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חברת החשמל לישראל בע"מ
חטיבת ייצור והולכה
אגף הייצור - מחלקת הכימאי הראשי
Paints and coatings
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Specification for Coating Requirements of Power Transformers and/or Arc Suppression Coil

The coating system shall supply protection against atmospheric corrosion for periods at least 15 year without need for maintenance, for the transformer and its attached elements.

Remark: in that coating spec "transformer" means "Transformer and/or Arc Suppression Coil".

Transformers shall be positioned in various environmental conditions. Some may be positioned in deserts and exposed to strong and direct sun radiation; other may be positioned in a polluted-marine environment classified as C5-M by ISO 12944-5. All coating systems shall be complying with ISO 12944-5 C5-M as minimum requirements.

Paints shall be applied in shop in the frame of SSPC – PA1. Field painting is not permitted.

Internal surfaces shall be paint/coating protected as a routine procedure of the manufacturer, and can be proved to be successful by documents.

The oil, coating layers, insulating materials, and all other components of the transformer must not chemically react and must not interfere with each other, in order to keep the properties of each one, under the operating temperature conditions.

In case of lack of experience in antiskid painting on the cover – the manufacturer may suggest an antiskid solution that was composed by the paint manufacturer.

Cover coating shall be thicker and include tested antiskid solutions (Similar to MIL PRF24667B).

Only coating systems for which the manufacturer has previous successful experience shall be suggested.

All coating layers shall be by the same single paint manufacture.

The outer top-layer shade shall be RAL 7038. Internal shade (where applicable) shall be fair.

The transformer manufacturer is responsible for the paint and coating application quality.

The final product shall be good looking, homogeneous, free from leaks and shall have a good adhesion to the transformer matrix.

Standards use in this specification:

ISO 12944-5	Paints and varnishes -- Corrosion protection of steel structures by protective paint systems -- Part 5: Protective paint systems
SSPC – PA1	Shop, Field, and Maintenance Painting of Steel
MIL PRF24667B	PERFORMANCE SPECIFICATION: COATING SYSTEM, NON-SKID, FOR ROLL, SPRAY, OR SELF-ADHERING APPLICATIONS
SSPC PA-2 or ISO 19840	Procedure for Determining Conformance to Dry Coating Thickness Requirements
ISO 16276	"Paints and varnishes – Cross cut test"

Radiators Coating:

The radiator shall be coated with "Duplex System" (zinc galvanizing + two layers of Polymer coating)

1. Hot deep zinc galvanizing, thickness 70 μ .

Paint: 2. Base coat – Polyamide Epoxy, 60 μ .

3. Topcoat – Polyurethane 60 μ

Total paint thickness: 120 μ .

The coating technical information shall be coordinated with the paints manufacturer and shall include at least:

- Coating procedure description
Surface preparation procedures
Description of application procedures
Required surface roughness
Special treatment of problematic areas (cover, thin edges, radiators, strip coats etc.)
- Materials
Manufacturer name and address.
Generic classification of coating system.
The full commercial paints name, technical datasheets of the paints and materials.
- Quality control
Quality reports and environmental conditions during application shall be given to the tank, radiators and other elements separately.
List of Parameters to be measured and measuring standards (thickness, adhesion and their scattering are mandatory).
Tests required:
Dry Film Thickness (DFT) shall be measured according to SSPC PA-2 or ISO 19840 (the supplier has to declare which standard he uses as a routine).
Adhesion test shall be according to ISO 16276 "Paints and varnishes – Cross cut test" (or ASTM D-3359), Level 1 required.
- Previous experience:
Names and addresses of two (2) customers. Dates of application, project description.
- Maintenance repairing instructions: for damages during shipment or erection or operation of all painting systems.

Principal Options for Protective Coating

The supplier shall suggest a coating system for the approval of Israel Electric Corp. Ltd. Such approval will include checking the suggested coating system to its purpose as well as compliance with all requirements of the current document.

All thickness dimensions are **minimum** requirements.

The supplier shall declare which option he uses for protection (see options A-D):

Option A**A Duplex system- Hot deep galvanized and painted (Information to be delivered by the manufacturer):**

- Galvanizing transformers is routine at the manufacturer's (indicate two customers)
- Galvanizing shall be according to "ASTM-A 153/2003 Std spec. for Zinc coating (Hot-Dip) on iron and steel" or by an international or regional accepted standard.
- The metal shall be suitable for galvanizing
- Surface preparation according to galvanizer's procedures
- Zinc thickness: 75 microns (minimum)
- Surface preparation for painting (without passivation).
- Paint system with 2 layers of 120 micron minimum thicknesses, except cover having 220 microns (minimum) and antiskid requirements.

Option B**Painted fused sprayed Zinc (equal to IEC's Spec. CL-100):**

(Information to be delivered by the manufacturer)

- Submission of method and workers audition certificates
- Two customers' addresses with 5 years experience
- Surface preparation for Zinc spraying
- Zinc thickness of 100 microns (minimum) + coating: primer 70 micron and topcoat 50 microns, except cover having 220 microns of paint (minimum) and an antiskid requirement.

Option C**A 3 layer system Zinc-rich/ Epoxy/ Polyurethane**

- Zinc-rich base is the routine for the manufacturer (indicate two customers)
- Zinc-rich shall be stated according to ASTM-D 520
- Description of Surface preparation.
- Total Thickness of 250 micron (minimum, with base layer thickness of 70 microns) , except cover having 350 microns(minimum) and an antiskid requirements.

Option D**A 3 layer system Epoxy/ Epoxy/ Polyurethane**

- Epoxy/Epoxy/Polyurethane is the routine for the manufacturer (indicate two customers)
- Description of Surface preparation.
- Total Thickness of 350 micron (minimum, with base layer thickness of 70 microns), except cover having 450 microns (minimum) and an antiskid requirements.

Internal

- Transformer manufacturer declaration that internal coating is a routine process (indicate two satisfied customers).
- Paint manufacturer declaration for compliance with mineral transformer oil.

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