

WICONA[®]
TECHNIK FÜR IDEEN



Individual and durable

» SURFACES

ALUMINIUM SURFACE TREATMENTS

Legal notices

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1	Aluminium surface treatment	4
1.1	Advantages of a surface treatment	4
1.2	Required standard of the surfaces	4
1.3	Functional areas	7
1.4	Suspension and bonding	7
1.5	GSB and Qualicoat	10
2	Pre-treatment with powder coating and liquid coating	13
2.1	Introduction	13
2.2	Yellow and green chromating to DIN 12487 standard	13
2.3	Alternative pre-treatment processes	15
2.4	Pre-anodisation	16
3	Powder coating (physical process)	18
3.1	General	18
3.2	Coating of (insulating) profiles	19
3.3	Steps of spray application	21
3.4	Chemical paint stripping	22
3.5	WICONA Colour Concept	23
4	Wet-lacquer coating	24
5	Anodising to DIN 17611 Standard (Electrochemical process)	25
5.1	Pre-treatment	25
5.2	WICONA Colour Concept	28
6	Storage and transport	29
7	Cleaning cycles of aluminium surfaces	29
7.1	Cleaning recommendations for components with organic coatings	30
7.2	Cleaning recommendations for anodic-oxidised components	39
8	Surface quality	45
8.1	Assessment criteria of the VFF (Verband für Fenster und Fassaden), the German Professional Association for Windows and Façades	45
8.2	Weathering behaviour of powder coatings	51
9	Guarantee	55
10	Literature	56

1 Aluminium surface treatment

1.1 Advantages of a surface treatment

Treating metal surfaces enables versatile, architectural design options for aluminium components. Other advantages are the increased UV- and weather resistance, protection against corrosion, as well as greater surface robustness and durability. *¹Different quality requirements apply to the surfaces of aluminium profiles. *²That is why there is a difference in surfaces with higher requirements, surfaces with normal requirements and surfaces with no or lower requirements.

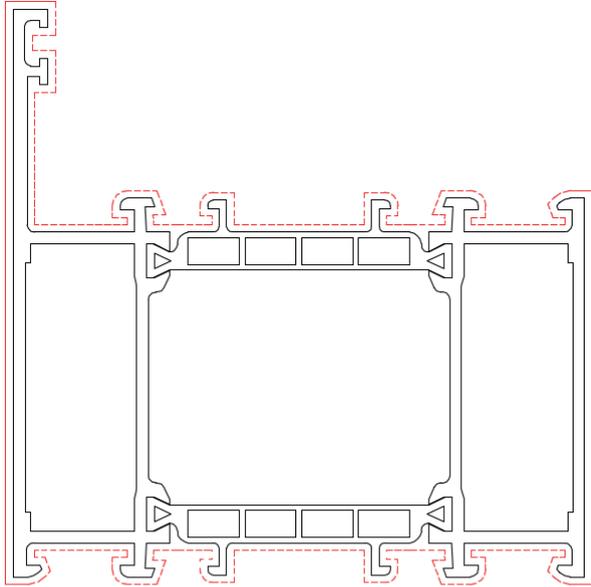
1.2 Required standard of the surfaces

Surfaces that are visible from the inside or from the outside when installed and closed are generally referred to as principal surfaces (surfaces with higher requirements). Surfaces with normal or lower requirements are those which are only open or which are not visible. [1] The respective surface requirements for window, door and façade profiles are shown in Illustration 1-1, Illustration 1-2 and Illustration 1-3. The assessment of the surface quality of aluminium profiles is covered in Chapter 7.2.

*¹ The quality requirements for the surfaces of the aluminium profiles vary.

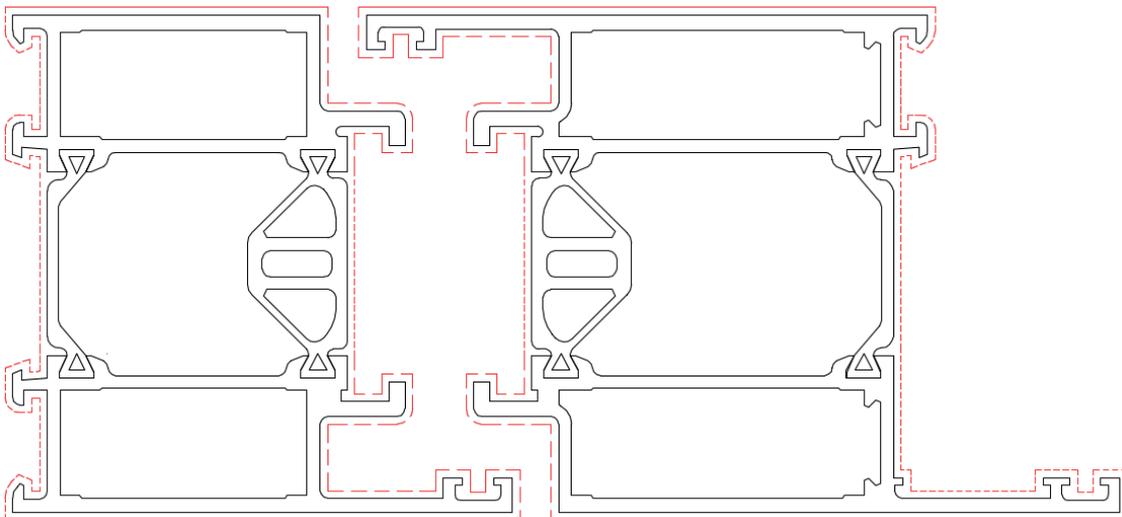
*² A distinction is made between:

- Surfaces with high requirements
- Surfaces with usual requirements
- Surfaces with no or little requirement



- Flächen mit geringer Anforderung
- Flächen mit hoher Anforderung

Illustration 1-1: Required standard for WICLINE Profile



- Flächen mit geringer Anforderung
- · - · - Flächen mit üblicher Anforderung
- Flächen mit hoher Anforderung

Illustration 1-2: Required standard for WICSTYLE Profile

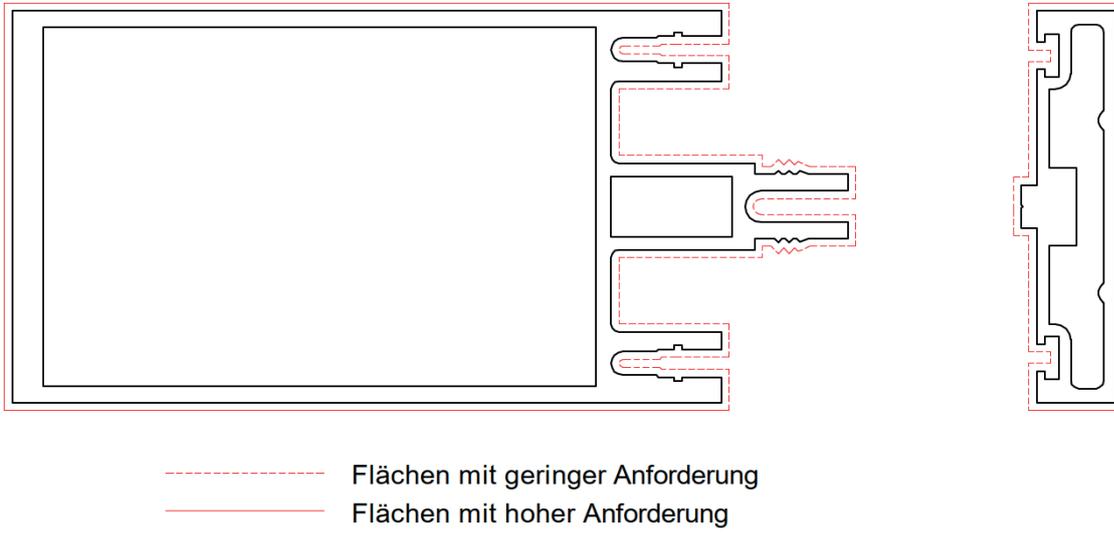


Illustration 1-3: Required standard for WICTEC Profile

1.3 Functional areas

Functional areas of composite profiles are not visible when installed. Therefore the required standard is lower with regard to the surface. To ensure the workability and the functions (e.g. the glass strip zone, the seal fixings, etc) of the half-shell, the accumulation of lacquer in the functional areas is not permitted.

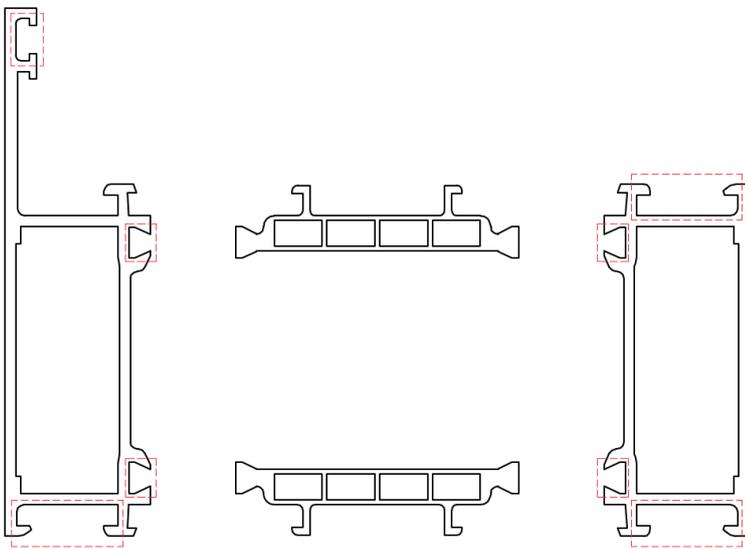


Illustration 1-4: Functional area of a composite profile

1.4 Suspension and bonding

As high requirements are sometimes placed on profile surfaces, care must be taken to ensure good bonding and suspension. An electrical contact to the profiles is necessary. Contact points must be avoided as much as possible on the principal surfaces of the profile. [2] Bonding can be done in the horizontal unit in accordance with Illustration 1-5 and 1-6.

If suspension is done in the horizontal unit, there is a risk that the profile will bend. A central support will help to limit the bending. Coating in the vertical unit is another possibility. Additional fixing of a shuttle protection prevents the profiles from making contact with each other.

Bonding at the ends of the aluminium profile is done by anodising. This will result in imperfections, which will need to be removed after coating. The profile ends must be shortened by 30 mm (by 50 mm with pre-anodisation). [2]

Due to technical requirements, some important features have to be considered for powder-coated profiles with pre-anodisation.

Because of the GSB guidelines, which state that pre-treatment and coating should take place under one roof, special handling of the profiles is needed.

The special features that arise as a result of this process are described below:

- During anodisation, the profiles must be bonded and suspended to the principal surface on both sides

These contact points may also be partially covered with powder coating but do not comply with the technical and decorative requirements of the remaining principal surfaces.

For this reason, a wastage of approx. 3 cm on both sides must be calculated.

- On vertical units, holes must be drilled on one side, to be able to suspend the profile.

Depending on the geometry of the profile, the point at which the hole is to be drilled must be chosen from the coating operation. The profile must be suspended in such a way that a complete coating is guaranteed in the unit. **It may therefore also be necessary to drill a hole in the visible surface.**

- With vertical units, it is also necessary to bond the opposite profile end, to prevent the profiles from oscillating and knocking against each other.

At our coaters, we use adhesive strips to do this. Consequently, no continuous coating is done here. **However, it is the same area in which the 3-cm wastage for pre-anodisation must be calculated.**

- **In fixed lengths, the additional wastage at both rod ends must be taken into consideration.**

If you have any questions about powder coating with pre-anodisation, please contact your consultant or your sales office.

Detailed information about bonding options using screws, hammers, etc. can be found in information sheet A 06 B 02 of the VOA (Verband für die Oberflächenveredelung von Aluminium e.V.), the association for the surface finishing of aluminium.

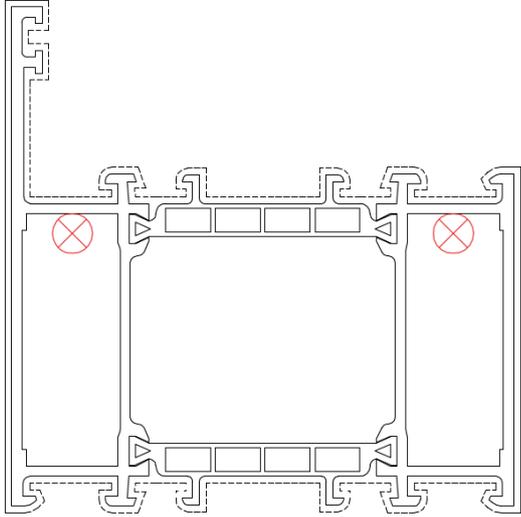


Illustration 1-5: Suspension of horizontal barriers

When suspended in this way (Illustration 1-5) the glass strip zone is transversally tensioned. To minimise the risk of shell misalignment, additional supportive measures can be employed (e.g. supports for the ancillary surfaces).

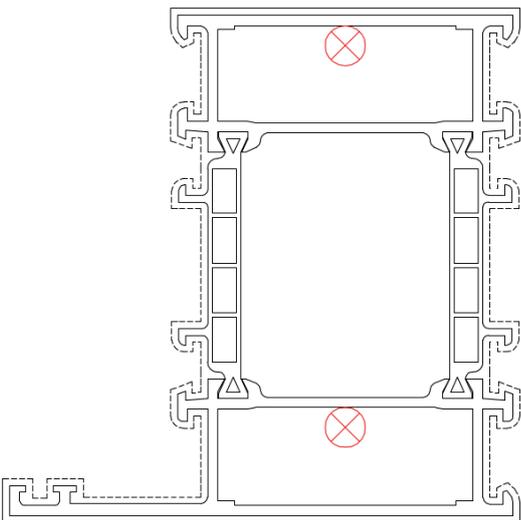


Illustration 1-6: Suspension of vertical barriers

In a suspension with vertical barriers (Illustration 1-6), the glass strip zone is tensioned. Consequently, the risk of shell misalignment is lower.

1.5 GSB and Qualicoat

The quality guidelines of GSB INTERNATIONAL or the regulations for acquiring the quality mark from QUALICOAT for coatings on aluminium form the basis for the coating of aluminium components. The respective coating classes are shown in Table 1-1 and Table 1-2.

Table 1-1: GSB coating classes [3]

	Product example	Weathering test
Standard	Standard Polyester	1 year Florida ~ 3 years MEK
Master	Super-durable Polyester	3 years Florida ~ 10 years MEK
Premium	Fluoropolymer PDVF/PFC	5 years Florida ~ 20 years MEK

Table 1-2: Qualicoat coating classes [4]

	Product example	Weathering test
Class 1	Standard Polyester	1 year Florida ~ 3 years MEK
Class 2	Super-durable Polyester	3 years Florida ~ 10 years MEK
Class 3	Fluoropolymer PDVF/PFC	10 years Florida ~ 30 years MEK

The selection of pre-treatment processes and coating materials is done in accordance with GSB using the classification in weathering categories (see Table 1-3 and 1-4).

Table 1-3: Weathering categories [3]

Weathering category	Corrosion effect	Atmospheric environment	recommended pre-treatment	GSB Coating classes	recommended cleaning interval
GSB - Country Side (C2)	low	low level of soiling, rural environment, urban and moderate industrial atmosphere	chrome-free/ chromate-free/ chrome-based	Approved	annually
GSB - Industrial (C3)	moderate	Industrial atmosphere with corrosive waste gases and coastal areas with moderate salt content	chrome-free/ chromate-free/ chrome-based	Master	annually
GSB - Sea Proof (C4)	strong	Coasts with medium salt content	chrome-free with documented process flow/ chromate-free/ chrome-based	Master	annually
				Premium	
GSB - Sea Proof Plus (C5)	very strong	Coasts with high salt content, open sea	Pre-anodisation	Master/ Premium	2 x annually

Table 1-4: Classes for GSB coating materials [3]

Coating material	UV exposure	Climate zone	Colour palette
Standard	Normal	Continental climate	Alle RAL colours and many special colours
Master	High	Mediterranean climate	Limited in accordance with manufacturer's specifications
Premium	Very high	Middle East	Very limited in accordance with manufacturer's specifications

Table 1-5: Corrosion categories [5]

Corrosion category	Corrosion exposure	Example
C1	Very low	Inside: heated spaces, e.g. schools, offices
C2	Low	Inside: unheated rooms, e.g. storage rooms, sports halls Outside: rural areas
C3	Medium	Inside: Food processing, breweries, laundries Outside: lightly soiled urban areas
C4	High	Inside: Swimming pools, industrial plants Outside: heavily soiled urban areas, industrial areas, coastal areas without salt water spray, exposure to de-icing salt
C5	Very high	Inside: Collieries, processing with aggressive media Outside: industrial areas, coastal areas with salt water spray
Cx	Extreme	Extremely corrosive atmospheres, such as industrial plants in sub-tropical and tropical climates

2 Pre-treatment with powder coating and liquid coating

2.1 Introduction

Pre-treatment of the profile surface occurs before coating and is significant for good lacquer adhesion and its associated protection against corrosion. Thorough pre-treatment of the substrate surface is a prerequisite for a high quality of coating. Firstly, all soiling such as oil, grease and dust, as well as natural oxide layers, must be removed from the bare aluminium surface. Depending on the atmospheric environment (see Table 1-3), pre-treatment is done by chromate coating, chrome-free or by pre-anodisation. Other criteria for the choice of pre-treatment are the type of substrate and the type of contamination.

2.2 Yellow and green chromating to DIN 12487 standard

The process steps for chromate pre-treatment in accordance with DIN 12487 are shown in Illustration 2-1. Coating of the profile must take place within 24 hours of chromate coating. In addition, protective measures must be chosen which prevent the profile from being contaminated after pre-treatment. [3]

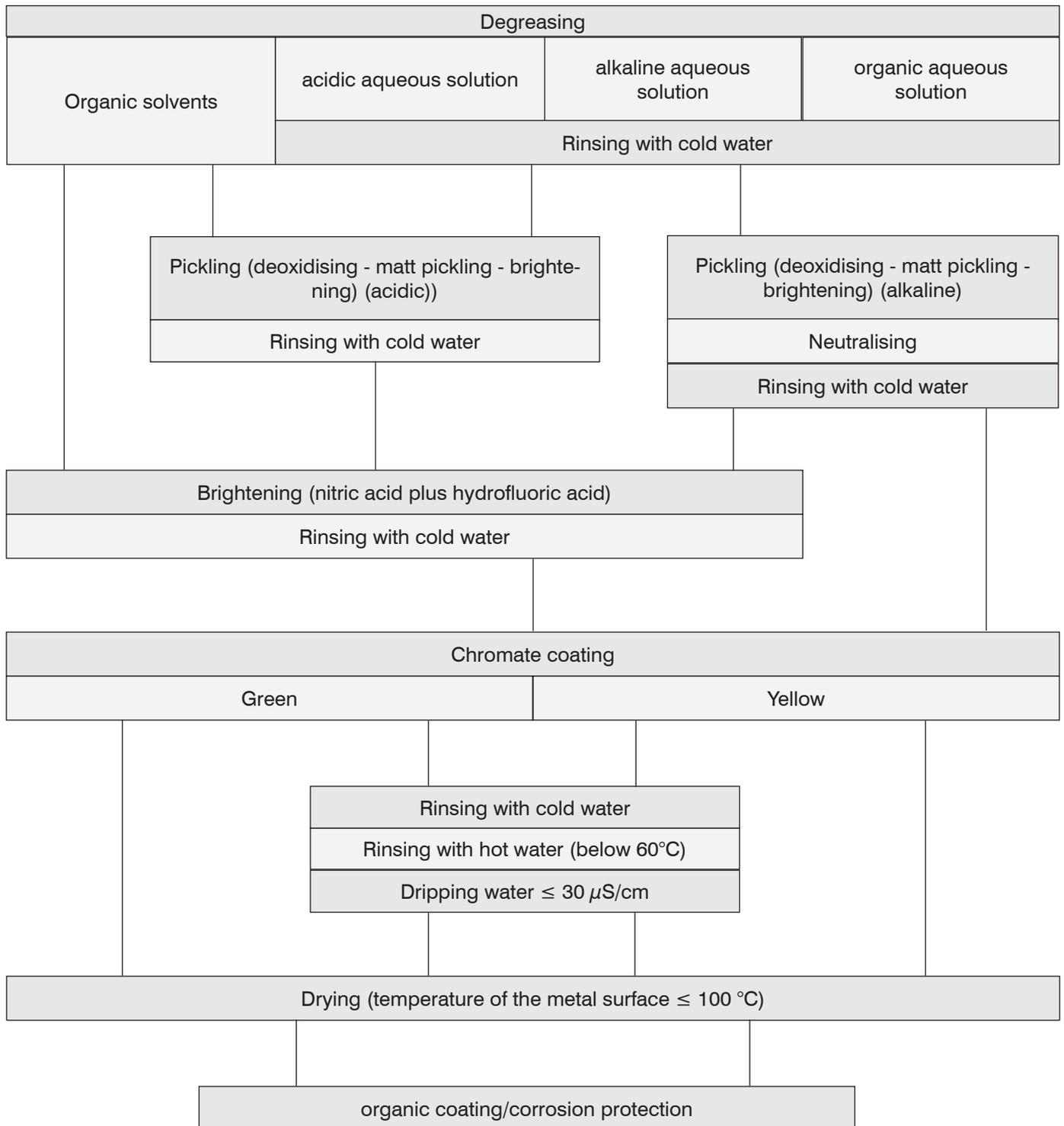


Illustration 2-1: Process steps for chromate coating [6]

2.3 Alternative pre-treatment processes

Chrome-free pre-treatment processes were developed for environmental and health protection reasons and are mostly based on zirconium or titanium compounds. The thickness of the coating produced is thinner compared with chromate coating or pre-anodisation. The pre-treatment of aluminium surfaces with chrome-free pre-treatment requires the same steps as for chromate coating (see Illustration 2-1):

- Step 1: Cleaning/Degreasing
- Step 2: Pickling
- Step 3: Rinsing
- Step 5: Chrome-free pre-treatment
- Step 6: Rinsing
- Step 7: Drying [7]

Alternative pre-treatment methods for aluminium surfaces may only be used if they are approved by Qualicoat or GSB International.

2.4 Pre-anodisation

In environments with greatly increased effects of corrosion, pre-anodisation of the profile is required in order to avoid filiform corrosion (1). Pre-anodisation is comparable to standard anodisation with higher electrolyte temperatures and higher current densities in a sulphuric acid bath. [8] Pre-anodisation must be carried out as per Table 2-1. After pre-anodisation, the aluminium profiles must be coated within 72 hours. [3]

Table 2-1: Process steps of pre-anodisation as per GSB INTERNATIONAL [3]

Step 1	Degreasing		
Step 2	Rinsing with water, temperature $T \geq 20^{\circ}\text{C}$ and $\leq 80^{\circ}\text{C}$		
Step 3	Pickling		
Step 4	Rinsing with water, temperature $T \geq 20^{\circ}\text{C}$ and $\leq 80^{\circ}\text{C}$		
Step 5	Etching		
Step 6	Rinsing with water, temperature $T \geq 20^{\circ}\text{C}$ and $\leq 80^{\circ}\text{C}$		
Step 7	Anodising using the direct current sulphuric acid process		
	Parameters:	Electrolyte concentration:	180–200 g/l free H ₂ SO ₄
		Aluminium content:	< 15 g/l
		Temperature:	25–30°C (with continuous recording)
		Current density:	0.8–2.0 A/dm ²
	Thickness	3–8 μm	
Step 8	Rinsing with water, temperature $T \geq 20^{\circ}\text{C}$ and $\leq 80^{\circ}\text{C}$		
Step 9	Rinsing with water, temperature $T \geq 20^{\circ}\text{C}$ and $\leq 80^{\circ}\text{C}$		
	Rinsing with demineralised water must be done in such a way that the final dripping rinse water at 20°C has a conductivity of $\square_{20^{\circ}\text{C}} < 30.0 \mu\text{S/cm}$.		
Step 10	Drying with an object temperature of below 100°C		
Step 11	Conducting a dye stain test is recommended for verifying the open porosity of the oxide layer. The dye stain test is compulsory for anodising which is subcontracted.		

Step 10	Drying with an object temperature of below 100°C
Step 11	Conducting a dye stain test is recommended for verifying the open porosity of the oxide layer. The dye stain test is compulsory for anodising which is subcontracted.
Step 12	Checking the thickness of the pre-anodisation coating
	a. non-destructive using the eddy current process as per ISO 2360
	b. a metallographic microsection is carried out, for arbitration, as per ISO 1463
Step 13	Secondary treatment possible

Filiform corrosion exhibits a typical filamentary development and occurs in environments with high chloride levels with contemporaneous high humidity. The filament grows using anodic infiltration. This means that the aluminium surface at the head of a filament directly under the coating corrodes. The coating then detaches itself from the carrier material and is pushed up by the corrosion products forming at the end.

Typical characteristics of filamentary corrosion are:

- It is found at a relative humidity between 40% and 90% .
- The filaments develop in a preferred direction.
- The filaments never intersect.

The risk of filiform corrosion can be minimised by chemical pickling with at least 2 g/m² of metal removal. By today's standards, only a pre-treatment with pre-anodisation, rather than chromate coating, offer complete protection against filiform corrosion. A poor quality of powder coating and a higher contamination level in the pre-treatment increase the risk of filiform corrosion.

3 Powder coating (physical process)

3.1 General

The coating powder is first electrostatically loaded into the spray gun and then applied to the workpiece with compressed air. The powder dissolves in the melting process during stoving with the aluminium surface. The surplus powder is returned to the cycle and reused. [9] Powder coatings are solvent free and therefore very environmentally friendly. WICONA uses polyester as a coating powder. The advantages of polyester include weather- and UV resistance, low tendency to yellowing, good colour gradient and high elasticity. Disadvantages are the lower chemical resistance and high raw material price.

GSB's powder coatings are classified as follows [3]:

- Standard: 50–120 μm thickness
- Master: 50–120 μm thickness
- Premium: 50–120 μm thickness

Qualicoat's powder coatings are classified as follows [4]:

- Class 1: min. 60 μm thickness
- Class 2: min. 60 μm thickness
- Class 3: min. 50 μm thickness

Two-layer powder coating (Class 1 and 2): min. 100 μm thickness

Two-layer, PVDF-based powder coating: min. 80 μm thickness

3.2 Coating of (insulating) profiles

Care must be taken when coating aluminium profiles to ensure even distribution of the powder. The nozzle adjustment must be regulated depending on the type of suspension (see Illustration 3-1 and Illustration 3-2). When coating insulation profiles, the problem of lacquer adhesion on the polyamide barriers must be considered. The polyamide barriers must be able to withstand a temperature of 180°C for a duration of 20 minutes. [10] Furthermore, blistering can form on the insulating barriers, for example as a result of moisture in the insulating barrier or the incorrect choice of lacquer. Metallic lacquers are particularly at risk for this. Attention must also be paid to:

- Bonding on both half-shells
- No suspension holes on the thermal barrier
- Suspension on heavy aluminium half-shells
- Avoid sagging and torsions
- Avoid compressive stress, bending stress or distortion stress on the thermal insulation zones

The result of the coating on the insulating barriers is not specifically influenced. Therefore there are low or no requirements for these surfaces. [1]

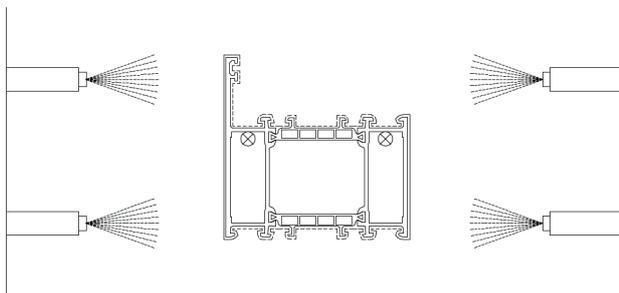


Illustration 3-1: Nozzle adjustment with 0° with a suspension of horizontal barriers

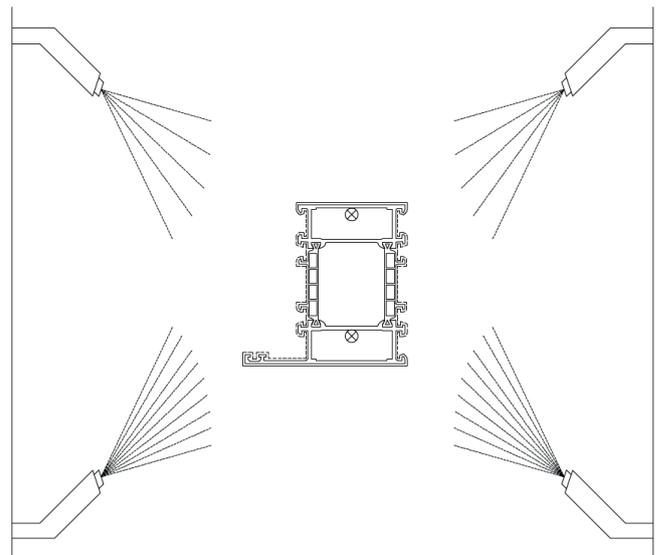


Illustration 3-2: Nozzle adjustment with 45° with a suspension of vertical barriers

In Illustration 3-3, an even application of the coating powder is not possible because of the incorrect nozzle adjustment.

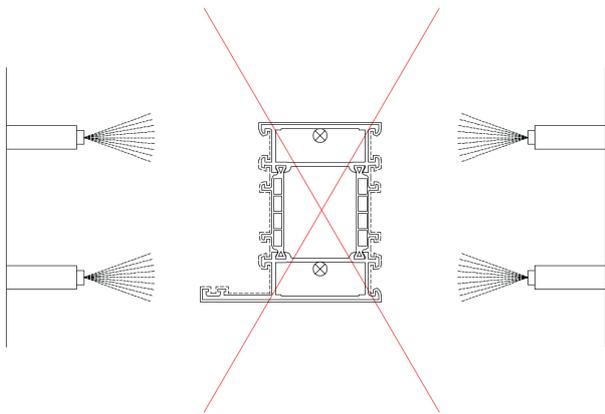


Illustration 3-3: Incorrect nozzle adjustment

3.3 Steps of spray application

- **Step 1:** Suspension of the profile
- **Step 2:** Pre-treatment of the profile
- **Step 3:** Application of the coating powder
- **Step 4:** Drying/Stoving
- **Step 5:** Cooling
- **Step 6:** Quality inspection
- **Step 7:** Packing

The following points must be noted when suspending the profile (Step 1):

- Ensure it is well earthed
- The greatest possible hanging thickness to obtain optimum throughput
- Ensure run-off of pre-treatment media
- Wear gloves when suspending pre-treated components
- Take care when positioning principal and ancillary surfaces

3.4 Chemical paint stripping

The coating layer can be removed from the aluminium surface using chemical paint stripping. In this way, the surface can be retreated. The lacquer bonding agent will decompose as a result of the chemical reaction between the bonding agent and the paint stripper. The lacquer disperses finely by chemical decomposition (Illustration 3-4), or forms a skin or filaments by infiltration (Illustration 3-5). Paint stripping with solvent in paint removal baths is a very gentle process. With this method, the base material is not damaged or degraded. After the chemical paint stripping, the material is rinsed with water, dried if necessary and pickled. The surface is passivated to provide a temporary protection against corrosion. [11]

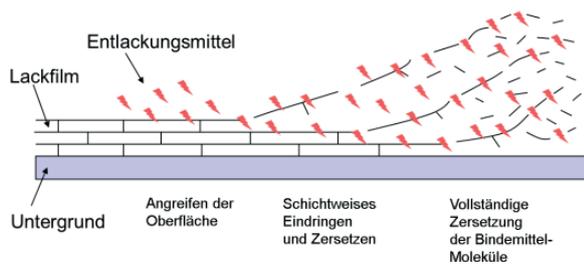


Illustration 3-4: Finely dispersed removal [11]

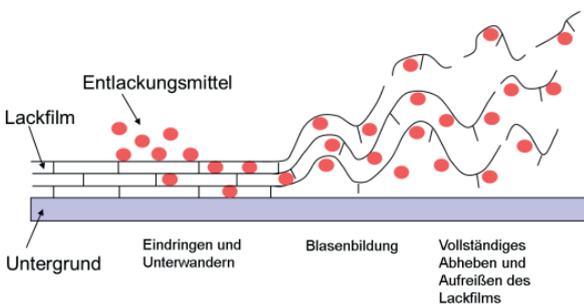


Illustration 3-5: Skin-forming/filament-forming removal [11]

3.5 WICONA Colour Concept

High Quality Design colours are available in silk sheen (70–90% gloss level) and matt (30% gloss level) versions. There is also a choice of metallic colours and Exclusive Design colours.

WICONA

» Die Stadt der Zukunft trägt Farbe...

Moderne Stadtarchitektur lebt von attraktiven Gebäudeformen und Farben. Die Stadt der Zukunft gestalten heißt auch mit Farben Akzente setzen, das individuelle Design des Bauwerks betonen, Kontraste zur gebauten Umgebung schaffen oder ein stimmiges Erscheinungsbild passend abzurunden.

Für diese Anforderungen bietet WICONA optimale Voraussetzungen: durch ein 25 exklusive Töne umfassendes Farbangebot für die Profilsbeschichtung. Damit lassen sich nahezu alle optischen Ansprüche erfüllen und zugleich die spezifischen Eigenschaften von Fassaden, Fenstern und Türen aus Aluminium hervorheben.

High Quality Design Farben, matt + seidenglanz

			
RAL 3004 Purpurrot	RAL 5004 Schwarzblau	RAL 5011 Stahlblau	RAL 5014 Taubenblau
			
RAL 6005 Moosgrün	RAL 7004 Signalgrau	RAL 7012 Basaltgrau	RAL 7015 Schiefergrau
			
RAL 7016 Anthrazitgrau	RAL 7021 Schwarzgrau	RAL 7022 Umbragrau	RAL 7024 Graphitgrau
			
RAL 7035 Lichtgrau	RAL 7039 Quarzgrau	RAL 7040 Fenstergrau	RAL 8003 Lehm Braun
			
RAL 8017 Schokoladenbraun	RAL 9003 Signalweiß	RAL 9005 Tiefschwarz	RAL 9006 Weißaluminium
			
RAL 9007 Graualuminium	RAL 9010 Reinweiß	RAL 9016 Verkehrsweiß	QUALICOAT Klasse 1 10 Jahre Garantie
			
Glimmerfarbe DB 702 Grau	Glimmerfarbe DB 703 Dunkelgrau		

Die Oberflächenpreise der High Quality Design Farben entnehmen Sie bitte unserer aktuellen Preisliste.

Druckbedingt können die dargestellten Farben vom Original abweichen.

» Colour follows function...

Dieser abgewandelte Spruch aus der Architektensprache steht für das Sonderprogramm innerhalb der WICONA Farbpalette. Die Beschichtungen übernehmen hier nicht nur eine optische, sondern zusätzlich auch eine technische Funktion.

Hoch kratzresistente Beschichtungen schützen die Fassadenprofile vor mechanischen Einflüssen. Varianten mit solar-reflektierenden Eigenschaften dienen dazu, die Oberflächentemperaturen von besonnten Flächen deutlich zu verringern.

Erhältlich sind beispielsweise Beschichtungen mit antibakteriellen und antiviralen Eigenschaften, die etwa bei medizinisch genutzten Gebäuden oder in Betreuungseinrichtungen zum Einsatz kommen können.

WICONA greift mit diesem Sonderfarb-Programm Anforderungen auf, wie sie in der Stadt der Zukunft auftreten. Mit Lösungen, die urbane Architektur für die Bewohner optisch und funktionell erlebbar machen.

Exklusiv Design Farben

Das WICONA Farbkonzept ist so angelegt, dass die dezenten Töne die architektonische Idee des Gebäudes unterstreichen, es aber nicht dominieren.

Beispiele für diese gelungene Kombination finden sich bei zahllosen WICONA Objekten weltweit.



Die Oberflächenpreise der Exklusiv Design Farben erhalten Sie auf Anfrage.



QUALICOAT Klasse 2
15 Jahre Garantie

Innovative Design Farben



Die Oberflächenpreise der Innovative Design Farben erhalten Sie auf Anfrage.

Druckbedingt können die dargestellten Farben vom Original abweichen.

4 Wet-lacquer coating

With wet-lacquer coating of aluminium, 2-component wet lacquers are applied to the surface. These lacquers cure by chemical reaction at room temperature.

DURAFLON® coatings comprise fluoropolymers and are approved for GSB classification in the Premium quality category, and for Qualicoat classification in Class 3 quality. DURAFLON® coatings have the following properties:

- **UV resistance:** The durability of the surface is mainly as a result of the UV resistance of the coating material
- **Chemical resistance:** DURAFLON® also demonstrates its superior resistance with so-called aggressive media, e.g. close to industrial plants or in the medical sector, with frequent use of disinfection agents
- **Cleaning:** Dirt-repellent properties extend the normal cleaning intervals
- **“Easy-to-clean”** technology: Thanks to its “Easy-to-clean” technology, any necessary cleaning is quick and simple. Even graffiti can usually be effortlessly removed.

5 Anodising to DIN 17611 Standard (Electrochemical process)

5.1 Pre-treatment

With oxidising (also called anodising), the natural oxide layer of the metal surface is strengthened. This anodically produced oxide layer increases the protection against corrosion and enables the surface to be coloured using different processes. Examples include colour anodisation, dip dyeing or electrolytic colouring. [12] Table 5-2 describes types of chemical (pickling) and mechanical (grinding, brushing and polishing) treatments to DIN 17611 standards. Depending on the choice and combination of types of pre-treatment (E0 to E8), different surface effects are obtained (e.g correction of surface defects, decorative effects, etc.).

In the DIN 17611 standard, the minimum coating thickness of the oxide layer is determined according to the environment (see Table 5-1).

Table 5-1: Minimum thickness of the oxide layer [13]

Category	Minimum thickness	Location and usage
10	10	Inside, dry
15	15	Inside, occasionally wet Outside, rural environment without air contaminants
20	20	Outside, urban and industrial environments
25	25	In particularly aggressive environments, e.g. a combination of industrial and coastal climates

Table 5-2: Surface pre-treatment to DIN 17611 standard [13]

Abbreviation	Type of pre-treatment	Comments
E0	Degreasing and deoxidising	Surface treatment before anodisation, in which the surface is degreased and deoxidised without additional pre-treatment. Mechanical surface defects, e.g. dents and scratches, remain visible. Spots of corrosion, which could hardly be perceived before the treatment, may become visible after the treatment.
E1	Grinding	Grinding results in a comparatively uniform, but somewhat dull, matt appearance. All existing surface defects are largely eliminated, but depending on the grit size of the abrasive, grinding marks may remain.
E2	Brushing	Mechanical brushing produces a uniform glossy surface with visible brush marks. Surface defects are only partially removed.
E3	Polishing	Mechanical polishing produces a glossy, shiny surface, while surface defects are only partially eliminated.
E4	Grinding and brushing	By grinding and brushing, a uniform glossy surface is obtained; mechanical surface defects are eliminated. Spots of corrosion, which may be visible with E0 or E6 treatments, are eliminated.
E5	Grinding and polishing	By grinding and polishing, a smooth glossy appearance is obtained; mechanical surface defects are eliminated. The effects of corrosion, which may be visible with E0 or E6 treatments, are eliminated.
E6	Pickling	After degreasing, the surface is given a silk-matt sheen by being treated in special alkaline pickling solutions. Mechanical defects are smoothed, but not completely removed. The effects of corrosion on the metal surface can become visible by pickling. Mechanical pre-treatment before pickling can eliminate these effects; however, it is more beneficial to handle and store the metal in such a way that corrosion is avoided.

E7	Chemical or electrochemical brightening	After degreasing of the surface in a steam degreasing agent or in a non-corrosive cleaning agent, the surface becomes very shiny from being treated in special chemical or electrochemical brightening baths. Surface impurities are eliminated only to a certain extent, and the effects of corrosion can become visible.
E8	Polishing and chemical or electrochemical brightening	Grinding and polishing with subsequent chemical or electrochemical brightening. This treatment results in a high-gloss appearance; mechanical surface defects and the onset of corrosion are generally visible.
<p>NOTE With E0 pre-treatment, the natural oxide layer is removed without any significant metal degradation. All other pre-treatments involve increased metal degradation.</p>		

Profile adaptations such as machining, reshaping or trimming must be done before the profile is anodised. Individual components and screw connections should only be assembled after anodisation, as no heavy metals should get into the anodising baths. [12]

5.2 WICONA Colour Concept

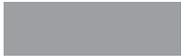
WICONA

» Die Stadt der Zukunft trägt Farbe...

Moderne Stadtarchitektur lebt von attraktiven Gebäudeformen und Farben. Die Stadt der Zukunft gestalten heißt auch mit Farben Akzente setzen, das individuelle Design des Bauwerks betonen, Kontraste zur gebauten Umgebung schaffen oder ein stimmiges Erscheinungsbild passend abzurunden.

Für diese Anforderungen bietet WICONA optimale Voraussetzungen: durch ein 25 exklusive Töne umfassendes Farbangebot für die Profilbeschichtung. Damit lassen sich nahezu alle optischen Ansprüche erfüllen und zugleich die spezifischen Eigenschaften von Fassaden, Fenstern und Türen aus Aluminium hervorheben.

High Quality Design Farben, matt + seidenglanz

			
RAL 3004 Purpurrot	RAL 5004 Schwarzblau	RAL 5011 Stahlblau	RAL 5014 Taubenblau
			
RAL 6005 Moosgrün	RAL 7004 Signalgrau	RAL 7012 Basaltgrau	RAL 7015 Schiefergrau
			
RAL 7016 Anthrazitgrau	RAL 7021 Schwarzgrau	RAL 7022 Umbragrau	RAL 7024 Graphitgrau
			
RAL 7035 Lichtgrau	RAL 7039 Quarzgrau	RAL 7040 Fenstergrau	RAL 8003 Lehm Braun
			
RAL 8017 Schokoladenbraun	RAL 9003 Signalweiß	RAL 9005 Tiefschwarz	RAL 9006 Weißaluminium
			
RAL 9007 Graualuminium	RAL 9010 Reinweiß	RAL 9016 Verkehrsweiß	QUALICOAT Klasse 1 10 Jahre Garantie
			
Glimmerfarbe DB 702 Grau	Glimmerfarbe DB 703 Dunkelgrau		

Die Oberflächenpreise der High Quality Design Farben entnehmen Sie bitte unserer aktuellen Preisliste.

Druckbedingt können die dargestellten Farben vom Original abweichen.

» Colour follows function...

Dieser abgewandelte Spruch aus der Architektensprache steht für das Sonderprogramm innerhalb der WICONA Farbpalette. Die Beschichtungen übernehmen hier nicht nur eine optische, sondern zusätzlich auch eine technische Funktion.

Erhältlich sind beispielsweise Beschichtungen mit antibakteriellen und antiviralen Eigenschaften, die etwa bei medizinisch genutzten Gebäuden oder in Betreuungseinrichtungen zum Einsatz kommen können.

Hoch kratzresistente Beschichtungen schützen die Fassadenprofile vor mechanischen Einflüssen. Varianten mit solar-reflektierenden Eigenschaften dienen dazu, die Oberflächentemperaturen von besonnten Flächen deutlich zu verringern.

WICONA greift mit diesem Sonderfarb-Programm Anforderungen auf, wie sie in der Stadt der Zukunft auftreten. Mit Lösungen, die urbane Architektur für die Bewohner optisch und funktionell erlebbar machen.

Exklusiv Design Farben

Das WICONA Farbkonzept ist so angelegt, dass die dezenten Töne die architektonische Idee des Gebäudes unterstreichen, es aber nicht dominieren.

Beispiele für diese gelungene Kombination finden sich bei zahllosen WICONA Objekten weltweit.



Die Oberflächenpreise der Exklusiv Design Farben erhalten Sie auf Anfrage.



QUALICOAT Klasse 2
15 Jahre Garantie

Innovative Design Farben



Die Oberflächenpreise der Innovative Design Farben erhalten Sie auf Anfrage.

Druckbedingt können die dargestellten Farben vom Original abweichen.

6 Storage and transport

Aluminium profiles should be stored in a dry location and protected against moisture to ensure optimum protection against corrosion. Damp profiles must be dried immediately. The treated aluminium must be transported in such a way that no damage occurs through soiling, water or deformation. Powder-coated surfaces are breathable, so condensation can form in the packaging or rainwater can penetrate if stored in unfavourable conditions. This moisture can appear as dark patches on the coated surface. This is not a quality defect on the coating, but a visual impairment caused by damp. These patches can be completely removed by heat (e.g. by using a hot-air gun). Once installed, water patches will disappear after a while. To prevent the formation of condensation and standing water, it is essential to open the sealed packaging after delivery.

7 Cleaning cycles of aluminium surfaces

Components made from aluminium must be cleaned at regular intervals to maintain the decorative appearance of the façade and to reduce the risk of corrosion caused by soiling. There is a distinction between initial cleaning, basic cleaning and interval cleaning. Compared to organically coated surfaces, anodised surfaces have very good weather resistance. Nevertheless, anodised aluminium components must be cleaned at regular intervals to maintain the appearance of the surface [14] The GRM (Gütegemeinschaft Reinigung Metallfassaden e. V.), the Quality Association for the Cleaning of Metal Façades gives advice on the choice and use of tested and approved cleaning and preserving agents.

7.1 Cleaning recommendations for components with organic coatings

Table 7-1 shows the recommended cleaning intervals according to GSB.

Table 7-1: Recommended cleaning intervals according to GSB [3]

Weathering category	Corrosion effect	Atmospheric environment	recommended pre-treatment	GSB Coating classes	recommended cleaning interval
GSB - Country Side (C2)	low	low level of soiling, rural environment, urban and moderate industrial atmosphere	chrome-free/ chromate-free/ chrome-based	Approved	annually
GSB - Industrial (C3)	moderate	Industrial atmosphere with corrosive waste gases and coastal areas with moderate salt content	chrome-free/ chromate-free/ chrome-based	Master	annually
GSB - Sea Proof (C4)	strong	Coasts with medium salt content	chrome-free with documented process flow/ chromate-free/ chrome-based	Master	annually
				Premium	
GSB - Sea Proof Plus (C5)	very strong	Coasts with high salt content, open sea	Pre-anodisation	Master/ Premium	2 x annually

The following advice from Tiger Coatings® should be observed when cleaning organically coated aluminium façades:

- Use only neutral, clean water, with a small amount of neutral (pH 7) detergent if necessary
- use a soft, non-abrasive cloth, rag or industrial wadding; avoid vigorous rubbing
- Greasy, oily or sooty substances can be removed using white spirit or isopropyl alcohol (IPA). Residues from glues, silicone rubber or adhesive tape can also be removed in this manner.
- Do not use any solvents containing esters, ketones, polyvalent alcohols, aromatics, glycol ether or halogenated hydrocarbons
- Sealing compound and other materials such as glazing aids, lubricants, drilling and cutting materials, etc., that come into contact with coated surfaces must be pH neutral and free from substances which damage lacquer.
- Do not use rough or abrasive materials
- Do not use strongly acidic or strongly alkaline cleaning or wetting agents
- Do not use any cleaning agent with an unknown composition
- Fine structural effects: Use a lint-free cloth; to assist cleaning, moderate mechanical support, using soft brush which does not damage the surface, is permissible
- Cleaning agent temperature should be max. 25°C. Do not use a steam cleaner.
- During cleaning, the surface temperature must not exceed 25°C
- The maximum exposure time to this cleaning agent must not exceed one hour; if necessary, the cleaning process can be repeated after at least 24 hours.
- After each cleaning process, rinse immediately with clean, cold water
- Before each initial clean and before changing to a different cleaning agent or cleaning aid during regular cleaning intervals, their suitability should also be tested on an area of at least 2 m², on test area which is located in a south-facing position and which is not exposed

The following tables contain cleaning recommendations from the SZFF (Schweizerische Zentrale Fenster und Fassade), the Swiss Centre for Windows and Façades:

Table 7-2: Cleaning Class A – Preliminary cleaning [15]

Cleaning Class	Soiling/Position, Group	Cleaning Steps	Comments
A Preliminary cleaning	Packaging remnants, labels, adhesive tape and protective film, soiling from transport and storage	Careful removal by hand without water or other solvent Abrasive tools such as brushes or unsuitable rags should be avoided	This cleaning is usually carried out by façade and window manufacturers to enable partial acceptance

Table 7-3: Cleaning Class B – Interim cleaning [15]

Cleaning Class	Soiling/Position, Group	Cleaning Steps	Comments
B Interim cleaning	Cement and mortar splashes Concrete secretion Plaster splashes	Immediate removal with a sponge and soft brush. Wash off with running water.	Consultation with fabrication company required
	Tar, Dye splashes Putty residue, Adhesive	Careful removal with suitable solvent and clean cotton rag	
	Construction debris on façades and scaffolding Scaffolding	Careful removal by hand Wipe carefully, possibly tip scaffolding boards outside, wash off with running water	
	Dust deposits on horizontal and sloping surfaces	Wash off with running water, possible clean with a sponge	

Table 7-4: Cleaning Class C – End of construction cleaning [15]

Cleaning Class	Soiling/Position, Group	Cleaning Steps	Comments
C End of construction cleaning	Short to medium construction time (approx. 1–4 months)	Rinse with plenty of water. Cleaning with wetting agent solution and sponge. Rinse off and dry	Degree of soiling and construction time are decisive for the workload
	Longer construction time (over 4 months)	See above Several cleans during construction time are recommended (approx. every 2–3 months)	See above Plan the maintenance cleaning in a timely manner!
	Cleaning of scaffolding Cleaning of windows and other materials on the façade		It must always be done Do not forget!
	Preservation	See F, Preservation	Care treatment is unnecessary in principle; however, with more exceptional façade designs it can be of benefit!

Table 7-5: Cleaning Class D – Periodic maintenance cleaning [15]

Cleaning Class	Soiling/ Position, Group	Cleaning Steps	Comments
D – Periodic maintenance cleaning	Components without special care treatment. Slight soiling and/or low aesthetic demands	Rinse with plenty of water. Cleaning with wetting agent solution and sponge. Rinse off and dry	Interval of 1–2 years, depending on the amount of soiling and aesthetic demands
	Preserved components	Rinse with plenty of water. Remove preservation residues with a special cleaning substance. Cleaning with wetting agent solution and sponge. Rinse off and dry. Renew the preservation.	Interval of 2–3 years; more frequently in exposed locations and/or exceptional façade designs!
	Cleaning of windows, window frames	Clean the window on both sides. Clean windows frames with rebates	Do not forget! All work should be sensibly combined
	Cleaning of sun protection equipment	Clean all sides by hand	

Table 7-6: Cleaning Class C – Basic cleaning [15]

Cleaning Class	Soiling/ Position, Group	Cleaning Steps	Comments
E Basic cleaning	Medium soiling	Rinse with plenty of water. Repeated mechanical Cleaning with wetting agent solution, vibro-slider and 'Scotchbrite' pad. Rinse off and dry	Repeated mechanical cleaning required!
	Removal of all preservation	Rinse with water. Remove preservation residues with a special cleaning substance, repeated mechanical cleaning with basic cleaning agent, vibro-slider and 'Scotchbrite' pad. Rinse off and dry	Soiling, coverings, old preservation media and sealants must be completely removed
	Cleaning of windows, window frames	Clean the window on both sides. Clean window frames with rebates	Do not forget! All work should be sensibly combined
	Cleaning of sun protection equipment	Clean all sides by hand	

Table 7-7: Cleaning Class F – Preservation [15]

Cleaning Class	Soiling/ Position, Group	Cleaning Steps	Comments
F Preservation	Together with end of construction cleaning	After cleaning has been carried out:	Preliminary cleaning in accordance with recommendation is compulsory!
	Together with maintenance cleaning	Apply preserving agent with a clean cotton rag or cleaning wool; polish	
	Together with basic cleaning		

7.2 Cleaning recommendations for anodic-oxidised components

Table 7-8: Cleaning Class A – Preliminary cleaning [15]

Cleaning Class	Soiling/ Position, Group	Cleaning Steps	Comments
A Preliminary cleaning	Packaging remnants, labels, adhesive tape and protective film, soiling from transport and storage	Careful removal by hand without water or solvent. Abrasive tools such as brushes, etc, should be avoided	This cleaning is usually carried out by façade and window manufacturers to enable partial acceptance

Table 7-9: Cleaning Class B – Interim cleaning [15]

Cleaning Class	Soiling/Position, Group	Cleaning Steps	Comments
B Interim cleaning	Cement and mortar splashes Concrete secretion Plaster splashes	Immediate removal with a sponge and soft brush. Wash off with running water.	Consultation with fabrication company required
	Tar, Dye splashes Putty residue, Adhesive	Careful removal with suitable solvent and a clean cotton rag	
	Construction debris on façades and scaffolding	Careful removal by hand	
	Scaffolding	Wipe carefully, possibly tip scaffolding boards outside, wash off with running water	
	Dust deposits on horizontal and sloping surfaces	Wash off with running water, possible clean with a sponge	

Table 7-10: Cleaning Class C – End of construction cleaning [15]

Cleaning Class	Soiling/ Position, Group	Cleaning Steps	Comments
C End of construction cleaning	Low level of soiling and/or low aesthetic demands with regard to long-term behaviour, short construction time (approx. 1 month)	Rinse with plenty of water. Cleaning with wetting agent solution and sponge. Rinse off and dry	The degree of soiling and the colour of the aluminium components are decisive for choosing which cleaning technique to use; the darker, the trickier!
	Medium soiling and/or high aesthetic demands with regard to long-term behaviour and/or medium construction time (over 4 months)	Rinse with plenty of water. Mechanical cleaning with wetting agent solution, vibro-slider and 'Scotchbrite' pad. Rinse off and dry	See above
	Heavy soiling and/or high aesthetic demands with regard to long-term behaviour and/or long construction time (over 9 months)	Rinse with plenty of water. Mechanical cleaning with basic cleaning agent and vibro-slider with 'Scotchbrite' pad. Rinse off and dry	See above
	Cleaning of scaffolding	See Interim cleaning	It must always be done
	Cleaning of windows and other materials on the façade		Do not forget!
Preservation, Sealing	See F, Preservation, Sealing	Provide reliable protection against environmental influences. In each case, the advantages and disadvantages must be accurately clarified.	

Table 7-11: Cleaning Class D – Periodic maintenance cleaning [15]

Cleaning Class	Soiling/ Position, Group	Cleaning Steps	Comments
D – Periodic maintenance cleaning	Components without special care treatment. Slight soiling and/or low aesthetic demands	Rinse with plenty of water. Cleaning with wetting agent solution and sponge. Rinse off and dry	Degree of soiling and aesthetic demands are decisive for the cleaning intervals
	Medium soiling and/or high aesthetic demands	Rinse with plenty of water. Mechanical cleaning with wetting agent solution, vibro-slider and ‘Scotchbrite’ pad. Rinse off and dry	
	Sealed components	Rinse with plenty of water. Cleaning with wetting agent solution and sponge. Rinse off and dry	Interval of 2–3 years; more frequently in exposed locations and/or exceptional façade designs!
	Preserved components	Rinse with plenty of water. Mechanical cleaning with wetting agent solution, vibro-slider and ‘Scotchbrite’ pad. Rinse off and dry. Renew the preservation.	
	Cleaning of windows, window frames	Clean the window on both sides. Clean windows frames with rebates	Do not forget! All work should be sensibly combined
	Cleaning of sun protection equipment	Clean all sides by hand	

Table 7-12: Cleaning Class C – Basic cleaning [15]

Cleaning Class	Soiling/ Position, Group	Cleaning Steps	Comments
E Basic cleaning	Medium soiling	Rinse with plenty of water. Repeated mechanical cleaning with wetting agent solution, vibro-slider and 'Scotchbrite' pad. Rinse off and dry	Only possible in a few cases! Generally, basic cleaning agents must be used
	Heavy soiling Removing old preservation media Removal of old sealant	Rinse with water. Repeated mechanical cleaning with basic cleaning agent, vibro-slider and 'Scotchbrite' pad. Rinse off and dry	Soiling, coverings, old preservation media and sealants must be completely removed
	Cleaning of windows, window frames	Clean the window on both sides. Clean window frames with rebates	Do not forget! All work should be sensibly combined
	Cleaning of sun protection equipment	Clean all sides by hand	

Table 7-13: Cleaning Class F – Preservation and Sealing [15]

Cleaning Class	Soiling/ Position, Group	Cleaning Steps	Comments
F Preservation	Together with end of construction cleaning	After mechanical cleaning has been carried out:	Preliminary mechanical cleaning compulsory!
	Together with basic cleaning	Apply preserving agent with a clean cotton rag or cleaning wool; polish	
	Together with maintenance cleaning	After mechanical Cleaning and removal of old preservation residues: Apply preserving agent with a clean cotton rag or cleaning wool; polish	Preliminary mechanical Undesired coverings of dirt (lamination) means that cleaning is compulsory!
F Sealing	Together with end of construction cleaning	After mechanical cleaning has been carried out:	Preliminary mechanical cleaning compulsory!
	Together with basic cleaning	Apply sealant	Follow the application instructions! The best possible protections against weather conditions, efficient maintenance cleaning; long-term protection (5–8 years) against immissions, costly elimination after 7–10 years

8 Surface quality

8.1 Assessment criteria of the VFF (The German Professional Association for Windows and Façades)

The VFF information sheet AL.02, “Visual assessment of organically coated aluminium surfaces”, forms the basis for the assessment of the surface quality of organically coated surfaces. This assesses any anomaly in the characteristics of exterior surfaces from a distance of 5 m and of interior surfaces from a distance of 3 m within an observation period of 10 seconds. The required standard of the surfaces (shown in Illustration 8-1, Illustration 8-2 and Illustration 8-3) serves as the basis for which features are permitted. Analogous to this, there is the VFF information sheet AL.03, “Visual assessment of anodic-oxidised aluminium surfaces”, for the assessment of anodised surfaces. The anomaly in the characteristics is heavily dependent on the gloss level of the surfaces. The anomaly in the characteristics increases proportionally to the gloss level. Exterior surfaces were tested in diffused daylight and interior surfaces in normal, diffused illumination. In Switzerland, the corresponding guidelines of the SZFF (Schweizerische Zentrale Fenster und Fassade) were issued.

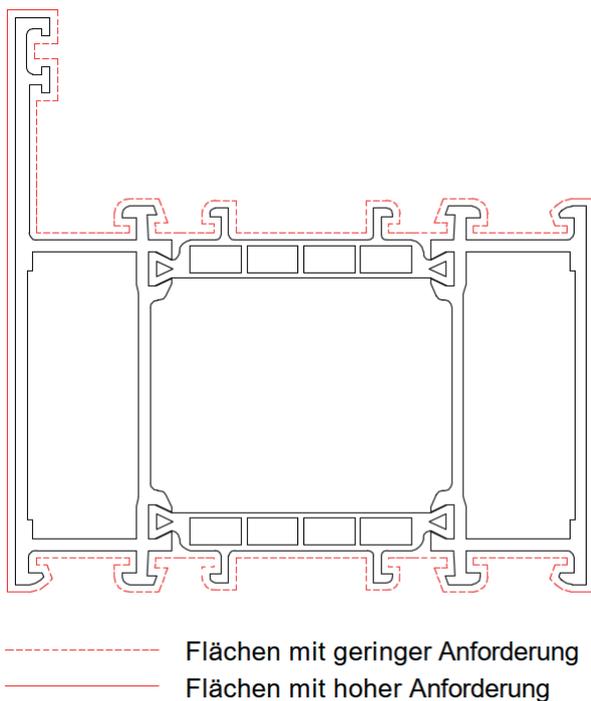


Illustration 8-1: Required standard for WICLINE Profile

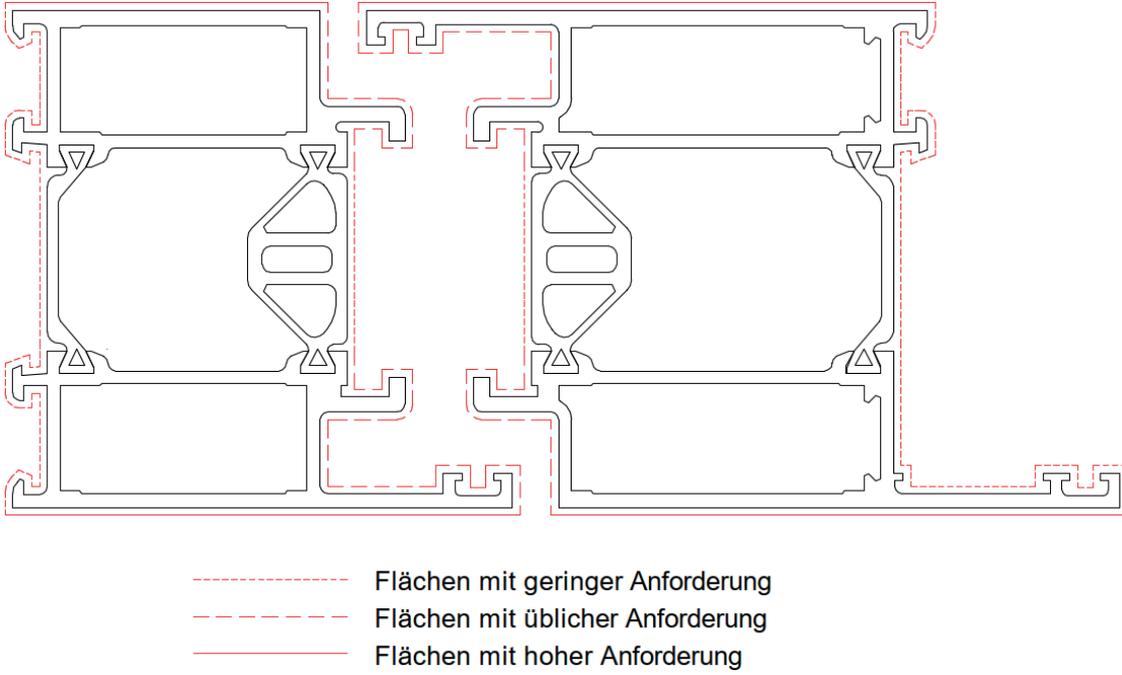


Illustration 8-2: Required standard for WICSTYLE Profile

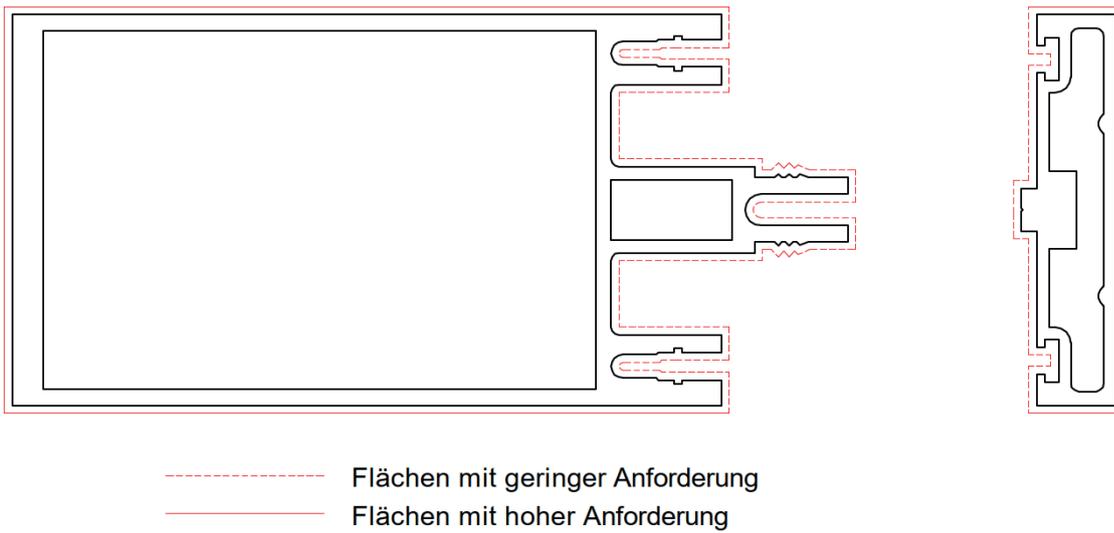


Illustration 8-3: Required standard for WICTEC Profile

Table 8-1: Visual assessment of organically coated aluminium surfaces [1]

Assessment criteria - Features	Requirement	MINIMUM REQUIREMENTS
		industrially coated
Craters, bubbles	high	Permitted if not noticeable. If noticeable: $\varnothing < 0.5$ mm permitted, for $\varnothing \geq 0.5$ mm max. 10 units per m or m ²
	normal	Permitted if not noticeable. If noticeable: $\varnothing < 0.5$ mm permitted, for $\varnothing \geq 0.5$ mm max. 15 units per m or m ²
	low	Feature is permitted
Pitting (e.g. filaments)	high	Permitted if not noticeable. If noticeable: $\varnothing < 0.5$ mm permitted, for $\varnothing \geq 0.5$ mm max. 5 units per m or m ²
	normal	Permitted if not noticeable. If noticeable: $\varnothing < 0.5$ mm permitted, for $\varnothing \geq 0.5$ mm max. 10 units per m or m ²
	low	Feature is permitted
Spalling	high/normal	Feature is not permitted
	low	Feature is permitted
Colour run-off	high/normal	Feature is not permitted
	low	Feature is permitted
Orange-peel effect	high	Finely structured permitted! Coarsely structure also permitted if the thickness is $> 120 \mu\text{m}$ for constructional reasons or order-related specifications.
	normal/low	Feature is permitted
Differences in gloss levels	high/normal	Permitted if not noticeable. (Observe viewing distances)
	low	Feature is permitted

Colour deviation	high/normal	Permitted if not noticeable (observe viewing distances)
	low	Feature is permitted
Welding seams with grinding marks or indentations	high	Permitted unless decorative grinding is expressly agreed
	normal/low	Feature is permitted
Unevenness related to semi-finished product (Indentations), draw lines, longitudinal welds, marks, patterns	high/normal/low	Feature is permitted
Production-related mechanical damage (e.g. indentations, bulges, scratches, imprints)	high/normal	Permitted if not noticeable (observe viewing distances)
	low	Feature is permitted

Table 8-2: Visual assessment of anodic-oxidised aluminium surfaces [16]

Assessment criteria - Features	Requirement	MINIMUM REQUIREMENTS
		industrially coated
Silicon excretions	high/normal	Feature is not permitted
	low	Feature is permitted
Imperfections in barriers, coarse grain	high/normal	Permitted if the E0/E6 pickling treatment is in accordance with DIN 17611 or with other pre-treatment processes if not noticeable
	low	Feature is permitted
Pre-corrosion	high/normal	Permitted if not noticeable with pickling treatment E0/E6 in accordance with DIN 17611
	low	Feature is permitted
Differences in gloss levels	high/normal	Permitted if it is within the tolerances listed below.
	low	Feature is permitted
Colour deviation	high/normal	Permitted if not noticeable (observe viewing distances). Unavoidable with welding seams.
	low	Feature is permitted
Welding seams with grinding marks or indentations	high	Permitted unless decorative grinding is expressly agreed
	normal/low	Feature is permitted
Unevenness related to semi-finished product (Indentations), draw lines, longitudinal welds, marks, patterns	high/normal/low	Feature is permitted

Assessment criteria - Features	Requirement	MINIMUM REQUIREMENTS
		industrially coated
Production-related mechanical Damage (e.g. indentations, bulges, scratches, imprints)	high/normal	Permitted if not noticeable (observe viewing distances)
	low	Feature is permitted
Sealing smudge (iridescent stratification)	high/normal	Feature is permitted. Unavoidable, especially with dark colours. (Can be eliminated by using abrasive basic cleaning).
	low	

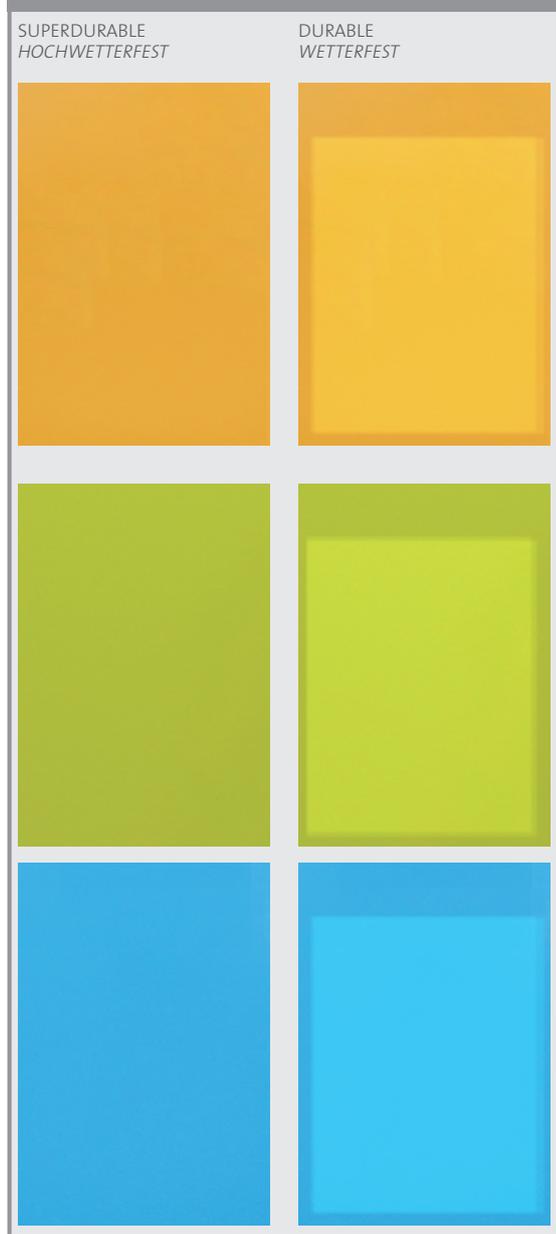
8.2 Weathering behaviour of powder coatings

When powder coatings weather, significant differences between the powder coating classifications become apparent (Table 8-3). [17] These values serve as a guide and can deviate from each other. Weatherproof powder coatings Qualicoat Class 1 and the GSB Standard. Highly weatherproof powder coatings are classified as Qualicoat Class 2 and GSB Master.

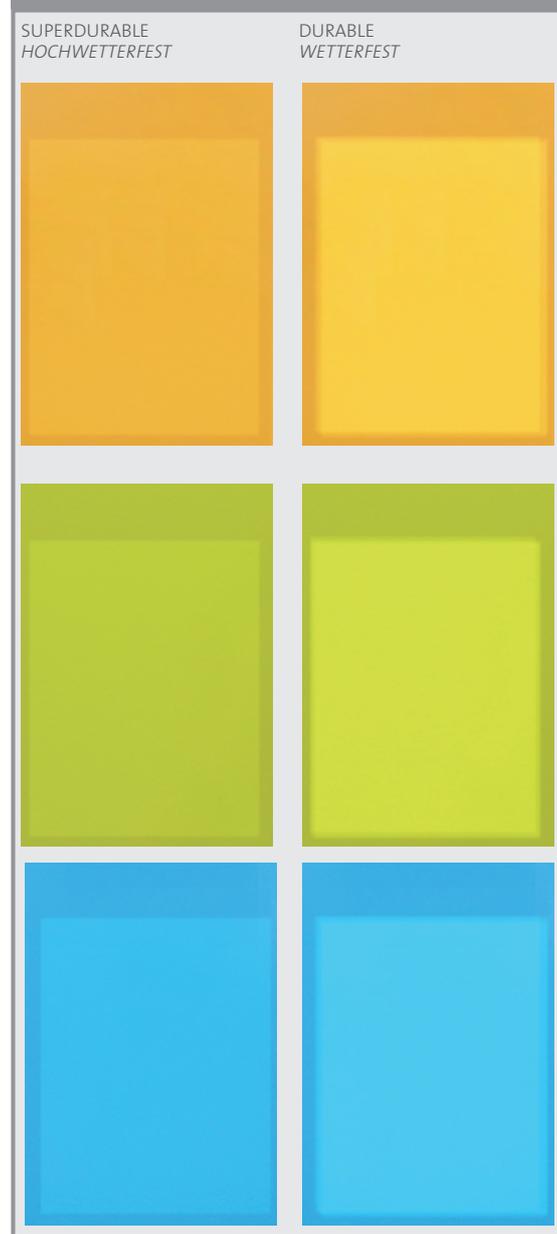
Table 8-3: Examples of weathering behaviour of powder coatings (Tiger Drylac®)

RAL Colour/Powder coating class	Accelerated weathering UV-B (313 nm)	
	Residual gloss after 300 hours	Residual gloss after 600 hours
7016/Weatherproof	72%	12%
7016/Highly weatherproof	96%	79%
3004/Weatherproof	74%	20%
3004/Highly weatherproof	96%	78%

QUV-B 300 h

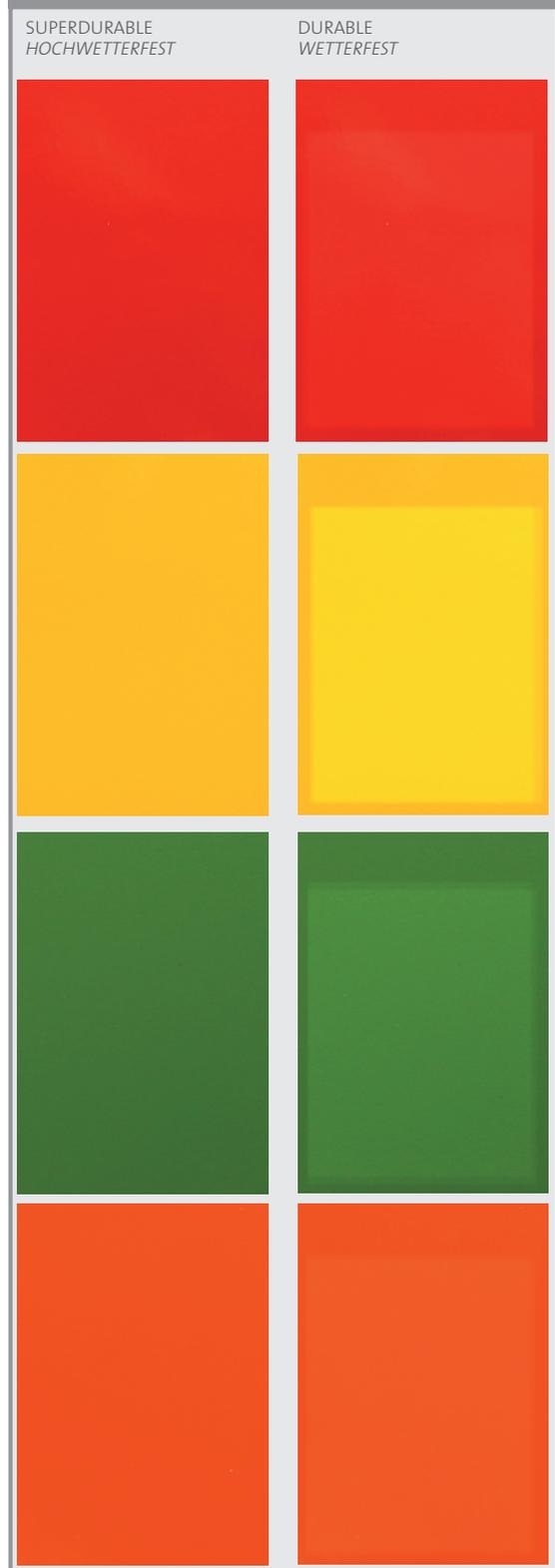


QUV-B 600 h



*Illustration 8-4: Weathering behaviour of HIGHLY WEATHERPROOF and WEATHERPROOF polyester
Comparison of powder coatings*

QUV-B 300 h



QUV-B 600 h

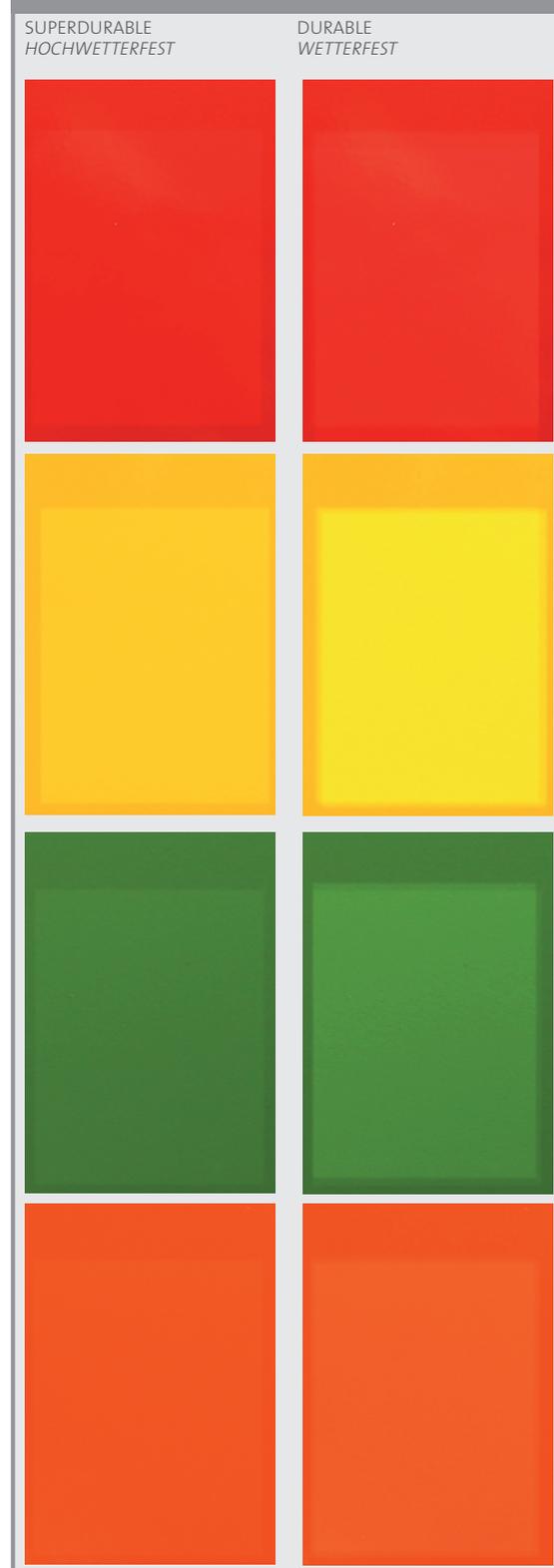
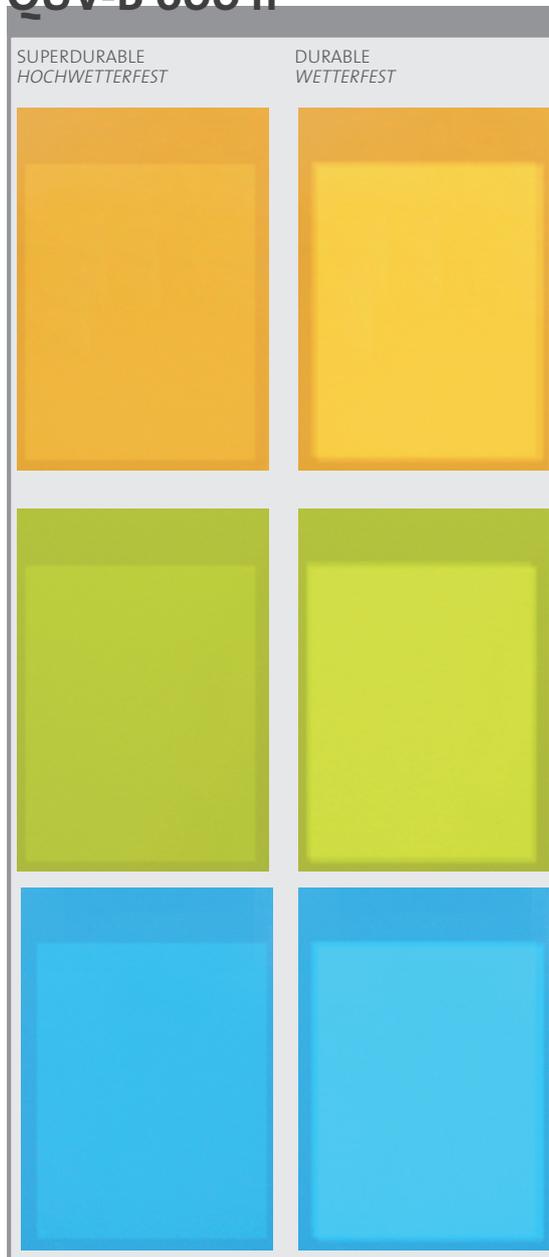


Illustration 8-5: Weathering behaviour of HIGHLY WEATHERPROOF and WEATHERPROOF polyester
Comparison of powder coatings

QUV-B 300 h



QUV-B 600 h



*Illustration 8-4: Weathering behaviour of HIGHLY WEATHERPROOF and WEATHERPROOF polyester
Comparison of powder coatings*

9 Guarantee

The coating company must check the aluminium profile before coating to see if there are any surface defects, deformations, distortions or torsions. Wicona assumes no guarantee in this respect. The coater assumes the responsibility for paint stripping and recoating.

The fabrication company must carry out and document an in-house production control to guarantee the quality of the coated profile. Retention samples serve as an assurance from the fabrication company.

The warranty period is 5 years for High Quality Design coatings (Qualicoat Class 1/GSB Standard) and 10 years for Exclusive Design coatings Qualicoat Class 1/GSB Master). The warranty period begins on delivery of the aluminium profile to the customer.

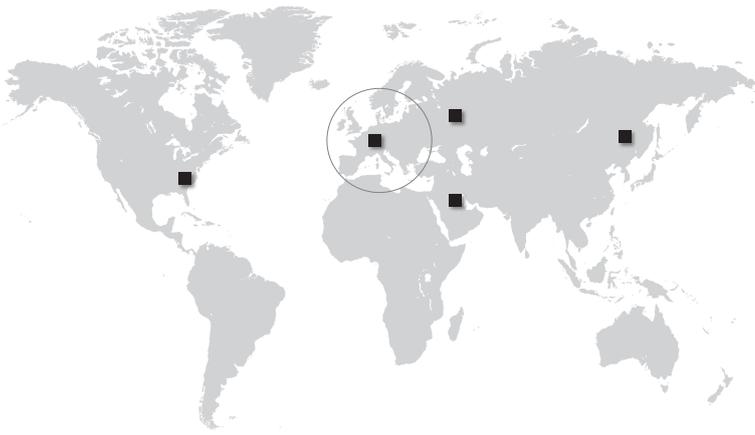
The warranty includes the compliance of the coating specification in accordance with the quality and testing specifications of GSB International and the respective current version from Qualicoat. Compliance of the coating specification offers no guarantee for reliable prevention of filiform corrosion on profile and machined edges, particularly in atmospheres containing chloride.

Regular cleaning and care of the aluminium components are the prerequisite for the warranty. The quality and testing regulations of the Gütegemeinschaft Reinigung Metallfassaden e. V. (the Quality Association for the Cleaning of Metal Façades) (RAL-GZ 623) must be observed.

10 Literature

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