

Technical Information

VETRESIT^â 17

Slot insulation laminates, sheets, strips, channel sections (L + U)

| | | | |
|---------------------------|--|---------------------------------------|-----------------------------------|
| MATERIAL | A thin laminate consisting of heat-resisting epoxy resin reinforced with glass fabric. | | |
| GENERAL PROPERTIES | High mechanical strength, good resistance to heat and moisture, low dielectric losses and high electric strength. | | |
| | Temperature class F – H | | |
| APPLICATION | Thin insulating material especially for use as slot insulation, slot liners, insulation between layers or conductors for big electrical machines. For electrical and mechanical applications in electrical machines and equipment operating at high temperatures. | | |
| SUPPLY | Channels and other sections The most common configurations are L- and U-channel sections. Micafil 's own manufacturing technology does not limit the length. Any other geometry of sections is possible to meet individual customer requirements. Straightness and deflection Admissible tolerance 1 mm/m on an even surface. When checking with a straight edge (full length of component), slight pressure is acceptable providing it does not cause distortion. Surface Slot insulation components are normally supplied machined to drawing specifications. "As pressed" surfaces do not require varnishing. Ground components ready for fitting can be varnished on request. Standard varnish colour: clear. Other colours are possible on request. Testing of slot insulation In order to ensure maximum security against slot insulation failures, specimens of material and finished components are tested at regular intervals. | | |
| STANDARDS | VETRESIT 17 meets the following standard specifications: | ISO 1642 NEMA LI 1 DIN/EN 60893 | EP GC3 Grade G 11 EP GC 203 |



DIMENSIONS

Table 1: Standard Dimensions and Tolerances

| | | | L-sections | | U-sections | |
|--------------------------------|----------------|----|------------------------------------|-----------|------------------------------------|-----------|
| | | | Standard dimensions | Tolerance | Standard dimensions | Tolerance |
| Length | L | mm | =12'000 | ± 1 | =12'000 | ± 1 |
| Breadth | B | mm | 20 - 250 | ± 0,1 | 15 - 50 | ± 0,1 |
| Height | H | mm | 5 - 50 | ± 0,1 | 5 - 150 | ± 0,1 |
| Wall thickness | s | mm | 0,5 - 2,5 | ± 0,1 | 0,5 - 2,5 | ± 0,1 |
| Wall thickness a (curved part) | a | mm | a=s | +0,1/-0,2 | a=s | +0,1/-0,2 |
| Inside radius | R _i | mm | 3 | ± 0,2 | 1 | ± 0,2 |
| Outside radius | R _a | mm | R _a = R _i +s | +0,4/-0 | R _a = R _i +s | +0,4/-0 |
| Angle | α | ° | 90 | ± 2 | 90 | ± 2 |

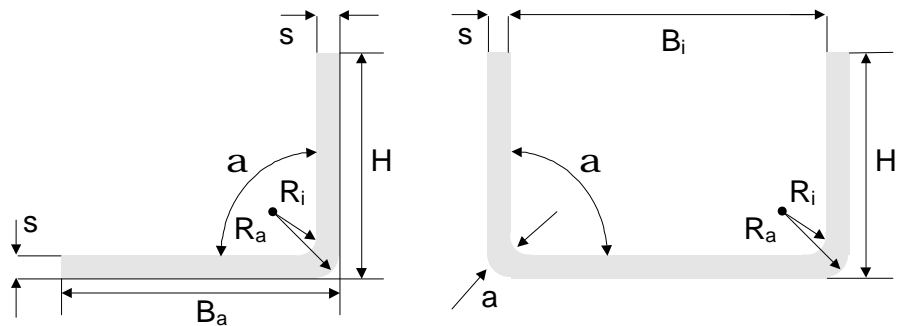


Table 2: Standard Dielectric Test Level ⊥

| The test voltage at 50 Hz, 1 minute is applied in perpendicular direction. The voltage level considers the shape and the surface of the slot insulation as well as the necessary flashover distances. | | | | |
|---|-------------------|-------------|-------------|-------------|
| Test voltage 50 Hz, 1 Min | Thickness s in mm | | | |
| | =0,5 - <1,0 | =1,0 - <1,2 | =1,2 - <1,5 | =1,5 - <2,0 |
| Sheets / Strips | 9 · s kV | 9 kV | 10 kV | 12 kV |
| L – sections | 10 · s kV | 10 kV | 12 kV | 15 kV |
| U – sections | 9 · s kV | 9 kV | 10 kV | 12 kV |

VETRESIT^â 17

| | Properties | | Standards | Units | Values | |
|---|---------------------------------------|--------------|-------------|---|-----------------------------------|----------------------------|
| Composition | Resin: Epoxy resin (EP) | | | | | |
| | Support: Glass fabric | | ISO 1172 | mass % | ≥ 50 | |
| | Density | | ISO 1183 | g/cm ³ | 1,6 - 2,0 | |
| Electrical properties | Electric strength, ⊥ | 23 °C | IEC 243 | kV/mm | 20 | |
| | 50 Hz, 1 Min., h = 3 mm | 90 °C | | | | |
| | Electric strength, ° | 23 °C | IEC 243 | kV/mm | 1,5 - 2,5 | |
| | 50 Hz, 1 Min., h = 25 mm | 90 °C | | | | |
| | Volume resistivity | | IEC 93 | MΩ · cm | 10 ⁶ - 10 ⁹ | |
| | Surface resistivity | | IEC 93 | MΩ | 10 ⁵ - 10 ⁹ | |
| | Insulation resistance, wet | | IEC 167 | MΩ | 10 ⁶ - 10 ⁸ | |
| | Dissipation factor tg δ | 23 °C | IEC 250 | - | 0,02 - 0,05 | |
| 50 Hz | 90 °C | | | | | |
| Relative permittivity ε _r | 23 °C | IEC 250 | - | 4,0 - 5,0 | | |
| 50 Hz | 90 °C | | | | | |
| Comparative tracking index (Solution A) | | IEC 112 | CTI | 200 | | |
| Mechanical properties | Tensile strength | | 23 °C | ISO 527 | N/mm ² | 300 |
| | Flexural strength | | 23 °C | ISO 178 | N/mm ² | 400 |
| | | | 155 °C | | | 250 |
| | Compressive strength | | ⊥ | ISO 604 | N/mm ² | 400 |
| Flexural modulus of elasticity (three-point method) | | 23 °C | ISO 527 | N/mm ² | 15 - 20 · 10 ³ | |
| Thermal properties | Temperature class | | | IEC 85 | °C | F - H |
| | Linear thermal expansion (20 - 100°C) | ° | ⊥ | DIN 52328 | K ⁻¹ | 14 - 16 · 10 ⁻⁶ |
| | | | | | | 35 - 50 · 10 ⁻⁶ |
| | Thermal conductivity (20 - 100°C) | ⊥ | VDE 0304 T1 | W/m K | 0,25 - 0,35 | |
| Flammability h = 1 mm | | ASTM D - 635 | s mm | ATB 5 - 10 ¹⁾ AEB 20 - 35 ²⁾ | | |

¹⁾ Average time to self extinguishment

²⁾ Average extend of burning

| | Properties | Standards | Units | Values |
|---|---|------------|--------------|-------------------|
| Physical and chemical properties | Water absorption h = 1,6 mm, Method A | ISO 62 | mg mass % | ≤ 19 ≤ 0,10 |
| | Oil absorption (24h/50°C + h = 1,6 mm 4h in Oil 90°C) | | mass % | ≤ 0,01 |
| | Resistance against: - solvents (except phenols and ketones) - mineral oils | ASTM D-543 | | good very good |
| | ⊥ senkrecht zu den Schichten | | | |
| | ° parallel zu den Schichten | | | |

These properties have been determined by the above shown methods. The data given are valid for standard test specimen only. Unless otherwise specified, all data were measured at ambient temperature on specimen as manufactured and without particular treatment.

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Due to the many application and manufacturing possibilities, we cannot give any warranty for the technical results in individual cases.



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