drinking water, or cosmetic applications. If the intended use of the product is for the manufacture of a medical device or of intermediate products for medical devices, for Food Contact products or cosmetic applications 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 medical device or intermediate products for medical devices, for Food Contact products or cosmetic applications must be made solely by the purchaser of the product without relying upon any representations by Covestro. 1) Please see the "Guidance on Use of Covestro Products in a Medical Application" document. 2) As defined in Commission Regulation (EU) 1935/2004.

Covestro AG

Polycarbonates Business Unit

Kaiser-Wilhelm-Allee 60

51373 Leverkusen

Germany

plastics@covestro.com

www.plastics.covestro.com