

# VALOX™ FR RESIN ENH4530

REGION EUROPE

## DESCRIPTION

VALOX ENH4530 is a 15% glass reinforced, non-chlorinated/brominated flame retardant Polybutylene Terephthalate (PBT) injection moldable grade with excellent chemical resistance. It has a UL94V0@0.80mm flame rating. This is a good candidate for a variety of applications needing a sustainable FR PBT solution.

## TYPICAL PROPERTY VALUES

| PROPERTIES                                   | TYPICAL VALUES | UNITS             | TEST METHODS |
|----------------------------------------------|----------------|-------------------|--------------|
| <b>MECHANICAL <sup>(1)</sup></b>             |                |                   |              |
| Tensile Stress, yld, Type I, 5 mm/min        | 80             | MPa               | ASTM D638    |
| Tensile Stress, brk, Type I, 5 mm/min        | 80             | MPa               | ASTM D638    |
| Tensile Strain, yld, Type I, 5 mm/min        | 2              | %                 | ASTM D638    |
| Tensile Strain, brk, Type I, 5 mm/min        | 3              | %                 | ASTM D638    |
| Tensile Modulus, 5 mm/min                    | 7300           | MPa               | ASTM D638    |
| Flexural Stress, yld, 1.3 mm/min, 50 mm span | 120            | MPa               | ASTM D790    |
| Flexural Stress, brk, 1.3 mm/min, 50 mm span | 120            | MPa               | ASTM D790    |
| Flexural Modulus, 1.3 mm/min, 50 mm span     | 5800           | MPa               | ASTM D790    |
| Tensile Stress, yield, 5 mm/min              | 80             | MPa               | ISO 527      |
| Tensile Stress, break, 5 mm/min              | 80             | MPa               | ISO 527      |
| Tensile Strain, yield, 5 mm/min              | 2              | %                 | ISO 527      |
| Tensile Strain, break, 5 mm/min              | 3              | %                 | ISO 527      |
| Tensile Modulus, 1 mm/min                    | 7500           | MPa               | ISO 527      |
| Flexural Stress, yield, 2 mm/min             | 130            | MPa               | ISO 178      |
| Flexural Stress, break, 2 mm/min             | 130            | MPa               | ISO 178      |
| Flexural Strain, break, 2 mm/min             | 3              | %                 | ISO 178      |
| Flexural Modulus, 2 mm/min                   | 6400           | MPa               | ISO 178      |
| Ball Indentation Hardness, H358/30           | 128            | MPa               | ISO 2039-1   |
| Hardness, Rockwell R                         | 98             | -                 | ISO 2039-2   |
| <b>IMPACT <sup>(1)</sup></b>                 |                |                   |              |
| Charpy Impact, unnotched, 23°C               | 35             | kJ/m <sup>2</sup> | ISO 179/2C   |
| Charpy Impact, unnotched, -30°C              | 25             | kJ/m <sup>2</sup> | ISO 179/2C   |
| Izod Impact, unnotched, 23°C                 | 400            | J/m               | ASTM D4812   |
| Izod Impact, unnotched, -30°C                | 360            | J/m               | ASTM D4812   |
| Izod Impact, notched, 23°C                   | 50             | J/m               | ASTM D256    |
| Izod Impact, notched, 0°C                    | 50             | J/m               | ASTM D256    |
| Izod Impact, notched, -30°C                  | 50             | J/m               | ASTM D256    |
| Izod Impact, unnotched 80*10*4 +23°C         | 30             | kJ/m <sup>2</sup> | ISO 180/1U   |
| Izod Impact, unnotched 80*10*4 -30°C         | 23             | kJ/m <sup>2</sup> | ISO 180/1U   |
| Izod Impact, notched 80*10*4 +23°C           | 6              | kJ/m <sup>2</sup> | ISO 180/1A   |
| Izod Impact, notched 80*10*4 0°C             | 6              | kJ/m <sup>2</sup> | ISO 180/1A   |
| Izod Impact, notched 80*10*4 -30°C           | 6              | kJ/m <sup>2</sup> | ISO 180/1A   |
| Charpy Impact, notched, 23°C                 | 6              | kJ/m <sup>2</sup> | ISO 179/2C   |
| Charpy Impact, notched, -30°C                | 6              | kJ/m <sup>2</sup> | ISO 179/2C   |

| PROPERTIES                                          | TYPICAL VALUES | UNITS      | TEST METHODS   |
|-----------------------------------------------------|----------------|------------|----------------|
| Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm          | 4              | kJ/m²      | ISO 179 / 1eA  |
| THERMAL <sup>(1)</sup>                              |                |            |                |
| CTE, -40°C to 95°C, flow                            | 3.50E-05       | 1/°C       | ASTM E831      |
| CTE, -40°C to 95°C, xflow                           | 7.00E-05       | 1/°C       | ASTM E831      |
| Vicat Softening Temp, Rate A/50                     | 217            | °C         | ASTM D1525     |
| Vicat Softening Temp, Rate B/50                     | 205            | °C         | ASTM D1525     |
| HDT, 0.45 MPa, 3.2 mm, unannealed                   | 220            | °C         | ASTM D648      |
| HDT, 1.82 MPa, 3.2mm, unannealed                    | 200            | °C         | ASTM D648      |
| CTE, -40°C to 40°C, flow                            | 2.85E-05       | 1/°C       | ISO 11359-2    |
| CTE, -40°C to 40°C, xflow                           | 7.E-05         | 1/°C       | ISO 11359-2    |
| CTE, 23°C to 150°C, flow                            | 4.2E-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                     | 205            | °C         | ISO 306        |
| Vicat Softening Temp, Rate B/120                    | 205            | °C         | ISO 306        |
| 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               | 200            | °C         | ISO 75/Af      |
| Relative Temp Index, Elec <sup>(2)</sup>            | 140            | °C         | UL 746B        |
| Relative Temp Index, Mech w/impact <sup>(2)</sup>   | 120            | °C         | UL 746B        |
| Relative Temp Index, Mech w/o impact <sup>(2)</sup> | 140            | °C         | UL 746B        |
| PHYSICAL <sup>(1)</sup>                             |                |            |                |
| Specific Gravity                                    | 1.45           | -          | ASTM D792      |
| Filler Content                                      | 15             | %          | ASTM D229      |
| Moisture Absorption, (23°C/50% RH/24 hrs)           | 0.07           | %          | ASTM D570      |
| Mold Shrinkage on Tensile Bar, flow <sup>(3)</sup>  | 0.3 – 0.8      | %          | SABIC method   |
| Melt Flow Rate, 265°C/5.0 kgf                       | 24             | g/10 min   | ASTM D1238     |
| Density                                             | 1.45           | g/cm³      | ISO 1183       |
| Water Absorption, (23°C/saturated)                  | 0.15           | %          | ISO 62-1       |
| Moisture Absorption (23°C / 50% RH)                 | 0.07           | %          | ISO 62         |
| Melt Volume Rate, MVR at 250°C/5.0 kg               | 17             | cm³/10 min | ISO 1133       |
| Melt Volume Rate, MVR at 265°C/5.0 kg               | 18             | cm³/10 min | ISO 1133       |
| Melt Viscosity, 260°C, 1500 sec-1                   | 150            | Pa-s       | ISO 11443      |
| ELECTRICAL <sup>(1)</sup>                           |                |            |                |
| Volume Resistivity                                  | 1.E+15         | Ω.cm       | ASTM D257      |
| Dielectric Strength, in oil, 0.8 mm                 | 28             | kV/mm      | ASTM D149      |
| Dielectric Strength, in oil, 1.6 mm                 | 21             | kV/mm      | ASTM D149      |
| Dielectric Strength, in oil, 3.2 mm                 | 17             | kV/mm      | ASTM D149      |
| Relative Permittivity, 1 MHz                        | 3.7            | -          | ASTM D150      |
| Dissipation Factor, 1 MHz                           | 0.15           | -          | ASTM D150      |
| 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                 | 28             | kV/mm      | IEC 60243-1    |
| Dielectric Strength, in oil, 1.6 mm                 | 21             | kV/mm      | IEC 60243-1    |
| Dielectric Strength, in oil, 3.2 mm                 | 17             | kV/mm      | IEC 60243-1    |

| PROPERTIES                                 | TYPICAL VALUES                   | UNITS    | TEST METHODS   |
|--------------------------------------------|----------------------------------|----------|----------------|
| Relative Permittivity, 1 MHz               | 3.7                              | -        | IEC 60250      |
| Dissipation Factor, 1 MHz                  | 0.15                             | -        | IEC 60250      |
| Comparative Tracking Index (UL) {PLC}      | 1                                | PLC Code | UL 746A        |
| Hot-Wire Ignition (HWI), PLC 0             | ≥0.8                             | mm       | UL 746A        |
| High Amp Arc Ignition (HAI), PLC 0         | ≥0.8                             | mm       | UL 746A        |
| FLAME CHARACTERISTICS <sup>(2)</sup>       |                                  |          |                |
| UL Yellow Card Link                        | <a href="#">E45329-100897478</a> | -        | -              |
| UL Recognized, 94-5VA Flame Class Rating   | ≥2                               | mm       | UL 94          |
| UL Recognized, 94V-0 Flame Class Rating    | ≥0.5                             | mm       | UL 94          |
| Glow Wire Ignitability Temperature, 3.0 mm | 750                              | °C       | IEC 60695-2-13 |
| Glow Wire Ignitability Temperature, 1.5 mm | 750                              | °C       | IEC 60695-2-13 |
| Glow Wire Ignitability Temperature, 0.8 mm | 750                              | °C       | IEC 60695-2-13 |
| Glow Wire Flammability Index, 3.0 mm       | 960                              | °C       | IEC 60695-2-12 |
| Glow Wire Flammability Index, 1.5 mm       | 960                              | °C       | IEC 60695-2-12 |
| Glow Wire Flammability Index, 0.8 mm       | 960                              | °C       | IEC 60695-2-12 |
| Oxygen Index (LOI)                         | 31                               | %        | ASTM D2863     |
| Oxygen Index (LOI)                         | 31                               | %        | ISO 4589       |
| INJECTION MOLDING <sup>(4)</sup>           |                                  |          |                |
| Drying Temperature                         | 110 – 120                        | °C       |                |
| Drying Time                                | 2 – 4                            | Hrs      |                |
| Maximum Moisture Content                   | 0.02                             | %        |                |
| Melt Temperature                           | 245 – 260                        | °C       |                |
| Nozzle Temperature                         | 230 – 255                        | °C       |                |
| Front - Zone 3 Temperature                 | 240 – 260                        | °C       |                |
| Middle - Zone 2 Temperature                | 235 – 250                        | °C       |                |
| Rear - Zone 1 Temperature                  | 230 – 240                        | °C       |                |
| Hopper Temperature                         | 40 – 60                          | °C       |                |
| Mold Temperature                           | 40 – 100                         | °C       |                |

(1) The information stated on Technical Datasheets should be used as indicative only for material selection purposes and not be utilized as specification or used for part or tool design.

(2) UL Ratings shown on the technical datasheet might not cover the full range of thicknesses and colors. For details, please see the UL Yellow Card.

(3) Measurements made from laboratory test coupon. Actual shrinkage may vary outside of range due to differences in processing conditions, equipment, part geometry and tool design. It is recommended that mold shrinkage studies be performed with surrogate or legacy tooling prior to cutting tools for new molded article. The information stated on Technical Datasheets should be used as indicative only for material selection purposes and not be utilized as specification or used for part or tool design.

(4) Injection Molding parameters are only mentioned as general guidelines. These may not apply or may need adjustment in specific situations such as low shot sizes, large part molding, thin wall molding and gas-assist molding.