

Symalit 1000 PVDF is a highly crystalline unreinforced fluoropolymer combining good mechanical, thermal and electrical properties with excellent chemical resistance. It also shows good resistance to high-energy radiation (considerably better than other fluoropolymers). Symalit 1000 PVDF is a versatile engineering material especially suitable for the manufacture of components for the petro-chemical, chemical, metallurgical, food, paper, textile, pharmaceutical and nuclear industries.

Physical properties (indicative values [■])

| PROPERTIES | Test methods | Units | VALUES |
|--|--------------------|-------------------|------------------------|
| Colour | - | - | natural (white) |
| Density | ISO 1183-1 | g/cm ³ | 1.78 |
| Water absorption: | | | |
| - after 24/96 h immersion in water of 23 °C (1) | ISO 62 | mg | 1 / 3 |
| | ISO 62 | % | 0.01 / 0.03 |
| - at saturation in air of 23 °C / 50 % RH | - | % | 0.05 |
| - at saturation in water of 23 °C | - | % | < 0.10 |
| Thermal Properties (2) | | | |
| Melting temperature (DSC, 10 °C/min) | ISO 11357-1/3 | °C | 175 |
| Glass transition temperature (DSC, 20 °C/min) - (3) | ISO 11357-1/2 | °C | - |
| Thermal conductivity at 23 °C | - | W/(K.m) | 0.19 |
| Coefficient of linear thermal expansion: | | | |
| - average value between 23 and 100 °C | - | m/(m.K) | 190 x 10 ⁻⁶ |
| - average value between 23 and 150 °C | - | m/(m.K) | 220 x 10 ⁻⁶ |
| - average value above 150 °C | - | m/(m.K) | - |
| Temperature of deflection under load: | | | |
| - method A: 1.8 MPa | ISO 75-1/2 | °C | 105 |
| Max. allowable service temperature in air: | | | |
| - for short periods (4) | - | °C | 160 |
| - continuously : for min. 20,000 h (5) | - | °C | 150 |
| Min. service temperature (6) | - | °C | -50 |
| Flammability (7): | | | |
| - "Oxygen Index" | ISO 4589-1/2 | % | 44 |
| - according to UL 94 (1.5 / 3 mm thickness) | - | - | V-0 / V-0 |
| Mechanical Properties at 23 °C (8) | | | |
| Tension test (9): | | | |
| - tensile stress at yield / tensile stress at break (10) | ISO 527-1/2 | MPa | 60 / - |
| - tensile strength (10) | ISO 527-1/2 | MPa | 60 |
| - tensile strain at yield(10) | ISO 527-1/2 | % | 9 |
| - tensile strain at break (10) | ISO 527-1/2 | % | 30 |
| - tensile modulus of elasticity (11) | ISO 527-1/2 | MPa | 2200 |
| Compression test (12): | | | |
| - compressive stress at 1 / 2 / 5 % nominal strain (11) | ISO 604 | MPa | 20 / 36 / 62 |
| Charpy impact strength - unnotched (13) | ISO 179-1/1eU | kJ/m ² | no break |
| Charpy impact strength - notched | ISO 179-1/1eA | kJ/m ² | 10 |
| Ball indentation hardness (14) | ISO 2039-1 | N/mm ² | 110 |
| Rockwell hardness (14) | ISO 2039-2 | - | M 78 |
| Electrical Properties at 23 °C | | | |
| Electric strength (15) | IEC 60243-1 | kV/mm | 18 |
| Volume resistivity | IEC 60093 | Ohm.cm | > 10 ¹⁴ |
| Surface resistivity | ANSI/ESD STM 11.11 | Ohm/sq. | > 10 ¹³ |
| Relative permittivity ε _r : - at 100 Hz | IEC 60250 | - | 7.4 |
| - at 1 MHz | IEC 60250 | - | 6.0 |
| Dielectric dissipation factor tan δ: - at 100 Hz | IEC 60250 | - | 0.025 |
| - at 1 MHz | IEC 60250 | - | 0.165 |
| Comparative tracking index (CTI) | IEC 60112 | - | 600 |

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

Symalit® is a registered trademark of the Quadrant Group.

This product data sheet and any data and specifications presented on our website shall provide promotional and general information about the Engineering Plastic Products (the "Products") manufactured and offered by Quadrant Engineering Plastic Products ("Quadrant") and shall serve as a preliminary guide. All data and descriptions relating to the Products are of an indicative nature only. Neither this data sheet nor any data and specifications presented on our website shall create or be implied to create any legal or contractual obligation.

Any illustration of the possible fields of application of the Products shall merely demonstrate the potential of these Products, but any such description does not constitute any kind of covenant whatsoever. Irrespective of any tests that Quadrant may have carried out with respect to any Product, Quadrant does not possess expertise in evaluating the suitability of its materials or Products for use in specific applications or products manufactured or offered by the customer respectively. The choice of the most suitable plastics material depends on available chemical resistance data and practical experience, but often preliminary testing of the finished plastics part under actual service conditions (right chemical, concentration, temperature and contact time, as well as other conditions) is required to assess its final suitability for the given application.

It thus remains the customer's sole responsibility to test and assess the suitability and compatibility of Quadrant's Products for its intended applications, processes and uses, and to choose those Products which according to its assessment meet the requirements applicable to the specific use of the finished product. The customer undertakes all liability in respect of the application, processing or use of the aforementioned information or product, or any consequence thereof, and shall verify its quality and other properties.



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 Symalit 1000 PVDF stock shapes.
- (8) Most of the figures given for the mechanical properties are average values of tests run on test specimens machined out of rod Ø 40 - 60 mm. Except for the hardness tests, the test specimens were then taken from an area mid between centre and outside diameter, with their length in longitudinal direction (parallel to the extrusion direction).
- (9) Test specimens: Type 1 B
- (10) Test speed: 50 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 (discs), mid between centre and outside diameter.
- (15) Electrode configuration: Ø 25 mm / Ø 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. **However, they are not guaranteed and they should not be used to establish material specification limits nor used alone as the basis of design.**