

# VALOX™ FR RESIN ENH4565

REGION ASIA

## DESCRIPTION

VALOX ENH4565 is a 33% glass reinforced, non-chlorinated/brominated flame retardant Polybutylene Terephthalate (PBT) injection moldable grade with excellent chemical resistance. It has a UL94V0@0.75mm flame rating. This is a good candidate for a variety of applications needing a sustainable FRPBT solution.

## TYPICAL PROPERTY VALUES

Revision 20231109

| PROPERTIES                                   | TYPICAL VALUES | UNITS             | TEST METHODS |
|----------------------------------------------|----------------|-------------------|--------------|
| MECHANICAL <sup>(1)</sup>                    |                |                   |              |
| Tensile Stress, yld, Type I, 5 mm/min        | 137            | MPa               | ASTM D638    |
| Tensile Stress, brk, Type I, 5 mm/min        | 137            | MPa               | ASTM D638    |
| Tensile Strain, yld, Type I, 5 mm/min        | 2.4            | %                 | ASTM D638    |
| Tensile Strain, brk, Type I, 5 mm/min        | 2.4            | %                 | ASTM D638    |
| Tensile Modulus, 5 mm/min                    | 11600          | MPa               | ASTM D638    |
| Flexural Stress, yld, 1.3 mm/min, 50 mm span | 180            | MPa               | ASTM D790    |
| Flexural Modulus, 1.3 mm/min, 50 mm span     | 9400           | MPa               | ASTM D790    |
| Tensile Stress, yield, 5 mm/min              | 140            | MPa               | ISO 527      |
| Tensile Stress, break, 5 mm/min              | 140            | MPa               | ISO 527      |
| Tensile Strain, yield, 5 mm/min              | 2.4            | %                 | ISO 527      |
| Tensile Strain, break, 5 mm/min              | 2.4            | %                 | ISO 527      |
| Tensile Modulus, 1 mm/min                    | 11500          | MPa               | ISO 527      |
| Flexural Stress, yield, 2 mm/min             | 185            | MPa               | ISO 178      |
| Flexural Modulus, 2 mm/min                   | 9400           | MPa               | ISO 178      |
| IMPACT <sup>(1)</sup>                        |                |                   |              |
| Charpy Impact, unnotched, 23°C               | 60             | 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                 | 800            | J/m               | ASTM D4812   |
| Izod Impact, unnotched, -30°C                | 600            | J/m               | ASTM D4812   |
| Izod Impact, notched, 23°C                   | 80             | J/m               | ASTM D256    |
| Izod Impact, notched, -30°C                  | 60             | J/m               | ASTM D256    |
| Instrumented Dart Impact Total Energy, 23°C  | 9              | J                 | ASTM D3763   |
| Izod Impact, notched 80°10°4 +23°C           | 14             | kJ/m <sup>2</sup> | ISO 180/1A   |
| Izod Impact, notched 80°10°4 -30°C           | 14             | kJ/m <sup>2</sup> | ISO 180/1A   |
| Charpy Impact, notched, 23°C                 | 12             | kJ/m <sup>2</sup> | ISO 179/2C   |
| Charpy Impact, notched, -30°C                | 12             | kJ/m <sup>2</sup> | ISO 179/2C   |
| THERMAL <sup>(1)</sup>                       |                |                   |              |
| Vicat Softening Temp, Rate B/50              | 205            | °C                | ASTM D1525   |
| HDT, 0.45 MPa, 3.2 mm, unannealed            | 218            | °C                | ASTM D648    |
| HDT, 1.82 MPa, 3.2mm, unannealed             | 206            | °C                | ASTM D648    |
| CTE, -40°C to 40°C, flow                     | 1.9E-05        | 1/°C              | ASTM E831    |
| CTE, -40°C to 40°C, xflow                    | 7.E-05         | 1/°C              | ASTM E831    |
| CTE, -40°C to 150°C, flow                    | 2.E-05         | 1/°C              | ASTM E831    |
| CTE, -40°C to 150°C, xflow                   | 9.8E-05        | 1/°C              | ASTM E831    |

© 2023 Copyright by SABIC. All rights reserved

CHEMISTRY THAT MATTERS™

| PROPERTIES                                          | TYPICAL VALUES           | UNITS                   | TEST METHODS   |
|-----------------------------------------------------|--------------------------|-------------------------|----------------|
| CTE, -40°C to 40°C, flow                            | 1.9E-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 80°C, flow                             | 1.9E-05                  | 1/°C                    | ISO 11359-2    |
| CTE, 23°C to 80°C, xflow                            | 8.E-05                   | 1/°C                    | ISO 11359-2    |
| Ball Pressure Test, 125°C +/- 2°C                   | Pass                     | -                       | IEC 60695-10-2 |
| Relative Temp Index, Elec <sup>(2)</sup>            | 130                      | °C                      | UL 746B        |
| Relative Temp Index, Mech w/impact <sup>(2)</sup>   | 140                      | °C                      | UL 746B        |
| Relative Temp Index, Mech w/o impact <sup>(2)</sup> | 140                      | °C                      | UL 746B        |
| <b>PHYSICAL <sup>(1)</sup></b>                      |                          |                         |                |
| Specific Gravity                                    | 1.6                      | -                       | ASTM D792      |
| Mold Shrinkage on Tensile Bar, flow <sup>(3)</sup>  | 0.1 – 0.4                | %                       | SABIC method   |
| Mold Shrinkage, flow, 3.2 mm <sup>(3)</sup>         | 0.1 – 0.4                | %                       | SABIC method   |
| Mold Shrinkage on Tensile Bar, xflow <sup>(3)</sup> | 0.4 – 0.8                | %                       | SABIC method   |
| Mold Shrinkage, xflow, 3.2 mm <sup>(3)</sup>        | 0.4 – 0.8                | %                       | SABIC method   |
| Melt Flow Rate, 250°C/5.0 kgf                       | 24                       | g/10 min                | ASTM D1238     |
| Density                                             | 1.61                     | g/cm <sup>3</sup>       | ISO 1183       |
| Water Absorption, (23°C/saturated)                  | 0.23                     | %                       | ISO 62-1       |
| Moisture Absorption (23°C / 50% RH)                 | 0.06                     | %                       | ISO 62         |
| Melt Volume Rate, MVR at 250°C/5.0 kg               | 18                       | cm <sup>3</sup> /10 min | ISO 1133       |
| Melt Volume Rate, MVR at 265°C/5.0 kg               | 20                       | cm <sup>3</sup> /10 min | ISO 1133       |
| <b>ELECTRICAL <sup>(1)</sup></b>                    |                          |                         |                |
| Comparative Tracking Index (UL) {PLC}               | 2                        | PLC Code                | UL 746A        |
| Hot-Wire Ignition (HWI), PLC 0                      | ≥0.75                    | mm                      | UL 746A        |
| High Amp Arc Ignition (HAI), PLC 0                  | ≥0.75                    | mm                      | UL 746A        |
| High Voltage Arc Track Rate {PLC}                   | 0                        | PLC Code                | UL 746A        |
| Arc Resistance, Tungsten {PLC}                      | 6                        | PLC Code                | ASTM D495      |
| <b>FLAME CHARACTERISTICS <sup>(2)</sup></b>         |                          |                         |                |
| UL Yellow Card Link                                 | <u>E207780-101188061</u> | -                       | -              |
| UL Recognized, 94V-0 Flame Class Rating             | ≥0.75                    | mm                      | UL 94          |
| UL Recognized, 94-5VB Flame Class Rating            | ≥3                       | mm                      | UL 94          |
| Glow Wire Ignitability Temperature, 3.0 mm          | 775                      | °C                      | IEC 60695-2-13 |
| Glow Wire Ignitability Temperature, 1.5 mm          | 750                      | °C                      | IEC 60695-2-13 |
| Glow Wire Ignitability Temperature, 0.75 mm         | 775                      | °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, 0.75 mm               | 960                      | °C                      | IEC 60695-2-12 |
| <b>INJECTION MOLDING <sup>(4)</sup></b>             |                          |                         |                |
| 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                      |                |

| PROPERTIES         | TYPICAL VALUES | UNITS | TEST METHODS |
|--------------------|----------------|-------|--------------|
| 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.

#### DISCLAIMER

Any sale by SABIC, its subsidiaries and affiliates (each a "seller"), is made exclusively under seller's standard conditions of sale (available upon request) unless agreed otherwise in writing and signed on behalf of the seller. While the information contained herein is given in good faith, SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY AND NON-INFRINGEMENT OF INTELLECTUAL PROPERTY, NOR ASSUMES ANY LIABILITY, DIRECT OR INDIRECT, WITH RESPECT TO THE PERFORMANCE, SUITABILITY OR FITNESS FOR INTENDED USE OR PURPOSE OF THESE PRODUCTS IN ANY APPLICATION. Each customer must determine the suitability of seller materials for the customer's particular use through appropriate testing and analysis. No statement by seller concerning a possible use of any product, service or design is intended, or should be construed, to grant any license under any patent or other intellectual property right.