ELANTAS
Electrical Insulation

Product Information

Electrical Insulation System

Impregnating varnish

Isonel® 31 J

solvented, oven-drying, general purpose, UL-recognized, thermal class 180 (H)

Product description

Isonel® 31 J is an impregnating varnish based on alkyd-/phenol resin. The product consists of polymeric binder, the so-called solid content, and a solvent mixture. The thinner 210 will be available for the dilution of the varnish.

Varnish and thinner fulfil the directives 2011/65/EU, 2003/11/EC and 2006/121/EC, the raw materials are pre-registered acc. to the directive No. 1907/2006/EC (REACH). The products do not contain by recipe substances listed in Art. 57/Anex XIV 1907/2006/EC from 9th of October 2008 (SVHC).

Areas of application

Isonel® 31 J is a general purpose varnish, used in repair shops as well as by equipment manufacturers for:

- transformers
- stators and armatures of motors, generators and alternators
- coils of different sizes
- equipments for the navy, railways, minings and aircrafts
- machines for tropical use

Properties of dried varnish

After drying the elastic material displays very good mechanical and dielectrical properties, in addition very favourable temperature cycling behaviour.

Owing to the temperature index of 180 - 200 acc. UL Isonel® 31 J can be used for thermal class 180 acc. DIN EN 60085 (former: H). UL have recognized the impregnating varnish under file no. E 171184.

A reduction in the degree of hardness of normally used enamelled wires does not occur if the components are properly impregnated.

Storage stability

Under appropriate storage conditions, protected from humidity and solar radiation, Isonel® 31 and thinner 210 can be stored in unopened containers for 12 months at 23 °C.

Flow time (Viscosity)

The flow time of Isonel® 31 J will be measured with the ISO-cup (6 mm), the product is ready to use when delivered.

The kind of processing, e.g. with higher ambient temperatures, leads possibly to rising losses of solvents and increased flow time. In this case it will be necessary to adjust the flow time again by addition of thinner 210.

Processing methods

Isonel® 31 J can be processed by all conventional impregnating methods, such as dipping, dip-rolling or flooding.

Processing under vacuum is basicly possible, in this case the pressure should not drop below 25-30 mbar to avoid excessive evaporation of solvents and the ensuing negative effect on the penetration.

Isonel® 31 J displays low susceptibility to the influence of foreign substances, such as punching grease, oils and primers. However, pollution of the varnish should be avoided as much as possible to guarantee impeccable flow and reliable drying.

After impregnation follows the drainage during 15 to 45 minutes, then, starting from room temperature, the drying process in an oven with circulating air. First step will be operation with supply of fresh air to evaporate the solvents, leading (with preference) into an after-burning system. Later, the real drying temperature and the indicated drying times will be effective.

To calculate time and energy consumption it will be advantageous to have the heating curves for the objects to be impregnated available in advance.

Isonel® 31 J can already be dried starting from 120 °C or within short time at 150 °C. When big objects or such with complex winding constructions have to be impregnated, the drying in two steps to remove the solvents is recommended.

It will be necessary to follow the instructions of the Material Safety Data Sheet (MSDS) of the varnish and thinner.

Properties of varnish as supplied

Property	Value	Unit
Shelf life at 23 °C	12	Months
Appearance	yellowish, transparent	-
Content of binder (1,5 g, 2h/135°C), Beck-test T 11 b following ISO 3251	47,5 ± 1,5	%
Flow time at 23°C, Beck-test V22 following ISO 2431	52 ± 12	s
Viscosity at 23 °C, Beck-test V 18 following DIN 53019	-	mPa.s
Density at 23 °C; following ISO 2811-2	0,94 ± 0,03	g/cm^3

Drying conditions

Temperature	100	120	130	140	150	160	°C
Drying time		10	6	4	2		h

Mechanical properties in dried condition

Test criterion	Condition	Value	Unit
Condition in thick layer, Beck-test M 1 following IEC 60464 part 2	Upper side Under side Interior	S 1 U 1 I 3.1	-
Bond strength, Beck-test M 2 following IEC 61083, method A (Twisted Coil)	23 °C 155 °C 180 °C	> 150 > 20 -	N
Mandrel test (3 mm), Beck-test M 4 following IEC 60464-3	23 °C	180	Degree

Temperature index

Test criterion	Limiting value	TI
Proof voltage, Beck-test M 15 following IEC 60172 (Twisted Pair)	1000 V	182
Bond strength, Beck-test M 16 following IEC 60290 (Helical Coil)	22 N	211

Dielectrical properties in dried condition

Test criterion	Condition	Value	Unit
Volume resistivity after water immersion, Beck-test M 5 following IEC 60464 part 2	Initial value 7 d storing	> 10^{16} > 10^{15}	Ω·cm
Volume resistivity at elevated temperatures, Beck-test M 13 following IEC 60464 part 2	155 °C 180 °C	> 10^{11} > 10^{11}	Ω·cm
Electrical strength after water immersion, Beck-test M 6b following IEC 60464 part 2	Initial value 24 h storing	> 120 -	kV/mm
Electrical strength at elevated temperatures, Beck-test M 6a following IEC 60464 part 2	155 °C 180 °C	> 80 -	kV/mm
Temperature at relative permittivity tanδ=0,1 Beck-test M 3b following IEC 60250	50 Hz, 1 V 1 kHz, 1 V 10 kHz, 1 V	> 140 > 180 > 180	°C

Effect of liquid chemicals, including water

Test criterion	Condition	Result, Value	Unit
Resistance to vapour of solvents, Beck-test M 7 following ISO 60464 part 2	Acetone Xylene Methanol Hexane Carbone disulphide	resistant resistant resistant resistant resistant	-
Water absorption, Beck-test M 9 following ISO 62	24 h at 23 °C 0,5 h at 100 °C	< 10 < 15	mg
Effect of liquids after 7 d storing, Beck-test M 10 following ISO 175	Ammonia solution 10 % Acetic acid 5 % Sodium hydroxide 1 % Hydrochloric acid 10 % Sulforic acid 30 % Iso-octane Toluol Transformer oil (mineral) BecFluid® 9902 Solution of detergent	- - - - - 12,6 74 5,2 - 4	mg

Manufacturing site: ELANTAS Europe S.r.l., Via San Martino 6, 15028 Quattordio (AL), Italy
www.elantas.com