

# Makrolon® 2805

General purpose grades / Medium viscosity

MVR (300 °C/1.2 kg) 9.0 cm³/10 min; general purpose; medium viscosity; easy release; injection molding - melt temperature 280 - 320 °C; available in transparent, translucent and opaque colors

ISO Shortname

PC

| Property                                        | Test Condition                                    | Unit       | Standard                | typical Value |
|-------------------------------------------------|---------------------------------------------------|------------|-------------------------|---------------|
| <b>Rheological properties</b>                   |                                                   |            |                         |               |
| Melt volume-flow rate                           | 300 °C/ 1.2 kg                                    | cm³/10 min | ISO 1133                | 9.0           |
| Melt mass-flow rate                             | 300 °C/ 1.2 kg                                    | g/10 min   | ISO 1133                | 10            |
| Molding shrinkage, parallel                     | 60x60x2 mm³/ 500 bar                              | %          | ISO 294-4               | 0.65          |
| Molding shrinkage, normal                       | 60x60x2 mm³/ 500 bar                              | %          | ISO 294-4               | 0.7           |
| 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> |                                                   |            |                         |               |
| Tensile modulus                                 | 1 mm/min                                          | MPa        | ISO 527-1,-2 ISO 527-   | 2400          |
| Yield stress                                    | 50 mm/min                                         | MPa        | 1,-2 ISO 527-1,-2 ISO   | 66            |
| Yield strain                                    | 50 mm/min                                         | % %        | 527-1,-2 ISO 527-1,-2   | 6.2           |
| Nominal strain at break                         | 50 mm/min                                         | MPa        | b.o. ISO 527-1,-2 ISO   | > 50          |
| Stress at break                                 | 50 mm/min                                         | %          | 899-1 ISO 899-1 ISO 178 | 70            |
| Strain at break                                 | 50 mm/min                                         | MPa        | ISO 178 ISO 178 ISO     | 130           |
| Tensile creep modulus                           | 1 h                                               | MPa        | 178 ISO 179/1eU ISO     | 2200          |
| Tensile creep modulus                           | 1000 h                                            | MPa        | 179/1eU ISO 179/1eU     | 1900          |
| Flexural modulus                                | 2 mm/min                                          | MPa        | ISO 21305/based on ISO  | 2400          |
| Flexural strength                               | 2 mm/min                                          | %          | 179/1eA                 | 97            |
| Flexural strain at flexural strength            | 2 mm/min                                          | MPa        | ISO 21305/based on ISO  | 7.1           |
| Flexural stress at 3.5 % strain                 | 2 mm/min                                          | kJ/m²      | 179/1eA                 | 73            |
| Charpy impact strength                          | 23 °C                                             | kJ/m²      | ISO 21305/based on ISO  | N             |
| Charpy impact strength                          | -30 °C                                            | kJ/m²      | 180/A                   | N             |
| Charpy impact strength                          | -60 °C                                            | kJ/m²      | ISO 6603-2              | N             |
| Charpy notched impact strength                  | 23 °C/ 3 mm                                       |            | ISO 6603-2              | 75P           |
| Charpy notched impact strength                  | -30 °C/ 3 mm                                      | kJ/m²      | ISO 6603-2              | 16C           |
| Izod notched impact strength                    | 23 °C/ 3 mm                                       | kJ/m²      | ISO 2039-1              | 70P           |
| Izod notched impact strength                    | -30 °C/ 3 mm                                      | kJ/m²      |                         | 15C           |
| Puncture impact properties - maximum force      | 23 °C                                             | N          |                         | 5400          |
| Puncture impact properties - maximum force      | -30 °C                                            | N          |                         | 6300          |
| Puncture energy CPuncture energy                | 23 °C                                             | J          |                         | 60            |
|                                                 | -30 °C                                            | J          |                         | 65            |
| Ball indentation hardness                       |                                                   | N/mm²      |                         | 115           |

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|-----------------------------------------------------------------------|------------------------|-----------|---------------------|---------------|
| <b>Thermal properties</b>                                             |                        |           |                     |               |
| CGlass transition temperature                                         | 10 °C/min              | °C °C     | ISO 11357-1,-2 ISO  | 145           |
| CTemperature of deflection under load                                 | 1.80 MPa               | °C °C     | 75-1,-2 ISO 75-1,-2 | 125           |
| CTemperature of deflection under load                                 | 0.45 MPa               | °C        | ISO 306 ISO 306     | 137           |
| CVicat softening temperature                                          | 50 N; 50 °C/h          | 10-4/K    | ISO 11359-1,-2      | 144           |
| VCicat softening temperature                                          | 50 N; 120 °C/h         | 10-4/K    | ISO 11359-1,-2      | 146           |
| CCoefficient of linear thermal expansion, parallel                    | 23 to 55 °C            | Class     | UL 94 UL 94 ISO     | 0.65          |
| CCoefficient of linear thermal expansion, normal                      | 23 to 55 °C            | Class %   | 4589-2 ISO 8302     | 0.65          |
| CBurning behavior UL 94 [UL recognition]                              | 0.75 mm                | W/(m·K)   | IEC 60695-10-2 UL   | V-2           |
| Burning behavior UL 94 [UL recognition]                               | 2.5 mm                 | °C °C     | 746B UL 746B UL     | HB            |
| COxygen index                                                         | Method A               | °C °C     | 746B IEC 60695-2-   | 28            |
| Thermal conductivity, through-plane                                   | 23 °C; 50 % r. h.      | °C °C     | 12 IEC 60695-2-12   | 0.20          |
| Resistance to heat (ball pressure test)                               |                        | °C °C     | IEC 60695-2-12 IEC  | 136           |
| Relative temperature index (Tensile strength) [UL recognition]        | 1.5 mm                 | °C °C     | 60695-2-13 IEC      | 125           |
| Relative temperature index (Tensile impact strength) [UL recognition] | 1.5 mm                 | °C °C     | 60695-2-13 IEC      | 115           |
| Relative temperature index (Electric strength) [UL recognition]       | 1.5 mm                 | °C        | 60695-2-13 IEC      | 125           |
| Glow wire test (GWFI)                                                 | 0.75 mm                | Class s   | 60695-2-13 b.o.     | 850           |
| Glow wire test (GWFI)                                                 | 1.5 mm                 | s s s s s | EDF HN60 E.02 b.o.  | 850           |
| Glow wire test (GWFI)                                                 | 3.0 mm                 | mm/min    | EDF HN60 E.02 DIN   | 930           |
| Glow wire test (GWIT)                                                 | 0.75 mm                | °C °C     | 53438-1,-3 IEC      | 875           |
| Glow wire test (GWIT)                                                 | 1.0 mm                 |           | 60695-11-5 IEC      | 875           |
| Glow wire test (GWIT)                                                 | 1.5 mm                 |           | 60695-11-5 IEC      | 875           |
| Glow wire test (GWIT)                                                 | 3.0 mm                 |           | 60695-11-5 IEC      | 900           |
| Glow wire test                                                        | 1.5 mm                 |           | 60695-11-5 IEC      | 750           |
| Glow wire test                                                        | 3.0 mm                 |           | 60695-11-5 IEC      | 750           |
| Application of flame from small burner                                | Method K and F/ 2.0 mm |           | 60695-11-5 ISO      | K1, F1        |
| Needle flame test                                                     | Method K/ 1.5 mm       |           | 3795 ASTM D1929     | 5             |
| Needle flame test                                                     | Method K/ 2.0 mm       |           | ASTM D1929          | 5             |
| Needle flame test                                                     | Method K/ 3.0 mm       |           |                     | 10            |
| Needle flame test                                                     | Method F/ 1.5 mm       |           |                     | 60            |
| Needle flame test                                                     | Method F/ 2.0 mm       |           |                     | 60            |
| Needle flame test                                                     | Method F/ 3.0 mm       |           |                     | 120           |
| Burning rate (US-FMVSS)                                               | >=1.0 mm               |           |                     | passed        |
| Flash ignition temperature                                            |                        |           |                     | 480           |
| Self ignition temperature                                             |                        |           |                     | 550           |
| <b>Electrical properties (23 °C/50 % r. h.)</b>                       |                        |           |                     |               |
| CRelative permittivity                                                | 100 Hz                 | - -       | IEC 60250           | 3.1           |
| CRelative permittivity                                                | 1 MHz                  | 10-4      | IEC 60250           | 3.0           |
| CDissipation factor                                                   | 100 Hz                 | 10-4      | IEC 60250           | 5             |
| CDissipation factor                                                   | 1 MHz                  | Ohm·m     | IEC 60250           | 90            |
| CVolume resistivity                                                   |                        | Ohm       | IEC 62631-3-1       | 1E14          |
| CSurface resistivity                                                  |                        | kV/mm     | IEC 62631-3-2       | 1E16          |
| CElectrical strength                                                  | 1 mm                   | Rating    | IEC 60243-1         | 34            |
| CComparative tracking index CTI                                       | Solution A             | Rating    | IEC 60112           | 250           |
| Comparative tracking index CTI M                                      | Solution B             | Rating    | IEC 60112           | 125M          |
| Electrolytic corrosion                                                |                        |           | IEC 60426           | A1            |

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|--------------------------------------------------------|--------------------------------------|-------------------|---------------|---------------|
| <b>Other properties (23 °C)</b>                        |                                      |                   |               |               |
| C Water absorption (saturation value)                  | Water at 23 °C                       | %                 | ISO 62 ISO    | 0.30          |
| C Water absorption (equilibrium value)                 | 23 °C; 50 % r. h.                    | %                 | 62 ISO 1183-  | 0.12          |
| C Density                                              |                                      | kg/m³             | 1 ISO 15106-  | 1200          |
| Water vapor permeability                               | 23 °C; 85 % RH/ 100 µm film          | g/(m²·24 h)       | 1 b.o. ISO    | 15            |
| Gas permeation                                         | Oxygen/ 100 µm film                  | cm³/(m²·24 h·bar) | 2556 b.o. ISO | 650           |
| Gas permeation                                         | Oxygen/ 25.4 µm (1 mil) film         | cm³/(m²·24 h·bar) | 2556 b.o. ISO | 2760          |
| Gas permeation                                         | Nitrogen/ 100 µm film                | cm³/(m²·24 h·bar) | 2556 b.o. ISO | 120           |
| Gas permeation                                         | Nitrogen/ 25.4 µm (1 mil) film       | cm³/(m²·24 h·bar) | 2556 b.o. ISO | 510           |
| Gas permeation                                         | Carbon dioxide/ 100 µm film          | cm³/(m²·24 h·bar) | 2556 b.o. ISO | 3800          |
| Gas permeation                                         | Carbon dioxide/ 25.4 µm (1 mil) film | cm³/(m²·24 h·bar) | 2556 ISO 60   | 16900         |
| Bulk density                                           | Pellets                              | kg/m³             |               | 660           |
| <b>Material specific properties</b>                    |                                      |                   |               |               |
| Refractive index                                       | Procedure A                          | -                 | ISO 489 ISO   | 1.586         |
| Haze for transparent materials                         | 3 mm 1 mm                            | %                 | 14782 ISO     | < 0.8         |
| Luminous transmittance (clear transparent materials)   | 2 mm 3 mm                            | %                 | 13468-2 ISO   | 89            |
| C Luminous transmittance (clear transparent materials) | 4 mm                                 | %                 | 13468-2 ISO   | 89            |
| Luminous transmittance (clear transparent materials)   |                                      | %                 | 13468-2 ISO   | 88            |
| Luminous transmittance (clear transparent materials)   |                                      | %                 | 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           |
| <b>Recommended processing and drying conditions</b>    |                                      |                   |               |               |
| Melt temperatures                                      |                                      | °C                | -             | 280 - 320     |
| Standard Melt temperature                              |                                      | °C                | -             | 300           |
| Barrel Temperatures - Rear                             |                                      | °C                | -             | 250 - 260     |
| Barrel Temperatures - Middle                           |                                      | °C                | -             | 270 - 280     |
| Barrel Temperatures - Front                            |                                      | °C                | -             | 280 - 290     |
| Barrel Temperatures - Nozzle                           |                                      | °C                | -             | 290 - 300     |
| Mold Temperatures                                      |                                      | °C                | -             | 80 - 120      |
| Hold Pressure (% of injection pressure)                |                                      | %                 | -             | 50 - 75       |
| Plastic Back Pressure (specific)                       |                                      | bar               | -             | 50 - 150      |
| Peripheral Screw Speed                                 |                                      | m/s               | -             | 0.05 - 0.2    |
| Shot-to-Cylinder Size                                  |                                      | %                 | -             | 30 - 70       |
| Dry Air Drying Temperature                             |                                      | °C                | -             | 120           |
| Dry Air Drying Time                                    |                                      | h                 | -             | 2-3           |
| Moisture Content max. (%)                              |                                      | %                 | -             | <= 0,02       |
| Vent Depth                                             |                                      | mm                | -             | 0.025 - 0.075 |

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