# Duratron® CU60 PBI

QUADRANT ENGINEERING PLASTIC PRODUCTS

PRODUCT DATA SHEET

Duratron CU60 PBI offers the highest temperature resistance and best mechanical property retention over 200 ℃ of all unfilled thermoplastics. Duratron CU60 PBI is very “clean” in terms of ionic impurity and does not outgas (except water). These characteristics make this material extremely attractive to high-tech industries such as semiconductor and aerospace industries. Usually Duratron CU60 PBI is used in critical components to decrease maintenance costs and to gain valuable production “uptime”. It is used to replace metals and ceramics in pump components, valve seats (high tech valves), bearings, rollers, high temperature insulators.

## Physical properties (indicative values ■)

| PROPERTIES | Test methods | Units | VALUES |
|---|---|---|---|
| Colour | - | - | black |
| Density | ISO 1183-1 | g/cm³ | 1.30 |
| Water absorption: | | | |
| - after 24/96 h immersion in water of 23 °C (1) | ISO 62 | mg | 60 / 112 |
| | ISO 62 | % | 0.74 / 1.37 |
| - at saturation in air of 23 °C / 50 % RH | - | % | 7.5 |
| - at saturation in water of 23 °C | - | % | 14 |
| **Thermal Properties (2)** | | | |
| Melting temperature (DSC, 10 °C/min) | ISO 11357-1/-3 | °C | NA |
| Glass transition temperature (DSC, 20 °C/min) - (3) | ISO 11357-1/-2 | °C | 415 |
| Thermal conductivity at 23 °C | - | W/(K.m) | 0.40 |
| Coefficient of linear thermal expansion: | | | |
| - average value between 23 and 100 °C | - | m/(m.K) | $25 \times 10^{-6}$ |
| - average value between 23 and 150 °C | - | m/(m.K) | $25 \times 10^{-6}$ |
| - average value above 150 °C | - | m/(m.K) | $35 \times 10^{-6}$ |
| Temperature of deflection under load: | | | |
| - method A: 1.8 MPa | ISO 75-1/-2 | °C | 425 |
| Max. allowable service temperature in air: | | | |
| - for short periods (4) | - | °C | 500 |
| - continuously : for min. 20,000 h (5) | - | °C | 310 |
| Min. service temperature (6) | - | °C | -50 |
| Flammability (7): | | | |
| - "Oxygen Index" | ISO 4589-1/-2 | % | 58 |
| - according to UL 94 (1.5 / 3 mm thickness) | - | - | V-0 / V-0 |
| **Mechanical Properties at 23 °C (8)** | 0 | 0 | |
| Tension test (9): | | | |
| - tensile stress at yield / tensile stress at break (10) | ISO 527-1/-2 | MPa | NYP / 130 |
| - tensile strength (10) | ISO 527-1/-2 | MPa | 130 |
| - tensile strain at yield(10) | ISO 527-1/-2 | % | NYP |
| - tensile strain at break (10) | ISO 527-1/-2 | % | 3 |
| - tensile modulus of elasticity (11) | ISO 527-1/-2 | MPa | 6000 |
| Compression test (12): | | | |
| - compressive stress at 1 / 2 / 5 % nominal strain (11) | ISO 604 | MPa | 58 / 118 / 280 |
| Charpy impact strength - unnotched (13) | ISO 179-1/1eU | kJ/m² | 20 |
| Charpy impact strength - notched | ISO 179-1/1eA | kJ/m² | 2.5 |
| Ball indentation hardness (14) | ISO 2039-1 | N/mm² | 375 |
| Rockwell hardness (14) | ISO 2039-2 | - | E 120 |
| **Electrical Properties at 23 °C** | 0 | 0 | |
| Electric strength (15) | IEC 60243-1 | kV/mm | 28 |
| Volume resistivity | IEC 60093 | Ohm.cm | $> 10^{14}$ |
| Surface resistivity | ANSI/ESD STM 11.11 | Ohm/sq. | $> 10^{13}$ |
| Relative permittivity $\varepsilon_r$ : - at 100 Hz | IEC 60250 | - | 3.3 |
| Relative permittivity $\varepsilon_r$ - at 1 MHz | IEC 60250 | - | 3.2 |
| Dielectric dissipation factor tan δ: - at 100 Hz | IEC 60250 | - | 0.001 |
| Dielectric dissipation factor tan δ - at 1 MHz | IEC 60250 | - | - |
| Comparative tracking index (CTI) | IEC 60112 | - | - |

Note: 1 g/cm³ = 1,000 kg/m³ ; 1 MPa = 1 N/mm² ; 1 kV/mm = 1 MV/m.

NA: not applicable

NYP: there is no yield point

**Legend:**

(1) According to method 1 of ISO 62 and done on discs Ø 50 mm x 3 mm.

(2) The figures given for these properties are for the most part derived from raw material supplier data and other publications.

(3) Values for this property are only given here for amorphous materials and for materials that do not show a melting temperature (PBI & PI).

(4) Only for short time exposure (a few hours) in applications where no or only a very low load is applied to the material.

(5) Temperature resistance over a period of min. 20,000 hours. After this period of time, there is a decrease in tensile strength – measured at 23 °C – of about 50 % as compared with the original value.
The temperature value given here is thus based on the thermal-oxidative degradation which takes place and causes a reduction in properties. Note, however, that the maximum allowable service temperature depends in many cases essentially on the duration and the magnitude of the mechanical stresses to which the material is subjected.

(6) Impact strength decreasing with decreasing temperature, the minimum allowable service temperature is practically mainly determined by the extent to which the material is subjected to impact. The value given here is based on unfavourable impact conditions and may consequently not be considered as being the absolute practical limit.

(7) These estimated ratings, derived from raw material supplier data and other publications, are not intended to reflect hazards presented by the material under actual fire conditions. There is no ‘UL File Number’ available for Duratron CU60 PBI stock shapes.

(8) Most of the figures given for the mechanical properties are average values of tests run on dry test specimens machined out of 16 mm thick compression moulded plate.

(9) Test specimens: Type 1 B

(10) Test speed: 5 mm/min [chosen acc. to ISO 10350-1 as a function of the ductile behaviour of the material (tough or brittle)]

(11) Test speed: 1 mm/min.

(12) Test specimens: cylinders Ø 8 mm x 16 mm

(13) Pendulum used: 4 J.

(14) Measured on 10 mm thick test specimens.

(15) Electrode configuration: ∅ 25 / ∅ 75 mm coaxial cylinders ; in transformer oil according to IEC 60296 ; 1 mm thick test specimens.

■ This table, mainly to be used for comparison purposes, is a valuable help in the choice of a material. The data listed here fall within the normal range of product properties of dry material. **However, they are not guaranteed and they should not be used to establish material specification limits nor used alone as the basis of design.**

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