Powder Coating of Aluminium Surfaces
Architect Information Surface Finishes

Status 09.2012
Content

1 Portfolio of System Finish Options
2 Overview of available Powder Coating Systems
3 Components of Powder Coatings
4 Application of Powder Coatings
5 Powder Coating Type I: Polyester (Façade Quality)
6 Powder Coating Type II: Modified Polyester (DuraClean)
7 Powder Coating Type III: Polyester (High Weather-Resistant)
8 Powder Coating Type IV: Anti-Graffiti Powder Coating
9 Powder Coating Type V: Fluoropolymer Powder Coating
10 Weathering of Powder Coating Finishes
11 Schüco System Finish Information
13 Contact details
## 1. Schüco Overview System Finish

Schüco System Finish Surface Options (Status 09.2012) – Powder coating in Red

<table>
<thead>
<tr>
<th>Basis</th>
<th>Performance</th>
<th>Decor</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PowColor</strong> (Powder)</td>
<td>Façade Quality</td>
<td>Powder Base Coat with Topcoat</td>
<td>MetallicEffekte</td>
</tr>
<tr>
<td>AnoLine</td>
<td>Pre-Anodisation with Powder Top Coat</td>
<td>Fine Texture Powder AnoLine FS</td>
<td></td>
</tr>
<tr>
<td>Cosmoline</td>
<td>DuraClean</td>
<td>Wood &amp; Stone Optics: DECORAL NATURALL</td>
<td></td>
</tr>
<tr>
<td>MetallicLine</td>
<td>Anti-Graffiti</td>
<td>WetLine</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High Durability Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MetallicLine Plus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INOX Optic Powder</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AnColor</strong> (Anodisation)</td>
<td>Anodisation (E6/EV1, C0)</td>
<td>Anodisation for Structural Glassing (SG Anodisation)</td>
<td>Coloured Anodisation with / without mechanical Pre-treatment (E1 to E6, C0, C31 to C35)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Silber &amp; Gold (EV2 to EV 4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S315</td>
<td></td>
</tr>
<tr>
<td><strong>WetColor</strong> (Liquid Paint)</td>
<td>Polyurethan (PUR)</td>
<td>Duration</td>
<td>PUR Trend</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Duration Trend AnoLine DF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# 1. Portfolio of Powder Coatings

## Influencing Factors Location and Requirements

### Status: 09.2012

<table>
<thead>
<tr>
<th>Test Duration / Finish</th>
<th>Stability for Weathering</th>
<th>Mechanical Requirement</th>
<th>Chemical Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Year Florida Weathering (GSB/Qualicoat)</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>5 Year Florida Weathering (AAMA2604-05)</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>10 Year Florida Weathering (AAMA2605-05)</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Example Requirement

<table>
<thead>
<tr>
<th>Example Requirement</th>
<th>Mid European Weather</th>
<th>USA, Middle East</th>
<th>USA, Middle East</th>
<th>Cleaning</th>
<th>Sand Blast Middle East, USA</th>
<th>Production (Non-Chemical)</th>
<th>Food- &amp; Chemical Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowColor</td>
<td>Southern Europe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facade Quality</td>
<td>USA, Middle East</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Durable Quality</td>
<td>Southwest USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluor Polymer Quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AnColor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E6/EV1, C0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C31 bis C35, S315</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SANDALOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WetColor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DURAFLOM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVDF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Green = Useable
- Yellow = to be checked
- Red = Not useable
## 2. Overview of available Powder Coating Systems

Powder Coating for Aluminium – Overview of Powder Types

<table>
<thead>
<tr>
<th>Properties</th>
<th>Facade Quality</th>
<th>Dirt-repellent eg. DURAClean</th>
<th>High weatherability Quality</th>
<th>Anti-Graffiti Quality</th>
<th>Fluoropolymer Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base composition</td>
<td>Polyester (PES)</td>
<td>Polyester (PES)</td>
<td>Polyester (PES)</td>
<td>Polyurethan (PUR)</td>
<td>Fluoropolymer similar to PVDF / Durafon</td>
</tr>
<tr>
<td>Colour range</td>
<td>very broad</td>
<td>broad, reduced by some effects</td>
<td>limited by pigment stabilities</td>
<td>limited</td>
<td>limited by pigment stabilities</td>
</tr>
<tr>
<td>Colour example</td>
<td>RAL, Metallics, Iron oxide colours, special colours (NCS, RDS, Sikkens)</td>
<td>most colours possible</td>
<td>RAL (in part), Metallics, Special colours</td>
<td>RAL (in part), Metallics, Special colours</td>
<td></td>
</tr>
<tr>
<td>Additional usage</td>
<td>Optic</td>
<td>dirt repellancy</td>
<td>Optic &amp; prolonged value</td>
<td>Anti-Graffiti, dirt repellancy</td>
<td>Highest stability against UV &amp; emissions</td>
</tr>
<tr>
<td>required object temperature [°C]</td>
<td>180 - 190°C</td>
<td>180 - 190°C</td>
<td>180 - 200°C</td>
<td>180 - 200 abhängig vom Hersteller</td>
<td>180 - 200 abhängig vom Hersteller</td>
</tr>
<tr>
<td>UV Stability</td>
<td>good (Northern Europe)</td>
<td>good (Northern Europe)</td>
<td>high (Europe)</td>
<td>good - high</td>
<td>very high</td>
</tr>
<tr>
<td>Stability against emissions</td>
<td>stable only for short term</td>
<td>stable only for short term</td>
<td>more stable</td>
<td>more stable</td>
<td>very stable</td>
</tr>
<tr>
<td>Area of usage</td>
<td>Europe</td>
<td>Europe</td>
<td>Europe, Middle East, Asia (indoor)</td>
<td>Europe</td>
<td>worldwide</td>
</tr>
<tr>
<td>Approval by</td>
<td>GSB</td>
<td>GSB / Qualicoat</td>
<td>GSB / Qualicoat depending on producer</td>
<td>Anti-Graffiti e.V. Vereinigung</td>
<td>fulfills AAMA 2605-05 requirements</td>
</tr>
<tr>
<td>Warranty by Schüco</td>
<td>Up to 10 years (Europe)</td>
<td>Up to 10 years (Europe)</td>
<td>Up to 10 years (Europe)</td>
<td>Up to 10 years (Europe)</td>
<td>Up to 10 years</td>
</tr>
</tbody>
</table>

The required Powder depends on Factors such as
- local Weathering,
- UV Radiation,
- Emissions,
and
- Usage of the Object

Schüco approved & applied powder suppliers are AKZO, DuPont, IGP, INVER, Jotun and TIGER.

**Green: Worldwide**

**Orange: Europe**
3. Components of Powder Coating
Constituents and their Function

Powder coatings are solid mixtures of functional components which melt when heated and cure to form a protective film on aluminium which achieves a certain look and serves a specific purpose.

Typical constituents are:
• **Binding agent** (polymer, critical for properties and stability)
• **Pigment** (colour, critical for appearance and weather-resistance)
• **Additive** (helps flow and function)
• **Filler material** (stabilisation of properties in polymer composite - additive - filler)

The nature of the binding agent and pigment is critical for the stability of the surface finish against weathering and environmental factors.

Binding agent types:
• **Polyester (PES)**
  Standard binder for architecture with good weather-resistant properties and flow; can be modified (e.g. PowClean, highly weather-resistant).
• **Polyurethane (PUR) or acrylate**
  Basis for anti-graffiti; more frangible than PES. Used in particular because it is easy to clean.
• **Fluoropolymer**
  Single layer solution of multi-layer wet coating system PVDF with very high polymer stability.

Special powders (PUR, fluoropolymer, PowClean, HWF) are not stock items but are made to order. **Contact Schüco for more information.**
4. Powder Coatings

From Powder to approved Aluminium Surface Finish (photos: Schüco)
4. Powder coatings
A look at powder coating facilities (Photos: Kemper)

View into a Horizontal Coating Line

View into a Vertical Coating Facility
Compressed air is used for the electrostatic application of the powder to the oppositely charged profiles, which also allows wraparound coating.
5. Application of Powder Coatings

Criteria for choosing Powder Coatings

The following factors are key when choosing powder coatings:

- **Look of surface finish** (colour and effect)
- **Protective function of aluminium** (what environmental factors are present?)
- **Additional benefits** (e.g. anti-graffiti, dirt resistance, powder stability)
- **Costs over service life** (cleaning, preserving)

Other benefits of powder coatings are:
- Industrial coating with highly uniform appearance
- High production capacities with short delivery time and a wide range of colours
- High retention of value with attractive cost/performance ratio

Powder coatings of façade quality are available at short notice - despite the numerous colour, effect and structure settings required - since they are mostly stock (powder) items.

Special colours and special products with another polymer base are made to order and are therefore not held in stock.

Schüco only uses powder coating systems with valid approval certificates from the GSB and/or Qualicoat quality standards institutions. Owing to their properties, special powder coatings such as anti-graffiti or Fluoropolymer powders are not available with these approval certificates; they require special approval. Details and restrictions must be clarified here depending on the guarantee.
Polyester powder coatings in façade quality is the most frequently used polymer group due to the wide range of colours, effects and flows on offer with usually a short delivery time (powder). The good ageing and weather-resistant stability as well as good fabrication properties (as powder and on aluminium) allow a wide range of applications combined with warranty periods of up to 10 years in Europe.

In addition to the standard colours (RAL, metallics), special colours (NCS, RDS, CI colours) can also be made to order. Contact Schüco for more information.

The nature of the PES system makes it preferable for Europe with moderate UV loads and weathering factors.
7. Powder Coating Types II: modified Polyester (DuraClean)

DuraClean (formerly PowClean with just six available colours) is based on an additive with a tried-and-tested dirt resistance. This modification makes it more difficult for dirt to adhere to the PES surface and makes it easier to carry out the necessary manual cleaning.

There is a wide variety of colours available for powder coating with this modification – in facade as well as in high weather resistant quality.

This surface finish needs to be cleaned only every 18 month - this means longer retention of value in terms of appearance and reduced maintenance for projects. Contact Schüco for more information.

DuraClean: longer retention of value for powder coating finishes thanks to dirt resistance  (Image: Schüco)
Highly weather-resistant powder coating is a further development of the proven façade quality with increased stability in terms of weather-resistance.

With heavy weathering (combination of sunlight, temperature and humidity), the surface finish changes over the years, resulting in a visible reduction in value as a result of the breakdown of the polymer and changes to the pigments.

Highly weather-resistant finishes prevent this weathering thanks to improved stability of the polymer and the use of more stable pigments - but this restricts the choice of colour options.

Contact Schüco for more information.
Polyurethane and/or Acrylate based powders are used in anti-graffiti products, i.e. functional powder coating. The reason for this is the high cross-linking of the resulting polymer combined with a high-quality look. The high level of cross-linking makes it less susceptible to attack or being affected by spray paints and makes cleaning (removal of graffiti) very easy. Anti-graffiti powder coatings are only approved by the Anti-Graffiti e.V. quality standards institution and not by GSB or Qualicoat - this is due to the high degree of cross-linking and the resulting property of the powder on aluminium.
10. Powder Coating Types V: Fluoropolymer Powder Coating
PowColor Premium

Fluoropolymer powders currently represent the most stable external weather-resistant systems in architecture. The use of a fluoropolymer as a binding agent offers the highest possible protection against breakdown through UV radiation and weathering. Only extremely stable pigments which meet the high quality standards for both simulated and real weathering are used (compare with point 11).

The advantage over 2-4 layer PVDF liquid paint coatings is the lack of VOC emissions and the use of powder coating facilities as a single layer solution with surface finish properties which can withstand environmental influences worldwide.

Limits on Façade Quality: 2 Years Exposure in Florida  
(Source: TIGERWERK/A)
5 Years Exposure in Florida: Façade vs. Fluoropolymer Quality  (Source: TIGERWERK/A)
12. Schüco System Finish Information
Overview of available information from Schüco – Status 09.2012

Downloads via www.schueco.com:

- Architect info Pre-treatment
- Architect info Powder Coating
- Architect info Metallics
- Architect info Dirt repellent Coatings
- Architect info Liquid Paints
- Architect info Anodisation

Printed Information:

- Colour finishes for Aluminium (Colour Booklets)
  
  Edition Basic 07/2012 (Art. No. 63116) for often requested finishes used in end customer business such as RAL, Standard Metallics and Anodisation according to EURAS.

  Edition Advance 07/2012 (Art. No. 63117) contains also object surface options and special finish methods used mainly for objects.

Digitale Info via SCV:

A wide series of information for current finish products is also available as PDF.

Function and Service Information Schüco

All Information are available as PDF in German or English.
13. Contact Details

For additional information and support for the presented products, please contact the Service Centre Finish (SCV)

Schüco International KG
Karolinenstraße 1-15
33615 Bielefeld

Tel.: 0521 / 783 - 0
Fax: 0521 / 783 - 451

www.schueco.com
info@schueco.com