

Specifications

B Exterior Applications of Powder Coatings on Steel

Project

Builder

General planner / Main Contractor

Architect

Façade Engineering

Metal Construction / Fabricator

Date

B0 Coating and finishing company for powder coating on galvanised steel

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Processable part sizes: 13 x 2.5 x 3.6m (length/width/height)
weighing up to 3000 kg per unit

Larger parts or heavier weights are possible upon request, depending on the construction of the respective element.

B1 Requirements for the work-pieces to be coated

The textures and fabricated elements must meet the requirements for powder coating.

Defects in construction which would enhance corrosion, e.g. inappropriate combinations of non-combinable materials and/or different metals, cavities, gaps or other spaces which cannot be ventilated, or other components or surfaces which are not suited for coating, should be avoided.

The quality of powder coating achievable on galvanised steel will be primarily determined by the quality of the galvanisation.

The hot galvanisation guidelines as per EN DIN ISO 1461 apply only when the hot galvanised steel will not be coated subsequently. If coating is planned, hot galvanisation should conform to the GSB's "Technical Guidelines for Approval and Confirmation of Hot Galvanisation of Steel Materials". In addition to that, please take note of the professional association's recommendation entitled "Duplex Systems – Hot Galvanisation plus Coating".

The user must at any rate determine the condition of the zinc coating and its suitability as a coating substrate before applying the powder coating.

B2 Preparation and Pre-treatment

The preparation and/or pre-treatment of galvanised work-pieces requires special care as the quality and durability of the coating depends on it to a great extent.

Observe the "Approval and Confirmation of Coating Materials for Hot Galvanisation" issued by GBS and the professional association's recommendation entitled "Duplex Systems – Hot Galvanisation plus Coating".

To obtain an optimal powder coated surface, grinding down of the uneven areas on the galvanised surface may occasionally be required; brushing or the use of abrasive paper, grain size 60, is recommended before initial preparation or pre-treatment.

Galvanised surfaces should be powder coated immediately after preparation or pre-treatment in order to avoid that products of zinc corrosion – white rust – can develop.

Preparation

Sweep blasting can be used to prepare a clean and even surface on the zinc-coating which is ideal for adhesion of the powder coating.

The hot galvanised parts should have a Rz mean surface roughness according to DIN 4768 of between 15 and 30 μm and a high degree of coverage. After the sweeping process is completed, any dust must be removed thoroughly from the entire surface, which should have a matt grey appearance without any remnants of glossy texture.

Pre-treatment

As wet-chemical process, thick-film iron-phosphating, yellow chromating or zinc-phosphating have to be employed; these methods use either immersion or spraying techniques.

It is of particular importance that the user must rinse the surface thoroughly with de-ionised water. The surface must be clean and sufficiently dry before powder coating to ensure that surface irregularities do not form when the powder coating is subsequently cured.

B3 Coating System

Regardless of the already excellent corrosion resistance of zinc coatings, powder coatings of galvanised steel are still preferably applied in a two-coat system. The first coat is applied to the pre-treated zinc substrate in the form of a primer/thermally cured undercoat which not only provides for corrosion protection of the steel substrate, exposed - if applicable – after grinding down of the surface, but also improves adhesion of the coating powder to the zinc surface. The second coat is a protective powder coat which is suitable for exterior applications.

In a two-coat system, the coating thickness must be between 120 and 160 µm. The coating thickness of the primer coat should not be less than 60 µm.

The minimum thickness of powder coatings in single coat applications is 60 µm of porous-free coating on corners and edges. On visible surfaces it must have an average coating thickness of at least 70 µm.

All coat thicknesses must be measured according to ISO 2360.

Primer

- ENVIRAL[®] thermally cured undercoat
- no primer for interior application

Top Coat

- Approved “low outgassing” ENVIRAL[®] polyester façade powder coating for exterior applications
- Approved highly weather resistant ENVIRAL[®] polyester powder coating for exterior applications (façade)
- Epoxy or epoxy-polyester powder coating for interior applications only

B4 Requirements for the Coating & Coating Material

The powder coating must satisfy the requirements of the quality guideline “Approval and Confirmation of Coating Materials for Hot Galvanisation“ issued by GSB.

For powder coating only approved products conforming to the quality guidelines applicable for aluminium substrates may be employed.

Follow the processing guidelines issued by the powder coating manufacturer and by ENVIRAL[®] as defined in the current versions of Product Datasheets & Technical Information Sheets.

- ENVIRAL[®] thermally cured undercoat

- Use approved “low outgassing” ENVIRAL[®] polyester façade powder coating for exterior applications as powder coating material according to its approval certificate issued by GSB or QUALICOAT Class 1.

- Use approved highly weather resistant ENVIRAL[®] polyester powder coating for exterior applications (façade) as powder coating material according to its approval certificate issued QUALICOAT Class 2.

- Use products sampled by ENVIRAL[®] or materials of similar quality for coatings. The quality of other materials must be equivalent, especially with regard to the following points:

Colour and effect

Gloss and surface characteristics such as flow properties and texture

Resistance to weathering and anti-corrosion protection

Mechanical properties

B5 Colour

- ENVIRAL[®] colour:
- Powder coating manufacturer colour:
- International colour standard (RAL, etc.) :
- Customer colour:

B6 Gloss Level According to ISO 2813/60° Angle

- Glossy, with a gloss level of 80-95
- Semi glossy, with a gloss level of 70-80
- Matt, with a gloss level of 25-35:

B7 Surface

- Smooth flow
- Rough texture, glossy surface
- Fine texture
- Special effect surface, e.g. Metallic, Flip-Flop, etc.

B8 Test data

Upon request the coating company must offer proof in the form of the manufacturer's datasheets that the powder coating being used conforms to the following test results and quality characteristics.

- Coating with approved "low outgassing" ENVIRAL[®] polyester façade powder coating for exterior applications must meet the following characteristics with regard to weathering, corrosion protection and mechanical properties:

Test	Norm	Results
Colour Fastness to Light	ISO 105/B01	min. scale ≥ 7 of "Wool Scale"
Colour Fastness to Weathering	ISO 105/A02	min. scale ≥ 4 of "Grey Scale"
Resistance to Weathering	conforms to GSB or QUALICOAT Class 1 quality guidelines (aluminium)	1 year of Florida-Test
Resistance to Humidity	ISO 6270	720h
Δt-Test	According to Work Sheet B1 1987/1 of the AGK ^{*)} classification	0
Resistance to Mortar	ASTM C 207 and ASTM D 3260	no negative effect
Resistance to Corrosion	DIN EN ISO 12944-6	C5-I and C5-M high > 15 years

**) Work Sheet B1 1987/1 of the Working Group Corrosion/Germany (Arbeitsgemeinschaft Korrosion e.V.)*

Coating Thickness	ISO 2360	60-80 µm
Adhesion	EN ISO 2409 1 mm between cuts classification	0
Buchholz Indentation Test	ISO 2815	≥ 87
Porosity Density	DIN 55670	Non-porous

These data were obtained using 3 mm chromated or swept hot-dipped-galvanised steel panels with a coating thickness of 60-80 µm in a one-coat system and a smooth glossy finish. It can also serve as a reference for other substrate thicknesses. Product specific parameters such as colour, effect and surface texture may result in minor deviations from the values stated in the table above.

SLV – High-Strength Screwed Connections	DIN 18800-1	Constant residual pre-stress of > 70%
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- Coating with approved highly weather resistant ENVIRAL[®] polyester powder coating for exterior applications (façade) must meet the following characteristics with regard to weathering, corrosion protection and mechanical properties:

Test	Norm	Results
Colour Fastness to Light	ISO 105/B01	min. scale ≥ 7 of "Wool Scale"
Colour Fastness to Weathering	ISO 105/A02	min. scale ≥ 4 of "Grey Scale"
Resistance to Weathering	conforms to GSB or QUALICOAT Class 1 quality guidelines (aluminium)	3 years of Florida-Test
Resistance to Humidity	ISO 6270	720h
Δt-Test	According to Work Sheet B1 1987/1 of the AGK ^{*)} classification	0
Resistance to Mortar	ASTM C 207 and ASTM D 3260	no negative effect
Resistance to Corrosion	DIN EN ISO 12944-6	C5-I and C5-M high > 15 years

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Coating Thickness	ISO 2360	60-80 µm
Adhesion	EN ISO 2409 1 mm between cuts classification	0
Buchholz Indentation Test	ISO 2815	≥ 87
Porosity Density	DIN 55670	Non-porous

These data were obtained using 3 mm chromated or swept hot-dipped-galvanised steel panels with a coating thickness of 60-80 µm in single coat application and a smooth glossy finish. It can also serve as a reference for other substrate thicknesses. Product specific parameters such as colour, effect and surface texture may result in minor deviations from the values stated in the table above.

Highly weather resistant ENVIRAL[®] polyester powder coating should be cured in indirectly heated curing ovens.

B9 Protection During Transport & Further Processing

Suitable **packaging materials** should be used to protect coated components during storage, transport and assembly against mechanical and chemical agents such as those in mortar, plaster, cement and concrete.

The user must make sure that the packaging materials and all other materials are used as intended and can be removed without difficulty. To avoid damage to coated surface check **adhesive tapes**, etc. for their suitability/stability.

In particular, make sure that incorrect **storage** does not lead to milky white spots on the surface, e.g. under packing materials, caused by a combination of moisture and warmth. These spots can be removed by applying heat, e.g. through post-tempering in an oven or with an industrial heating device.

Sealing compounds and other material such as glazing aids, drilling, cutting and other kinds of lubricants which may come into contact with coated surfaces must be pH neutral and free of any substances which could damage the coating. They must be subjected to a suitability test by the user. ENVIRAL[®] will provide a list of tested sealing compounds upon request.

Direct pasting together of glass panes with coated surfaces – i.e. **structural glazing** also requires appropriate testing and approval of the materials by the adhesive manufacturer. ENVIRAL[®] will provide a list of products which have been tested with powder coatings upon request.

Subsequent **mechanical processing** of the coated work-piece such as sawing, cutting, drilling, milling and shaping must be avoided, as this may damage the galvanisation zinc-layer or coating and reduce the level of corrosion protection.

Follow the **cleaning guidelines** issued by the powder coating manufacturer and recommended by ENVIRAL[®] in the current version of the Technical Information Sheet ENV 801a carefully.

Warranty

The nature and scope of the warranty will be defined in a separate agreement concluded between the contractual partners.

In this case, the current version of product guarantee which the powder coating manufacturer extends to the coating company for the powder coatings employed will become part of the warranty agreement.

The product warranty applies to:

- Approved low outgassing ENVIRAL[®] polyester façade powder coating for exterior applications → *five years*
- Approved highly weather resistant ENVIRAL[®] polyester powder coating for exterior applications (façade) → *ten years*

The product guarantee of the powder coating manufacturer comprises:

➤ **Delivery Specifications**

Based on the current versions of Product Datasheets & Technical Information Sheets issued by the powder coating manufacturer and by ENVIRAL[®].

➤ **Colour Fastness to Light**

Colour fastness to daylight, tested according to ISO 105/B01, resulting in a value of at least scale ≥ 7 of "Wool Scale" rating.

➤ **Colour Fastness to Weathering**

Colour fastness to weathering, tested according to ISO 105/B01, resulting in a value of at least scale ≥ 4 of "Grey Scale" rating.

➤ **Gloss Level**

The gloss level has been established according to ISO 2813 and must be observed in accordance with the limiting values determined by the powder coating manufacturer for the individual gloss levels.

➤ **General impression**

In spite of the most skilled and diligent treatment and processing of all materials and in spite of taking all precautionary measures possible, such as e.g. the use of a thermally cured undercoat as first coat, tempering, the use of "low outgassing" powder coatings, etc. it is still possible that outgassing and pinholing may occur (due to the thermal treatment after the coating process).

The product guarantee extends to the uniformity of gloss, colour and texture of parts coated exclusively with ENVIRAL[®] products, determined in a visual assessment, carried out without the use of any aid at a distance of 5 m for external elements and 3 m for internal elements.

The finished, coated surface will be assessed in accordance with the guidelines issued by the Verband der Fenster und Fassadenhersteller e.V. (*Registered Association of Window- and Façade Manufacturers, Germany*) in their Code of Practice No.02, version of April 1997 (*Visual Assessment of Organically Coated Surfaces on Steel Substrates*) and delivered according to the quality standards stated therein. Claims exceeding these provisions shall only be valid if they are confirmed in written form by ENVIRAL®.

Claims shall be considered as arising on the basis of this product guarantee, if relevant defects have occurred on more than 5% of the buildings surface to be assessed and if these defects impair the general impression of the building to a considerable extent. Defects which result from uneven exposure to sunlight or other surrounding conditions and environmental influences are not covered by this warranty.

Contractual partners:

City and date:

These documents were prepared with a great deal of care. At the same time, ENVIRAL® cannot be held responsible for their completeness or accuracy.