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QIB
Qualitätsgemeinschaft
Industriebeschichtung

QIB leaflet „Order correctly“

in cooperation with Frank Schellin, Frank Drummer und Robert Weil

Content

1. Introduction

Figure 1 Coating procedure

Perhaps when reading our leaflet some purchasers wonder why the coater asks all these questions. Does he possibly want to replicate the product? No, of course not! After reading this leaflet it will become clear, why it is so important to question all these points.

The purchaser should be aware of the scope of his purchasing decision. With his choice he influences the quality of the product, the external presentation and in the end the success of his own company. He is responsible for the right purchase desicion and this is certainly not just about the price but also the quality.

Therefore, the following questions arise:

- What is the purpose of the coating?
- For which specific area, e.g. mechanical engineering or medical technology, is the coated component required?
- Are there any specific customer requirements for this?
- Are there any relevant specifications, coating requirements, standards, etc.?
- Are the selected coating companies able and willing to meet these requirements?
- Does the coating company has appropriate certificates and documents (e.g., QIB approval, DB approval, DIN EN ISO 9001, DIN EN 1090, DIN 55633, DIN 55634 etc.)?
- In addition to compliance with the painting regulations, are the required coating materials actually used?
- Is the coating company insured against a possible worst-case scenario?
- Characteristics of the workpieces to be coated (e.g. geometry, capillaries, undercuts, doublings,leakage behavior, visible and functional surfaces, joint connections, etc.) should be known to the coater.
- The coating process starts with the preparation / pre-treatment and ends with the final packaging.
- It is also important to have suitable hanging / mounting options (contact options) which must be agreed with the coater before.

For the procurement of organically coated surfaces, it is important to know the aforementioned basic data in order to be able to communicate them to the coater. The requirements should match the product and the application and be selected accordingly.

It should be noted that higher requirements mean additional work and thus result in a higher price.

2. Colour shade

The colour shade is chosen according to different colour systems. Typical examples are:

- RAL classic (most frequently chosen)
- DB
- RAL Design
- NCS
- Pantone

The colours according to the "RAL classic" and "DB colours" are used most frequently in the contract coating, since these colours are often available as stock items.

All other colour systems are special colours. Therefore, this colour shades often lead to considerable extra costs due to special production. In addition, minimum purchase quantities are often used as a basis, which in the worst case lead to increased residual quantities, which thenhave to be disposed of at great expense.

In the field of architecture e.g., the NCS colours are particularly popular. However, it must be borne in mind that these are also special colours.

Figure 2: NCS Colour Fan and RAL Colour Fan

Colour deviations are possible within the manufacturing tolerances of the coating material manufacturers. The leaflet "Zulässige Farbtoleranzen für unifarbene Pulverlacke bei Architekturanwendung" („Permissible colour tolerances for plain-coloured powder coatings for architectural applications") of VdL serves as a guideline. If necessary, a coating sample can be requested from the customer. In the case of metallic pigmented colours, different recipes of the individual coating material manufacturers can lead to considerable visual differences.

2. Colour shade

When determining the colour shade, colour fans, master samples or limiting samples are agreed on in practise. When agreeing on a colour fan, it is recommended that the colour fan used is defined (e.g., RAL-fan/year 2020), as the individual colour fans are also subject to certain tolerances and significant deviations in colour between different colour fans may occur.

In principle, it is recommended to agree on a master sample or limiting samples.

Figure 3 Colour deviation on a facade

Practical tip:
If several coaters work on one object a joint material batch from one manufacturer must be specified in order to avoid colour deviations. It is recommended to communicate this with the selected manufacturer of coating material so that the needed quantity of coating material can be supplied single-batch. The same applies for follow-up orders. Often differences can be avoided by customer provision of the coating material.

It is therefore imperative to coordinate a suitable solution with the surface coater(s).

Note:
Despite the use of the same batch of coating material by several coaters deviations of colour shades may occur due to different application processes (corona, tribo, oven techniques, stoving conditions etc.).

3. Weathering stability

Figure 4: weathering stability, chalking

It is not only important to choose the colour shade, but also to know the conditions of use to make the right colour selection:

- outdoor use
- indoor use with UV exposure
- indoor use

By selecting the place of use, you determine the choice of binding agent. Varnishes with an epoxy resin as a binder or powder coatings with such a component have a poor UV have a higher chemical resistance. Due to the limited UV resistance, this system should only be used indoors or as a primer.

For outdoor use, polyester, acrylic or polyurethane powders are used to achieve higher UV resistance. For the use on facades approved coatings must be used.

4. Special requirements

Depending on the intended use or area of application, additional requirements have often to be met by the organic coating. These can be, for example, wear resistance, slip resistance, sliding properties, edging ability, antimicrobial properties, special chemical resistance, anti-stickers properties, graffiti protection, printability (defined surface tension), electrical conductivity.

The desired properties must be agreed with the coating company and the paint manufacturer as early as the planning phase. Not all requirements can be realized.

5. Surface structure

The most common surface structures are:

- smooth running
- coarse structure
- fine structure

Figure 5: coarse structure

Figure 6: fine structure

These gradients are set by the coating manufacturer using additives and cannot be influenced or changed by the processor. It is imperative to specify the desired structure when ordering.

Structures are not uniformly defined and may be different for different coating material manufacturers, so that samples must be defined.

Practical tip:
Coarse structural coatings are often used in mechanical engineering. This avoids the view on cavity spaces and warpage of welded or tacked sheet metal constructions.

6. Gloss

Figure 7: Measuring of gloss

The gloss degree is also a property that is set by the paint manufacturer and is mandatory for an order. The following common classifications have established themselves in practice:

• matt	0-30 GU	+/-5 GU
• satin	31-70 GU	+/-7 GU
• gloss / high-gloss	71-100 GU	+/-10 GU

The values refer to a measurement at a 60° angle. (GU = gloss units)

Practical tip:
Large and smooth sheets should not be coated with high gloss if possible. High-gloss surfaces do not forgive unevenness, scratches, pimples or the like and should always be sanded after an intermediate coating. The procedure is similar to painting a car. However, this results in significantly higher costs.

Matt surfaces or even structured surfaces are more forgiving of slight unevenness and should therefore be the preferred surface quality, especially for purely industrial applications!

The usual terms such as matt, satin and gloss are not defined by an exact degree of gloss. For higher demands, a more precise specification must be made, stating the exact gloss unit and the measuring angle used.

7. Optical levels

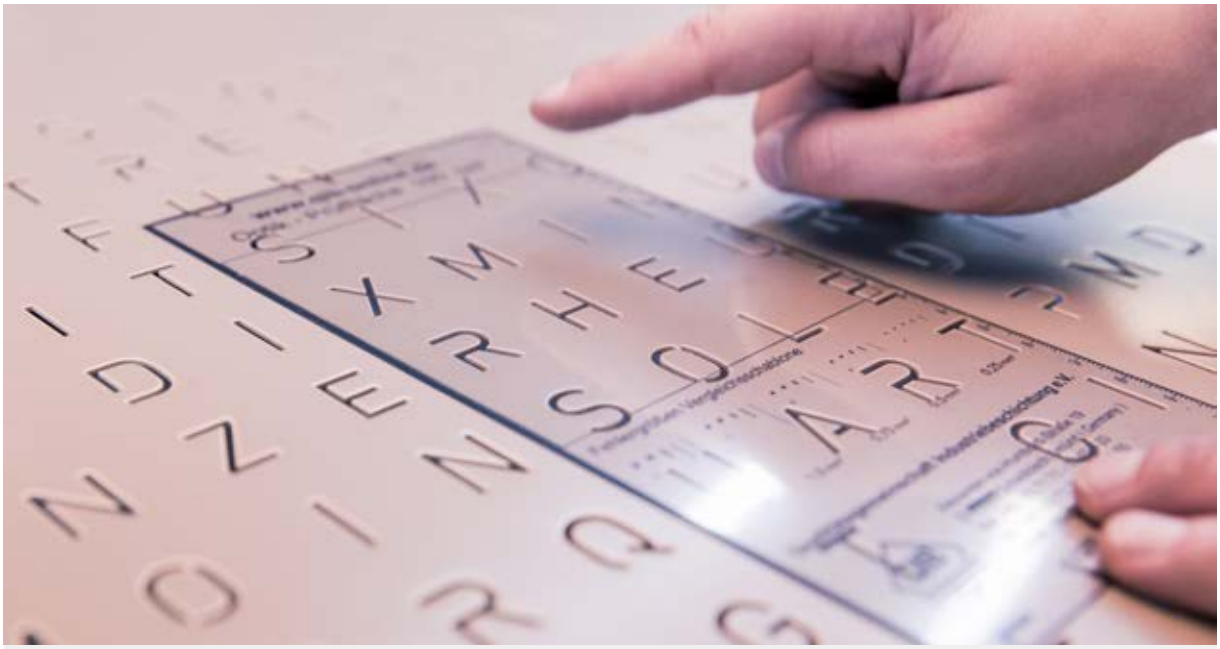

Figure 8: Test-foil of QIB for visual assessment of a surface

You can specify an optical surface requirement when ordering. For this purpose, the QIB has issued the information sheet 3-1 “Visual Assessment of Organically Coated Decorative surfaces”. If this information is missing, the standard level II is used.

Practical tip:
The higher the surface requirement, the higher the reject rate. As a result, a corresponding quantity of components has to be taken into account for rework in a production lot, which is noticeable in the pricing.

Basically, the QIB differentiates the following optical levels:

- • • • Surfaces with exceptionally high requirements
  (e.g. bathroom fittings, control panels for electric appliances, medical engineering),
  viewing distance at least 0.5 m; 10 seconds.

- • • • Surfaces with high requirements
  (e.g. furniture industry),
  viewing distance at least 0.8 m; 5 seconds.

- • • Standard class with usual requirements
  (e.g. housing parts for switching cabinets etc.),
  viewing distance at least 1.5 m; 3 seconds.

- • Surfaces with low requirements
  (e.g. steel components – non-visible steel components without demand on optical appearance, e.g. fencing posts, storage racks etc.),
  viewing distance at least 3 m; 3 seconds.

8. Corrosion protection

Figure 9: corrosion on substrate

The coating must reliably protect the part from corrosion. Here, too, the following applies: The higher the required corrosion protection, the higher the effort and thus the price. If possible, the constructive measures of the QIB leaflets 2-2 and 2-3 or other normative specifications (DIN 55633, 55634) must be observed. The coater must be notified of the required corrosion protection (corrosivity category and protection period) or at least of the later conditions of use, so that he can define the necessary corrosion protection.

Depending on the required corrosion protection, it must be checked whether a multi-layer structure consisting of primer and topcoat is necessary.

The required corrosivity category basically depends on the load to which the part to be coated will later be exposed. The expected lifetime indicates how long the part should last in the specified corrosivity category until the first repair.

For the sake of simplicity the QIB has made a classification into six stress groups, which are very closely based on DIN EN ISO 12944, DIN 55633 und DIN 55634. The QIB stress groups I – V apply for all base materials, whereas the test requirements are more narrowly defined than in the standards. For the stress groups I – V the corrosivity categories C1 – C5 are set in connection with the expected lifetime high (H). Another exception is the base material aluminium. Here, separate requirements for the stress groups I - VI are specified. More detailed explanations can be found in Chapter A.1.4. of QIB quality regulations.

8. Corrosion protection

Determination of QIB stress groups
The QIB has subsequently classified the stress groups on the basis of the corrosivity categories of DIN EN ISO 12944.

Stress group I:
The parts are only used indoors without humid or corrosive stress.

Stress group II:
The parts are occasionally resp. for a short term exposed to temperature or humidity stress. However, parts which have been pre-treated in such a way are mostly used indoors.

Stress group III:
The parts have a conversion layer allowing to expose them to slightly corrosive and humid stress for longer time.

Stress group IV:
Due to the high requirements on the applied conversion layers it is possible to expose these parts to usual corrosion as well as to humidity all over their service life. Special corrosion stress such as filiform corrosion resistance and the like is the only exception. This requires additional pre-treatment and protection measures for steel as well as for aluminium.

Stress group V:
Steel and aluminium parts are treated with mostly multi-layered coating systems due to the very high requirements for industrial, coastal, and offshore regions with a term of protection of more than 15 years. In the case of aluminium this is only possible by pre-anodizing or 2-layer structure.

Stress group VI:
Steel and aluminium parts are treated with mostly multi-layered coating systems due to the very high requirements for industrial, coastal, and offshore regions with a term of protection of more than 25 years. In the case of aluminium this is only possible by pre-anodizing.

The following table shows the comparison between QIB stress groups and the corrosivity categories of DIN EN ISO 12944 part 6 “Corrosion protection of steel structures by protective coating systems” and the test periods of the neutral salt spray test required herein:

8. Corrosion protection

Stress group acc. to QIB	Test period acc. to QIB stress group (h)	Test period acc. to DIN EN ISO 12944 part 6 (h)	Short term corrosivity category and term of protection acc. to DIN EN ISO 12944-6
I	125	120	C2 (high)
II	250	240	C3 (medium) C4 (low)
III	500	480	C2 (very high) C3 (high) C4 (medium) C5 (low)
IV	1.000	720	C3 (very high) C4 (high) C5 (medium)
V	1.500	1.440	C4 (very high) C5 (high)
VI*	2.200	-	C5 (very high)

** only for coatings on galvanized base material with a EDP priming respectively pre-anodizing for aluminum*

The higher the required corrosion protection, the more likely it is that a multilayer coating system will be used. Basically, a single-layer system is sufficient for the interior (without strong corrosive loads). Depending on the base material and kind of pre-treatment multi-layer systems must be used with increasing corrosive loads in order to achieve corrosion protection.

8. Corrosion protection

The following table shows the layer systems to be used for the respective stress groups, depending on the base material. These must be observed.

Base material	Layer structure powder coating	I	II	III	IV	V	VI
Aluminum	1	■	■	■	■		
	2	■	■	■	■	■	
Aluminum with pre-anodizing	1	■	■	■	■	■	■
Steel	1	■	■				
	2	■	■	■	■		
Continuously hot dipped steel (strip galvanized)	1	■	■	■			
	2	■	■	■	■	■	
Hot-dip galvanized steel (batch galvanized)	1	■	■	■			
	2	■	■	■	■	■	
Steel coated by thermal spraying	1	■	■	■			
	2	■	■	■	■	■	
Aluminum, steel and hot-dip galvanized steel with EDP priming	0	■	■	■			
Aluminum with EDP priming	1	■	■	■	■	■	
	2	■	■	■	■	■	
Steel with EDP priming	1	■	■	■	■	■	
	2	■	■	■	■	■	
Galvanized steel (batch or strip galvanized) with EDP priming	1	■	■	■	■	■	
	2	■	■	■	■	■	■

Practical tip:
Please note that a piece of furniture used in the living area definitely requires less corrosion protection compared to parts used outdoors. Here, excessive safety thinking costs a lot of money. In return, a system not suitable for corrosion protection will lead to considerable restauration costs.

Functional coatings:
The following properties play a role in the inquiry process and are helpful in determining the desired and necessary offer and order contents: ESD, chemical resistance, slip resistance, antibacterial, fire protection, anti-graffiti, anti-sticker and others.

9. Special Services

9.1. Decoating

The decoating takes place by chemical means, by pyrolysis (heating to approx. 450° C) or mechanically by blasting. The suitable option is to be chosen according to agreement between customer and coater.

Practical tip:

Decoating by pyrolysis may influence the structure and negatively affect the geometry of the component.

9.2. Ordering of hot-dip galvanized components

Figure 10: Zinc delamination after coating

Many problems with the coating of hot-dip galvanized material can be traced back to a lack of communication between the customer, the galvanizing company and the coating company. In this respect, the galvanizer must be informed on ordering that a subsequent coating is to be carried out (see DIN EN ISO 1461, NB).

In these cases, the abbreviation “t Zn k” (“keine Nachbehandlung ausführen“ = „do not perform post-treatment“) on ordering the galvanization must be used.

With all types of galvanizing, small gas pockets form (also due to improper storage of the galvanized material), which expand due to heating during powder coating. The excess gas then escapes through the coating. This can lead to the formation of craters on the surface (so-called outgassing). This effect can be counteracted by suitable measures (sweeping, tempering, outgassing-optimized powder). Despite these measures outgassing cannot be 100 % avoided.

9. Special Services

9.3. Fine plastering of hot-dip galvanized parts

Since there is a risk of grinding through the pure zinc layer / zinc skin during fine plastering, this must be agreed with the galvanizing company for warranty reasons and only be carried out by the coater in exceptional cases. Fine plastering before coating improves the visual quality.

Figure 11: not-plastered zinc thickening

9.4. Gluing or covering

For some parts, various surfaces must be free of paint. These can be fitting surfaces, threads, drill holes or similar. Heat-resistant adhesive tape is usually used for surfaces, while silicone covers are available for holes and threads. When removing the covers, a slight burr cannot be avoided.

Figure 12: masked components before coating

Practical tip:

Additional work such as masking, covering and deburring is purely manual work and correspondingly time-consuming. Therefore, please remember that this work often increases the coating effort considerably. If the components are delivered already covered and masked, this must be agreed with the coater in advance in order to avoid subsequent surface problems.

9. Special Services

9.5. Packaging

The packaging services are to be coordinated between the customer and the coater. It is recommended that the delivery is made with the same packaging means as the dispatch, e.g. A-trestles, pallets or boxes. It should be noted that the coated components need more space due to their more damageable surface and the packaging required for this reason. This must be taken into account in the number of packaging provided.

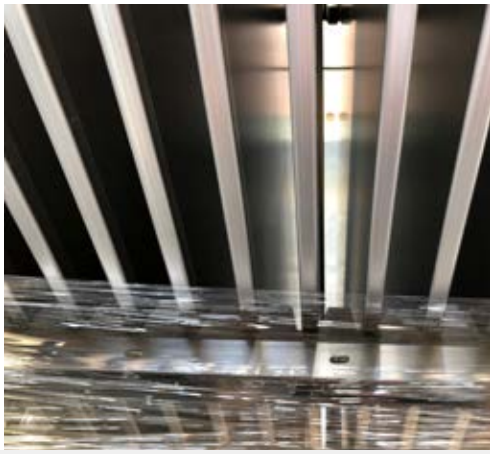

Figure 13: The packaging must be taken into account both during delivery and dispatch
Figure 14: Proper packaging on delivery

Practical tip:

Packaging is usually pure transport packaging. These must be opened immediately after receipt of the goods, as otherwise condensation may occur and thus damage to the goods.

10. Cleaning and care

Figure 15: Cleaning

Components must be cleaned after completion of work. Special contaminants, such as cement, mortar, etc. must be removed immediately. The powder coating is a surface that needs cleaning at certain intervals, depending on the coating system and the installation condition. Since improper cleaning can cause considerable damage, cleaning measures should only be carried out by specialist companies. Further information on specialist companies can be found at the Gütegemeinschaft Reinigung von Fassaden und Metallfassadensanierung e.V. (Quality Association for Cleaning Facades and Metal Facade Renovation e.V. – www.grm-online.de)

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