Iran-Transfo

ITS-MC01-04

Edition 1.0 2015-01

Two Components Epoxy Resin Systems for Electrical Steel use in Oil Transformers

Technical Terms of Delivery

ITS

IRAN TRANSFO STANDARD
Research & Development Department

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Number of Pages: 5

FOREWORD

Iran Transfo Standard consists of a series of standards which are prepared on the basis of valid International standards, in conformity with Iran Transfo's technical requirements.

The initial draft has been prepared in Iran Transfo Co. Research and Development Department which is also responsible to issue finally the documents approved in professional committees after discussing them, in the form of ITS standards. It should be mentioned that all departments of Iran Transfo Co. are obligated to apply the issued ITS Standards.

All users must be assured that the latest edition of this standard will be used. The latest edition of ITS standards is also available on the ITS web site:

http://www.research.iran-transfo.com/

About this standard

The present standard has been approved in Iran Transfo Co. with collaboration of Mrs. Ebrahimi Movaghar and Mr. Farahkhah from QC Dep. and Paint and Chemicals Committee, whose members include:

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1 Scope

This technical terms of delivery specifies requirements for bonding of electrical steel (Transformer Core Sheet) to other material like NBR rubber and coating the cutting edge of electrical steel.

2 Designation code

All epoxy resin systems should be specified as blow:

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3 Specifications

3.1 Materials

This system consists of two components, epoxy resin and hardener.

3.2 Characteristics

Property	Epoxy resin	Hardener	System	Test method
Color	Transparent	Pale yellow	Pale yellow	-
Density (g/cm^3)	1.15±0.05	0.95±0.05	1.05±0.05	ISO 1675
Viscosity at 25°C (Pa.s)	30-50	30-45	30-45	ASTM D2393
Flash point	>120°C	>120°C	-	DIN 51758
Pot life 100 g at 25°C (min)	-	-	100±20	ASTM D2471

3.3 Main Characteristics

- Resistance to mechanical stresses
- Heat resistance up to 130°C
- High chemical resistance specially to transformer oil
- Good adhesion between electrical steel to other material
- The system should be cured completely at room temperature in maximum 7 days, and fast curing condition should be mentioned by supplier

3.4 Technical Data and Test

Full cured system should have the following data range:

Property	Test method	Acceptance range
Flexural Strength (MPa)	ISO 178	55 – 65
Dielectric Strength (2 mm specimen) (kV/mm)	IEC 60243-1	20 – 24
Lap share strength at 23°C (MPa)	ISO 4587	>19

3.5 Oil contamination

After 3 days immersion of specimen in 100°C hot transformer oil, the following properties of transformer oil must not deviate more than blow specified values referred to initial condition:

- Dielectric Dissipation Factor (DDF) at 90°C: <5×10^{-3} according the IEC 60247
- Maximum value of Breakdown Voltage (BV) reduce: 5% according the IEC 60156

[1] Two Components

4 Delivery, Labeling and Packing

4.1 Delivery

Epoxy resin and its hardener should be packed in separate containers. A hardener should be specified for each resin. The consignment of resin and hardener should be packed separately and delivered.

4.2 Labeling

Each containers and packages should be labeled with following data:

- Manufacture name
- Mixing ratio
- Production and expiring date
- Batch numbers
- Irantransfo designation code

4.3 Packing

Packages must be protected against heat, moisture, mechanical and chemical damages.

5 Precautions

Every supplier should provide a Material Safety Data Sheet (MSDS) for each consignment.

6 Normative references

ASTM D2393

Test Method for Viscosity of Epoxy Resins and Related Components

ASTM D2471

Standard Test Method for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins

ASTM E1356

Standard Test Method for Assignment of the Glass Transition Temperatures by Differential Scanning Calorimetry

DIN 51758

Testing of liquid petroleum products and other combustible liquids; determination of flash point by Pensky-Martens closed tester

IEC 60243-1

Electric strength of insulating materials - Test methods - Part 1: Tests at power frequencies

ISO 1675

Plastics -- Liquid resins -- Determination of density by the pyknometer method

ISO 178

Plastics -- Determination of flexural properties

ISO 4587

Adhesives -- Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies

ISO 8894-1

Refractory materials -- Determination of thermal conductivity -- Part 1: Hot-wire methods (cross-array and resistance thermometer)