Iran-Transfo

ITS-MC01-01

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Cast Resin System for Arresting of Active Parts of Power Transformers

«Araldite»

Technical Terms of Delivery

ITS

IRAN TRANSFO STANDARD
Research & Development Department

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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. Paint and Chemicals Committee, whose members include,

1- Abdollah Cheklou
2- Akbar Baqheri
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4- Hassan Mirzaei
5- Hossein Nemati
6- Mohsen Heydarian
7- Saeed Najafi
8- Yousef Nazari

CONTENTS

1 Scope

This standard covers technical specifications for supplying and application instruction for using of casting resin in order to arrest the active part of power transformers (annex A).

2 Designation code

It is valid for all cast resin arresting parts (Tank bottom and cover) which according to drawing data must be manufactured. Cast resin arresting drawings should be remarked as below

iTS-MC01-01 – Cast resin

3 Specifications

3.1 Epoxy casting resin system

3.1.1 Materials

Epoxy casting resin system contain the materials epoxy resin, hardener and filler.

3.1.1.1 Material Data

Liquid epoxy resin				
Specific gravity	at 25°C	ISO 1675	1.1-1.2	g/cm³
Epoxy content		ISO 3001	min 4	Eq/kg
Flash point		DIN 51758	≥120	°C
Viscosity		1500 – 2500		
Hardener polyamine or polyaminoamid based				
Specific gravity	at 25°C	ISO 1675	≥0.9	g/cm³
Flash point		DIN 51758	≥120	°C

3.1.2 Main Characteristics

- High resistance to mechanical stresses
- Heat resistance
- High chemical resistance specially to transformer oil up to 100 C

3.1.3 Typical Properties

- The system should be epoxy chemistry based, curing at room temperature and if required possibility to accelerate gelation / curing by warming up.
- The cast resin system (mixing) of app. 3kg should have pot life about 120 minutes and also the hardening process ca. 3-4 hours at room temperature.

3.1.4 Technical Data* and Test

On full cure at room temperature the system should have the following data range:

Property	Test Method	Unit	Acceptance range
Tensile Strength	ISO 527	Mpa	25 – 35
Elongation at break	ISO 527	%	0.5 – 1.5
Flexural Strength	ISO 178	Mpa	45 – 50
Impact Strength	ISO 179	kJ/m²	5 – 15
Martens dimensional stability under heat	DIN 53458 → 53462	°C	100 30 – 40
Dielectric Strength (2 mm specimen)	IEC 60243-1	kV/mm	20 – 24

* to reduce the curing time, the casting is often gelled at room temperature and then post-cured for 2-6 hours at 60-80°C.

VALID

4 Normative references

DIN 51758 (1985-08)
Testing of liquid petroleum products and other combustible liquids; determination of flash point by Pensky-Martens closed tester

DIN 53458 (1968-07)
Testing of Plastics; Determination of Dimensional Stability under Heat by Martens Method

DIN 53483-1 (1969-07)
Testing of Insulating Materials; Determination of Dielectric Properties; Definitions, General Information

DIN 53483-2 (1970-03)
Testing of Insulating Materials; Determination of Dielectric Properties; Testing at Standard Frequencies of 50 Hz, 1 kHz, 1 MHz

DIN 53483-3 (1969-07)
Testing of Insulating Materials; Determination of Dielectric Properties; Measuring Cells for Liquids for Frequencies up to 100 MHz

IEC 60243-1 Ed. 2.0 (1998-01-23)
Electrical strength of insulating materials - Test methods - Part 1: Tests at power frequencies

ISO 1675:1985
Plastics -- Liquid resins -- Determination of density by the pyknometer method

SO 178:2010
Plastics -- Determination of flexural properties

ISO 179-1:2010
Plastics -- Determination of Charpy impact properties -- Part 1: Non-instrumented impact test

ISO 3001:1999
Plastics -- Epoxy compounds -- Determination of epoxy equivalent

ISO 527-1:1993
Plastics -- Determination of tensile properties -- Part 1: General principles

Annex A Application instruction in Transformer

A.1 Scope

This annex specifies the method to be used for the application of cast resin system for arresting of active parts of power transformers.

A.2 Materials

A.2.1 Cast Resin System

- Cast resin
- Hardener
- Filler (Silica flour)

A.2.2 Silicon-release agent (only for normal execution)

Silicon paste (Mould release agent).

A.2.3 Universal Adhesive (only for damped oscillation execution)

A.3 Manufacturing Condition

The Active part should be after principal preparation tightened, established and pressed. The tank is prepared to install the active part.

A.4 Operating Procedure

For using the cast resin is special care necessary. The limited pot life of cast resin mass (1 hour at 45-50°C, 2 hours at room temperature) also the hardening process until vacuum resistance (7 hours at 45-50°C, 16 hours at room temperature) is the necessary time for preparing of cast resin.

A.4.1 Mixing of cast resin mass

According to the order quantity, the mix ratio of cast resin, hardener and filler should be executed parts by weight corresponding to the producer's instruction.

Degassing of cast resin occurs by stirring at a vacuum up to 1 Torr.

A.4.2 Procedure of arresting preparation

The procedure of cast resin arresting in normal and damped oscillation execution is different.

A.4.2.1 Cast resin arresting in Normal execution

The following steps should be carried out:

A.4.2.1.1 Applying of release agent

The inside surface of arresting pot (see figure) should be coated with Silicon paste completely.

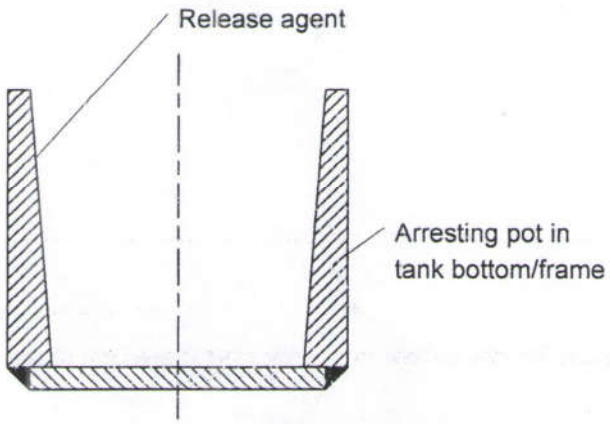

Figure 1

A.4.2.1.2 Filling of cast resin

The arresting pot should be filled with equal parts of cast resin mass.

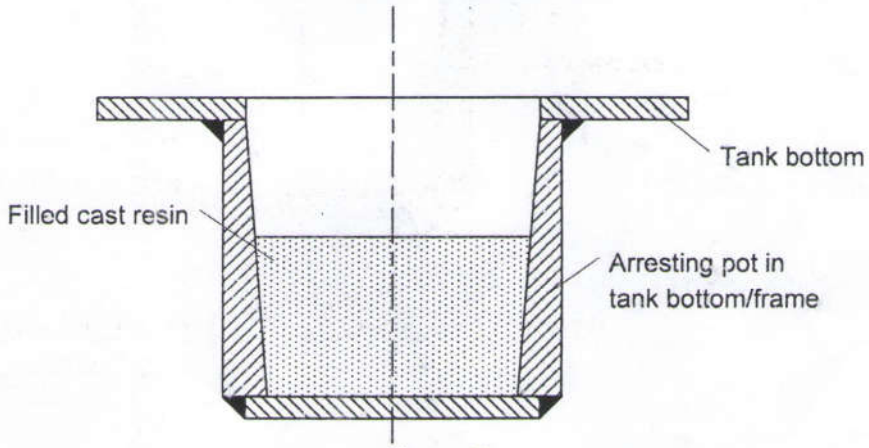

Figure 2

A.4.2.1.3 Setting of active part or cover

The positioning of active part in tank should occur within the pot life of cast resin (2 hours at room temperature, 1 hour at 45-50°C).

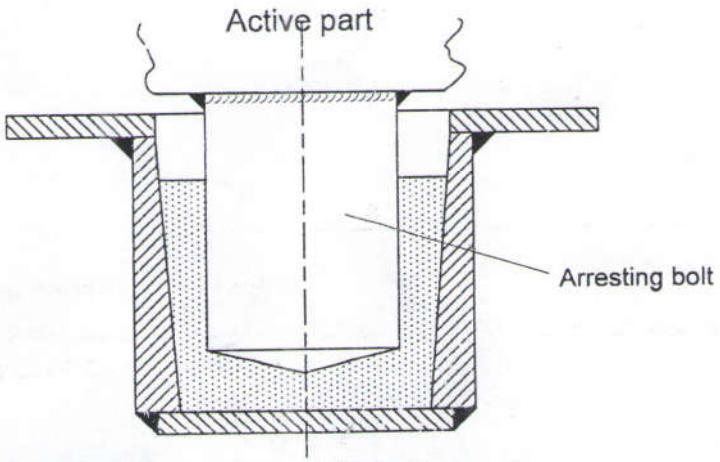

Figure 3

A.4.2.1.4 Removing of active part or cover

At a later period the active part or cover could be disassembled easily (because of release layer in the conical arresting pot).

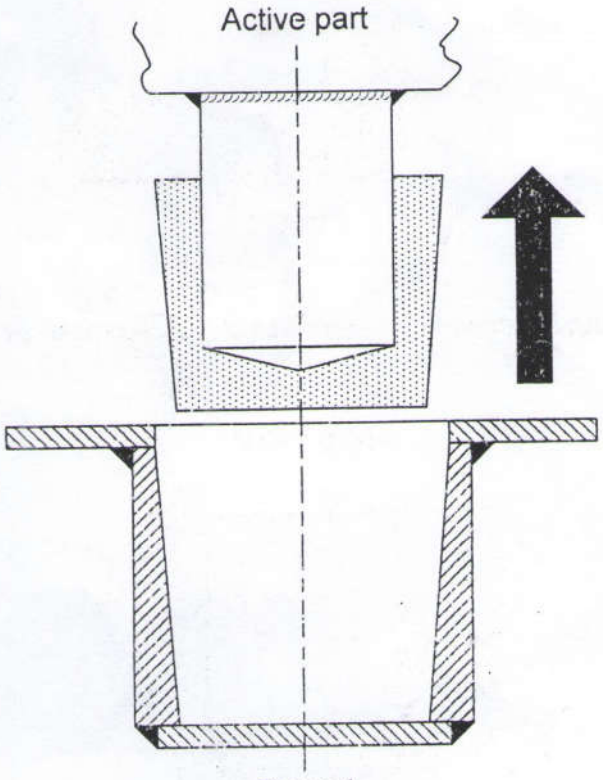

Figure 4

The adherent cast resin around the arresting bolt could be removed with hammer blows if necessary.

A.4.2.2 Cast resin arresting in damped oscillation execution

The following steps should be carried out:

A.4.2.2.1 Inlaying of microcellular rubber-strips

The preinstructed numbers of microcellular rubber-strips should be pasted to inside of arresting tube on the tank bottom with universal glue.

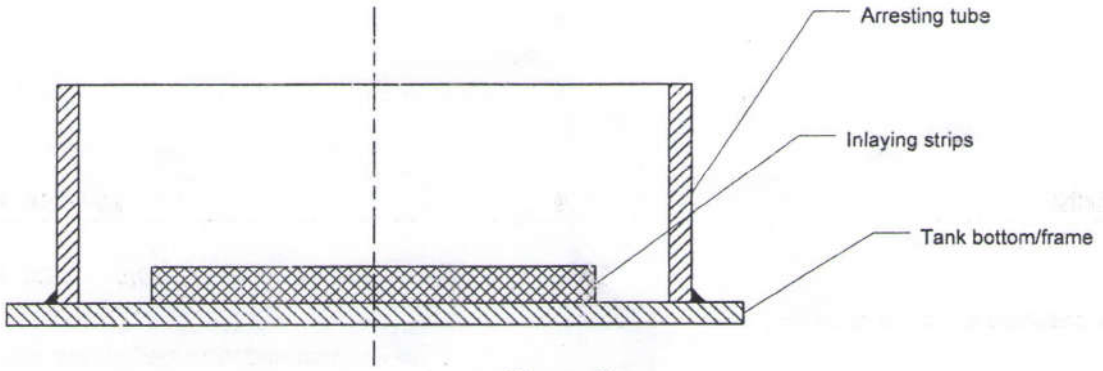

Figure 5

A.4.2.2.2 Setting of KP[1]-Pot

The KP-Pot should be set in the arresting tube without agglutination.

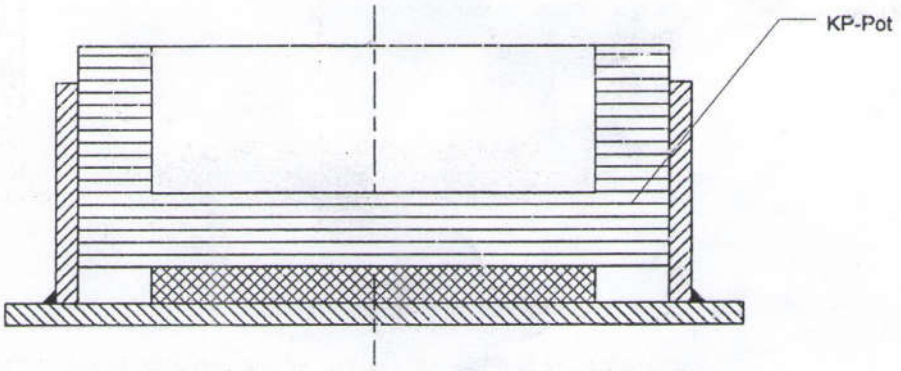

Figure 6

A.4.2.2.3 Filling of cast resin

The arresting pot should be filled with equal parts of cast resin mass.

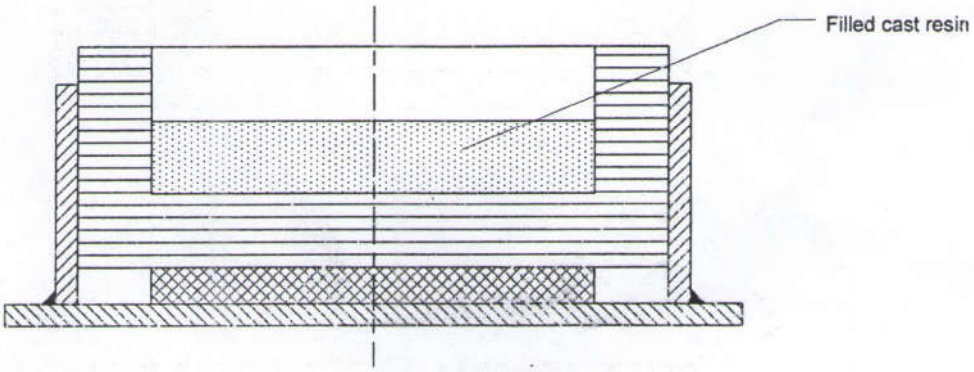

Figure 7

[1] KP = KunstharzPressholz (German) = Synthetic Resin Laminated Wood (English)

A.4.2.2.4 Setting of active part or cover

The positioning of active part in tank or mounting of cover should occur within the pot life of cast resin (2 hours at room temperature, 1 hour at 45-50°C).

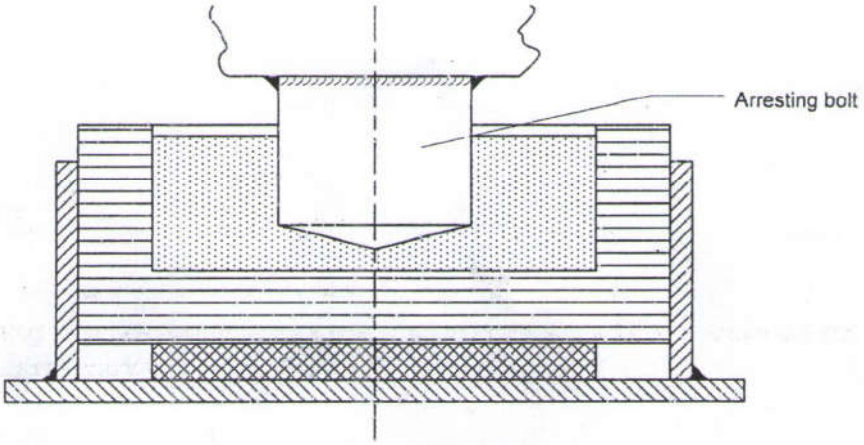

Figure 8

A.4.2.2.5 Removing of active part or cover

At a later period the active part or cover could be disassembled easily (because of tolerance between KP-Pot and arresting tube).

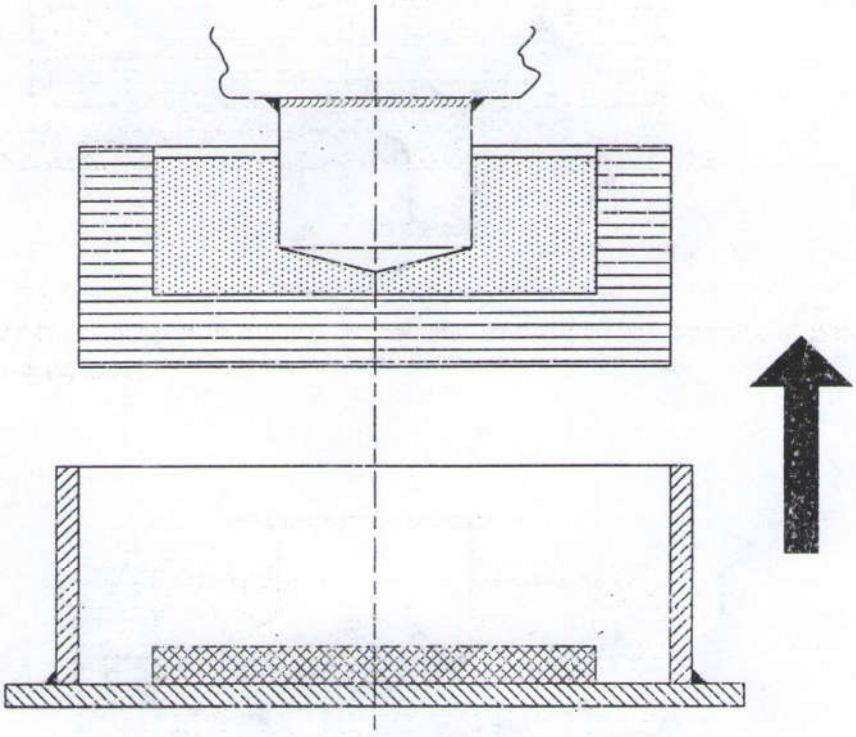

Figure 9