PAINTING PROCEDURES FOR MOTORS SIZE FROM SIZE 63 TO 315 EPOXY PAINTING FOR CORROSIVE ATMOSPHERE

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DATE	REV.	DESCRIPTION	PREPARED	CHECKED – APPROVED
02/09/09	0	Issue	Garanzia Qualità Augusto Madaschi	Direzione Generale Vito Failla
10/11/09	1	Plus Motor 280-315	Garanzia Qualità Augusto Madaschi	Direzione Generale Vito Failla
16/04/2010	2	New Epoxy paint enamel	Garanzia Qualità Augusto Madaschi	Direzione Generale Vito Failla
22/06/2010	3	New Epoxy paint enamel	Garanzia Qualità Augusto Madaschi	Direzione Generale Vito Failla

1. AIM

This specification aims to define fundamental characteristics of the painting process applied to motor components (made by qualified sub-contractor) and of the final painting processes applied to electric motors. It defines:

- the methods for preparing the surfaces and the type of treatment applied;
- the methods of application of painting products;
- the checks to be carried out;
- the characteristics of applied products.

2. REFERENCE DOCUMENTS

Reference documents are:

- ISO 12944 –1 Paints and varnishes – Corrosion protection of steel structures by protective paint systems - Introduction
- ISO 12944 –2 Paints and varnishes - Corrosion protection of steel structures by protective paint systems – Classification of environments
- ISO 12944 – 4 Paints and varnishes - Corrosion protection of steel structures by protective paint systems – Types of surface and surface preparation
- ISO 12944 – 5 Paints and varnishes - Corrosion protection of steel structures by protective paint systems – Protective painting systems

3. PREAMBLE

Before assembling all motors components are pre-painted according to procedure at point 4 or at point 5..

Protection of inner surfaces is described at point 6.
Once assembled, the motor is cleaned, degreased and prepared for final painting as described at point 7.

If the customer require for characteristics (thickness or colour different from CEMP Standard), this specification is integrated by Attachment 1 “Particular Painting Requisition”.

Table of used cycle

Motor type	Painting of components	Protection of inner surfaces	Final painting cycle
From 63 to 250	Ref. 4.1 – 4.2 – 4.3 – 4.4	6	7
From 280 to 315	Ref. 5.1 – 5.2 – 5.3	6	7

4. PAINTING PROCEDURE FOR COMPONENTS (MOTOR FRAME 63 TO 250)

This procedure is done by qualified sub-contractor on aluminium, steel and cast iron electric motor’s components.

4.1 – Surface preparation – sandblasting

Before treatment at point 4.2, all the component are sand blasted (level Sa 2 ½ according ISO 8501-1).

4.2 - Surface preparation – cleaning

Surface preparation treatment (degreasing) purpose is to eliminate any substances or foreign bodies that could contaminate the single component (such as oil, grease, oxidations …) and guarantee the best duration and effectiveness of painting.

Components pre-treatment is done in a 6 station tunnel:
- Step 1: degreasing with alkaline solution (sprayed at 3 atm);
- Step 2: 80 °C water rinse (sprayed at 3 atm);
- Step 3: degreasing with acid solution (sprayed at 3 atm);
- Step 4: 80 °C water rinse (sprayed at 3 atm);
- Step 5: 80 °C water rinse (sprayed at 3 atm);
- Step 6: 80 °C demineralized water rinse (sprayed at 3 atm).

At the end of the tunnel all components are controlled with elimination of water by compressed air blowing. All components are oven dryed (temperature 160 °C).

4.3 – Site conditions

Site condition of painting shop are:
- Ambient temperature from + 5 °C to + 35 °C;
- Humidity level less than 70%.

4.4 – Components powder painting cycle

- Material: Standard paintwork by thermohardending epoxy-polyester powder (e.g.: Akzo Nobel – Epoxy Polyester Interpon 700 or equivalent), colour RAL 5010:
- Paint application: First coat is made manually for critical areas, then the powder is automatically sprayed with electrostatic gun on all the surface
- Minimun film thickness 100 - 120 μm;
- Paint reticulation in oven temperature at 200 - 220 °C. Time for complete reticulation: 60 minutes;
- Cooling of components;
- 100% visual control of components;
- Packaging.

4.4.1 - Principal characteristics of epoxy-polyester powder.

Epoxy-Polyester powder (Interpon 700 or equivalent)		
Product description	Thermohardending epoxy polyester based powder, with special catalyst. Special formulation for industrial application. Good mechanical, weather and chemical agents resistance.	
Powder properties	Chemical type	Epoxy and Polyester
	Particle size	Suitable for electrostatic spray
	Specific gravity	1.2 – 1.7 g/cm^3
	Stoving schedule	15 minutes at 170 °C (object temperature)
Application	Epoxy-polyester powder can be applied on a variety of substrates: surfaces to be coated must be cleaned and free from grease. The powder can be applied by manual or automatic electrostatic equipment. It is recommended that powder film thickness be between 80 – 100 microns.	

4.5 – Controls and tests

Following tests are carried on 5% of painted components, directly by the sub-contractor.

Thickness test
The dry film thickness is measured according to proper specification.

Adhesion test
The adhesion of the paint is checked according to ASTM D3359 B method.

5. PAINTING PROCEDURE FOR COMPONENTS (MOTOR FRAME 280 TO 315)

This procedure is done by qualified sub-contractor on cast iron electric motor's components.

5.1 – Surface preparation – sandblasting

Before treatment at point 5.2, all the component are sand blasted (level Sa 2 ½ according ISO 8501-1).

5.2 – Components pre-treatment

After sanding and fettling, cast iron components of series A280 – 315 are pre-treated with anticorrosive primer by dipping (type Z.F Montidrol 9.311.2336). Minimun film thickness 80 μm;

Site condition for this type of treatment are:
- Ambient temperature from + 5 °C to + 35 °C;
- Humidity level less than 70%.

5.2.1 – Principal characteristics of anticorrosive primer

Z.F. Montidrol 9.311.2336 type		
Product Description	Painting product with good resistance to atmospheric agents; it's possible to overpaint with nitro enamel after completely dried. This product is suitable as rust preventer for cast iron components.	
Drying schedule	Touch dry	4 hours (air drying)
	Completely dried	48 hours (air drying)
	Flash period	15 minutes (oven temperature at 20°C)
	Complete drying	30 minutes (oven temperature at 80°C)

5.3 – Controls and tests

Following tests are carried on 5% of painted components, directly by the sub-contractor.

Thickness test
The dry film thickness is measured according to proper specification.

Adhesion test
The adhesion of the paint is checked according to ASTM D3359 B method.

6. PROTECTION ON INNER SURFACES

This procedure is applied to motor component's before assembling:
- Unpainted and uncovered inner surfaces including rotor are protected by a layer of fungicidal polyurethane varnish type LECHSYS HYDRO drying on air.
- Winding undergo to an additional impregnation with layer of fungicidal polyurethane varnish type Synthite AC 46, drying on air.

7. FINAL MOTOR PAINTING

7.1 – Epoxy painting

This procedure is applied on assembled motors, when request for use in highly corrosive environments.

Painting procedure:
- Solvent degreasing of motor external surfaces;
- Sanding by means of sand-paper grade P150;
- Coating by means of spray gun with layer of epoxy paint;
- Minimum film thickness for every layer 80 μm;

- Warm-air drying (40 °C);
- After touch dried, application of other layers up to reach request thickness;
- Between layers, warm-air drying (40 °C).

7.1.1 - Principal characteristics of epoxy enamel paint

Epoxy paint		
Product description	Epoxy enamel with good resistance to acid and alkaline	
Properties	Drying schedule (air temp. at 20 °C)	30-45 minutes tack free 2–3 hours touch dry 24–36 hours completely dried
Application	The epoxy paint is applied by means of spray guns, with dilution of 15%, after preparation with catalyst.	

7.2. Tests

Following tests are carried on finished motors painted. Control and test performed according to proper procedure.

Thickness test
Measurement of the dry film thickness (on all motor after epoxy paint).

Adhesion test
The adhesion of the paint is checked according to ASTM D3359 B method. This test is performed on 1 motor for each batch.

Colour test
Check of final request colour (on all motor after epoxy paint).

8. EXPECTED LIFE OF PAINTING MOTORS USE LIMITS

Motors treated with this cycle are suitable for use in highly corrosive environments.
As defined by standard ISO 12944-5, this painting system has an expected durability of:

Classification of environment	Thickness	Expected durability
C3 – Medium corrosivity	240 μm	15 years
C4 – High corrosivity	240 μm	10 years
	280 μm	15 years
C5I – Very high corrosivity (industrial)	240 μm	5 years
	280 μm	10 years
	320 μm	15 years
C5M- Very high corrosivity (marine)	--	Not applicable

9. ATTACHMENT

The attached form is filled for special request of colour and thickness of painting, different for CEMP standard.

cemp
Flameproof
Motors

ATTACHMENT 1

PARTICULAR PAINTING REQUISITION

Project Ref:

Customer:

☐ **Order:** ☐ **Offer:**

Surface preparation: Sand Blasting level Sa 2 ½ (ISO 8501-1)

Type of final coat: Epoxy painting

Colour: RAL 5010

Final thickness: 240 μm

Test:
- ☐ **Thickness test**
- ☐ **Colour test**
- ☐ **Adhesion test**

☐ **Report of painting test is requested**

Note:
this form is filled when customer has request different from CEMP Standard.