

## **Product Information**

Electrical Insulation System

Impregnating varnish

# **Elmotherm<sup>®</sup> 073-1010**

solvented, oven-drying, good chemical resistivity, UL-recognized, thermal class 200

## Product description

Elmotherm® 073-1010 is a solvented, oven-drying impregnating varnish based on modified isophthalic resins, easy to supply and with very good thermal and mechanical properties. The thinner F 163 should be used to adjust the flow time.

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 9<sup>th</sup> of October 2008 (SVHC).

## Areas of application

Elmotherm® 073-1010 is a general purpose varnish, used in repair shops as well as by equipment manufacturers for

- stators
- rotors
- transformers

showing best impregnating results by excellent penetration and good film building.

## Properties of dried varnish

After drying the elastic material displays very good mechanical properties. The high bond strength can -in individual cases - be increased by longer drying times and higher drying temperatures. Additionally this varnish offers very good resistivity against moisture and liquid chemicals (inclusive their vapours).

Elmotherm® 073-1010 can be used for thermal class 200 acc. DIN EN 60085.

The product has been registered by UL (Underwriters Laboratories, USA) under file No, 151 126.

## Flow time (Viscosity)

The flow time of Elmotherm® 073-1010 should 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 F 163.

## Processing methods

Elmotherm® 073-1010 can be processed by all conventional impregnating methods, such as dipping, dip-rolling or flooding.

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

Elmotherm 073-1010 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 definitive drying temperature and the indicated drying times will be effective.

The drying process in 2 steps is recommended to remove the solvents. in particular when big objects or such with complex winding constuctions have to be impregnated. For the first step the guide value is approx. 100-120 °C, then follows the definitive drying temperature.

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

## Properties of varnish as supplied

| Property                                                                 | Value       | Unit              |
|--------------------------------------------------------------------------|-------------|-------------------|
| Shelf life at 23 °C                                                      | 12          | Months            |
| Appearance                                                               | -           | -                 |
| Content of binder (1,5 g, 2h/135°C), Beck-test T 11 b following ISO 3251 | 50 ± 2      | %                 |
| Flow time at 23°C, Beck-test V22 following ISO 2431                      | 55 ± 5      | s                 |
| Viscosity at 23 °C, Beck-test V 18 following DIN 53019                   | -           | mPa.s             |
| Density at 23 °C; following ISO 2811-2                                   | 0,98 ± 0,02 | g/cm <sup>3</sup> |

## Drying conditions

| Temperature | 100 | 120 | 130 | 140 | 150 | 160 | °C |
|-------------|-----|-----|-----|-----|-----|-----|----|
| Drying time |     |     |     | 10  |     | 6   | 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 | S 1   | -      |
|                                                                           | Under side | U 1   |        |
|                                                                           | Interior   | I 4.3 |        |
| Bond strength, Beck-test M 2 following IEC 61083, method A (Twisted Coil) | 23 °C      | 230   | N      |
|                                                                           | 155 °C     | 23    |        |
|                                                                           | 180 °C     | 53    |        |
| Mandrel test (3 mm), Beck-test M 4 following IEC 60464-3                  | 23 °C      | -     | Degree |

## Temperature index

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

## 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 | $10^{16}$   | $\Omega \cdot \text{cm}$ |
|                                                                                          | 7 d storing   | $10^{16}$   |                          |
| Volume resistivity at elevated temperatures, Beck-test M 13 following IEC 60464 part 2   | 155 °C        | $> 10^{11}$ | $\Omega \cdot \text{cm}$ |
|                                                                                          | 180 °C        | -           |                          |
| Electrical strength after water immersion, Beck-test M 6b following IEC 60464 part 2     | Initial value | 115         | kV/mm                    |
|                                                                                          | 24 h storing  | -           |                          |
| Electrical strength at elevated temperatures, Beck-test M 6a following IEC 60464 part 2  | 155 °C        | 106         | kV/mm                    |
|                                                                                          | 180 °C        | 99          |                          |
| Temperature at relative permittivity $\tan\delta=0,1$ Beck-test M 3b following IEC 60250 | 50 Hz, 1 V    | 135         | °C                       |
|                                                                                          | 1 kHz, 1 V    | $> 180$     |                          |
|                                                                                          | 10 kHz, 1 V   | $> 180$     |                          |

## 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                   | sticky        | -    |
|                                                                            | Xylene                    | resistant     |      |
|                                                                            | Methanol                  | resistant     |      |
|                                                                            | Hexane                    | resistant     |      |
|                                                                            | Carbone disulphide        | -             |      |
| Water absorption, Beck-test M 9 following ISO 62                           | 24 h at 23 °C             | 3,6           | mg   |
|                                                                            | 0,5 h at 100 °C           | 6,8           |      |
| Effect of liquids after 7 d storing, Beck-test M 10 following ISO 175      | Ammonia solution 10 %     | 14            | mg   |
|                                                                            | Acetic acid 5 %           | 6,4           |      |
|                                                                            | Sodium hydroxide 1 %      | 3,6           |      |
|                                                                            | Hydrochloric acid 10 %    | 3             |      |
|                                                                            | Sulfuric acid 30 %        | 3,8           |      |
|                                                                            | Iso-octane                | 50            |      |
|                                                                            | Toluol                    | 120           |      |
|                                                                            | Transformer oil (mineral) | 25            |      |
|                                                                            | BecFluid® 9902            | -             |      |
|                                                                            | Solution of detergent     | 4,9           |      |

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