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## **Voltatex® 4020 1-component resin**

Voltatex® 4020 is a styrene based, thermosetting, ready-to-use, blue-grey pigmented one pack ready-to-use impregnating resin with high capillary activity, based on unsaturated polyesterimide resins.

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### **Attributes**

- single component
- coverage of rust
- improved protection against climate influences
- high efficiency due to favourable curing conditions
- excellent impregnating result at low material consumption

The cured resin compound is characterized by:

- good resistance against solvent gases
- thermal long term stress

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### **Application**

Suitable for:

- Insulation systems of thermal class 200 (N)

Impregnating of:

- transformers
- stabilisers

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### **Standards**

- UL-File-Nr.: E 101752 (M) Underwriters Laboratories Inc., USA
- Isolation-system temperature of thermal class 200 (N) acc. to IEC 60085:2007
- Temperature index in acc. with IEC 60455-3-5, Type 200
- Testing Method in acc. with IEC 60216
- Temperature class acc. to UL 1446:

Twisted Pair ASTM D2307 MW 30:200

MW 35:200

Helical Coil ASTM D2519 MW 35:200

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

Class 130 C190HE

R150HE

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Z130HE  
Z150HE  
Class 155 C290HE  
CZ255HE  
R201HE  
R203HE  
Z200HE  
Class 180 R342HE

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### **Delivery forms**

Voltatex® 4020 is delivered in 20 kg one-way-cans.

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### **Storage**

The resin can be stored for up to 3 months at max. 25 °C if sealed correctly in original containers. Opened containers have to be resealed and protected against direct daylight!

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### **Hardening**

In order to minimize evaporation of reactive components while curing the impregnated objects should be heated up to the curing temperature in the shortest possible time. The air flow in curing oven should be kept to the minimum permitted by safety considerations.

Curing times: at 150 °C: 2-3 h

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### **Protection**

Voltatex® 4020 is biologically inactive and safe to health. Implement normal protective measures when processing the liquid dip resin: See the Material safety data sheet (MSDS).

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### **Processing**

The impregnating Resin can be applied by using:

- all kind of conventional dip & bake equipment
- continuous and vacuum dip processes
- VPI process

Unlimited tank stability can be achieved as long as Voltatex® 4020 is kept below 25 °C and at least 10 % of the tank content is used and replaced with fresh resin per month. Cooling of the resin is needed provided the ambient temperature is exceeding the recommended maximum temperature. In order to avoid sedimentation of pigments Voltatex® 4020 need to be stirred up in the delivered packaging prior to filling into the tank. Additionally, to keep the material homogeneously while processing, a continuous or repetitive stirring schedule has to be set up. It is highly recommended to install a motor-powered stirring unit in the storage tank. For optimum process viscosity it is possible

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to add Voltatex® T031.

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### **Cleaning**

Once cured Voltatex® 4020 is almost insoluble. Therefore, application equipment should be cleaned regularly 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 | Conditions       | Values   | Test Method                               |
|---------------------------------------|-----------------|------------------|----------|-------------------------------------------|
| Bond strength of twisted coils        | N               | room temperature | 180 ± 30 | IEC 60455-2, test method A acc. IEC 61033 |
| Bond strength of twisted coils 130 °C | N               |                  | 35 ± 10  | IEC 60455-2, test method A acc. IEC 61033 |
| Bond strength of twisted coils 155 °C | N               |                  | 35 ± 10  | IEC 60455-2, test method A acc. IEC 61033 |
| Bond strength of twisted coils 180 °C | N               |                  | 30 ± 10  | IEC 60455-2, test method A acc. IEC 61033 |
| Shore-D-hardness                      |                 | room temperature | 37 ± 5   | IEC 60455-2, test method acc. ISO 868     |

| Thermal                      | Unit of measure | Conditions | Value | Test method                              |
|------------------------------|-----------------|------------|-------|------------------------------------------|
| Temperature index            | °C              |            | 200   | IEC 60455-3-5 test method acc. IEC 60216 |
| Testing voltage IEC 60317-8  | °C              | MW 30      | 210   | IEC 60172                                |
| Testing voltage IEC 60317-13 | °C              | MW 35      | 200   | IEC 60172                                |
| Bond strength IEC 60317-13   | °C              | MW 35      | 211   | IEC 61033, method b, final point 22 N    |

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| Chemical                  | Unit of measure | Conditions                                                | Values                               | Test method                            |
|---------------------------|-----------------|-----------------------------------------------------------|--------------------------------------|----------------------------------------|
| Water absorption          | %               | after 96h at 23°C                                         | 0.35                                 | IEC 60455-2, test method 1 acc. ISO 62 |
| Impact on enamelled wires |                 |                                                           | compatible to common enamelled wires |                                        |
| Resistance                |                 | Distilled water, transformer oils, 5% soap-flock-dilution | resistant                            |                                        |
| Resistance                |                 | Hexane, methanol, oil                                     | resistant                            |                                        |
| VOC acc. 31. BLmSchV      |                 |                                                           | 29.8 %                               | 2010/75/EU                             |

| Electrical                              | Unit of measure          | Conditions   | Values               | Test Method                                            |
|-----------------------------------------|--------------------------|--------------|----------------------|--------------------------------------------------------|
| Specific volume resistance at 155 °C    | $\Omega \cdot \text{cm}$ |              | $5.0 \times 10^{11}$ | acc. IEC 60455-2, test method acc. IEC 60093           |
| Creep resistance                        |                          | typ. value   | CTI 600M             | acc. IEC 60455-2, test method acc. point 6.2 IEC 60112 |
| Dielectric constant at 155 °C and 50 Hz |                          |              | $4.0 \pm 0.5$        | acc. IEC 60455-2, test method acc. IEC 60250           |
| Loss factor                             |                          | 120 °C/50 Hz | $195 \times 10^{-3}$ | IEC 60455-2, test method acc. IEC 60250                |

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| Electrical                                            | Unit of measure | Conditions | Values | Test Method                             |
|-------------------------------------------------------|-----------------|------------|--------|-----------------------------------------|
| Loss factor cross section<br>0.2=200x10 <sup>-3</sup> | °C              |            | 120    | IEC 60455-2, test method acc. IEC 60250 |

| Liquid phase                   | Unit of measure | Conditions | Value      | Test Method                           |
|--------------------------------|-----------------|------------|------------|---------------------------------------|
| Flow time                      | s               | at 23 °C   | 60 ± 15    | acc. DIN 53211                        |
| Reaction process gel time      | min             | at 100 °C  | 15.0 ± 4.0 | company standard Energy Solutions-014 |
| Reaction process reaction time | min             | at 100 °C  | 31 ± 9.0   | company standard Energy Solutions-014 |

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