RILSAN®
FINE POWDERS

# Rilsan® coating application methods and recommendations

## Fluidized Bed Dipping Process

### PRINCIPLE OF THE PROCESS

Fluidized bed dip-coating consists of immersing a heating part into powder suspended by rising air flow. As soon as the Rilsan® powder comes into contact with the preheated article, it melts and forms a film on the surface of the component. This process produces a consistent thickness, even on parts with complex profiles (internal and external coatings in one operation). The dip-coating process is efficient (100% transfer) and straightforward. All Rilsan® T/FB grades have been developed specifically for this technology along with a tailored primer range (**For more information, please refer to the leaflet on Surface pre-treatments and primers**).

### CRITERIA FOR CHOOSING THIS PROCESS

Dip-coating application simplifies the coating process by combining excellent productivity with outstanding thickness reproducibility. It can be easily automated and is generally selected depending on the following criteria:

- **Thickness of the part**
The process is particularly suitable for parts with a metal thickness of at least 3 mm. For small diameter wire articles, a post fusion operation may be required following the dip-coating operation.

- **Thickness of coating**
The process allows the application of Rilsan® coatings with a thickness from 250 to 500 µm. For very massive parts, it is possible to apply thicker coatings by increasing dipping time, or by successive dipping operations.

- **Size of the part**
The dimension of the part determines the size of the tank. Very heavy or very long components (tubes) can be coated by this method, but will require specific handling equipment.

- **Nature of the substrate**
Any type of material that can withstand the necessary oven preheat temperatures.

### EQUIPMENT FOR DIP COATING

**FLUIDIZING TANK**
The fluidizing tank should consist of 2 stainless steel sections separated by a porous tile. The air used for fluidization should be at ambient temperature, clean and dry. In the case of large tanks, air from a blower can be used. The temperature of the Rilsan® powder during fluidization should not exceed 60°C. Special fluid beds can be made with jacketed walls that circulate water to cool the powder.

**AIR EXHAUST**
An air exhaust should be installed near the top of the tank to capture dust particles that could contaminate the immediate environment.

**PREHEATING OVEN**
Forced air circulation oven is recommended (air flow: minimum 6 m/s). Capability of the oven will depend on the coated parts: it should be designed to permit a maximum temperature of 330°C for massive parts and 420°C for thin parts or wire articles. Not all ovens have the same behaviour and different results can be obtained from one oven to another.

## OPERATING CONDITIONS

When handling Rilsan® Fine Powders, users are advised to refer to the product's safety datasheet and current regulations on the use of powder coatings.

### SURFACE TREATMENT – PRIMER

A surface preparation is necessary, requiring cleaning, surface treatment and primer application. For further information, please refer to the leaflet Surface pre-treatments and primers.

### PREHEATING CONDITIONS

For any given part there is a minimum temperature below which it is not possible to obtain a coating with a smooth surface. There is also a maximum temperature above which coating and/or primer degradation
may occur. Because parts usually have varying thicknesses, it is essential to adjust the pre-heating time as well as the temperature. The preheating temperature and time are determined respectively by the minimum and maximum thickness of the part to be coated. It should always allow suitable curing conditions for the primer. Please refer to Surface pre-treatments and Primers. Large variation in metal thicknesses may render the part difficult to coat by dipping method. This should be taken into consideration when designing the part. To obtain a high quality Rilsan® coating over the entire surface, the temperature of the part should be as even as possible, around 280°C- 300°C at the time of dipping for massive parts.

### MASKING

It is possible to locally mask areas that do not require coating by using caps, tapes, pastes or mineral fibers.

### HANDLING AND TOUCH-UP OF THE PARTS

The jig or hanger should be fastened to the part to allow good movements (shaking) of the part. Where possible, it is preferable to attach the hanger to an area of the part that does not require coating. Hanger marks can be touched up with a suitable epoxy or polyester resin.

## MAIN APPLICATION DEFECTS AND POSSIBLE CAUSES

| DEFECT | CAUSE |
|---|---|
| **Poor adhesion** | • Inadequate preparation of the surface<br>• Too little or too much primer<br>• Wrong preheating temperature and/or time |
| **Bubbles** | • Degassing of part<br>• Primer layer too thick<br>• Air inclusion due to excessively long dipping time |
| **Clusters** | • Poor fluidization of the powder<br>• Insufficient or inadequate motion during dipping |
| **Black spots** | • Contaminated powder<br>• Presence of impurities around the tank<br>• Pollution in post-fusion oven |
| **Yellowing** | • Preheating temperature too high<br>• Preheating time too long<br>• Dipping time too short |
| **Pinholes at intersection of faces or wires** | • Insufficient shaking during dipping<br>• Preheating temperature too low<br>• Dipping time too short |
| **Poor edge coverage** | • Preheating temperature too high<br>• Dipping time too short<br>• Post-fusion temperature too high and/or time too long<br>• Edges too sharp |
| **Frosting or unmelted powder** | • Preheating temperature too low or/and time too short<br>• Excessive delay between preheating and dipping<br>• Dipping time too long<br>• Insufficient shaking after dipping |

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