

# MATERIAL DATASHEET

## ZX-324V1T



**ZEDEX®**  
Tribological Polymer Solutions

| Properties                                           | Symbol            | Unit                | Standard          |
|------------------------------------------------------|-------------------|---------------------|-------------------|
| information                                          |                   |                     |                   |
| material code                                        | -                 | -                   | internal Standard |
| colour                                               | -                 | -                   | Beige             |
| density                                              | $\rho$            | kg/dm <sup>3</sup>  | ISO 1183          |
| mechanical                                           |                   |                     |                   |
| compressive modulus                                  | E <sub>c</sub>    | MPa                 | DIN EN ISO 604    |
| elastic limit                                        | $\sigma_{yel}$    | MPa                 | internal Standard |
| compressive stress at yield                          | $\sigma_{cy}$     | MPa                 | DIN EN ISO 604    |
| compressive strength                                 | $\sigma_{cm}$     | MPa                 | DIN EN ISO 604    |
| compressive stress at 1% strain                      | $\sigma_{1\%}$    | MPa                 | DIN EN ISO 604    |
| compressive stress at 2% strain                      | $\sigma_{2\%}$    | MPa                 | DIN EN ISO 604    |
| compressive stress at 3,5% strain                    | $\sigma_{3,5\%}$  | MPa                 | DIN EN ISO 604    |
| compressive strength (0,01 h)                        | $\sigma_{M0,01}$  | MPa                 | internal Standard |
| compressive strength (100 h)                         | $\sigma_{M100}$   | MPa                 | internal Standard |
| compressive strength (10000 h)                       | $\sigma_{M10000}$ | MPa                 | internal Standard |
| compressive stress at break                          | $\sigma_{mb}$     | MPa                 | DIN EN ISO 604    |
| elastic compression limit                            | $\epsilon_{rel}$  | %                   | internal Standard |
| nominal compressive yield strain                     | $\epsilon_{cy}$   | %                   | DIN EN ISO 604    |
| nominal compressive strain at compressive strength   | $\epsilon_{cm}$   | %                   | DIN EN ISO 604    |
| nominal compressive strain at break                  | $\epsilon_{cb}$   | %                   | DIN EN ISO 604    |
| modulus in tension (tensile modulus)                 | E <sub>t</sub>    | MPa                 | DIN EN ISO 527    |
| elastic limit                                        | $\sigma_{yel}$    | MPa                 | internal Standard |
| tensile stress at yield                              | $\sigma_y$        | MPa                 | DIN EN ISO 527    |
| tensile strength                                     | $\sigma_m$        | MPa                 | DIN EN ISO 527    |
| tensile stress at break                              | $\sigma_b$        | MPa                 | DIN EN ISO 527    |
| elastic yield point                                  | $\epsilon_{yel}$  | %                   | internal Standard |
| yield strain                                         | $\epsilon_y$      | %                   | DIN EN ISO 527    |
| elongation at maximum force                          | $\epsilon_m$      | %                   | DIN EN ISO 527    |
| tensile elongation at break                          | $\epsilon_b$      | %                   | DIN EN ISO 527    |
| modulus in flexure                                   | E <sub>f</sub>    | MPa                 |                   |
| outer fibre stress at 3,5% outer fibre strain        | $\sigma_{f3,5\%}$ | MPa                 |                   |
| flexural strength                                    | $\sigma_{fb}$     | MPa                 |                   |
| flexural stress at break                             | $\sigma_{fb}$     | MPa                 |                   |
| elongation at flexural yield stress                  | $\epsilon_{fb}$   | %                   |                   |
| flexural elongation at break                         | $\epsilon_{fb}$   | %                   |                   |
| creep modulus at 1% deformation after 1000h          | E                 | N/mm <sup>2</sup>   | DIN 53444         |
| stress at 1% deformation after 1000h                 | $\sigma_{1\%}$    | N/mm <sup>2</sup>   | DIN 53444         |
| creep resistance                                     | -                 | -                   | relative value    |
| ball indentation hardness H358/30 (H132/30) [H49/30] | HB                | N/mm <sup>2</sup>   | DIN 2039          |
| Shore A hardness                                     | -                 | Shore               |                   |
| Shore D hardness                                     | -                 | Shore               |                   |
| impact strength Charpy not notched                   | -                 | kJ/m <sup>2</sup>   | EN ISO 179/1eU    |
| impact strength Charpy notched                       | -                 | kJ/m <sup>2</sup>   | EN ISO 179/1eA    |
| loss tangent (1Hz)                                   | tan $\delta$      | 1                   | internal Standard |
| fatigue strength at 20°C, 106 stress cycles, 1 Hz    | -                 | MPa                 | internal Standard |
| thermal                                              |                   |                     |                   |
| continuous operating temperature (long term)         | RTi               | °C                  | UL 746B           |
| short term operating temperature (3 h)               | -                 | °C                  | internal Standard |
| maximum RTi temperature for bushings when pressed    | -                 | °C                  | internal Standard |
| melting temperature (DSC, 10°C/min)                  | T <sub>m</sub>    | °C                  | ISO 11357-1/-3    |
| glass transition temperature (DSC, 20°C/min)         | T <sub>g</sub>    | °C                  | ISO 11357-1/-2    |
| coefficient of thermal expansion up to 100°C         | $\alpha$          | 10 <sup>-5</sup> /K | ISO E 830         |
| coefficient of thermal expansion up to 150°C         | $\alpha$          | 10 <sup>-5</sup> /K | ISO E 831         |
| heat distortion temperature HDT/A 1,8 MPa            | HDT(A)            | °C                  | DIN EN ISO 75     |
| thermal conductivity                                 | $\lambda$         | W/(m·K)             | DIN 52612         |
| specific heat capacity                               | c <sub>p</sub>    | kJ/(kg·K)           | DSC               |
| fire behaviour (3,2mm) UL94                          | -                 | -                   | UL 94 HB          |
| limiting oxygen index (LOI)                          | %                 | LOI                 | DIN EN ISO 4589   |

| Properties                                             | Symbol            | Unit                                    | Standard          |
|--------------------------------------------------------|-------------------|-----------------------------------------|-------------------|
| electrical                                             |                   |                                         |                   |
| volume resistivity                                     | R <sub>D</sub>    | Ω*cm                                    | IEC 93            |
| surface resistance                                     | R <sub>S</sub>    | Ω                                       | IEC 93            |
| penetration resistance                                 | E                 | kV/mm                                   | IEC 243           |
| tracking resistance                                    | -                 | V                                       | IEC 112           |
| dielectric constant (110Hz)                            | -                 | 1                                       | IEC 250           |
| dissipation factor (110Hz)                             | tan $\delta$      | 1                                       | IEC 112           |
| PV values                                              |                   |                                         |                   |
| max. surface pressure v=1m/min                         | p <sub>sd</sub>   | N/mm <sup>2</sup>                       | 50,73             |
| max. surface pressure v=10m/min                        | p <sub>sd</sub>   | N/mm <sup>2</sup>                       | 2,10              |
| max. surface pressure v=100m/min                       | p <sub>sd</sub>   | N/mm <sup>2</sup>                       | 0,24              |
| max. surface pressure v=200m/min                       | p <sub>sd</sub>   | N/mm <sup>2</sup>                       | 0,12              |
| evolution of heat with v=1m/min                        | -                 | °C                                      | 61                |
| evolution of heat with v=10m/min                       | -                 | °C                                      | 47                |
| evolution of heat with v=100m/min                      | -                 | °C                                      | 109               |
| evolution of heat with v=200m/min                      | -                 | °C                                      | 115               |
| friction                                               |                   |                                         |                   |
| μ static 20° C dry operation                           | μ <sub>stat</sub> | 1                                       | internal Standard |
| μ dynamic 20° C dry operation                          | μ <sub>dyn</sub>  | 1                                       | inclined plane    |
| μ dynamic 100° C dry operation                         | μ <sub>dyn</sub>  | 1                                       |                   |
| wear                                                   |                   |                                         |                   |
| wear factor at 20°C                                    | -                 | mm <sup>3</sup> /100km                  | 0,34              |
| wear factor at 100°C                                   | -                 | mm <sup>3</sup> /100km                  | 0,14              |
| wear factor at 200°C                                   | -                 | mm <sup>3</sup> /100km                  | 0,10              |
| wear factor at 240°C                                   | -                 | mm <sup>3</sup> /100km                  | 0,24              |
| available as                                           |                   |                                         |                   |
| tubes (hollow rods) up to øe (de)                      | -                 | mm                                      | ✓                 |
| sheets up to max. thickness                            | -                 | mm                                      | ✓                 |
| rods up to øe (de)                                     | -                 | mm                                      | ✓                 |
| plastic granules                                       | -                 | -                                       | ✓                 |
| injection moulded parts                                | -                 | -                                       | ✓                 |
| machined parts                                         | -                 | -                                       | ✓                 |
| precision                                              |                   |                                         |                   |
| dimensional stability with moisture absorption         | -                 | -                                       | relative value    |
| water absorption 23°C / RMC 93%                        | -                 | %                                       | DIN EN ISO 62     |
| water absorption until an equilibrium moisture content | -                 | %                                       | DIN EN ISO 62     |
| dimensional stability with temperature variation       | -                 | -                                       | relative value    |
| high precision bushings (negative clearance)           | -                 | -                                       | ✓                 |
| alignment adjustment                                   | -                 | -                                       | relative value    |
| envrionmental influences                               |                   |                                         |                   |
| suitable for use in water                              | -                 | -                                       | ✓                 |
| resistance against hot water                           | -                 | °C                                      | 140               |
| resistance against dust, dirt, abrasive substances     | -                 | -                                       | relative value    |
| UV rays resistance                                     | -                 | -                                       | relative value    |
| suitable for outdoor use                               | -                 | -                                       | relative value    |
| resistance to chemicals                                | -                 | -                                       | relative value    |
| FDA compliant / EU 10/2011 compliant                   | -                 | -                                       | -                 |
| suitable for vacuum                                    | -                 | -                                       | ✓                 |
| rate of desorption                                     | a <sub>1h</sub>   | mbar <sup>3</sup> /(s·cm <sup>3</sup> ) | -                 |
| ROHS / WEEE                                            | -                 | -                                       | -                 |
| free from silicone                                     | -                 | -                                       | ✓                 |
| free from PTFE                                         | -                 | -                                       | x                 |
| sterilization                                          |                   |                                         |                   |
| resistant against disinfectant                         | -                 | -                                       | ✓                 |
| moist heat sterilization                               | -                 | -                                       | relative value    |
| gamma-rays radiation sterilization                     | -                 | -                                       | relative value    |
| chemical sterilization                                 | -                 | -                                       | relative value    |
| UV-sterilization                                       | -                 | -                                       | relative value    |

| Legend |                |
|--------|----------------|
| ①      | low            |
| ⑩      | high           |
| ✓      | applicable     |
| x      | not applicable |
| (✓)    | limited        |
| k.Br.  | no break       |
| n.d.   | not feasible   |
| -      | not determined |
| n.v.   | non-existent   |

#### Legal information:

All the tests are been made with a standard conditioning atmosphere of 23°C (at the moment no other temperature is available). The specified values are established from average values of several tests and they correspond to our today's knowledge. They are only to be used as information about our products and as help for the material selection. With these values, we do not ensure specific properties, or the suitability for certain application, therefore we do not assume any legal responsibility for an improper usage. The used test pieces have been machined from extruded semi-finished material. Since the plastics' properties depend on the manufacturing process (extrusion, injection moulding), on

the dimensions of the semi finished material and on the degree of crystallinity, the actual properties of a specific product may slightly deviate from the tested ones. For information about divergent properties do not hesitate to contact us. On request we advise you regarding the most appropriate component design and the definition of material specifications more suitable to your application data. Notwithstanding, the customer bears all the responsibility for the thorough examination of suitability, efficiency, efficacy and safety of the chosen products in pharmaceutical applications, medical devices or other end uses.