
Voltatex® 4201 1-component-resin

Voltatex® 4201 is a low emission, ready-to-use impregnating 1K dip resin, based on unsaturated polyesterimide resins.

Attributes

- single component
- low emission
- minimum exposure in the working area
- no classification as dangerous goods

The cured resin compound is characterised by:

- very good adhesion
- high thermomechanical strength, also when sustained loading is applied
- hard and tough

Application

Suitable for:

- insulation systems of thermal class 220 (R)
- electric motors, also large-scale machines
- high speed rotors
- transformers, especially with thick wires and shaped conductors

Standards

- UL-File-Nr.: E 101752 (M) Underwriters Laboratories Inc., USA
- Isolation-system temperature of thermal class 220 (R) acc. to IEC 60085:2007
- Temperature Index in acc. with IEC 60455-3-5, Type 220, testing method in acc. with IEC 60216
- Temperature class acc. to UL 1446:

Twisted Pair ASTM D2307 MW 30:200
MW 35:220

Helical Coil ASTM D2519 MW 30:240
MW 35:220

Insulation-system acc. to UL 1446 (IEC 61858):

Class 130 C190HE
R150HE
Z130HE
Z150HE

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Updated 06/24

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Class 155 C290HE
 CZ255HE
 R201HE
 R203HE
 Z200HE
Class 180 R342HE
 R342HE2

Delivery forms

The dip resin is delivered in 25 kg one-way-cans.

Storage

The resin can be stored for up to 8 months at max. 25 °C if sealed correctly in original containers. Opened containers have to be resealed and protected against direct daylight!

Hardening

Voltatex® 4201 is a low emission product, nevertheless to minimize evaporation of reactive components during curing; the impregnated objects should be heated up to curing temperature in the shortest possible time. The air flow in the curing oven should also be kept to the minimum permitted by safety considerations.

Curing times:

| | |
|--------------------|---------------------|
| Dip & Bake Process | at 130 °C 2 h |
| | at 150 °C 1 h |
| Trickle Process | at 130 °C 15-30 min |
| | at 150 °C 10-15 min |

Protection

Voltatex® 4201 is biologically inactive and safe to health. Implement normal protective measures when processing the liquid dip resin: See the Material safety data sheet (MSDS).

Processing

The impregnating resin can be applied by using all kind of conventional dip and bake equipment, continuous and vacuum dip process, VPI process and trickle feed process is also possible. Unlimited tank stability with resin Voltatex® 4201 can be achieved as long as the material is kept below 25 °C and at least 20 % of the tank content is used and replaced with fresh resin per month.

Cleaning

Cured Voltatex® 4201 is almost insoluble. Therefore, application equipment should be regularly cleaned with cleaner Voltatex® T050. All equipment cleaning and maintenance should be carried out in accordance with the equipment

manufacturer's instructions.

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| Mechanical | Unit of measure | Value | Test method |
|---|-----------------|----------|--|
| Bond strength of twisted coils room temperature | N | 240 ± 30 | IEC 60455-2 test method A acc. IEC 61033 |
| Bond strength of twisted coils 130 °C | N | 90 ± 10 | IEC 60455-2 test method A acc. IEC 61033 |
| Bond strength of twisted coils 155 °C | N | 78 ± 10 | IEC 60455-2 test method A acc. IEC 61033 |
| Bond strength of twisted coils 180 °C | N | 70 ± 10 | IEC 60455-2 test method A acc. IEC 61033 |
| Shore D hardness room temperature | | 78 ± 5 | IEC 60455-2 test method acc. ISO 868 |

| Thermal | Unit of measure | Condition | Value | Test method |
|----------------------|-----------------|-------------------|-------|---|
| Temperature index | °C | | 220 | IEC 60455-3-5, test method acc. IEC 60216 |
| Thermal conductivity | W(m*k)^-1 | | 0.23 | based on DIN 501046 |
| Bond strength | °C | IEC 60317-8/MW 30 | 238 | IEC 6103, method B, final point 22 N |
| Bond strength | °C | IEC 60317-8/MW 35 | 229 | IEC 61033, method B, final point 22 N |
| Testing voltage | °C | IEC 60317-8/MW 30 | 212 | IEC 60172 |
| Testing voltage | °C | IEC 60317-8/MW-35 | 222 | IEC 60172 |

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| Chemical | Unit of measure | Conditions | Value | Test method |
|---------------------------|-----------------|---|--|---------------------------------------|
| Resistance | | refrigerants/cooling machine oil systems R22, Shell 22-12 | resistant | UL 984-41 |
| Resistance | | Transformer oil, distilled water, 5 % soap-flock-dilution | resistant | IEC 60455-2, test method acc. ISO 175 |
| Impact on enamelled wires | | | compatible with all common enamelled wires | |
| VOC acc. 31. BlmSchV | % | | 5.8 | 2010/75/EU |

| Electrical | Unit of measure | Value | Test method |
|--|-----------------|--------------------|---|
| Dielectric strength at 23 °C and 50 % r.h. | kV/mm | ≥ 80 | IEC 60455-2, test method acc. IEC 60243-1 |
| Dielectric strength at 155 °C | kV/mm | ≥ 80 | IEC 60455-2, test method acc. IEC 60243-1 |
| Dielectric strength at 23 °C after 96 h storage at 92 % r.h. | kV/mm | ≥ 80 | IEC 60455-2, test method acc. IEC 60243-1 |
| Dielectric strength at 105 °C after 168 h oil immersion | kV/mm | ≥ 90 | IEC 60455-2, test method acc. IEC 60243-1 |
| Specific volume resistance at 23 °C | Ω*cm | ≥ 10 ¹⁵ | IEC 60455-2, test method acc. IEC 60093 |

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| Electrical | Unit of measure | Value | Test method |
|--|-----------------|--------------------------|--|
| Specific volume resistance at 155 °C | Ω*cm | $\geq 10^{10}$ | acc. IEC 60455-2, test method acc. IEC 60093 |
| Creep resistance | | CTI 600 M | acc. IEC 60455-2, test method acc. 6.2 IEC 60112 |
| Dielectric constant at 23 °C between 50 Hz and 1 MHz | | 4.0 ± 0.5 | acc. IEC 60455-2, test method acc. IEC 60250 |
| Loss factor at 23 °C from 50 Hz and 1 MHz | | $\leq 30 \times 10^{-3}$ | IEC 60455-2, test method acc. IEC 60250 |
| Loss factor cross section $0.2=200 \times 10^{-3}$ | °C | ≥ 135 | |

| Liquid phase | Unit of measure | Conditions | Value | Test method |
|---------------|-----------------|------------|---------------|---------------------------------------|
| Gel time | min | at 100 °C | 8.7 | company standard Energy Solutions-001 |
| Reaction time | min | at 100 °C | 9.9 | company standard Energy Solutions-001 |
| Viscosity | mPas | at 25 °C | 900 ± 200 | acc. DIN 53019 |

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