

## PAINT SPECIFICATION - Three-phase Motors

This document has been prepared as information for customers and describes the paint systems applied in the factory.

### 1. Corrosion prevention

For the purpose of motors corrosion prevention, standard -worldwide, special - worldwide, special maritime climate or Off-Shore special paint systems are offered. The paint systems are suitable for a variety of environmental impacts. Temperature resistance -40°C to 140°C.

**The standard paint system** - worldwide is suitable for the group of climates "World-wide" according to IFC Publication 60721-2-1 (edition 1992), (more specified in appendix 2).

The paint design complies to **class C2** acc. to EN 12944-2. It is recommended for motors operating indoors or outdoors under cover, protected against the direct effects of weather. Chemical impacts (e.g. salts, acids, alkali) are not allowed. Suitable up to 60% rel. humidity at 40°C.

**The special paint system** - worldwide (order code 1(26, S70) is suitable for the group of climates "World-wide" according to IEC 60721-2-7 (edition 1992) (more specified in appendix 2), The paint design complies to **class C3** acc. to EN 12944-2. It is recommended for machines operating outdoors and exposed to the direct effects of sunlight and/or weather, industry climate with gentle SO<sub>2</sub> influence. Possible chemical impacts up to 7% acid and alkali concentration. Tropical proof up to 100% rel. humidity at 40°C.

**The marine climate special paint system** (order code M94, part of C19, Crane Motors) is suitable for the group of climates "World-wide" according to IEC Publication 6072 1-2-1 (edition 1992) (more specified in appendix 2). The paint design complies to **class C4** acc. to EN 12944-2. It is recommended for machines operating outdoors and exposed to the direct effects of sunlight and/or weather. Typical use: Industry climate with mild SO<sub>2</sub> influence, VIK requirements, sea climate but not offshore climate. Possible chemical impacts up to 5% acid and alkali concentration. Tropical weather resistant up to 75% rel. humidity at 50°C.

**The special paint system -offshore** (order code M91, S04 part of C26) is suitable for the corrosion **class C5** according to EN 12944-2. It is recommended for machines operating outdoors and exposed to the direct effects of sunlight and/or weather. Typical using: Industry climate with mild SO<sub>2</sub> influence and offshore sea climate. Possible chemical impacts above 5% acid and alkali concentration. Tropical weather resistant up to 75% rel. humidity at 60°C.

For motors intended to operate under climatic situations, which are not described above a different paint system can be agreed upon.

### 2. Paint systems

#### 2.1 Surface pre-treatment

Cast iron parts are shot blasted. According to EN ISO 8501-1 the surfaces comply with degree of cleanliness Sa 2 ½ (metallic clean).

Steel parts are cleaned by hand and degreased where necessary. Shot blasting for the degree of cleanliness Sa 2 ½ (metallic clean according to EN ISO 8501-1) will exclusively be applied upon customer request or when the paint system is intended for nuclear power purposes or in case of offshore special paint system.

Small parts are only degreased (not shot blasted).  
Aluminium parts are cleaned and degreased.  
Plastic parts are cleaned and degreased.

## **2.2 Primer**

### **2.2.1 Priming of cast iron housings and steel parts**

The primers in use are solvent or water borne acryl or alkyd resins with zinc-phosphate as active pigments for the corrosion prevention. They are applied in a thickness of the dried film of approximately 30 µm. The parts for offshore special paint system are hot dip zinc galvanized on both sides (housing only outer side)

### **2.3 Cleaning of surfaces after assembly**

After assembly all contamination such as oil, grease and impurities are removed with cleaning agents.

### **2.4 Standard paint system - worldwide**

On primer pre-treated external surfaces a 2-part epoxy resin top coat is applied after final assembly. The dry film thickness is approximately 30 µm. The standard colour shade is RAL 7030 (stone grey). The degree of gloss is 35-50% at a gloss angle of 60° according to ISO 2813 (semi-gloss).

### **2.5 Special paint system - worldwide**

After assembly a 2-part epoxy resin top coat is applied on external surfaces with a dry film thickness of about 60 µm. The standard colour is RAL 7030 (stone grey). The degree of gloss is 35-50% at a gloss angle of 60° according to ISO 2813 (semi-gloss).

### **2.6 Special paint system- marine, offshore**

At first an intermediate 2-part epoxy resin coat is applied on external surfaces with a dry film thickness of about 60 µm. Followed by 2-part epoxy resin coat applied on all external surfaces with a dry film thickness of about 60 µm. The standard colour is RAL7030 (stone grey). The degree of gloss is 35-50 % at a gloss angle of 60° according to ISO 2813 (semi-gloss).

### **2.7 Film thicknesses**

The total dry film thickness of 60 µm respectively 90 µm represents an optimum measure with respect to corrosion resistance, mechanical strength (bond strength) and motor generated heat dissipation. Upon customer request it is possible to supply motors with thicker dry film in order to achieve an improved protection against severe environmental conditions. In such cases it should be kept in mind that an increased dry film thickness is accompanied by a reduction of mechanical strength (bond strength) and impaired motor generated heat dissipation.

If requested by the customer, the required total film thickness will be randomly checked before the motor is despatched. If not specifically requested otherwise or agreed with the customer, the total film thicknesses stated above is considered as average value calculated from 5 readings made by magnetic paint thickness measurements according to ISO 2178. The readings are taken from different spots on the motor surface, which are at least 10mm distant from the edges.

Complicated housing geometry is the reason for non-uniform film thickness. For this reason, minimum, nominal and maximum values are provided for the primer coat as well as for the total coat. They are defined below:

#### **2.7.7 Minimum value**

The minimum value is the requirement for surfaces that are not easily accessible, e.g. ribs sides and slot bottoms.

#### **2.7.2 Nominal value**

This value is valid for all plane surfaces.

### **2.7.3 Maximum value**

The maximum value is the requirement for surfaces within the overspray region of areas that are not easily accessible, e.g. rib peaks. Dry film thicknesses exceeding the recommended maximum value within complicated geometric areas must be tolerated.

### **2.7.4 Total thickness**

The total thickness for the paint systems listed in Table 1 is a minimum film requirement. A minimum thickness for each film (primer coat, top coat) cannot be guaranteed due to surface complexities. For areas that are not easily accessible during the coating process (e.g. rib bottom) a lower thickness must be tolerated.

## **3 Recoating**

### **3.7 Primed surfaces**

If requested, motors can be ordered coated in primer only. Before over painting with a top or intermediate coat, the entire surface must be cleaned and degreased. The primed surfaces can generally be over coated with all types of intermediate and top coats. If in doubts please consult the manufacturers (see § 6).

### **3.2 Repair procedure**

After grinding, cleaning and degreasing the surfaces, both the standard and special paint may also be recoated with all types of paint. If in doubts please consult the manufacturers (see § 6).

## **4 Toxicity**

Toxic substances, such as cadmium, lead, chrome or their compounds are not contained in any of the paints of the manufacturers standard colour range.

## **5 Standards**

IEC 60721-2-1 -Electrical engineering; classification of environmental conditions; environmental conditions appearing in nature; temperature and humidity

EN ISO 2178 -Non-magnetic coating on magnetic substrates; Measurement of coating thickness; Magnetic method

EN ISO 8501-1 -Preparation of steel substrates before application of paints and related products; Visual assessment of surface cleanliness

Part 1: -Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.

EN ISO 2813 -Paints and varnishes; Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°

EN ISO 12944-2 -Paints and varnishes; Corrosion protection of steel structures by protective paint systems

Part 2: Classification of environments

## **6 Used paint materials**

Approved Suppliers:

Weckerle GmbH & Co. KG

Strohgäustrasse 20 D-70435 Stuttgart, Germany

Tel. +49-711-82601-0

### **6.1 2-Component Epoxy Intermediate Coat**

Weckerle

Trade name WECO-FAN-EP-2K

Part No. 41601125222

Colour RAL 1015, light ivory

Hardener 41931850000

### **6.2 2-Component Epoxy Top Coat**

Weckerle

Trade name WECO-FAN-EP-2K

Part No. 41601125666

Colour RAL 7030, stone grey

Hardener 10400001814

### **6.3 2-Component Epoxy Top Coat**

Weckerle

Trade name WECO-POX-2K-HS

Part No. 17601030130

Colour RAL 7030, stone grey

Hardener 17960180000

Attached is: Table 1

Table 1

Frame Sizes 63-315	1	2	3	4
	Standard Paint System "worldwide" C2 to EN12944-2	Special Paint System "worldwide" C3 to EN12944-2	Marine Climate Special Paint System C4 to EN12944-2	Special Paint System for Offshore C5 to EN12944-2
<b>Priming of internal &amp; external surfaces</b> Type: Colour: Dry film thickness*:	Acrylic resin Red-brown 20µm- <b>30µm</b> -60µm			Zincd** Grey 20µm- <b>30µm</b> -60µm (inside) 40µm- <b>50µm</b> -60µm (outside)
<b>Intermediate coat on external surfaces</b> Type: Colour: Dry film thickness*:	n/a	n/a	2-Component Epoxy Resin Light ivory (RAL 1015) 50µm- <b>60µm</b> -70µm	2-Component Epoxy Resin Light Ivory (RAL 1015) 50µm- <b>60µm</b> -70µm
<b>Top coat on external surfaces</b> Type: Colour: Degree of gloss: Dry film thickness*:	2-Component Epoxy Resin Stone Grey (RAL 7030) 60° 35-50% (DIN 67530) semi-gloss 20µm- <b>30µm</b> -60µm	2-Component Epoxy Resin Stone Grey (RAL 7030) 60° 35-50% (DIN 67530) semi-gloss 50µm- <b>60µm</b> -90µm	2-Component Epoxy Resin Stone Grey (RAL 7030) 60° 35-50% (DIN 67530) semi-gloss 50µm- <b>60µm</b> -90µm	2-Component Epoxy Resin Stone Grey (RAL 7030) 60° 35-50% (DIN 67530) semi-gloss 50µm- <b>60µm</b> -70µm
<b>Total film thickness*</b>	40µm- <b>60µm</b> -120µm	70µm- <b>90µm</b> -150µm	120µm- <b>150µm</b> -220µm	140µm- <b>170µm</b> -200µm
<b>Installation/Use</b>	Indoor/Outdoor Under cover Industrial climate	Outdoor Chemical industries	Outdoor Marine environment Chemical industries	Outdoor Marine offshore environment Chemical industries

\***Dry film thickness:** minimum value-**nominal value**-maximum value

\*\*Only cast iron motors can be Hot Zinc Plated (not aluminium motors).