

Application Guide

Heat Transfer (Sublimation) Process



Application Guide for Jotun Architectural Powder Coatings using the Heat Transfer (Sublimation) Process

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1.0 Introduction

This document provides guidelines for the factory application of Jotun Façade for the wood finish effect using sublimation process. Jotun Façade powder coatings are used for the aesthetic and corrosion protection of architectural aluminum and claddings.

2.0 General overview

Jotun Façade Powder Coatings are exterior durable powder coatings designed as a base coat for sublimation or heat transfer decoration technique to meet the stringent requirements of the construction industry. It provides longevity to the projects and building components by ensuring gloss retention, colour stability and corrosion protection.

The critical steps that must be controlled are:

- 1) Surface preparation and pre-treatment
- 2) Drying
- 3) Base Coat Application
- 4) Curing of the Base Coat
- 5) Storage of Base Coated Components
- 6) Jigging and Application of the Heat Transfer Film
- 7) Curing
- 8) Final inspection and quality control

3.0 Surface preparation and pre-treatment

Proper attention should be given to the cleaning and preparation of the aluminum components.

The aluminum or aluminum alloy must be suitable for the pre-treatment and the coating process. It should allow the coating to perform according to technical properties specified in the Product Data Sheets for Jotun Façade, as well as other properties specified for these systems. The substrate must be bare clean, free from corrosion, and not exposed beforehand to any anodic or organic coating.

There must be no sharp edges. The edges radii must allow the coating to completely cover the whole object's surface to ensure adequate film thickness and prevent holidays.

3.1 Handling

- 3.1.1 Components or objects must be carefully handled. Avoid contamination with dust, oil, fat, finger marks, etc.
- 3.1.2 Care should be taken to secure a proper treatment of the total area.

3.2 Pre-treatment

3.2.1 It is recommended that the following pre-treatment is performed. Moreover, always follow the chemical supplier's recommendation.

- a) Degreasing / etching – alkaline or acidic. Etching degree must be ≥ 1 g/m².
And ≥ 2 g/m² if the coated component is exposed to sea climate area.
- b) Rinse
- c) Acid wash
- d) Rinse
- e) Chromating
- f) Rinse
- g) Rinse, using demineralized water (the last running water from the object should be tested at 20°C. The readings should be taken from the open sections and readings should be below 30 μ Siemens/cm).

3.2.2 The coating thickness of the chromate conversion layer should be:

Yellow chromate = 0.6 – 1.2 g/m²

Green chromate = 0.6 – 1.5 g/m²

The color of the pre-treatment will have an influence on the final appearance of the coating. A final quality check with the stakeholders to verify that the final appearance is as per standard is advisable.

3.2.3 Chrome-free pre-treatment

Suitable chrome-free pre-treatments are also recommended. Due to the variety of chrome-free pre-treatments available today, only the approved systems from Qualicoat and GSB should be used. Detailed advice should be sought from the pre-treatment supplier.

4.0 Drying

Pre-treated aluminum components should be dried in an oven. Maximum object temperatures in the drying oven must not exceed 100°C. Perform the process according to the chemical supplier's written instructions.

5.0 Base Coat Application

Pre-treated aluminum components should never be handled with bare hands.

Pre-treated aluminum components are to be transferred to the coating process immediately in a clean and dry state, to avoid deterioration of the pre-treatment integrity. Pre-treated components should be powder coated within 12 hours. Otherwise, pre-treated components should be properly stored in a cool, dry place and should be covered with a clean plastic sheet.

A single coat application should be undertaken in one operation, to a film thickness of 80 – 100 microns for exposed areas. Wider film thickness variation can lead to pronounced color difference in the final color of the coated profiles. The coating thickness should not exceed 100 microns if the coated aluminum component is to be treated mechanically after coating (i.e. sawing, milling, drilling, etc.).

6.0 Curing of the Base Coat

Powder coated aluminum components should be cured in a curing oven, using the curing schedule as per product data sheets of Jotun Façade. The temperature of the object to be coated must be recorded once a week. The temperature is best obtained by measuring it at the thickest wall of the object, while the oven is fully loaded.

The air temperature in the curing zone must not deviate from the adjusted nominal temperature by more than $\pm 5^{\circ}\text{C}$. It is important to a fully cured base coat to ensure an easy removal of the film after the sublimation process. Refer to the relevant technical datasheet of the base coat.

7.0 Storage of Base Coated Components

Base coated aluminum components should never be handled with bare hands.

Base coated components should be unloaded and transferred to a clean rack or other similar container. Components should be allowed to cool down prior to the application of the film. Base coated components should never be dropped or collide with any hard surface to prevent damage to the base coating. Base coated components should be decorated with a suitable film within 12 hours. Otherwise, base coated components should be properly stored in a cool, dry place and should be covered with a clean plastic sheet. To avoid deterioration of the base coat components, maximum storage of base coated components should be < 72 hours.

8.0 Jigging and Application of the Sublimation Film

Proper maintenance of equipment (including cleaning) is a must to have reproducible results.

The presence of impurity on the profile surface (dust, grains, aluminum chips) prior and during sublimation process leads to permanent faults on the quality of wood finish.

Before the application of the sublimation film, masking tapes are installed on the both ends of each coated aluminum component.

Depending on the geometry and size of the coated aluminum component, the size of the film is pre-determined. The proper size of the bag is calculated as the addition of the total external perimeter of the profile plus 200mm. Once the sublimation film is selected, the base coated aluminum components are assembled on a conveyor for the sealing of the sublimation film. The bag can be sealed using either an automatic bagging-machine (ultrasonic welding) or manually by using a tape.

8.1 Batch Type Sublimation Process

Film sealed base coated aluminum components are assembled one by one on a trolley with vacuum accessories. Film ends at the edges of the base coated aluminum components are inserted on sealing tubes and locked in. Once the steel rectangular table is filled, the sublimation film on the base coated aluminum components is then vacuum sealed. In order to get a good film contact to the coated aluminum, it is recommended to have an applied vacuum of 200KPa or 29 psi.

The Trolley with accessories is transferred to the sublimation oven for the process of ink transfer into the powder coating.

8.2 Continuous Type Sublimation Process

Film sealed base coated aluminum components are assembled one by one onto a conveyor. One by one, the film ends at the edges of the base coated aluminum components are inserted on sealing tubes and locked in. The sublimation film on the base coated aluminum components are then air vacuumed. In order to get a good film contact to the coated aluminum, it is recommended to have an applied vacuum of 200KPa or 29 psi throughout the sublimation process.

One by one, these vacuum sealed coated aluminum components in the conveyor are transferred to the sublimation oven for ink transfer.

9.0 Sublimation

The vacuum sealed powder coated aluminum components must be cured as specified by the film supplier. In order to get a proper ink penetration, the metal temperature on the profile must not be below 190°C and not exceed 200°C (see the relevant Product Data Sheet). Final color of the wood finish can vary if the curing temperature (as recommended by film supplier) is not achieved. The temperature of the object to be

coated must be recorded once a week. The metal temperature is best obtained by measuring it at the thickest wall of the object using a surface temperature probe. The air temperature in the sublimation zone must not deviate from the adjusted nominal temperature by more than $\pm 5^{\circ}\text{C}$.

10. Handling

Once the coated aluminum components are out of the curing oven and cooled down, compressed air is blown into the bag of the sublimation film for easier removal.

Coated aluminum components should be cooled to below 40°C before manual handling.

Precaution should be taken to avoid damages on the finished coating during stacking, packaging, storing and transportation.

11. Final inspection and quality control

Thorough inspection and coordination with the other application steps are essential for a quality coating. Inspection should be considered as part of the process control operation and not just a decision point for approving or rejecting coatings. If each processing step is done correctly, a high quality coating is assured.

Regular quality control tests to be carried out after base coat curing include film thickness, visual assessment of the color and visual appearance of the coating. The surface of the coating must be continuous and damage-free. The base color of the coating must be even.

Regular quality control tests to be carried out after the curing process include film thickness, visual assessment of the color, gloss, adhesion and other mechanical properties, and visual appearance of the coating. Cure test can be carried out using the MEK (Methyl Ethyl Ketone) test.

12. Packing

Special care must be taken when loading and unloading the coated components and objects. Reasonable care should be exercised during handling. To prevent any damage during transportation, each coated object or component should be packed individually and isolated from other objects or components by a Kraft paper, plastic sheet, foam pad or any other equivalent that serves the purpose. Regular adhesive tapes should never come into direct contact with the coating. Should protective tape be required, then only a specially designed tape for the protection of coated aluminum shall be used. No residue of any nature should be left on the finished product. If coated aluminum components are wrapped with any plastic sheet, these coated aluminum components should not be subjected to high heat or high humidity or direct sunlight.

Note: The information on this Application Guide is given to the best of the manufacturer's knowledge, based on laboratory testing and practical experience. Jotun Powder Coatings reserves the right, without notice, to alter or change the content of this Application Guide.

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