

VALOX 310SE0 is an unreinforced, flame retardant PBT injection moulding resin. Applications: electrical industry, bobbins, keyboard, switches and switch components and appliance housings.

| YPICAL PROPERTIES <sup>1</sup>               | TYPICAL VALUE | Unit      | Standard     |
|--|---------------|-----------|--------------|
| MECHANICAL                                   |               |           |              |
| Tensile Stress, yld, Type I, 50 mm/min       | 58            | MPa       | ASTM D 638   |
| Tensile Stress, brk, Type I, 50 mm/min       | 58            | MPa       | ASTM D 638   |
| Tensile Strain, yld, Type I, 50 mm/min       | 20            | %         | ASTM D 638   |
| Tensile Strain, brk, Type I, 50 mm/min       | 20            | %         | ASTM D 638   |
| Tensile Modulus, 5 mm/min                    | 2820          | MPa       | ASTM D 638   |
| Flexural Stress, yld, 1.3 mm/min, 50 mm span | 101           | MPa       | ASTM D 790   |
| Flexural Modulus, 1.3 mm/min, 50 mm span     | 2620          | MPa       | ASTM D 790   |
| Taber Abrasion, CS-17, 1 kg                  | 19            | mg/1000cy | SABIC Method |
| Tensile Stress, yield, 50 mm/min             | 55            | MPa       | ISO 527      |
| Tensile Stress, break, 50 mm/min             | 40            | MPa       | ISO 527      |
| Tensile Strain, yield, 50 mm/min             | 6             | %         | ISO 527      |
| Tensile Strain, break, 50 mm/min             | 20            | %         | ISO 527      |
| Tensile Modulus, 1 mm/min                    | 2800          | MPa       | ISO 527      |
| Flexural Stress, yield, 2 mm/min             | 90            | MPa       | ISO 178      |
| Flexural Modulus, 2 mm/min                   | 2600          | MPa       | ISO 178      |
| Hardness, H358/30                            | 105           | MPa       | ISO 2039-1   |
| Hardness, Rockwell R                         | 120           | -         | ISO 2039-2   |
| IMPACT                                       |               |           |              |
| Izod Impact, unnotched, 23°C                 | 1602          | J/m       | ASTM D 4812  |
| Izod Impact, notched, 23°C                   | 37            | J/m       | ASTM D 256   |
| Izod Impact, notched, -30°C                  | 22            | J/m       | ASTM D 256   |
| Instrumented Impact Total Energy, 23°C       | 200           | J         | ASTM D 3763  |

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| IMPACT                                      |               |        |                |
| Izod Impact, unnotched 80*10*4 +23°C        | NB            | kJ/m²  | ISO 180/1U     |
| Izod Impact, unnotched 80*10*4 -30°C        | NB            | kJ/m²  | ISO 180/1U     |
| Izod Impact, notched 80*10*4 +23°C          | 5             | kJ/m²  | ISO 180/1A     |
| Izod Impact, notched 80*10*4 -30°C          | 3             | kJ/m²  | ISO 180/1A     |
| Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm  | 8             | kJ/m²  | ISO 179/1eA    |
| Charpy Impact, notched, 23°C                | 4             | kJ/m²  | ISO 179/2C     |
| Charpy -30°C, V-notch Edgew 80*10*4 sp=62mm | 4             | kJ/m²  | ISO 179/1eA    |
| Charpy 23°C, Unnotch Edgew 80*10*4 sp=62mm  | NB            | kJ/m²  | ISO 179/1eU    |
| Charpy -30°C, Unnotch Edgew 80*10*4 sp=62mm | NB            | kJ/m²  | ISO 179/1eU    |
| THERMAL                                     |               |        |                |
| Vicat Softening Temp, Rate B/50             | 165           | °C     | ASTM D 1525    |
| HDT, 1.82 MPa, 3.2mm, unannealed            | 74            | °C     | ASTM D 648     |
| HDT, 0.45 MPa, 6.4 mm, unannealed           | 162           | °C     | ASTM D 648     |
| HDT, 1.82 MPa, 6.4 mm, unannealed           | 71            | °C     | ASTM D 648     |
| CTE, -40°C to 40°C, flow                    | 7.92E-05      | 1/°C   | ASTM E 831     |
| CTE, -40°C to 40°C, xflow                   | 7.92E-05      | 1/°C   | ASTM E 831     |
| CTE, 60°C to 138°C, flow                    | 1.31E-04      | 1/°C   | ASTM E 831     |
| Thermal Conductivity                        | 0.24          | W/m-°C | ISO 8302       |
| CTE, -40°C to 40°C, flow                    | 7.6E-05       | 1/°C   | ISO 11359-2    |
| CTE, -40°C to 40°C, xflow                   | 7.3E-05       | 1/°C   | ISO 11359-2    |
| CTE, 23°C to 60°C, flow                     | 1.E-04        | 1/°C   | ISO 11359-2    |
| CTE, 23°C to 60°C, xflow                    | 1.E-04        | 1/°C   | ISO 11359-2    |
| Ball Pressure Test, 125°C +/- 2°C           | PASSES        | -      | IEC 60695-10-2 |
| Vicat Softening Temp, Rate A/50             | 212           | °C     | ISO 306        |

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|--|---------------|-------------------------|--------------|
| THERMAL                                      |               |                         |              |
| Vicat Softening Temp, Rate B/50              | 165           | °C                      | ISO 306      |
| Vicat Softening Temp, Rate B/120             | 165           | °C                      | ISO 306      |
| HDT/Be, 0.45MPa Edgew 120*10*4 sp=100mm      | 135           | °C                      | ISO 75/Be    |
| HDT/Ae, 1.8 MPa Edgew 120*10*4 sp=100mm      | 60            | °C                      | ISO 75/Ae    |
| HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm        | 71            | °C                      | ISO 75/Af    |
| Relative Temp Index, Elec                    | 120           | °C                      | UL 746B      |
| Relative Temp Index, Mech w/impact           | 120           | °C                      | UL 746B      |
| Relative Temp Index, Mech w/o impact         | 140           | °C                      | UL 746B      |
| PHYSICAL                                     |               |                         |              |
| Specific Gravity                             | 1.4           | -                       | ASTM D 792   |
| Specific Volume                              | 0.71          | cm³/g                   | ASTM D 792   |
| Mold Shrinkage on Tensile Bar, flow (2) (5)  | 1.1 - 1.8     | %                       | SABIC Method |
| Mold Shrinkage, flow, 3.2 mm (5)             | 1.5 - 2.3     | %                       | SABIC Method |
| Mold Shrinkage, flow, 0.75-2.3 mm (5)        | 0.9 - 1.6     | %                       | SABIC Method |
| Mold Shrinkage, flow, 2.3-4.6 mm (5)         | 1.5 - 2.3     | %                       | SABIC Method |
| Mold Shrinkage on Tensile Bar, xflow (2) (5) | 0.9 - 1.9     | %                       | SABIC Method |
| Mold Shrinkage, xflow, 0.75-2.3 mm (5)       | 1 - 1.7       | %                       | SABIC Method |
| Mold Shrinkage, xflow, 2.3-4.6 mm (5)        | 1.6 - 2.4     | %                       | SABIC Method |
| Melt Flow Rate, 250°C/2.16 kgf               | 8.6           | g/10 min                | ASTM D 1238  |
| Density                                      | 1.4           | g/cm³                   | ISO 1183     |
| Water Absorption, (23°C/sat)                 | 0.36          | %                       | ISO 62       |
| Moisture Absorption (23°C / 50% RH)          | 0.08          | %                       | ISO 62       |
| Melt Volume Rate, MVR at 250°C/2.16 kg       | 8             | cm <sup>3</sup> /10 min | ISO 1133     |
| ELECTRICAL                                   |               |                         |              |
| Dielectric Strength, in air, 3.2 mm          | 18.4          | kV/mm                   | ASTM D 149   |
| Dielectric Strength, in oil, 1.6 mm          | 22            | kV/mm                   | ASTM D 149   |
| Arc Resistance, Tungsten {PLC}               | 6             | PLC Code                | ASTM D 495   |
| Hot Wire Ignition (PLC)                      | 2             | PLC Code                | UL 746A      |

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| YPICAL PROPERTIES <sup>1</sup>                | TYPICAL VALUE | Unit     | Standard       |
|---|---------------|----------|----------------|
| ELECTRICAL                                    |               |          |                |
| High Voltage Arc Track Rate {PLC}             | 4             | PLC Code | UL 746A        |
| High Voltage Arc Resistance (PLC)             | 6             | PLC Code | UL 746A        |
| High Ampere Arc Ign, surface {PLC}            | 0             | PLC Code | UL 746A        |
| Comparative Tracking Index (UL) {PLC}         | 3             | PLC Code | UL 746A        |
| Volume Resistivity                            | >1.E+15       | Ohm-cm   | IEC 60093      |
| Surface Resistivity, ROA                      | >1.E+15       | Ohm      | IEC 60093      |
| Dielectric Strength, shorttime, 1.0mm         | 18            | kV/mm    | IEC 60243-1    |
| Dielectric Strength, in oil, 0.8 mm           | 31            | 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, 100 Hz                 | 3.1           | -        | IEC 60250      |
| Relative Permittivity, 1 MHz                  | 2.8           | -        | IEC 60250      |
| Dissipation Factor, 50/60 Hz                  | 0.001         | -        | IEC 60250      |
| Dissipation Factor, 100 Hz                    | 0.002         | -        | IEC 60250      |
| Dissipation Factor, 1 MHz                     | 0.01          | -        | IEC 60250      |
| Comparative Tracking Index                    | 175           | V        | IEC 60112      |
| Comparative Tracking Index, M                 | 100           | V        | IEC 60112      |
| Relative Permittivity, 50/60 Hz               | 2.9           | -        | IEC 60250      |
| FLAME CHARACTERISTICS                         |               |          |                |
| UL Recognized, 94V-0 Flame Class Rating (3)   | 0.71          | mm       | UL 94          |
| UL Recognized, 94-5VA Rating (3)              | 3             | mm       | UL 94          |
| Glow Wire Flammability Index 960°C, passes at | 1             | mm       | IEC 60695-2-12 |
| Oxygen Index (LOI)                            | 30            | %        | ISO 4589       |

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# VALOX™ Resin 310SE0

Asia Pacific: COMMERCIAL

| ROCESSING PARAMETERS        | TYPICAL VALUE | Unit |
|-----------------------------|---------------|------|
| Injection Molding           |               |      |
| Drying Temperature          | 120           | °C   |
| Drying Time                 | 3 - 4         | hrs  |
| Drying Time (Cumulative)    | 12            | hrs  |
| Maximum Moisture Content    | 0.02          | %    |
| Melt Temperature            | 245 - 260     | °C   |
| Nozzle Temperature          | 240 - 255     | °C   |
| Front - Zone 3 Temperature  | 245 - 260     | °C   |
| Middle - Zone 2 Temperature | 240 - 255     | °C   |
| Rear - Zone 1 Temperature   | 230 - 250     | °C   |
| Mold Temperature            | 50 - 75       | °C   |
| Back Pressure               | 0.3 - 0.7     | MPa  |
| Screw Speed                 | 50 - 100      | rpm  |
| Shot to Cylinder Size       | 40 - 80       | %    |
| Vent Depth                  | 0.013 - 0.025 | mm   |

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