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## **Voltatex® 4130 1-component-resin**

Voltatex® 4130 is a cloudy, yellow-brown, vinyl toluene based, styrene-free single-component impregnating resin that is ready to use, based on unsaturated polyesterimide resins.

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### **Attributes**

- single component
- very high capillary activity
- low evaporation losses while processing
- high resin retention in the object
- low draining losses in the oven

The cured resin compound is characterized by:

- high thermal endurance
- excellent bond strength
- high thermal and mechanical stability, especially under extreme long term stress
- tough and hard resin compound

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### **Application**

- stators
- transformers
- suitable for: Insulation systems of thermal class 180 (H)

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### **Standards**

- UL-File-Nr.: E 101752 (M) Underwriters Laboratories Inc., USA
- Isolation-system temperature of thermal class 180 (H) acc. to IEC 60085:2007
- Temperature Index in acc. with IEC 60455-3-5, Type 180, Testing Method in acc. with IEC 60216
- Temperature class acc. to UL 1446:

Twisted Pair ASTM D2307 MW 30:200

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MW 35:180

Helical Coil ASTM D2519 MW 30:200

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

Class 130 C190HE

R150HE

Z130HE

Z150HE

Class 155 C290HE

CZ255HE

R201HE

R203HE

Z200HE

Class 180 R342HE

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### Delivery forms

Voltatex® 4130 is supplied in one-way-cans containing 25 kg.

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### Storage

In closed original cans the resin can be stored for 6 months if provided storage temperature does not exceed 25 °C.

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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 the curing oven should be kept to the minimum permitted by safety considerations.

Curing time:

at 130 °C: 3h

at 150 °C: 1h

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### Protection

Cured Voltatex® 4130 is biologically inactive and not dangerous to health. When processing the liquid resin please refer to the Material Safety Data Sheet (MSDS) for Voltatex® 4130 and the regulations of your local authority.

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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

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- VPI process

Unlimited tank stability can be achieved as long as Voltatex® 4130 is kept below 25 °C and at least 30 % of the tank content is used and replaced with fresh resin per month. For optimum process viscosity it is possible to add Voltatex® T032.

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## Cleaning

Once cured Voltatex® 4130 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.

| Mechanical                            | Unit of measure | Conditions       | Values   | Test method                               |
|---------------------------------------|-----------------|------------------|----------|-------------------------------------------|
| Bond strength of twisted coils        | N               | Room temperature | 230 ± 20 | IEC 60455-2, test method A acc. IEC 61033 |
| Bond strength of twisted coils 130 °C | N               | 130 °C           | 33 ± 8   | IEC 60455-2, test method A acc. IEC 61033 |
| Bond strength of twisted coils 155 °C | N               | 155 °C           | 30 ± 5   | IEC 60455-2, test method A acc. IEC 61033 |
| Bond strength of twisted coils 180 °C | N               | 180 °C           | 30 ± 5   | IEC 60455-2, test method A acc. IEC 61033 |
| Shore-D-hardness                      |                 | room temperature | 50 ± 5   | acc. IEC 60455-2, ISO 868                 |

| Thermal                      | Unit of measure | Conditions        | Values | Test method                |
|------------------------------|-----------------|-------------------|--------|----------------------------|
| Temperature index            | °C              | IEC 60455-3-5     | 180    | acc. IEC 60216             |
| Testing voltage IEC 60317-13 | °C              | MW 35             | 196    | IEC 60172                  |
| Testing voltage IEC 60317-8  | °C              | MW 30             | 209    | IEC 60172                  |
| Bond strength IEC 60317-13   | °C              | IEC 61033 / MW 35 | 214    | method B, final point 22 N |

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| Thermal              | Unit of measure     | Conditions | Values | Test method     |
|----------------------|---------------------|------------|--------|-----------------|
| Thermal conductivity | $W(m \cdot K)^{-1}$ |            | 0.17   | acc. DIN 501046 |

| Chemical             | Unit of measure | Conditions                                                | Values    | Test method                     |
|----------------------|-----------------|-----------------------------------------------------------|-----------|---------------------------------|
| Resistance           |                 | Hexane                                                    | resistant | Energy Solutions, Voltatex® 019 |
| Resistance           |                 | Transformer oil, distilled water, 5 % soap-flock-dilution | resistant | acc. Axalta company standard    |
| VOC acc. 31. BlmSchV | %               |                                                           | 39.9      | 2010/75/EU                      |

| Electrical                                                   | Unit of measure | Conditions | Values | Test method                               |
|--------------------------------------------------------------|-----------------|------------|--------|-------------------------------------------|
| Dielectric strength at 23 °C and 50 % r.h.                   | kV/mm           | typ. value | 74     | IEC 60455-2 test method acc. IEC 60243-1  |
| Dielectric strength at 155 °C                                | kV/mm           | typ. value | 72     | IEC 60455-2, test method acc. IEC 60243-1 |
| Dielectric strength at 23 °C after 96 h storage at 92 % r.h. | kV/mm           | typ. value | 90     | IEC 60455-2 test method acc. IEC 60243-1  |

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| Electrical                                              | Unit of measure | Conditions | Values                                      | Test method                               |
|---------------------------------------------------------|-----------------|------------|---------------------------------------------|-------------------------------------------|
| Dielectric strength at 105 °C after 168 h oil immersion | kV/mm           | typ. value | 130                                         | IEC 60455-2 test method acc. IEC 60243-1  |
| Specific volume resistance at 155 °C                    | Ω*cm            | typ. value | 5x10 <sup>10</sup>                          | IEC 60455-2 test method acc. IEC 60093    |
| Specific volume resistance at 180 °C                    | Ω*cm            | typ. value | 1x10 <sup>10</sup>                          | IEC 60455-2 test method acc. IEC 60093    |
| Specific volume resistance after 7 d water immersion    | Ω*cm            | typ. value | 8x10 <sup>15</sup>                          | IEC 60455-2 test method acc. IEC 60093    |
| Creep resistance                                        |                 | typ. value | CTI 600 M                                   | IEC 60455-2, test method acc. IEC 60234-1 |
| Dielectric constant at 23 °C between 50 Hz and 1 MHz    |                 |            | 3.4 ± 0.5                                   | IEC 60455-2 test method acc. IEC 60250    |
| Loss factor at 155 °C and 50 Hz                         |                 |            | 100x10 <sup>-3</sup> - 300x10 <sup>-3</sup> | IEC 60455-2 test method acc. IEC 60250    |
| Loss factor cross section<br>0.2=200x10 <sup>-3</sup>   | °C              |            | 145-170                                     | IEC 60455-2 test method acc. IEC 60250    |

| Liquid phase | Unit of measure | Conditions | Values  | Test method    |
|--------------|-----------------|------------|---------|----------------|
| Flow time    | s               | 23 °C      | 75 ± 10 | acc. DIN 53211 |

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| Liquid phase                   | Unit of measure | Conditions | Values           | Test method                              |
|--------------------------------|-----------------|------------|------------------|------------------------------------------|
| Reaction process gel time      | min             | 100 °C     | 7.7              | company standard<br>Energy Solutions-014 |
| Reaction process reaction time | min             | 100 °C     | 12.9             | company standard<br>Energy Solutions-014 |
| Viscosity                      | mPas            | 25°C       | 265 ± 30         | acc. DIN 53019                           |
| VOC acc. 31.<br>BLmSchV        |                 | Mass       | approx. 5.2<br>% | DIN EN 60455-3-5:2006                    |

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