

## TECASINT 4011 natural - Stock Shapes (rods, plates, tubes)

### Chemical Designation

PI (Polyimide)

### Colour

yellow

### Density

1.42 g/cm<sup>3</sup>

### Main features

- very high thermal and oxidative resistance
- very low water absorption
- high thermal and mechanical capacity
- high creep resistance
- low outgassing
- good chemical 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                 | condition                 | value              | unit                             | test method          | comment                                                                                                                                                                                         |
|---------------------------------------|---------------------------|--------------------|----------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tensile strength                      | 0.40 inch/min             | 134                | MPa                              | ASTM D 638           | (1) eU                                                                                                                                                                                          |
| Modulus of elasticity (tensile test)  | 0.04 inch/min             | 4083               | MPa                              | ASTM D 638           | (2) eA<br>(3) Specimen in 4mm thickness                                                                                                                                                         |
| Elongation at break (tensile test)    | 0.40 inch/min             | 6.9                | %                                | ASTM D 638           |                                                                                                                                                                                                 |
| Flexural strength                     | 0.54 inch/min             | 207                | MPa                              | ASTM D 790           |                                                                                                                                                                                                 |
| Modulus of elasticity (flexural test) | 0.54 inch/min             | 4299               | MPa                              | ASTM D 790           |                                                                                                                                                                                                 |
| Compression strength                  | 0.05 inch/min, 10% strain | 188                | MPa                              | ASTM D 695           |                                                                                                                                                                                                 |
| Compression modulus                   | 0.05 inch/min             | 4325               | MPa                              | ASTM D 695           |                                                                                                                                                                                                 |
| Impact strength (Charpy)              | max 7.5 J                 | 87                 | kJ/m <sup>2</sup>                | DIN EN ISO 179-1     | 1)                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max 7.5 J                 | 9.6                | kJ/m <sup>2</sup>                | DIN EN ISO 179-1     | 2)                                                                                                                                                                                              |
| Shore hardness                        | Shore D                   | 88                 |                                  | DIN EN ISO 868       |                                                                                                                                                                                                 |
| Ball indentation hardness             |                           | 265                | MPa                              | ISO 2039-1           | 3)                                                                                                                                                                                              |
| Thermal properties                    | condition                 | value              | unit                             | test method          | comment                                                                                                                                                                                         |
| Glass transition temperature          |                           | 500                | °F                               | DIN EN ISO 11357     | (1) Thermal expansion XY/Z axis                                                                                                                                                                 |
| Heat distortion temperature           | 1.82 MPa                  | 680                | °F                               | ASTM D 648           | (2) Thermal expansion XY/Z axis                                                                                                                                                                 |
| Thermal expansion (CLTE)              | 122-392°F                 | 46 / 56            | 10 <sup>-6</sup> K <sup>-1</sup> | DIN 53 752           | (1)<br>(3) Thermal expansion XY/Z axis                                                                                                                                                          |
| Thermal expansion (CLTE)              | 392-572°F                 | 62 / 76            | 10 <sup>-6</sup> K <sup>-1</sup> | DIN 53 752           | 2)                                                                                                                                                                                              |
| Thermal expansion (CLTE)              | 572-662°F                 | 85 / 112           | 10 <sup>-6</sup> K <sup>-1</sup> | DIN 53 752           | 3)                                                                                                                                                                                              |
| Specific heat                         |                           | 1.22               | J/(g*K)                          | ASTM E1461           |                                                                                                                                                                                                 |
| Thermal conductivity                  | 104°F                     | 0.4                | W/(K*m)                          | ASTM E1461           |                                                                                                                                                                                                 |
| Electrical properties                 | condition                 | value              | unit                             | test method          | comment                                                                                                                                                                                         |
| surface resistivity                   | 73°F                      | 10 <sup>16</sup>   | Ω                                | ASTM D 257           |                                                                                                                                                                                                 |
| volume resistivity                    | 73°F                      | 10 <sup>16</sup>   | Ω*cm                             | ASTM D 257           |                                                                                                                                                                                                 |
| Electric strength DC                  | 73°F                      | 18                 | kV*mm <sup>-1</sup>              | ASTM D 149           |                                                                                                                                                                                                 |
| Dielectric loss factor                | 1 kHz                     | 1*10 <sup>-3</sup> |                                  | ASTM D 150           |                                                                                                                                                                                                 |
| Dielectric constant                   | 1 kHz                     | 3.59               |                                  | ASTM D 150           |                                                                                                                                                                                                 |
| Other properties                      | condition                 | value              | unit                             | test method          | comment                                                                                                                                                                                         |
| Water absorption                      | 24 h in water, 73°F       | 0.16               | %                                | 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, 176°F      | 0.6                | %                                | 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                          |                           | 49                 | %                                | EN ISO 4589-2        |                                                                                                                                                                                                 |

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