

## VALOX™ RESIN 4031

REGION EUROPE

### DESCRIPTION

VALOX 4031 is a 30% high strength glass fibre reinforced PBT injection moulding resin with excellent strength, stiffness and heat resistance. Applications: appliance handles, spotlights, electric motors.

### TYPICAL PROPERTY VALUES

Revision 20240327

| PROPERTIES                                   | TYPICAL VALUES | UNITS             | TEST METHODS |
|----------------------------------------------|----------------|-------------------|--------------|
| <b>MECHANICAL</b>                            |                |                   |              |
| Tensile Stress, yld, Type I, 5 mm/min        | 140            | MPa               | ASTM D638    |
| Tensile Stress, brk, Type I, 5 mm/min        | 140            | MPa               | ASTM D638    |
| Tensile Strain, yld, Type I, 5 mm/min        | 3              | %                 | ASTM D638    |
| Tensile Strain, brk, Type I, 5 mm/min        | 3              | %                 | ASTM D638    |
| Tensile Modulus, 5 mm/min                    | 10000          | MPa               | ASTM D638    |
| Flexural Stress, yld, 1.3 mm/min, 50 mm span | 190            | MPa               | ASTM D790    |
| Flexural Stress, brk, 1.3 mm/min, 50 mm span | 190            | MPa               | ASTM D790    |
| Flexural Modulus, 1.3 mm/min, 50 mm span     | 7900           | MPa               | ASTM D790    |
| Tensile Stress, yield, 5 mm/min              | 135            | MPa               | ISO 527      |
| Tensile Stress, break, 5 mm/min              | 135            | MPa               | ISO 527      |
| Tensile Strain, yield, 5 mm/min              | 2              | %                 | ISO 527      |
| Tensile Strain, break, 5 mm/min              | 2              | %                 | ISO 527      |
| Tensile Modulus, 1 mm/min                    | 10000          | MPa               | ISO 527      |
| Flexural Stress, yield, 2 mm/min             | 210            | MPa               | ISO 178      |
| Flexural Stress, break, 2 mm/min             | 200            | MPa               | ISO 178      |
| Flexural Strain, break, 2 mm/min             | 3              | %                 | ISO 178      |
| Flexural Modulus, 2 mm/min                   | 8300           | MPa               | ISO 178      |
| Ball Indentation Hardness, H358/30           | 125            | MPa               | ISO 2039-1   |
| Hardness, Rockwell R                         | 125            | -                 | ISO 2039-2   |
| <b>IMPACT</b>                                |                |                   |              |
| Charpy Impact, unnotched, 23°C               | 65             | kJ/m <sup>2</sup> | ISO 179/2C   |
| Charpy Impact, unnotched, -30°C              | 60             | kJ/m <sup>2</sup> | ISO 179/2C   |
| Izod Impact, unnotched, 23°C                 | 880            | J/m               | ASTM D4812   |
| Izod Impact, unnotched, -30°C                | 880            | J/m               | ASTM D4812   |
| Izod Impact, notched, 23°C                   | 100            | J/m               | ASTM D256    |
| Izod Impact, notched, 0°C                    | 100            | J/m               | ASTM D256    |
| Izod Impact, notched, -30°C                  | 100            | J/m               | ASTM D256    |
| Izod Impact, unnotched 80°10°4 +23°C         | 55             | kJ/m <sup>2</sup> | ISO 180/1U   |
| Izod Impact, unnotched 80°10°4 -30°C         | 55             | kJ/m <sup>2</sup> | ISO 180/1U   |
| Izod Impact, notched 80°10°4 +23°C           | 11             | kJ/m <sup>2</sup> | ISO 180/1A   |
| Izod Impact, notched 80°10°4 0°C             | 11             | kJ/m <sup>2</sup> | ISO 180/1A   |
| Izod Impact, notched 80°10°4 -30°C           | 10             | kJ/m <sup>2</sup> | ISO 180/1A   |
| Charpy 23°C, V-notch Edgew 80°10°4 sp=62mm   | 7              | kJ/m <sup>2</sup> | ISO 179/1eA  |
| Charpy Impact, notched, 23°C                 | 12             | kJ/m <sup>2</sup> | ISO 179/2C   |

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| PROPERTIES                                  | TYPICAL VALUES | UNITS      | TEST METHODS   |
|---------------------------------------------|----------------|------------|----------------|
| Charpy -30°C, V-notch Edgew 80*10*4 sp=62mm | 6              | kJ/m²      | ISO 179/1eA    |
| Charpy Impact, notched, -30°C               | 12             | kJ/m²      | ISO 179/2C     |
| Charpy 23°C, Unnotch Edgew 80*10*4 sp=62mm  | 50             | kJ/m²      | ISO 179/1eU    |
| Charpy -30°C, Unnotch Edgew 80*10*4 sp=62mm | 55             | kJ/m²      | ISO 179/1eU    |
| THERMAL                                     |                |            |                |
| Vicat Softening Temp, Rate A/50             | 220            | °C         | ASTM D1525     |
| Vicat Softening Temp, Rate B/50             | 215            | °C         | ASTM D1525     |
| HDT, 0.45 MPa, 3.2 mm, unannealed           | 220            | °C         | ASTM D648      |
| HDT, 1.82 MPa, 3.2mm, unannealed            | 205            | °C         | ASTM D648      |
| CTE, -40°C to 40°C, flow                    | 2.1E-05        | 1/°C       | ISO 11359-2    |
| CTE, -40°C to 40°C, xflow                   | 7.4E-05        | 1/°C       | ISO 11359-2    |
| CTE, 23°C to 80°C, flow                     | 3.E-05         | 1/°C       | ISO 11359-2    |
| CTE, 23°C to 80°C, xflow                    | 1.2E-04        | 1/°C       | ISO 11359-2    |
| CTE, 23°C to 150°C, flow                    | 1.98E-05       | 1/°C       | ISO 11359-2    |
| CTE, 23°C to 150°C, xflow                   | 1.73E-04       | 1/°C       | ISO 11359-2    |
| Ball Pressure Test, 125°C +/- 2°C           | PASSES         | -          | IEC 60695-10-2 |
| Vicat Softening Temp, Rate A/50             | 220            | °C         | ISO 306        |
| Vicat Softening Temp, Rate B/50             | 215            | °C         | ISO 306        |
| Vicat Softening Temp, Rate B/120            | 215            | °C         | ISO 306        |
| HDT/Be, 0.45MPa Edgew 120*10*4 sp=100mm     | 220            | °C         | ISO 75/Be      |
| HDT/Ae, 1.8 MPa Edgew 120*10*4 sp=100mm     | 210            | °C         | ISO 75/Ae      |
| HDT/Bf, 0.45 MPa Flatw 80*10*4 sp=64mm      | 220            | °C         | ISO 75/Bf      |
| HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm       | 205            | °C         | ISO 75/Af      |
| Relative Temp Index, Elec                   | 140            | °C         | UL 746B        |
| Relative Temp Index, Mech w/impact          | 140            | °C         | UL 746B        |
| Relative Temp Index, Mech w/o impact        | 140            | °C         | UL 746B        |
| PHYSICAL                                    |                |            |                |
| Specific Gravity                            | 1.54           | -          | ASTM D792      |
| Filler Content                              | 30             | %          | ASTM D229      |
| Mold Shrinkage on Tensile Bar, flow         | 0.3 – 0.7      | %          | SABIC method   |
| Mold Shrinkage on Tensile Bar, xflow        | 0.5 – 1        | %          | SABIC method   |
| Melt Flow Rate, 266°C/5.0 kgf               | 50             | g/10 min   | ASTM D1238     |
| Density                                     | 1.54           | g/cm³      | ISO 1183       |
| Water Absorption, (23°C/saturated)          | 0.26           | %          | ISO 62-1       |
| Moisture Absorption (23°C / 50% RH)         | 0.06           | %          | ISO 62         |
| Melt Volume Rate, MVR at 250°C/2.16 kg      | 12             | cm³/10 min | ISO 1133       |
| Melt Volume Rate, MVR at 250°C/5.0 kg       | 30             | cm³/10 min | ISO 1133       |
| Melt Volume Rate, MVR at 265°C/5.0 kg       | 40             | cm³/10 min | ISO 1133       |
| Melt Viscosity, 260°C, 1500 sec-1           | 150            | Pa-s       | ISO 11443      |
| ELECTRICAL                                  |                |            |                |
| Volume Resistivity                          | >1.E+15        | Ω.cm       | ASTM D257      |
| Dielectric Strength, in oil, 0.8 mm         | 26             | kV/mm      | ASTM D149      |
| Dielectric Strength, in oil, 1.6 mm         | 24             | kV/mm      | ASTM D149      |
| Dielectric Strength, in oil, 3.2 mm         | 18             | kV/mm      | ASTM D149      |
| Arc Resistance, Tungsten {PLC}              | 5              | PLC Code   | ASTM D495      |

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| PROPERTIES                                       | TYPICAL VALUES                | UNITS    | TEST METHODS   |
|--------------------------------------------------|-------------------------------|----------|----------------|
| Hot Wire Ignition (PLC)                          | 1                             | PLC Code | UL 746A        |
| High Voltage Arc Track Rate (PLC)                | 1                             | PLC Code | UL 746A        |
| High Ampere Arc Ign, surface (PLC)               | 1                             | PLC Code | UL 746A        |
| Comparative Tracking Index (UL) (PLC)            | 0                             | PLC Code | UL 746A        |
| Volume Resistivity                               | >1.E+15                       | Ω.cm     | IEC 60093      |
| Surface Resistivity, ROA                         | >1.E+15                       | Ω        | IEC 60093      |
| Dielectric Strength, in oil, 0.8 mm              | 26                            | kV/mm    | IEC 60243-1    |
| Dielectric Strength, in oil, 1.6 mm              | 24                            | kV/mm    | IEC 60243-1    |
| Dielectric Strength, in oil, 3.2 mm              | 15                            | kV/mm    | IEC 60243-1    |
| Relative Permittivity, 1 MHz                     | 3.1                           | -        | IEC 60250      |
| Dissipation Factor, 50/60 Hz                     | 0.0016                        | -        | IEC 60250      |
| Dissipation Factor, 1 MHz                        | 0.014                         | -        | IEC 60250      |
| Comparative Tracking Index                       | 400                           | V        | IEC 60112      |
| Relative Permittivity, 50/60 Hz                  | 3.3                           | -        | IEC 60250      |
| FLAME CHARACTERISTICS                            |                               |          |                |
| UL Yellow Card Link                              | <a href="#">E45329-236594</a> | -        | -              |
| UL Recognized, 94HB Flame Class Rating           | 0.84                          | mm       | UL 94          |
| UL Recognized, 94HB Flame Class Rating 2nd value | 6                             | mm       | UL 94          |
| Glow Wire Flammability Index 750°C, passes at    | 1                             | mm       | IEC 60695-2-12 |
| INJECTION MOLDING                                |                               |          |                |
| Drying Temperature                               | 110 – 120                     | °C       |                |
| Drying Time                                      | 2 – 4                         | Hrs      |                |
| Maximum Moisture Content                         | 0.02                          | %        |                |
| Melt Temperature                                 | 250 – 270                     | °C       |                |
| Nozzle Temperature                               | 240 – 260                     | °C       |                |
| Front - Zone 3 Temperature                       | 245 – 265                     | °C       |                |
| Middle - Zone 2 Temperature                      | 240 – 255                     | °C       |                |
| Rear - Zone 1 Temperature                        | 230 – 245                     | °C       |                |
| Hopper Temperature                               | 40 – 60                       | °C       |                |
| Mold Temperature                                 | 40 – 100                      | °C       |                |

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