

## TECASINT 4111 natural - Stock Shapes (rods, plates, tubes)

### Chemical Designation

PI (Polyimide)

### Colour

yellow

### Density

1.47 g/cm<sup>3</sup>

### Main features

- very high thermal and oxidative resistance
- very low water absorption
- high thermal and mechanical capacity
- low outgassing
- good chemical resistance
- high creep resistance
- resistance against high energy radiation
- sensitive to hydrolysis in higher thermal range

### Target Industries

- mechanical engineering
- precision engineering
- electronics
- electrical engineering
- conveyor technology
- semiconductor technology

| Mechanical properties                 | parameter             | value            | unit                             | norm                 | comment                                                                                                                                                                                         |
|---------------------------------------|-----------------------|------------------|----------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tensile strength                      | 50 mm/min             | 100              | MPa                              | DIN EN ISO 527-1     | (1) eU                                                                                                                                                                                          |
| Modulus of elasticity (tensile test)  | 1 mm/min              | 6100             | MPa                              | DIN EN ISO 527-1     | (2) eA<br>(3) Specimen in 4mm thickness                                                                                                                                                         |
| Elongation at break (tensile test)    | 50 mm/min             | 1.7              | %                                | DIN EN ISO 527-1     |                                                                                                                                                                                                 |
| Flexural strength                     | 10 mm/min             | 160              | MPa                              | DIN EN ISO 178       |                                                                                                                                                                                                 |
| Modulus of elasticity (flexural test) | 2 mm/min              | 6100             | MPa                              | DIN EN ISO 178       |                                                                                                                                                                                                 |
| Elongation at break (flexural test)   | 10 mm/min             | 2.5              | %                                | DIN EN ISO 178       |                                                                                                                                                                                                 |
| Compression strength                  | 10 mm/min             | 250              | MPa                              | EN ISO 604           |                                                                                                                                                                                                 |
| Compression strength                  | 10 mm/min, 10% strain | 210              | MPa                              | EN ISO 604           |                                                                                                                                                                                                 |
| Compression modulus                   | 1 mm/min              | 6193             | MPa                              | EN ISO 604           |                                                                                                                                                                                                 |
| Compression                           |                       | 15               | %                                | -                    |                                                                                                                                                                                                 |
| Compressive strain at break           | 10 mm/min             | 25               | %                                | EN ISO 604           |                                                                                                                                                                                                 |
| Impact strength (Charpy)              | max 7.5 J             | 20               | kJ/m <sup>2</sup>                | DIN EN ISO 179-1     | 1)                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max 7.5 J             | 1.1              | kJ/m <sup>2</sup>                | DIN EN ISO 179-1     | 2)                                                                                                                                                                                              |
| Shore hardness                        | Shore D               | 90               |                                  | DIN EN ISO 868       |                                                                                                                                                                                                 |
| Ball indentation hardness             |                       | 345              | MPa                              | -                    | 3)                                                                                                                                                                                              |
| Thermal properties                    | parameter             | value            | unit                             | norm                 | comment                                                                                                                                                                                         |
| Glass transition temperature          |                       | n.a.             | °C                               | DIN EN ISO 11357     | (1) Thermal expansion XY/Z axis                                                                                                                                                                 |
| Heat distortion temperature           | 1.82 MPa              | 470              | °C                               | ASTM D 648           | (2) Thermal expansion XY/Z axis                                                                                                                                                                 |
| Thermal expansion (CLTE)              | 200-300°C             | 4.7 / 6.9        | 10 <sup>-5</sup> K <sup>-1</sup> | DIN 53 752           | 1)                                                                                                                                                                                              |
| Thermal expansion (CLTE)              | 50-200°C              | 3.6 / 5.2        | 10 <sup>-5</sup> K <sup>-1</sup> | DIN 53 752           | 2)                                                                                                                                                                                              |
| Thermal expansion (CLTE)              | 300-400°C             | 6.5 / 9.9        | 10 <sup>-5</sup> K <sup>-1</sup> | DIN 53 752           | 3)                                                                                                                                                                                              |
| Specific heat                         |                       | 1.24             | J/(g*K)                          | ASTM E1461           |                                                                                                                                                                                                 |
| Thermal conductivity                  | 40°C                  | 0.52             | W/(K*m)                          | ASTM E1461           |                                                                                                                                                                                                 |
| Electrical properties                 | parameter             | value            | unit                             | norm                 | comment                                                                                                                                                                                         |
| surface resistivity                   | 23°C                  | 10 <sup>16</sup> | Ω                                | ASTM D 257           |                                                                                                                                                                                                 |
| volume resistivity                    | 23°C                  | 10 <sup>16</sup> | Ω*cm                             | ASTM D 257           |                                                                                                                                                                                                 |
| Electric strength DC                  | 23°C                  | 22.7             | kV*mm <sup>-1</sup>              | ASTM D 149           |                                                                                                                                                                                                 |
| Dielectric loss factor                | 1 MHz                 | 0.0013           |                                  | ASTM D 150           |                                                                                                                                                                                                 |
| Dielectric constant                   | 1 MHz                 | 3.7              |                                  | ASTM D 150           |                                                                                                                                                                                                 |
| Other properties                      | parameter             | value            | unit                             | norm                 | comment                                                                                                                                                                                         |
| Water absorption                      | 24 h in water, 23°C   | 0.08             | %                                | 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   | 0.3              | %                                | DIN EN ISO 62        |                                                                                                                                                                                                 |
| Outgassing in high vacuum             |                       | passed           |                                  | ECSS-Q-70-02         |                                                                                                                                                                                                 |
| Flammability (UL94)                   | corresponding to      | V0               |                                  | DIN IEC 60695-11-10; | 1)                                                                                                                                                                                              |
| Oxygen Index                          |                       | 53               | %                                | EN ISO 4589-2        |                                                                                                                                                                                                 |

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