

## TECASINT 2011 natural - Stock Shapes (rods, plates, tubes)

### Chemical Designation

PI (Polyimide)

### Colour

brown

### Density

1.38 g/cm<sup>3</sup>

### Main features

- very good thermal stability
- high thermal and mechanical capacity
- low outgassing
- very good electrical insulation
- resistance against high energy radiation
- good chemical resistance
- high creep resistance
- sensitive to hydrolysis in higher thermal range

### Target Industries

- mechanical engineering
- precision engineering
- aircraft and aerospace technology
- cryogenic engineering
- electronics
- electrical engineering
- medical technology
- semiconductor technology
- vacuum technology

| Mechanical properties                 | parameter            | value            | unit                             | norm                 | comment                                                                                                                                                                                         |
|---------------------------------------|----------------------|------------------|----------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tensile strength                      | 50 mm/min            | 130              | MPa                              | DIN EN ISO 527-1     | (1) eU                                                                                                                                                                                          |
| Modulus of elasticity (tensile test)  | 1 mm/min             | 3600             | MPa                              | DIN EN ISO 527-1     | (2) eA<br>(3) Specimen in 4mm thickness                                                                                                                                                         |
| Elongation at break (tensile test)    | 50 mm/min            | 8                | %                                | DIN EN ISO 527-1     |                                                                                                                                                                                                 |
| Flexural strength                     | 10 mm/min            | 177              | MPa                              | DIN EN ISO 178       |                                                                                                                                                                                                 |
| Modulus of elasticity (flexural test) | 2 mm/min             | 3600             | MPa                              | DIN EN ISO 178       |                                                                                                                                                                                                 |
| Compression strength                  | 10 mm/min            | 470              | MPa                              | EN ISO 604           |                                                                                                                                                                                                 |
| Compression strength                  | 10mm/min, 10% strain | 170              | MPa                              | EN ISO 604           |                                                                                                                                                                                                 |
| Compression modulus                   | 1 mm/min             | 3430             | MPa                              | EN ISO 604           |                                                                                                                                                                                                 |
| Compressive strain at break           | 10 mm/min            | 55               | %                                | EN ISO 604           |                                                                                                                                                                                                 |
| Impact strength (Charpy)              | max 7.5 J            | 87.9             | kJ/m <sup>2</sup>                | DIN EN ISO 179-1     | 1)                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max 7.5 J            | 9.3              | kJ/m <sup>2</sup>                | DIN EN ISO 179-1     | 2)                                                                                                                                                                                              |
| Shore hardness                        | Shore D              | 90               |                                  | DIN EN ISO 868       |                                                                                                                                                                                                 |
| Ball indentation hardness             |                      | 260              | MPa                              | ISO 2039-1           | 3)                                                                                                                                                                                              |
| Thermal properties                    | parameter            | value            | unit                             | norm                 | comment                                                                                                                                                                                         |
| Glass transition temperature          |                      | 352              | °C                               | -                    | 1)                                                                                                                                                                                              |
| Heat distortion temperature           | 1.80 MPa             | 319              | °C                               | DIN 53 461           | (1) DMA, maximum loss factor tan δ<br>(2) Thermal expansion XY/Z axis                                                                                                                           |
| Thermal expansion (CLTE)              | 50-200°C             | 4.4 / 4.3        | 10 <sup>-5</sup> K <sup>-1</sup> | DIN 53 752           | 2)                                                                                                                                                                                              |
| Thermal expansion (CLTE)              | 200-300°C            | 5.1 / 5.1        | 10 <sup>-5</sup> K <sup>-1</sup> | DIN 53 752           | 3)                                                                                                                                                                                              |
| Specific heat                         |                      | 0.925            | J/(g*K)                          | -                    |                                                                                                                                                                                                 |
| Thermal conductivity                  | 40°C                 | 0.22             | W/(K*m)                          | ISO 8302             |                                                                                                                                                                                                 |
| Electrical properties                 | parameter            | value            | unit                             | norm                 | comment                                                                                                                                                                                         |
| surface resistivity                   | 23°C                 | 10 <sup>15</sup> | Ω                                | DIN IEC 60093        |                                                                                                                                                                                                 |
| volume resistivity                    | 23°C                 | 10 <sup>15</sup> | Ω*cm                             | DIN IEC 60093        |                                                                                                                                                                                                 |
| Electric strength DC                  | 23°C                 | 34.3             | kV*mm <sup>-1</sup>              | ISO 60243-1          |                                                                                                                                                                                                 |
| Dielectric constant                   | 100 Hz               | 3.5              |                                  | DIN VDE 0303         |                                                                                                                                                                                                 |
| Dielectric constant                   | 1 kHz                | 3.5              |                                  | DIN VDE 0303         |                                                                                                                                                                                                 |
| Dielectric constant                   | 10 kHz               | 3.4              |                                  | DIN VDE 0303         |                                                                                                                                                                                                 |
| Dielectric constant                   | 100 kHz              | 3.4              |                                  | DIN VDE 0303         |                                                                                                                                                                                                 |
| Other properties                      | parameter            | value            | unit                             | norm                 | comment                                                                                                                                                                                         |
| Water absorption                      | 24 h in water, 23°C  | 0.47             | %                                | DIN EN ISO 62        | (1) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Water absorption                      | 24 h in water, 80°C  | 1.65             | %                                | DIN EN ISO 62        |                                                                                                                                                                                                 |
| Outgassing in high vacuum             |                      | passed           |                                  | ECSS-Q-70-02         |                                                                                                                                                                                                 |
| Flammability (UL94)                   | corresponding to     | V0               |                                  | DIN IEC 60695-11-10; | 1)                                                                                                                                                                                              |

→ TECASINT 2000 series show significant water uptake. Parts have to be pre-dried before fast heating to above 200 °C (drying process: 2 h per 3 mm wall thickness at 150 °C).

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