

## Makrolon® 2258

Covestro - Polycarbonates - *Polycarbonate*

### General Information

#### Product Description

MVR (300°C/1.2 kg) 34 cm³/10 min; medical devices; suitable for ETO and steam sterilization at 121°C; biocompatible according to many ISO 10993-1 test requirements; low viscosity; easy release; injection molding - melt temperature 280 - 320°C; available in transparent and opaque colors

#### General

|                   |                                                  |                                        |                      |
|-------------------|--------------------------------------------------|----------------------------------------|----------------------|
| Material Status   | • Commercial: Active                             |                                        |                      |
| Availability      | • Africa & Middle East<br>• Asia Pacific         | • Europe<br>• Latin America            | • North America      |
| Features          | • Biocompatible<br>• Ethylene Oxide Sterilizable | • Good Mold Release<br>• Low Viscosity | • Steam Sterilizable |
| Uses              | • Medical Devices                                | • Medical/Healthcare Applications      |                      |
| Agency Ratings    | • ISO 10993-1                                    | • USP Class VI                         |                      |
| RoHS Compliance   | • RoHS Compliant                                 |                                        |                      |
| Appearance        | • Clear/Transparent                              | • Colors Available                     | • Opaque             |
| Processing Method | • Injection Molding                              |                                        |                      |
| ISO Designation   | • ISO 7391-PC,MR,(,)-24-9                        |                                        |                      |

### Properties <sup>1</sup>

| Physical                                                 | Nominal Value | Unit      | Test Method  |
|----------------------------------------------------------|---------------|-----------|--------------|
| Density (73°F)                                           | 1.20          | g/cm³     | ISO 1183     |
| Apparent (Bulk) Density <sup>2</sup>                     | 0.66          | g/cm³     | ISO 60       |
| Melt Mass-Flow Rate (MFR) (300°C/1.2 kg)                 | 37            | g/10 min  | ISO 1133     |
| Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)               | 34            | cm³/10min | ISO 1133     |
| Molding Shrinkage                                        |               |           |              |
| Across Flow                                              | 0.50 to 0.70  | %         | ISO 2577     |
| Flow                                                     | 0.50 to 0.70  | %         | ISO 2577     |
| Across Flow : 536°F, 0.0787 in <sup>3</sup>              | 0.65          | %         | ISO 294-4    |
| Flow : 0.0787 in <sup>3</sup>                            | 0.65          | %         | ISO 294-4    |
| Water Absorption (Saturation, 73°F)                      | 0.30          | %         | ISO 62       |
| Water Absorption (Equilibrium, 73°F, 50% RH)             | 0.12          | %         | ISO 62       |
| Mechanical                                               | Nominal Value | Unit      | Test Method  |
| Tensile Modulus (73°F)                                   | 348000        | psi       | ISO 527-1/1  |
| Tensile Stress (Yield, 73°F)                             | 9430          | psi       | ISO 527-2/50 |
| Tensile Stress (Break, 73°F)                             | 8700          | psi       | ISO 527-2/50 |
| Tensile Strain (Yield, 73°F)                             | 6.0           | %         | ISO 527-2/50 |
| Tensile Strain (Break, 73°F)                             | 130           | %         | ISO 527-2/50 |
| Nominal Tensile Strain at Break (73°F)                   | > 50          | %         | ISO 527-2/50 |
| Tensile Creep Modulus (1 hr)                             | 305000        | psi       | ISO 899-1    |
| Tensile Creep Modulus (1000 hr)                          | 247000        | psi       | ISO 899-1    |
| Flexural Modulus <sup>4</sup> (73°F)                     | 341000        | psi       | ISO 178      |
| Flexural Stress <sup>4</sup>                             |               |           | ISO 178      |
| 73°F                                                     | 14100         | psi       |              |
| 3.5% Strain, 73°F                                        | 10600         | psi       |              |
| Flexural Strain at Flexural Strength <sup>5</sup> (73°F) | 7.1           | %         | ISO 178      |
| Impact                                                   | Nominal Value | Unit      | Test Method  |
| Charpy Notched Impact Strength <sup>6</sup>              |               |           | ISO 179/1eA  |



|                                                         |                           |                               |                    |
|---------------------------------------------------------|---------------------------|-------------------------------|--------------------|
| -22°F, Complete Break                                   | 5.7 ft·lb/in <sup>2</sup> |                               |                    |
| 73°F, Partial Break                                     | 26 ft·lb/in <sup>2</sup>  |                               |                    |
| Charpy Unnotched Impact Strength                        |                           |                               | ISO 179/1eU        |
| -76°F                                                   | No Break                  |                               |                    |
| -22°F                                                   | No Break                  |                               |                    |
| 73°F                                                    | No Break                  |                               |                    |
| Notched Izod Impact Strength <sup>6</sup>               |                           |                               | ISO 180/A          |
| -22°F, Complete Break                                   | 5.7 ft·lb/in <sup>2</sup> |                               |                    |
| 73°F, Partial Break                                     | 26 ft·lb/in <sup>2</sup>  |                               |                    |
| Multi-Axial Instrumented Impact Energy                  |                           |                               | ISO 6603-2         |
| -22°F                                                   | 44.3 ft·lb                |                               |                    |
| 73°F                                                    | 40.6 ft·lb                |                               |                    |
| Multi-Axial Instrumented Impact Peak Force              |                           |                               | ISO 6603-2         |
| -22°F                                                   | 1330 lbf                  |                               |                    |
| 73°F                                                    | 1100 lbf                  |                               |                    |
| <b>Hardness</b>                                         | <b>Nominal Value</b>      | <b>Unit</b>                   | <b>Test Method</b> |
| Ball Indentation Hardness                               | 16700                     | psi                           | ISO 2039-1         |
| <b>Thermal</b>                                          | <b>Nominal Value</b>      | <b>Unit</b>                   | <b>Test Method</b> |
| Deflection Temperature Under Load (66 psi, Unannealed)  | 279                       | °F                            | ISO 75-2/B         |
| Deflection Temperature Under Load (264 psi, Unannealed) | 255                       | °F                            | ISO 75-2/A         |
| Glass Transition Temperature <sup>7</sup>               | 293                       | °F                            | ISO 11357-2        |
| Vicat Softening Temperature                             |                           |                               |                    |
| --                                                      | 295                       | °F                            | ISO 306/B120       |
| --                                                      | 293                       | °F                            | ISO 306/B50        |
| Ball Pressure Test (277°F)                              | Pass                      |                               | IEC 60695-10-2     |
| CLTE - Flow (73 to 131°F)                               | 3.6E-5                    | in/in/°F                      | ISO 11359-2        |
| CLTE - Transverse (73 to 131°F)                         | 3.6E-5                    | in/in/°F                      | ISO 11359-2        |
| Thermal Conductivity <sup>8</sup> (73°F)                | 1.4                       | Btu·in/hr/ft <sup>2</sup> /°F | ISO 8302           |
| RTI Elec (0.06 in)                                      | 257                       | °F                            | UL 746B            |
| RTI Imp (0.06 in)                                       | 239                       | °F                            | UL 746B            |
| RTI Str (0.06 in)                                       | 257                       | °F                            | UL 746B            |
| <b>Electrical</b>                                       | <b>Nominal Value</b>      | <b>Unit</b>                   | <b>Test Method</b> |
| Surface Resistivity                                     | 1.0E+16                   | ohms                          | IEC 60093          |
| Volume Resistivity (73°F)                               | 1.0E+16                   | ohms·cm                       | IEC 60093          |
| Electric Strength (73°F, 0.0394 in)                     | 860                       | V/mil                         | IEC 60243-1        |
| Relative Permittivity                                   |                           |                               | IEC 60250          |
| 73°F, 100 Hz                                            | 3.10                      |                               |                    |
| 73°F, 1 MHz                                             | 3.00                      |                               |                    |
| Dissipation Factor                                      |                           |                               | IEC 60250          |
| 73°F, 100 Hz                                            | 5.0E-4                    |                               |                    |
| 73°F, 1 MHz                                             | 9.0E-3                    |                               |                    |
| Comparative Tracking Index (Solution A)                 | 250                       | V                             | IEC 60112          |
| <b>Flammability</b>                                     | <b>Nominal Value</b>      | <b>Unit</b>                   | <b>Test Method</b> |
| Flame Rating                                            |                           |                               | UL 94              |
| 0.11 in, CL                                             | HB                        |                               |                    |
| 0.030 in, CL                                            | V-2                       |                               |                    |
| Glow Wire Ignition Temperature                          |                           |                               | IEC 60695-2-13     |
| 0.030 in                                                | 1610                      | °F                            |                    |
| 0.06 in                                                 | 1610                      | °F                            |                    |
| 0.12 in                                                 | 1650                      | °F                            |                    |
| Flash Ignition Temperature                              | 896                       | °F                            | ASTM D1929         |
| Self Ignition Temperature                               | 1022                      | °F                            | ASTM D1929         |
| <b>Optical</b>                                          | <b>Nominal Value</b>      | <b>Unit</b>                   | <b>Test Method</b> |
| Refractive Index <sup>9</sup>                           | 1.586                     |                               | ISO 489            |
| Light Transmittance                                     |                           |                               | ISO 13468-2        |
| 39.37 mil                                               | 89.0                      | %                             |                    |
|                                                         | 89.0                      | %                             |                    |
|                                                         | 88.0                      | %                             |                    |
|                                                         | 87.0                      | %                             |                    |
|                                                         | < 0.800                   | %                             | ISO                |

## Processing Information

| Injection                          | Nominal Value    | Unit |
|------------------------------------|------------------|------|
| Drying Temperature - Dry Air Dryer | 248              | °F   |
| Drying Time - Dry Air Dryer        | 2.0 to 3.0       | hr   |
| Suggested Max Moisture             | < 0.020          | %    |
| Suggested Shot Size                | 30 to 70         | %    |
| Rear Temperature                   | 482 to 500       | °F   |
| Middle Temperature                 | 518 to 536       | °F   |
| Front Temperature                  | 536 to 554       | °F   |
| Nozzle Temperature                 | 554 to 572       | °F   |
| Processing (Melt) Temp             | 536 to 608       | °F   |
| Mold Temperature                   | 176 to 248       | °F   |
| Back Pressure                      | 725 to 2180      | psi  |
| Vent Depth                         | 9.8E-4 to 3.0E-3 | in   |

### Injection Notes

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

### Notes

<sup>1</sup> Typical properties: these are not to be construed as specifications.

<sup>2</sup> Pellets

<sup>3</sup> 60x60x2mm, 500 bar

<sup>4</sup> 0.079 in/min

<sup>5</sup> 2.0 mm/min

<sup>6</sup> 3 mm

<sup>7</sup> 10°C/min

<sup>8</sup> Across Flow

<sup>9</sup> Method A

