

Information regarding Tolerances of coated Aluminum Surfaces

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For both powder and liquid paint coatings the usage of different raw materials (e.g. powder or liquid paint and its components) together with application details (e.g. type of equipment, application pistol type and orientation, coating parameters and oven technology), which are unique to each coating company, result in a specific optical definition of the coated Aluminum product (production color definition both for powder and liquid paint).

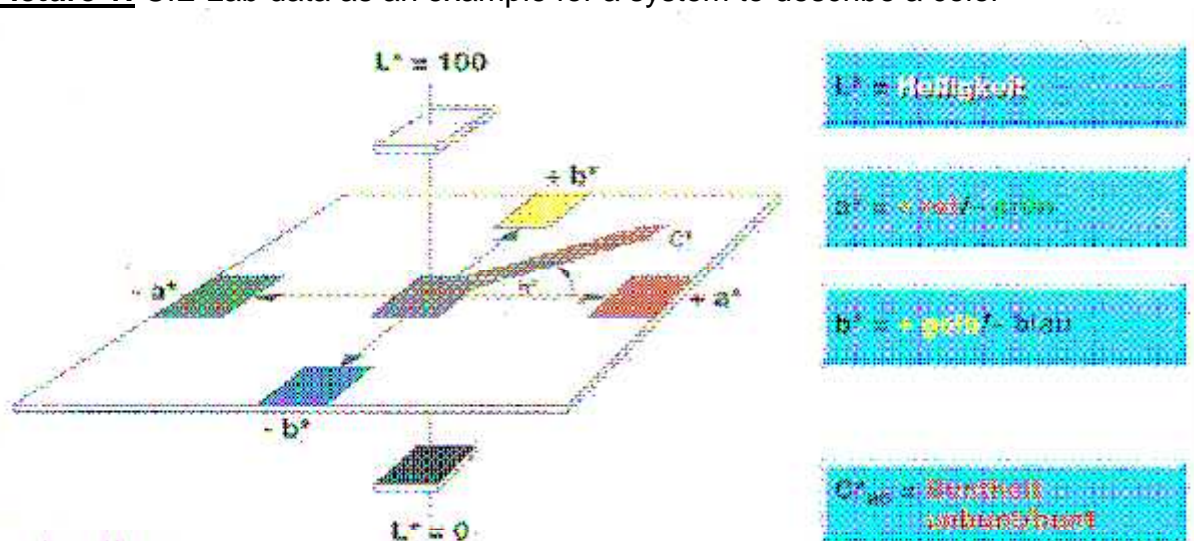
Important factor is the coating material (powder or liquid paint), which is specified by key definition data such as:

- Color definition (e.g. RAL 6005)
- Glossiness (matt, semi glossy or glossy)
- Surface definition (e.g. smooth, fine structured, sand blasted)
- Quality (facade, high durable, super durable = Fluor polymer powder, special qualities)

1) Basics

A coated product consists with respect to the resulting surface finish impression mainly of the components binder (polymer and hardener) and pigment (color providing ingredient). Uni colored coatings (without weathering and ageing), the color impression is determined solely by the pigment mixture used. The intended color is prepared by mixing a variation of several pigments and comparison of the resulting shade against an approved master (e.g. RAL, but also RDS, NCS). These masters are available depending on the color system either as a master sample and/or as digital stored information, e.g. as CIE Lab data (compare Picture 1):

Picture 1: CIE Lab data as an example for a system to describe a color



The color is described in this system with the key data L (= lightness), a (+ = red/ - = green, b (+ = yellow / - = blue) with C defining the coloriness. All technical produced colors have a process-given tolerance against the master due to production process as well as the color measurement itself (type of instrument, angle of measurement,

Glossiness and texture; in addition for Metallic surfaces reflexions of the effect pigment).

Color tolerances will only be noticeable if coating products of two different material suppliers (powder, liquid paint; also material production tolerances) applied by one coating company for one object or one coating material applied by several coating companies without definition of a bind production master for one object. The color co-ordination for customer-owned material (e.g. profiles of other suppliers, formed sheets) has either been contracted to Schüco as part of the order or must be done by the customer himself by creation of binding production samples for all coating suppliers involved in this object. If Schüco System Finish service is ordered, Schüco does co-ordinate that only one coater is used for the object (Schüco profiles & customer-owned material). If an object is build by a consortium of different metal builders with the preference of local Schüco coaters, Schüco will co-ordinate the distribution of production masters for each involved color. The customer must order the specific coating with reference to the object. Schüco will then co-ordinate the preparation and exchange of production color masters to achieve maximum color identity.

Color acceptance between different samples is based on optical identity rather than measurement data. **Picture 2** presents two RAL colors supplied by different material producers. The observed slight optical differences arise from the usage of different raw materials as well as from their behavior during mixing and production

Picture 2: Samples of RAL 5010 and 6005 semi gloss from different suppliers



For uni colors the optical difference is visible but small while for the metallic colors, which are currently under high demand from the market, this optical difference becomes much larger due to the nature of the effect pigment (Aluminum, Mica, special materials), the amount as well as the type of metallic pigment (**Pictures 3 & 4**):

Pictures 3, 4: Variations of RAL 9007 (left) and DB 703 (right; façade quality, different suppliers)



All surfaces finishes shown in **Pictures 3 & 4** are within the approved color definition of the given color, however optical differences are clearly visible: The metallic pigment, most likely base on Mica or a coated Aluminum flake, depending on its distribution on the surface and the application process results in a different optic. In addition, a different reflexion impression ("Sparkling") is noticeable from sample to sample. In total, both effects can add up to the impression of a different color.

Please remember to order via the provided the special ordering number in case of choosing a special color even if similar to a RAL color because a mix up will clearly be visible (**Picture 5**).

Picture 5: Example for special colors around RAL 9006 (Source TIGER)



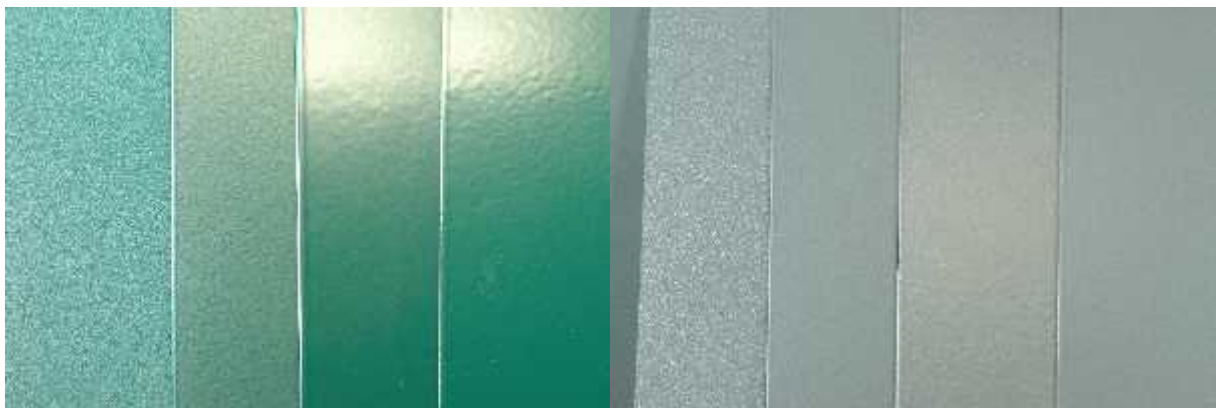
Some special colors such as RAL pearl pigment colors are producer depending in their color definition. This results from the usage of different pigment mixtures and from different production processes between different material producers. After agreement of the chosen color based on the provided samples, the complete ordering code and material producer of this selected sample must be requested in the order to Schüco. As shown in **Picture 6**, the information of only the RAL pearl number is not sufficient for identification of the correct shade. Does the customer order only contains the RAL pearl code, Schüco will deliver just this surface from one of the available powder suppliers. This does not define a defect based on the service provided by Schüco.

Picture 6: Shade difference for RAL pearl color 1036 (different suppliers)



Optical differences are noticeable for the eye, a very sensitive measurement tool, even if the shade is identical but the surface texture or the degree of glossiness has changed (**Pictures 7 & 8**). These differences are clearly visible both for uni RAL colors as well as for metallic colors.

Pictures 7 & 8: RAL 6005 (left) and 9006 (right) with the textures /glossiness values fine structure, matt, semi glossy and glossy (samples TIGERWERK/A)



For this reason, the customer must provide either the full code given on the approved sample or the specific values for texture and glossiness in order that Schüco can check and confirm availability, price and delivery time.

This procedure is very important for follow-up orders for objects for which the customer has directed Schüco to use a special coating material .

For follow-up orders, the customer must consider that the color on the object has changed over exposure time due to weathering as well as UV radiation impact. **Picture 9** shows a selection of colors in facade quality after 2 years exposure in Florida: The upper part was covered and the color is basically unchanged while the lower part was exposed. Clearly, color bleaching as result of degradation of both pigment and polymer are visible.

Picture 9: Overview of RAL colors in facade quality after 2 years exposure in Florida (Source DuPont D)



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