

Technical process recommendations for powder coating sandwich panels

IGP Pulvertechnik AG
Ringstrasse 30
9500 Wil, Schweiz
Telefon +41 (0)71 929 81 11
Telefax+41 (0)71 929 81 81
igp-powder.com
info@igp-powder.com

Ein Unternehmen der DOLD GROUP

What you need to know before you start

Even with the most careful preparation, sometimes the primer on these panels doesn't achieve sufficient adhesion with the powder coating. Due to the large number of primer coatings on the market, with their different chemical properties, this can't be avoided in every case.

The same applies for the adhesion between sheet metal and insulating foam. Because of the variety of insulating foams available, there will always be some cases where the metal separates, even with meticulous temperature control. A temperature stability of at least 130°C is necessary for this composite (metal/insulation), and we recommend a stability of $\geq 140^\circ\text{C}$.

Goals of preparation

Above all, the preparation of panels consisting of metal with insulation foam aims to achieve these goals:

- Creating adhesion strength with the powder coating
- Preventing defects and contamination in and on the surface

Process steps for preparation

Various steps are available to achieve the best possible bond between panel and powder coating:

- **Dust removal/degreasing:**
Before any type of coating, clean all dust, oil, and grease from the surface. To remove dust, you can use oil-free compressed air. Additionally, you can wipe the surface with a clean, silicone-free or leather glove to pick up stubborn dust.
For degreasing, we recommend solvent-free surfactants and soaps (e.g. BONDERITE C-NE FA from Henkel). After cleaning, rinse the surface with demineralized water to remove any surfactant residues. Next, the surface must be dried. Avoid rubbing the surface too hard because this could generate an electrostatic charge which would interfere with the coating process.
Solvents such as ethanol or paint thinners can damage or permeate the primer coating, resulting in severe surface defects in the subsequent coating process.
In some cases, degreasing the surface and removing the dust are enough to achieve sufficient adhesion.

- **Sanding :**

You can sand the surface lightly to roughen it and improve the adhesion of the powder coating. However, only sand after degreasing or ensuring the surface is free of oil and grease.

You can sand either manually or mechanically. Whichever method you choose, ensure the sanding material is not too coarse and you don't sand through the primer coating down to the metal substrate. Especially on textured surfaces, it's easy to oversand.

We recommend fine abrasive cloths or sponges as sanding materials. You can also use fine sandpaper with a grain of $\geq \text{P240}$.

For a series process, we recommend electric sanding rollers or radial sanders with cloth rollers or brushes. These machines achieve a high area performance without sanding through the primer coat. Specially designed continuous flow machines can also be used for these processes. After sanding, it is imperative to thoroughly remove dust from the surface, as described above.

- **Flame treatment/plasma treatment:**

Flame or plasma treatment, which is also used in plastics coating, is a good method for the surface activation of sandwich panels. In both cases, it's important to know that the temperature applied can exceed the resistance of the sandwich composite.

Plasma pretreatment is technically very complex and cannot be performed by individual coaters. For that reason, we only describe the flame process here.

This method involves passing an oxygen-saturated gas flame (deep blue flame) over the surface evenly and quickly. The flame hits the surface at half its length. Radical oxygen atoms in the flame are deposited on the surface to improve the adhesion between the primer and the powder coating. This effect only lasts for a few minutes, so the coating should be applied directly after flame treatment.

Caution!

Because this process uses a naked flame, it is imperative that you take precautions to prevent explosions in the vicinity of the powder coating.

Whatever type of pretreatment you choose, always regularly check the adhesion between the primer and the powder coating using the cross-cut adhesion test according to DIN EN ISO 2409. The measured value should not exceed GT0-GT1.

Moisture can affect the adhesion, therefore we recommend that you also perform a condensation test according to DIN EN ISO 6270-2, followed by another cross-cut adhesion test. Alternatively, you can test after outdoor exposure.

Technical process recommendations for powder coating sandwich panels

IGP Pulvertchnik AG
Ringstrasse 30
9500 Wil, Schweiz
Telefon +41 (0)71 929 81 11
Telefax +41 (0)71 929 81 81
igp-powder.com
info@igp-powder.com

Ein Unternehmen der DOLD GROUP

Suspension / positioning for coating

Usually, panels are only coated on one side, therefore we recommend coating them in a flat position. This means you don't need to cover the rear side or adjust the coating process correspondingly. However, you must ensure that the metal in the sandwich panel is sufficiently earthed. This is a basic prerequisite for achieving an even finish and it also guarantees reliable coating according to ATEX RL 2014/34/EU, EN 50177, EN 12981.

Application

For the best possible surface, the coating quality must be even.

To achieve this, make sure you generate a "soft cloud". This means that the powder cloud emerges evenly from the spray nozzle at a moderate speed and without pulsation at a speed that is too slow. The parameters for this are different for every spraying plant and depend on a number of factors (hose diameter, hose length, injector type, pump, spray nozzle). Therefore, we cannot make any recommendations here. Please contact our technical service team, who will be happy to help you determine and set the right parameters for your coating plant.

We recommend a spraying distance (between nozzle and substrate) of 180-250 mm, depending on the speed of the powder cloud. When applying effect powder coatings, it may be necessary to increase this distance to up to 300 mm to prevent streak or cloud formation. In the case of single-color coatings, setting a too-small spraying distance can cause uneven coating thicknesses.

There is also a risk of streaks and uneven coating thicknesses if the movement of the gun is set incorrectly. For a calculation of the correct movement for your specific plant, please also contact our technical service team.

Because of the coating already on the panels, select a high voltage of 40-60 kV. Limit the spray current to approx. 5-50 μ A. It's important to check the actual values during coating, because they can differ from the set values.

Caution!

Above all when coating products with a fine-textured surface, make sure you avoid over-charging, which would impair the structural characteristics. You can use ion-leakage rings to prevent the electrostatic charge from affecting the characteristics of fine-textured surfaces, or to prevent the orange-peel effect on smooth powder coatings. These rings discharge excessive charges for a homogeneous coating appearance. They are available as accessories from many gun manufacturers.

At greater coating thicknesses, there is a greater risk of negative effects on the surface appearance, and more powder is used than necessary. Please avoid coating thicknesses of >110-120 μ m. We recommend thicknesses of 70-90 μ m. This ensures good technical characteristics and surface quality at the lowest possible powder consumption.

If your plant is equipped with a cyclone separator, you can also run it in reclaiming mode. For this, small amounts of reclaimed powder should be added to the fresh powder (automatically where possible) and processed.

We recommend feeding both fresh and reclaimed powder through an ultrasonic screening device. This reduces any contamination and prevents coarse particles or lumps, which can impair the surface quality of the coating.

Curing

Due to the restricted thermal conductivity of the substrate, we recommend using infrared (electric or gas-catalytic) ovens.

The surface temperature is determined on a test panel using attached thermal sensors (preferably type-K thermal elements). We recommend fixing the thermal sensors with temperature-stable glass textile tape (e.g. type 69 from 3M). See the corresponding technical data sheet for the product-specific curing conditions. In order to determine the ideal curing conditions, we recommend always performing practical trials that are adapted to the object in question and the curing oven.

To keep the temperature introduced into the substrate as low as possible, only heat the areas to be coated. This can prevent distortion or delamination.

As described in the section "Suspension / positioning for coating", we recommend transporting the panels in a flat position. Coating panels lying flat means that gravity works against any possible distortion due to the heating from one side.

Pay particular attention to the surface temperature on the edge and fold areas. The material is thinner here, so it tends to overheat more quickly, leading to negative effects such as swelling of the insulating foam and separation of the metal from the foam.

Do not undercut the necessary temperature/time combination, otherwise the powder coating will not be fully cured. This in turn can lead to negative effects up to complete loss of adhesion and the required technical characteristics.

Please contact our technical service if you'd like us to support you with the optimal settings for your specific components.

Technical process recommendations for powder coating sandwich panels



IGP Pulvertechnik AG
Ringstrasse 30
9500 Wil, Schweiz
Telefon +41 (0)71 929 81 11
Telefax+41 (0)71 929 81 81
igp-powder.com
info@igp-powder.com

Ein Unternehmen der DOLD GROUP

Removal

When you remove the suspended workpieces and stack them after coating, the surface temperature should not be above 40°C. This prevents pressure marks on the powder-coated surface.

Test methods

To check the coating quality, you can perform the following tests:

- Acetone test (IGP AA341.58)
- Cross-cut adhesion test according to DIN EN ISO 2409

If you have any questions, please contact us.