Energy Solutions
Impregnating Resins

Voltatex® Product Overview
Low emission/Monomer-free/Epoxide

Energy Solutions Impregnating Resins
Voltatex® Product Overview

Product	Thermal Class	UL	Chemical Base	Flow Time DIN 53211	Viscosity DIN 53019	Shelf Life / Storage Time	Emissions DIN EN 60455-3-5	Thixotropic	Pigmented	VOC - Free
	acc.to IEC 60085(1)	E101752		23°C [sec.]	25°C [mPas]	25°C [months]	[%]			
Low Emission										
Voltatex® 4200	220 (R)	X	Unsat. Polyesterimide	-	2,000 - 2,500	6	1.2	-	-	X
Voltatex® 4201	220 (R)	X	Unsat. Polyesterimide (4)	-	800 - 1,000	8	2.4	-	-	-
Voltatex® 4202	180 (H)	X	Unsat. Polyester	-	2,000 - 2,500	8	2.2	-	-	X
Voltatex® 4204	180 (H)	X	Unsat. Polyesterimide	-	270 - 370	6	1.1	-	-	X
Voltatex® 4210	expected: 200 (N)		Unsat. PEI	-	700 - 1100	6	1.8	-	-	X
Voltatex® 4224 L	provisional: 180 (N) expected: 200 (N)	X	Unsat. PEI	-	850 - 1150	10	1.4	-	X	X
Voltatex® 4230	220 (R)	X	Unsat. Polyesterimide (4)	-	800 - 1,200	4	2.4	X	-	-
Voltatex® 4250	220 (R)	X	Unsat. Polyesterimide	-	2,000 - 2,500	6	1.7	-	-	X
Voltatex® 4252	220 (R)		Unsat. Polyesterimide (3)	-	2,000 - 2,500	6	1.5	-	-	X
Monomer free / VOC-minimised										
Voltatex® 4300	180 (H)	-	Unsat. Polyesterimide	-	6,300 - 7,700	6	0.5	-	-	X
Voltatex® 4301	180 (H)	-	Unsat. Polyesterimide	-	5,500 - 6,200	8	1	-	-	X
Voltatex® 4302	180 (H)	-	Unsat. Polyesterimide	-	6,300 - 7,700	12	0.5	-	-	X
Voltatex® 4303	180 (H)	X	Unsat. Polyesterimide	-	700 - 1,100	8	0.5	-	-	X
Voltatex® 4310	180 (H)	X	Unsat. Polyesterimide (3)(4)	-	800 - 1,200	4	2	-	-	-
Epoxide Resins										
Voltatex® 4400	220 (R)	-	Epoxy	-	4,500 - 5,500	12 @ 20°C	-	-	-	X
Voltatex® 4401	180 (H)	-	Epoxy	-	1,000 - 4,000	12 @ 20°C	-	-	-	X
Voltatex® 4410	180 (H)	-	2K-Epoxy	-	2,000 - 2,500	24 @ 20°C	-	-	-	X

(1) based on temperature index MW 35, Twisted Pair
(2) curing by peroxide
(3) highly reactive
(4) contains a small portion of reactive thinner to optimize the viscosity
(5) company standard Energy Solutions - Voltatex® 001 "measurement of gel time" in acc. with DIN 46448
(6) under consideration
(7) viscosity at 23°C

Voltatex®	Gel Time	Reaction Time	Dip & Bake (conventional)	VI Vacuum Impregnation	VPI Vacuum Pressure Impregnation	Hot-Dip / Gel Inside Resin	Trickle	Special Properties
	[min] (5)	[min] (5)						
4200	7.0 - 13.0	8.0 - 16.0	X	X	X		X	Low emission, VOC-free, styrene free, high thermal and mechanical endurance even under long term stress; good resistance against solvent vapour, resistant to refrigerants
4201	7.0 - 13.0	8.0 - 15.0	X	X	X		X	Low emission, high thermal and mechanical endurance; very good adhesion, tough and hard; applicable in dip-roll-process
4202	9.0 - 15.0	11.0 - 18.0	X	X	X			Low emission, VOC-free, styrene free, very good adhesion, high thermal and mechanical endurance; good elasticity, very good dialectric properties
4204	6.0 - 12.0	8.0 - 14.0	X	X	X		X	Very low viscous, low emission resin, VOC-free, very low tendency to crack, very good adhesion; contains renewable raw materials, also applicable in dip-roll-process
4210	5.5 - 9.0	6.0 - 12.0	X	X	X	X	X	Low viscosity, low emissions, VOC-free, very low tendency to crack, resistant to ATF-oil, improved resistance to humidity and water
4224 L	8.0 - 14.0	9.0 - 18.0	○	○	○	X	○	Improved thermal conductivity, filled, low sedimentation, processable viscosity, VOC-free, improved resistance to corona effects. Optimal application with preheating
4230	9.5 - 15.0	10.0 - 16.0	X	X	X			Excellent resin retention and high efficiency due to thixotropic formulation, high thermal and mechanical endurance even under long term stress
4250	7.5 - 13.5	8.5 - 14.5	X	X	X	X		Applicable in the Electrical/UV-process, low emission, VOC-free, styrene free, high thermal and mechanical endurance even under long term stress, resistant to refrigerants
4252	6.0 - 12.0	10.0 - 16.0	X	X	X	X		Higher reactive formulation of Voltatex® 4250
4300	6.0 - 16.0	7.0 - 17.0	X			X		Monomer free, low emission resin, low smell, VOC-free, high viscous; low tendency to crack, very good elasticity
4301	10.0 - 16.0	15.0 - 24.0	X			X		Monomer free, low emission resin, low smell, VOC-free, high viscous; low tendency to crack, very good elasticity
4302	25.0 - 60.0	-	X			X		Monomer free, low emission resin, low smell, VOC-free, high viscous; low tendency to crack, very good elasticity
4303	9.0 - 15.0	10.0 - 17.0	X				X	Monomer free, low viscous, low emission resin, low smell, VOC-free, low tendency to crack, good adhesion
4310	4.5 - 7.5	5.0 - 10.0					X	Low emission resin, contains a small portion of reactive thinner to optimize viscosity, good adhesion; very high thermal and mechanical endurance
4400	5-10 @ 165°C	-			X			1-component epoxy resin, free of anhydride. High thermal resitance (up to 220°C), high chemical resistance. Suitable for 3,3-kV-insulation systems in combination with VPI-process.
4401	8-20 @ 155°C	-				X		1-component epoxy resin for VPI-process and/or dip roll impregnation, also processable in the electrical heating process. Formulation with increased reactivity.
4410	30 @ 20°C	-					X	2-component epoxy resin, curing at low temperatures. High bond strength, high chemical resitance and good adhesion. Resistant to refrigerants.

Voltatex®	Transformer <100 kVA	Transformer >100 kVA	Rotors	Rotors, high speed	Stators, trickle	Stators, dip & bake process	Stators / Rotors up to 3 kV, vpi process	Stators, dipping, combined curing electrically and oven	Stators, dipping, electrical/uv process	Stators, dipping, hot dip/gel process	Wind Generators, < 1000 V	High Voltage Applications < 6,6 kV UN
4200	◎	◎	●	○	◎	●	○	●	○	○	○	○
4201	◎	◎	◎	○	◎	◎	○	●	○	○	○	○
4202	●	●	○	○	◎	●	◎	●	○	○	○	○
4204	◎	○	○	○	●	◎	●	○	○	○	●	●
4210	◎	◎	●	◎	●	●	◎	●	◎	●	●	◎
4224 L	◎	◎	○	◎	○	●	◎	●	◎	●	●	◎
4230	●	●	●	○	○	●	○	●	○	○	○	○
4250	◎	◎	◎	○	◎	◎	○	◎	●	●	○	○
4252	●	●	●	○	◎	●	○	●	●	●	○	○
4300	●	●	○	○	○	◎	○	◎	○	○	●	○
4301	●	●	●	○	○	●	○	●	○	○	○	○
4302	○	○	○	○	○	◎	○	◎	○	○	●	○
4303	●	●	●	○	○	●	○	●	○	○	○	○
4310	●	●	●	●	◎	●	○	◎	○	○	○	○
4400	○	○	○	○	●	○	●	○	○	○	○	●
4401	○	○	○	○	●	○	○	○	●	●	○	○
4410	○	○	●	●	●	○	○	○	○	○	○	○

● = recommended ◎ = suitable ○ = not recommended

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Product	Thermal Class	Flow Time DIN 53211	Shelf Life / Storage Time	Special Properties
	acc. to IEC 60085[1]	23 °C [sec.]	25 °C [months]	
Finishing Varnish				
Voltatex® 2010	-	30 - 40	24	Quick single component air drying clear finishing varnish with excellent adhesion on metals and plastics, suitable as additional protection against external influences and corrosion.
Voltatex® 2020 red	-	75 - 125	8	Quick single component air drying pigmented finishing varnish with excellent adhesion on metals and plastics, suitable as additional protection against external influences and corrosion, especially against humidity.
Voltatex® 2020 grey	-	55 - 75	12	Quick single component air drying pigmented finishing varnish with excellent adhesion on metals and plastics, suitable as additional protection against external influences and corrosion, especially against humidity.
Voltatex® 2040	180 (H)	45 - 65	12	Clear, rapid drying overcoat for protection against climate conditions and mold. Suitable as a protection varnish for electric motors and transformers and as impregnating material for small transformers with low requirements.
Impregnating Varnish				
Voltatex® 2100	180 (H)	65 - 95	12	Clear, fast curing ready-to-use varnish, thermosetting, delivers a hard and elastic compound with resistances against solvent gases, transformer oil, climate stresses, fungal investigation and acids, suds and ammonia.
Waterborne Impregnating Varnish				
Voltatex® 2240	180 (H)	10 - 30	12	Water based epoxy-emulsion, milky appearance in liquid form, non-flammable and not explosive. Suitable for electric motors (except high voltage applications), transformers and hermetic motors. Resistant to refrigerants.
Thinner				
Voltatex® T022	Voltatex® T022 can be added to Impregnating Varnish Voltatex® 2100 to adjust the required viscosity.			
Voltatex® T023	Voltatex® T023 can be added to Finishing Varnishes Voltatex® 2020 & Voltatex® 2010 series to adjust the required viscosity.			
Reactive Thinner				
Voltatex® T031	Voltatex® T031 can be added to Impregnating Resins Voltatex® 4000 series to adjust the required viscosity.			
Voltatex® T032	Voltatex® T032 can be added to Impregnating Resins Voltatex® 4100 series to adjust the required viscosity.			
Cleaning Agent				
Voltatex® T050	Voltatex® T050 is a clear, transparent solvent mixture with excellent cleaning properties.			
Voltatex® T060	Voltatex® T060 is a clear, transparent cleaner with low emissions (approx. 2 %).			
Service Products				
Voltatex® H140	1K Hardener Voltatex® H140 is mixed into Voltatex® - Impregnating Resins based on unsaturated polyester/polyester imide chemistry for adjusting the reactivity.			
Voltatex® H151	Catalyst Voltatex® H151 is mixed into Voltatex® - Impregnating Resins based on unsaturated polyester/polyester imide chemistry for curing at low temperature.			
Voltatex® A341	Voltatex® A341 is mixed into Voltatex® - Impregnating Resins based on unsaturated polyester/polyester imide chemistry to allow "cold curing" at room temperature together with an MEK-peroxide. For further information please contact our Technical Service team.			

[1] based on Temperature Index MW 35, Twisted Pair

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