

High quality surface treatment of Capacitors



High quality surface treatment of capacitor units

Capacitors are installed in widely varying and often severe environmental conditions, and normally operate for long periods without inspection. A thorough surface treatment of the capacitors is therefore necessary in order to meet the environmental conditions. The surface treatment system used by ABB Capacitors is part of the company's overall approach to quality and satisfies very stringent requirements.

Surface treatment on a continuous conveyor

The capacitor containers are made of ferritic Ti-stabilized chromium steel plate and are fully welded in robot production stations. The surface treatment operations are performed in a specially designed conveyor installation. Each capacitor is suspended in a cart on the conveyor and the surface treatment program is entered into the central computer via a bar code reader.

The computer keeps track of the location of each cart, thus ensuring that every capacitor unit is subjected to its particular surface treatment program.



Cover photo:
Inside the IR oven

ABB Capacitors manufactures capacitor units for outdoor applications with the best surface treatment system available. The quality of the surface treatment is verified both by laboratory and field tests.



Station 1: Washing

The capacitor units are automatically washed and rinsed in water in a closed system.

Station 2: Electrical testing

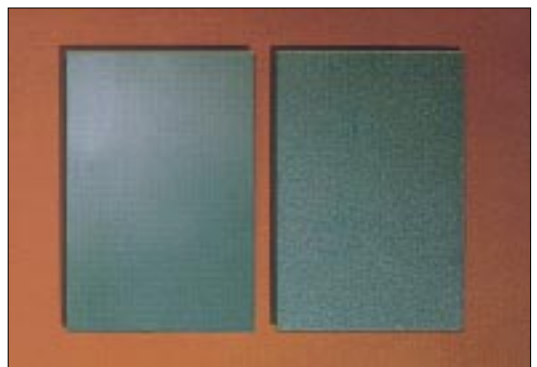
All capacitor units are routine tested according to the applicable standards.

Station 3: Blasting

The capacitor units are blasted with mineral blasting material. The blasting process cleans the metal and makes the surface rough (see illustration), creating excellent conditions for good paint adhesion. Good adhesion ensures good resistance to damage caused by handling and by humid environmental conditions. It also improves the protection against effects of chemical or corrosive environmental conditions.

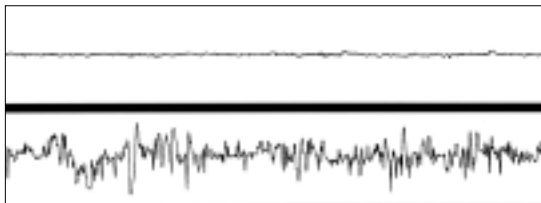


Programming of the blasting robot.



Appearance of sheet metal surface before blasting.

Appearance of sheet metal surface after blasting.



Surface profile of metal before and after blasting

Station 4: Painting

The capacitors move on to the painting station, where they are electrostatically painted by a robot. Electrostatic painting allows the amount of paint applied to be accurately controlled, to give a uniform coating and to prevent paint wastage.

A two-component paint is used. It is mixed in a controlled continuous process at the painting station. Paint and hardener are subjected to continuous laboratory tests (by the supplier).

As a result of extensive development work, the paint has excellent resistance to mechanical and chemical attack (see next page).



The painting robot is controlled by the computer

Station 5: Drying and hardening

The paint on the capacitor units is hardened in an IR oven (see cover photo), making it quickly ready for further handling.

Quality control

The results of surface treatment are checked by frequent inspections.

Among the factors inspected are the degree of blasting and the thickness and appearance of the paint coat.



The degree of blasting is compared with a reference scale

For more than seventy years, ABB Capacitors has manufactured power capacitors for small and large installations all over the world. ABB Capacitors in Ludvika bears overall responsibility for the capacitor business of the ABB Group.

ABB Capacitors is certified according to ISO 9001 (quality) and ISO 14001 (environment).

The product range of ABB Capacitors covers most types of capacitors for power applications, for instance:

- High voltage shunt banks
- Harmonic filters
- Series compensation
- Static var compensators
- High voltage direct current (HVDC) installations
- Capacitive voltage dividers (CVDs).

Properties of the paint

The paint is an oxirane-ester based on ethoxilated vegetable oil. It contains pigments for both rust protection and colour.

The chart below shows the properties of the paint coating after application to chromium steel sheet that has been blast cleaned to Sa 2 1/2 according to ISO 8501-1:1988.

Mechanical data			
Coating thickness	ISO 2808, Min 80 µm		
Gloss	Semi matte		
Colour	Grey, Munsell 5BG 7/1		
Hardness	ISO 1522, 130 s		
Adhesion	ISO 2409, Degree 0		
Elasticity	ISO 1520, 1 mm		
Chemical resistance to solvents and chemicals at room temperature (ABB 1017 2001)			
Industrial alcohol 50 %	24 hours	Temporary softening	
Acetone	10 minutes	Temporary softening	
Xylene	3 hours	Good	
Trichloroethylene	3 hours	Good	
Hydrochloric acid 10 %	3 hours	Good	
Sodium hydroxide 3 %	24 hours	Good	
Thermal resistance			
Mineral oil at 90°C	400 hours	ABB 1017 6001	Good
Dry hot air	120 °C	Slight change in colour may occur	
Temperature changes	500 hours	ABB 1017 3012-1(-20 °C – +55 °C)	Good
Neutral salt spray chamber	1000 hours	ISO 7253	Good
Moisture	1000 hours	DIN 500 17	Good
Corrosion in marine atmosphere	4 years	ABB 1017 3001	Very good
		Spread of rust from scribe mark (both sides) 10 mm*	
Gloss after 2 years in marine atmosphere	ABB 1017 300	Some reduction of the gloss of the paint may occur	

*) The surface treatment system offers very good corrosion protection outdoors, also in a marine atmosphere with a limited salt deposition.



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Edition 4, 2005-12