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## Voltatex® 4204 1-component impregnating resin

Voltatex® 4204 is a low emission, environmentally friendly, ready-to-use impregnating, yellowish 1K dip resin based on unsaturated polyesterimide resins.

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### Attributes

- single component
- low emission
- very low viscosity
- environmentally friendly
- minimum exposure in the working area
- no risk of fire or explosion
- based on renewable raw materials

The cured resin compound is characterised by:

- very low tendency to crack
- very good adhesion

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### Application

- electric motors
- generators, also for large drives
- transformers
- in particular for mica tape insulated flat rolled litz wires
- suitable for: insulation systems of thermal class 180 (H)
- suitable for applications in medium and high voltage area

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### Standards

- UL approved, file no.: E 101752 (M) Underwriters Laboratories Inc., USA
- Temperature Index 180 (H) in acc. with IEC 60085
- UL 1446 approved:

Twisted Pair ASTM D2307 MW 35:180  
MW 80:155

Helical Coil ASTM D2519 MW 35:200  
MW 80:180

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Updated 06/24



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## Delivery forms

Voltatex® 4204 is supplied in one-way-cans containing 25 kg or 200 kg.

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## 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 sunlight!

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## Hardening

Voltatex® 4204 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	130 °C 0.5-1 h
	150 °C 15-30 min.
Trickle Feed Process	130 °C 15-20 min.
	150 °C 10-15 min.

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## Protection

Cured Voltatex® 4204 is biologically inactive and not dangerous to health. When processing the liquid resin, please refer to the Material Safety Data Sheet (MSDS) for Voltatex® 4204.

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## Processing

The impregnating resin can be applied by using

- all kind of conventional dip & bake equipment
- continuous, vacuum dip and VPI processes
- dip & roll equipment
- trickle feed machines

Unlimited tank stability with resin Voltatex® 4204 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.

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## Cleaning

Cured Voltatex® 4204 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 manufacturers instructions.

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Mechanical	Unit of measure	Values	Test method
Bond strength of twisted coils room temperature	N	200 ± 40	IEC 60455-2, test method A acc. IEC 61033
Bond strength of twisted coils 155 °C	N	57 ± 10	IEC 60455-2, test method A acc. IEC 61033
Shore D hardness room temperature		70 ± 5	IEC 60455-2, test method acc. ISO 868
Water absorption	%	0.6	Company standard Energy Solutions-015, acc. ISO 62
Glass transition temperature	°C	55-75	DSC-method
Volume shrinkage	%	Company standard Energy Solutions-003	

Chemical	Unit of measure	Conditions	Values	Test method
Resistance		solvent vapours	under test	IEC 60455-2, test method acc. ISO
VOC acc. 31. BImSchV	%		0.8	2010/75/EU
Resistance		Distilled water, transformer oil	resistant	company standard Energy Solutions - Voltatex® 019

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Page 4

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Electrical	Unit of measure	Typ. values	Test method
Dielectric strength at 23 °C and 50 % r.h.	kV/mm	60-85	IEC 60455-2, test method acc. IEC 60243-1
Dielectric strength at 155 °C	kV/mm	55-80	IEC 60455-2, test method acc. IEC 60243-1
Dielectric strength at 23 °C after 96 h storage at 92 % r.h.	kV/mm	35-75	IEC 60455-2, test method acc. IEC 60243-1
Dielectric strength at 105 °C after 168 h oil immersion	kV/mm	70-110	IEC 60455-2, test method acc. IEC 60243-1
Specific volume resistance at 180 °C	Ω*cm	10 <sup>11</sup> -10 <sup>12</sup>	IEC 60455-2, test method acc. IEC 60093
Specific volume resistance after 7 d water immersion	Ω*cm	10 <sup>14</sup> -10 <sup>16</sup>	IEC 60455-2, test method acc. IEC 60093
Creep resistance		CTI 600 M	IEC 60455-2, test method acc. IEC 60112
Dielectric constant at 23 °C between 50 Hz and 1 MHz		3.9 ± 0.4	IEC 60455-2, test method acc. IEC 60250-1
Loss factor at 155 °C and 50 Hz		140x10 <sup>-3</sup> - 200x10 <sup>-3</sup>	IEC 60455-2
Loss factor cross section 0.2=200x10 <sup>-3</sup>	°C	150-180	IEC 60250, between 50 Hz and 1 MHz

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Liquid phase	Unit of measure	Conditions	Values	Test method
Impact on enamelled wires			compatible with all common magnet wires	IEC 60851-4
Viscosity	mPas	at 25 °C	315 ± 25	DIN 53019
Viscosity	mPas	at 40 °C	130 ± 25	DIN 53019
Reaction process gel time	min	100 °C	9.6	company standard Energy Solutions-014
Reaction process reaction time	min	100 °C	11.6	company standard Energy Solutions-014

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