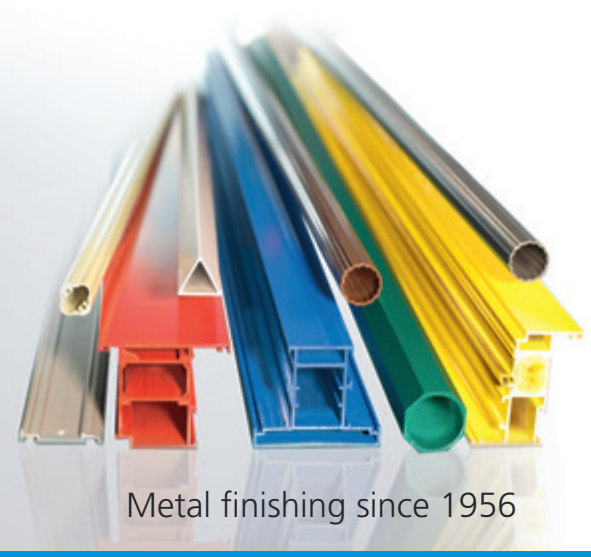

Metal finishing since 1956

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Oberflächentechnik

General and technical information 2025

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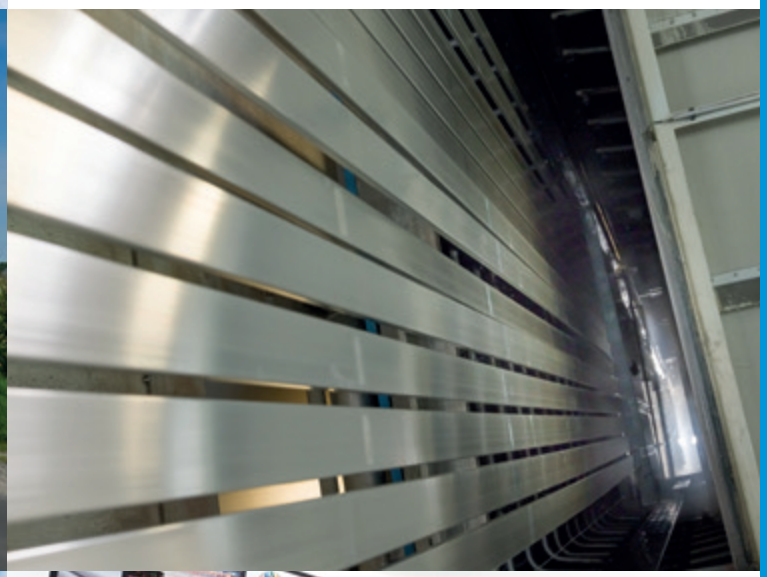

General and technical information 2025

- All information in this catalogue has been compiled in line with the current state of the art and to the best of our knowledge.
- We are happy to answer your specific questions without obligation.
- Misprints and changes reserved!
- No liabilities can be derived in respect of possible deviations in individual cases or of third party rights.
- Status as of 01/01/2025

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Internet: www.agru.net

Contents

Anodising

What is anodising?

- Anodising (anodic oxidation) is an electrochemical process that converts the surface of aluminium into aluminium oxide. This oxide layer is not applied; it forms part of the metal itself and provides durable protection for aluminium. The oxide layer can be left in its natural colour or dyed in various ways.

Our quality

- AGRU Oberflächentechnik GmbH holds the EURAS/EWAA quality mark (licence number 102). This mark signifies the high quality of anodised aluminium parts. Strict, internationally defined provisions form the basis for this quality mark. It is awarded only to companies that are prepared and equipped to work to these provisions, which are periodically verified by unannounced inspections by a neutral national testing institute.
- On request we can also carry out anodising to British Standard.

- **The following colouring processes are possible:**

  Dyeing the initially colourless anodised aluminium in organic or inorganic dye baths (colours per AGRU colour fan);

  Electrolytic colouring of the initially colourless anodised aluminium in metal salt solutions using alternating current (colours per AGRU colour fan);

  Production of various colour shades in the standard GS electrolyte using special alloys.

- **As a holder of the quality mark, AGRU guarantees:**

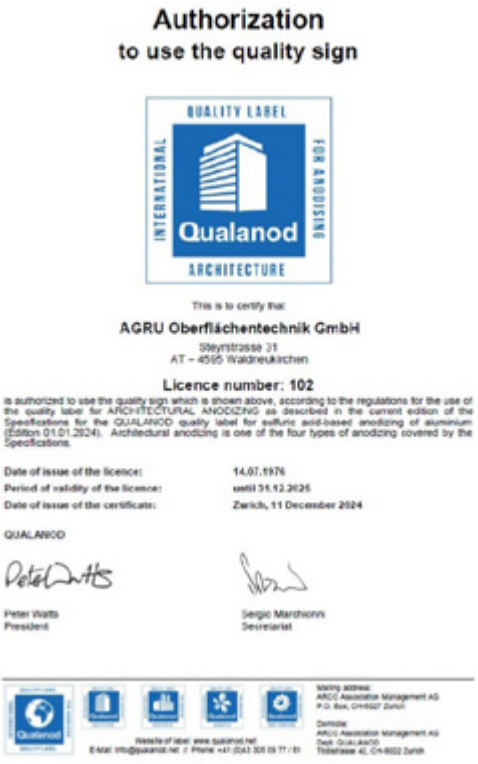
  A high standard of technical equipment, consistent proven production methods, and regular inspections by neutral experts to ensure consistently high quality.


qualityaustria
Certification

CERTIFICATE

AGRU Oberflächentechnik GmbH

QUALITY MANAGEMENT SYSTEM
ISO 9001:2015


Authorization
to use the quality sign

QUALITY LABEL
INTERNATIONAL
FOR ANODISING
Qualanod
ARCHITECTURE

This is to certify that
AGRU Oberflächentechnik GmbH
Steyrstrasse 31
AT – 4565 Waldneukirchen

Licence number: 102

is authorized to use the quality sign which is shown above, according to the regulations for the use of the quality label for ARCHITECTURAL ANODIZING as described in the current edition of the Specifications for the QUALANOD quality label for sulfuric acid-based anodizing of aluminium (Edition 01.01.2024). Architectural anodizing is one of the four types of anodizing covered by the Specifications.

Date of issue of the licence: 14.07.1976
Period of validity of the licence: until 31.12.2025
Date of issue of the certificate: Zurich, 11 December 2024

QUALANOD

Peter Watts
President

Sergio Marchionni
Secretariat

Anodising

Factors affecting quality

- We anodise to EURAS/EWAA guidelines and ÖNORM C 2531. The scratch test is excluded for colour anodising (for visual reasons) and for components with a depth exceeding 300 mm or for special constructions. To achieve flawless anodising quality, aluminium of high decorative anodising quality (EQ quality) must be used. Observe ÖNORM C 2531.

- For assemblies forming a closed area (e.g., one façade elevation), we recommend ordering anodised parts in a single material composition, as differing alloys and alloy variations can cause colour deviations.

- Semi finished product related or visual defects may only become visible after anodising, e.g. due to:
  - extrusion seams
  - hot deformation
  - meeting different rolling/extrusion directions
  - banding, web impressions
  - oxide inclusions, magnesium precipitations, coarse grain
  - rolling waves in sheet
  - weld seams
  - differing specular effects (light/dark) in parts not installed perfectly flat

- Composite, riveted or hemmed parts are not permissible, because electrolyte residues trapped in joints and capillaries are hard to remove and can lead to later corrosion.

- No parts made of other materials may be present on items to be anodised.

  Electrolyte must be drained safely and completely from cavities (e.g., by drilling).

- For precision parts (e.g., machine parts), note that slight dimensional changes may occur due to anodising.

- Secure electrical contact (contact points/strips) is required. A drawing indicating visible faces must be attached to the delivery note. For sheets, contact strips are normally placed on the back and contact points on the front. Profiles are contacted at both ends (2–3 cm)!

- Any special contacting requests must appear on all delivery documents!

- For frame constructions/cavities: inlet and drain holes must be provided by the customer (see page 27). If drain holes are incorrectly positioned or blocked (e.g., with aluminium swarf), pretreatment solutions cannot drain correctly. Any necessary rework will be at your expense.

- Anodising of materials with wall thickness < 1 mm can only be carried out at the customer's risk.

- With reference samples, differences in gloss may occur in production.

Production sequence:

Pretreatment:
- alkaline degreasing
- alkaline etch based on sodium hydroxide (caustic soda)
- As an alternative to chemical pretreatment, mechanical pretreatment (E1–E5) is also possible.

Fine etch:
- pickling based on HNO3+H2S04+H202

Anodising:
- GS process, direct current, sulphuric acid

Colour anodising:
- inorganic electrolytic on tin salt basis for bronze
- inorganic absorptive on ferro oxalate basis for gold.

Sealing:
- hot sealing > 96 °C

Anodising

Pretreatment

Delivery overview according to ÖNORM C 2531

Mechanical and/or chemical pre-treatment serves to prepare the surface of the parts for anodic oxidation. This allows certain surface effects to be achieved.

Code	Type of pre-treatment	Explanations
E0	DEGREASING AND DEOXIDISING	Surface treatment is carried out prior to coating, during which the surface is degreased and deoxidised without further pre-treatment. Existing mechanical surface defects, e.g. dents, scratches, grooves, inclusions and corrosion, remain visible. Surface defects that were barely noticeable before treatment may even become more visible after treatment. AGRU still pickles for 3 minutes! Please take this into account when fitting.
E1	GRINDING	Grinding results in a comparatively uniform but slightly duller appearance. Existing mechanical surface defects, e.g. indentations, scratches, grooves, inclusions and corrosion, are partially removed. Depending on the abrasive grain size, coarse to fine grinding marks are visible. Previously invisible signs of corrosion, which may become visible during treatments E0 or E6, are partially removed (no flat grinding).
E2	BRUSHES	Mechanical brushing produces a uniform, shiny surface with visible brush marks. Existing mechanical surface defects, e.g. dents, scratches, grooves, inclusions and corrosion, can only be removed to a limited extent. Previously invisible corrosion that may become visible during treatments E0 – E6 is not removed (no surface grinding).
E3	POLISHING	Mechanical polishing results in a shiny, smooth surface. Existing mechanical surface defects, e.g. dents, scratches, grooves, inclusions and corrosion, remain visible and are not removed. Previously invisible corrosion that may become visible during treatments E0 or E6 is not removed (no surface grinding).
E4	GRINDING AND BRUSHING	Grinding and brushing achieve a uniformly shiny surface. Existing mechanical surface defects, e.g. dents, scratches, grooves, inclusions and corrosion, are partially removed. Previously invisible corrosion, which may become visible during treatments E0 or E6, is partially removed (no flat grinding).
E5	GRINDING AND POLISHING	Grinding and polishing achieve a smooth, shiny appearance. Existing mechanical surface defects, e.g. dents, scratches, grooves, inclusions and corrosion, are partially removed. Previously invisible corrosion that may become visible during treatments E0 or E6 is partially removed (no flat grinding).
E6	PICKLING	After degreasing and pickling, the surface is usually given a satin, matt finish by treating it with special alkaline pickling solutions. Existing mechanical surface defects, e.g. dents, scratches, grooves, inclusions and corrosion, are not removed. These can be partially removed by mechanical pre-treatment (E1, E4 or E5) prior to pickling. Structural irregularities, e.g. coarse grain formation, striping and weld seams, may become visible as a result of this treatment. Surface defects that were barely noticeable before treatment may even become more visible after treatment.

WITH E1–E5, DIFFERENT SPECULAR (LIGHT/DARK) EFFECTS CAN OCCUR UNDER SUNLIGHT AND SHARP VIEWING ANGLES.

Maximum workpiece size for mechanical processing of sheet:

E1, E2 micro lined and E4 micro lined:
3300 x 1800 mm

E2 brushed, E3, E4 brushed, E5:
possible for profiles and sheets with max. width 200 mm.
For larger parts, bent sheets and parts over 20 kg, please consult us in advance.

Please note:

Grinding direction for sheets = sheet rolling direction

Grinding direction for profiles = extrusion/longitudinal direction

With grinding widths < 30 mm, it is very likely the surface will become crowned!

Anodising

Colour range

- **delivery overview**
  As standard we offer natural, bronze and gold shades per the AGRU anodising colour fan.

Code	colour designations	notes
C0	UNCOLOURED	After the GS bath, no dyeing is performed; the light natural tone remains.
C31 C32 C33 C34 C35	LIGHT BRONZE LIGHT BRONZE MEDIUM BRONZE DARK BRONZE BLACK	**Bronze tones (brown hues)** are achieved electrolytically with alternating current in metal salt solutions.
C2 C3 C4	LIGHT GOLD MEDIUM GOLD DARK GOLD	**Gold tones** are achieved in inorganic dye baths.

Colours according to AGRU anodising colour chart

- **Special colours**
  Various tones can be produced in the GS bath provided certain aluminium alloys are used.

  For projects, intermediate shades can be produced on request.

- Because decorative appearance, gloss and/or colour (C31–C34 and C2–C4) cannot usually be captured by simple measurements, you should request limit samples (separate by semi finished product).

  Colour differences may occur due to process and material.

- **Maximum processing sizes (with central contact possible):**

  Natural: 750 x 7500 x 2100 mm
  Bronze: 500 x 7500 x 2100 mm
  Gold: 500 x 7500 x 2100 mm
  Larger parts on request!

  From a layer thickness of 20 µm, maximum component depth 300 mm.

Anodising

Calculation methods and examples

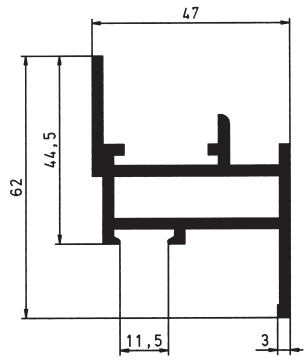
- **Profiles**

Billable development (“Abwicklung”, AW) is determined as:
AW = (greatest height + greatest width) × 2
If the effective development is > 50 % higher than the circumscribed development, the effective development is used.
Minimum billable length: 1000 mm.

Anodising:
The minimum billable development is 100 mm
Mechanical processing (E1–E5):
The minimum billable width is 150 mm
Otherwise the billable area equals the effective processed area.

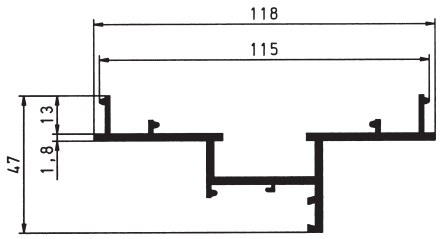
Example 1

greatest width:	47 mm
greatest height:	62 mm
	109 mm x 2
processing:	218 mm



Example 2

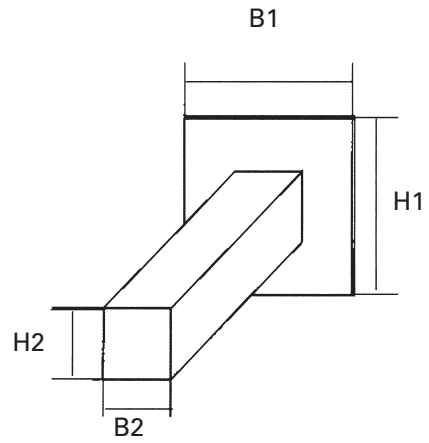
greatest width:	118 mm
greatest height:	47 mm
	165 mm x 2
processing:	330 mm



Anodising

- **Rectangular tube posts and profiles with base plate / welded on parts**

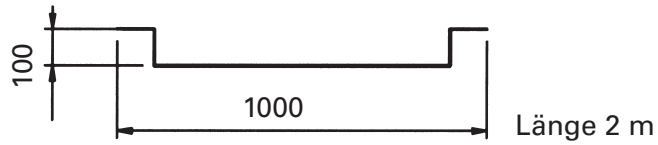
The calculation is based on the average settlement!
Average processing time:
(AW 1+ AW 2) :2
AW 1 = (B1+H1) x 2
AW 2 = (B2+H2) x 2



- **Sheets**

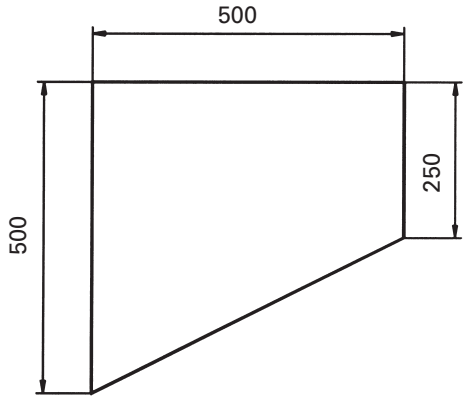
For sheets, the stretched length or stretched width is used as the basis for calculation.
Billable area = stretched length × stretched width **x 2**.
The minimum billing area is 0.1 m².

Bent sheet:



billing area = 2,0 x 1,2 x 2 = 4,8 m²

Flat sheet:



billing area = 0,5 x 0,5 x 2 = 0,5 m²

Anodising

Frames

For frames, the longest length or highest height is used as the basis for calculation.

Billable area = greatest length × greatest height × 2 × factor d, where:

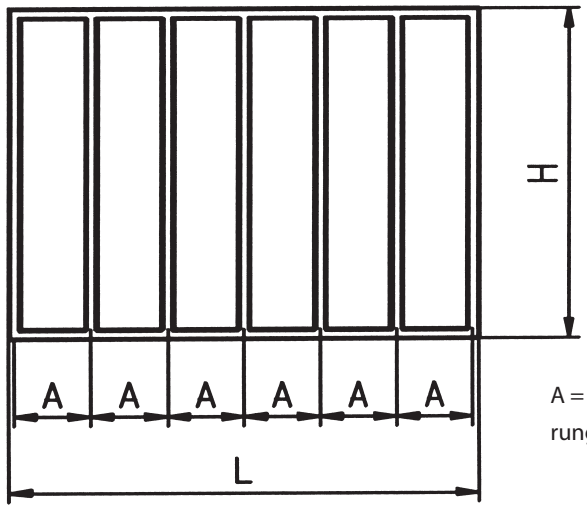
d = 0,9: Frame with a crossbar at maximum intervals of 500 mm (A) or no crossbar.

d = 1: Frame with glazing bars every 150–499 mm (A).

d = 1,5: Frame with bars every 80–149 mm (A) and plastic mesh elements.

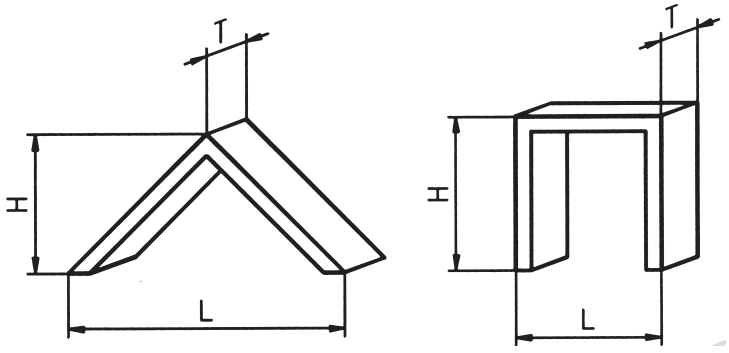
d = 2: Frame with bars at least every 80 mm (A) (e.g. slatted grille).

Mechanical processing of frames on request.



A = distance between rungs.

For round windows, D = H = L.
For U-shaped or L-shaped frames, the following dimensions are used for calculation (d = 0.9):



Maximum component depth T = 100 mm

Bulky or over long parts are charged according to bath utilisation / effective effort.

Anodising

Quality requirements
(per ÖNORM C 2531)

- **Thickness of the oxide layer**
  Required oxide thickness depends on chemical and/or mechanical exposure.

Location and exposure	thickness class
Indoors, dry	10
Indoors, occasionally wet; outdoors, rural atmosphere without air pollution (only small SO_2 from domestic/industrial heating)	15
Outdoors, urban & industrial atmosphere (SO_2 from combustion/industrial flue gases)	20
Aggressive atmosphere such as road salt/sea climate	25

- The layer thicknesses are measured using eddy current devices.
  The measurement accuracy is ±2 µm.

  It should be noted that the layer thickness in, for example, grooves, cavities, hollow spaces, concealed edges and in the case of greater construction depths may be lower due to the nature of the process. Therefore, the agreed thickness class cannot be achieved in these areas.

  The EURAS/EWAA scratch test values are met up to a maximum component depth of 300 mm.

  Note: if the delivery note (our binding order) contains no thickness instruction, we anodise to 15 µm.

Cleaning instructions for anodised surfaces

- For proper upkeep of an anodised structure, it must be cleaned at least twice a year in consecutive intervals—more often in severe environments—in accordance with the GRM (Gütegemeinschaft für die Reinigung von Metallfassaden e.V.) using GRM approved cleaning agents and aids for anodised façades under RAL GZ 632. Before the first cleaning and before changing agents during ongoing intervals, suitability must also be tested on a trial area of at least 2 m² on a south facing, non exposed spot

- Normally, internal parts can be kept clean simply by wiping them periodically with a soft cloth. Internal parts that have not been cleaned for a long time can be cleaned with a neutral cleaning agent and a soft cloth, followed by rinsing with clean water. A final polish with a dry, soft cloth will give the internal parts a like-new appearance.

- In practice, the cleaning frequency for components exposed to the external atmosphere depends on the type of parts and the aggressiveness of theatmosphere.

- For outdoor applications where decorative appearance and protective function are important, e.g. canopies, entrances, shop fronts, etc., cleaning should be carried out once a week. In this case, i.e. with regular cleaning, it is possible to use clean water with a suede cloth and then wipe with a dry, soft cloth.

- Window frames and sills, façade cladding and other parts must be cleaned at regular intervals, whereby the aggressiveness of the atmosphere and the façade construction must be taken into account when determining these intervals. Cleaning is best carried out using neutral (pH 7) synthetic cleaning solutions, using a cloth, sponge, chamois leather or soft brush. Do not use scratching or abrasive agents. Then rinse with clean water and rub dry.

- Heavy soiling should be removed with abrasive cleaning agents or fibre cloths containing finely ground neutral polishing agents.

- Soda solutions, alkalis and acids must be avoided at all costs. Similarly, abrasive cleaning agents must not be used under any circumstances.

- Do not use cleaning agents of unknown composition.

- The cleaning agents must not exceed a maximum temperature of 25 [°C]. Do not use steam jet cleaners.

- The surface temperature of the façade elements must also not exceed 25 [°C] during cleaning.

Cleaning instructions for anodised surfaces

- The maximum exposure time for these cleaning agents must not exceed one hour; if necessary, the entire cleaning process can be repeated after at least 24 hours.
- Immediately after each cleaning process, rinse with clean, cold water.
- If a coated component becomes contaminated during transport, storage or assembly, it must be cleaned immediately with clear, cold or lukewarm water.
- If the components are preserved after cleaning, care must be taken to ensure that only a very thin, water-repellent film remains. This film must not yellow, attract dust and dirt, or cause iridescence. Waxes, petroleum jelly, lanolin and similar substances are not suitable.
- The same requirements must also be imposed on combination cleaners.
- Joint sealants and other auxiliary materials such as glass installation aids, lubricants, drilling and cutting agents, adhesives, grouting compounds, putties, adhesive and masking tapes, etc., which come into contact with anodised surfaces, must be pH-neutral and free of substances that damage surfaces. Exposure to sunlight increases the aggressiveness of these chemicals. The aforementioned substances must therefore be tested for their suitability for anodising before use.

Further information on maintenance and cleaning can be obtained from, among others:

- Aluminium Headquarters Consulting and Information Service D-40003 Düsseldorf.
- Quality Association for the Cleaning of Metal Facades (GRM), D-73529 Schwäbisch-Gmünd

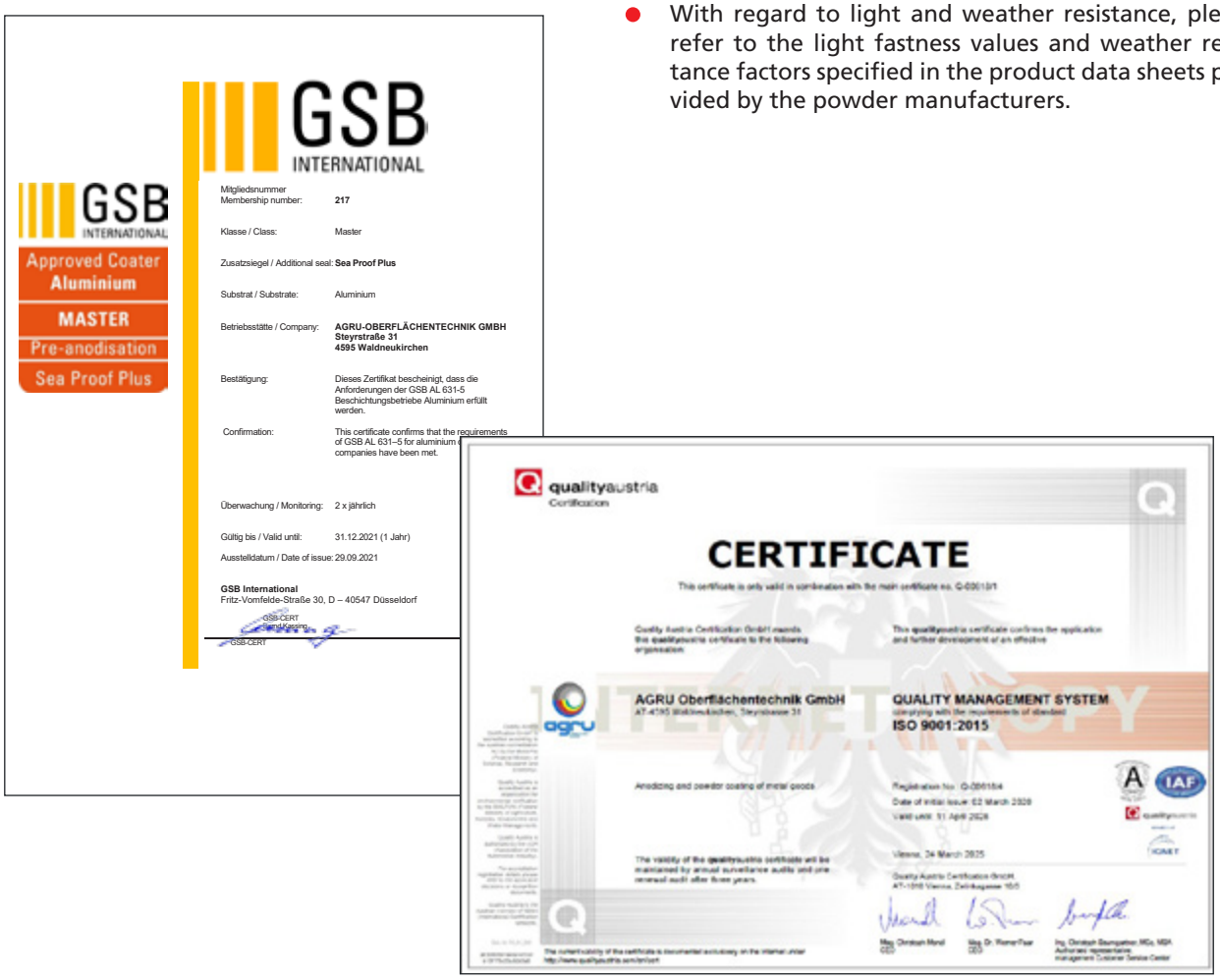
This information sheet replaces all previous ones on this subject. If the version date of this information sheet is more than 12 months old, please request a new one.

Our recommendations, both verbal and written, which we provide to assist you based on our experience and to the best of our knowledge in accordance with the current state of scientific and practical knowledge, are non-binding and do not establish any contractual legal relationship or ancillary obligation arising from the purchase contract. They do not release the buyer from their responsibility to check our products themselves for their suitability for the intended purpose.

Coatings

General

- As anodising is limited to relatively few colours, coating has become increasingly popular in recent years. With coatings, all colours and degrees of gloss can be achieved. Even metallic colours are available.
- Special colours and metallic colours can be supplied on request. Textured powders, matt powders and NCS colours can also be supplied.
- Highly weather-resistant powder qualities for increased weathering and emission stability for worldwide use are available as an alternative to standard façade quality!
- The maximum dimensions for series production are (provided that centred contacting is possible):
  500 x 2000 x 6800 mm.
  Maximum length for profile bars: 7 m
  For larger items and items weighing more than 75 kg, please contact us in advance.
- **If no special execution is requested by the customer (= specification on the delivery note): Powder coating is smooth/glossy, standard facade quality.**
- We coat in accordance with the guidelines of the Austrian Research Institute for Chemistry and Technology (OFI-Lackinstitut) and the GSB guidelines.
- We will be happy to send you the OFI or GSB guidelines on request!
- With regard to light and weather resistance, please refer to the light fastness values and weather resistance factors specified in the product data sheets provided by the powder manufacturers.



Coatings

Metallic / fine texture / speckled colours

(including RAL 9006, RAL 9007, pearlescent mica, iron mica, DB colours, etc.):

Note on powder formulation:

- The RAL colour registers are produced using a liquid paint system and created with aluminium pigments, for example. Aluminium pigments are not permitted in weather-resistant powder systems due to their chemical instability. However, it is precisely these aluminium pigments that determine the character of the colour and effect of RAL 9006, among others.

- A reproduction using the powder system with alternative metallic pigments, which ensure weather resistance, can therefore only produce an effect and colour impression similar to the RAL template.

- The tilt effect present in every metallic finish will also differ between the paint template and the powder system, resulting in a different colour impression. With regard to conformity with the RAL colour register, it should also be noted that the RAL template has a highly matt surface (RAL register 840HR), which cannot be compared with a glossy surface.

AGRU continuously processes the following products:

colour shade:	powder manufacturer	Production number/ item number of the powder manufacturer
approx. RAL 9006 GL.	Tiger Company, Wels	29/90024
approx. RAL 9006 MATT	Tiger Company, Wels	29/91600
approx. RAL 9007 GL.	Tiger Company, Wels	29/90013
approx. RAL 9007 MATT	Tiger Company, Wels	29/90700
approx. DB 701 MATT ***	Tiger Company, Wels	29/70103
approx. DB 702 MATT ***	Tiger Company, Wels	29/70790
approx. DB 703 MATT ***	Tiger Company, Wels	29/82030
approx. DB 703 FINE STRUCTURE	Tiger Company, Wels	29/80077
approx. RAL 7048 MATT ***	Tiger Company, Wels	29/70326
approx. RAL 8029 MATT ***	Tiger Company, Wels	29/60064
approx. RAL 9022 MATT ***	Tiger Company, Wels	29/70199
approx. RAL 9023 MATT ***	Tiger Company, Wels	29/90015
approx. RAL 1035 MATT ***	Tiger Company, Wels	29/90010
approx. RAL 1036 MATT ***	Tiger Company, Wels	29/90012
approx. iron mica P2 MATT ***	Tiger Company, Wels	29/70161
approx. iron mica P4 MATT ***	Tiger Company, Wels	29/70129
approx. iron mica P5 MATT ***	Tiger Company, Wels	29/82110
approx. iron mica P6 MATT ***	Tiger Company, Wels	29/70162
approx. iron mica P7 MATT ***	Tiger Company, Wels	29/82160
approx. iron mica P7 FST	Tiger Company, Wels	29/80081
approx. iron mica P14 MATT ***	Tiger Company, Wels	29/70097

*** Please note: Unfortunately, we do not have these colours in stock in GL or SGL. Therefore, matt is generally used for these colours.

Please always state the production number on the LS, on your orders, etc.! This ensures that the colour shade you require is clearly defined! If no information is provided, we will use the above-mentioned powder.

Note on processing/powder coating:

- Powder coatings are formulated and manufactured according to defined colour standards, e.g. RAL. Despite the most careful working methods, differences in colour tone and effect between different batches and production lots are unavoidable.

- The colour differences between different batches of metallic powder coatings caused by the supplier are similar in magnitude to those for powder coatings without a metallic effect. However, this assessment does not yet include process-related colour deviations in powder coating.

- However, the colour tone/effect achieved also depends on the coating system and the geometry of the parts. In order to keep system-related colour tone/effect differences to a minimum, the entire coating process must be carried out on the same system, preferably without interruption. With manual coating, colour tone and effect variations are to be expected due to uneven powder application.

- The cause of the colour tone and effect sensitivity of metallic powder coatings can be explained primarily by the metallic pigment content. The metallic pigment is mainly used in the form of fine flakes (thousands of tiny mirrors). The metallic effect, but also the colour tone, depend on the orientation of these flakes in the paint layer. Experience shows that processing parameters and part geometry have an influence on the position of the metallic flakes and thus on the colour tone and effect of the paint layer. Slight differences are particularly noticeable when light metallic effects are present in a darker background. As a result, clouding, a light/dark effect or a so-called picture frame effect cannot be completely avoided due to processing factors.

⇨

Coatings

Metallic / fine texture / speckled colours
(including RAL 9006, RAL 9007, pearlescent mica, iron mica, DB colours, etc.):

⇨

- These arise because, as mentioned above, the metallic pigments align themselves slightly differently due to physical effects, thereby changing the visual impression.

- Light and dark contrasts within a powder-coated surface on the façade also occur when the surfaces are not perfectly flat in the viewer's plane, which can be due to both structural and geometric reasons. The prevailing lighting conditions and the viewer's angle of vision are therefore crucial for the uniform colour and effect of the façade elements.

- These influences can also be seen, for example, on anodised façade elements. On surfaces that are not perfectly flat, different colour and effect variations can therefore occur even within a larger element. For larger façade surfaces, especially those assembled from different component geometries, slight shading in the overall appearance is therefore state of the art. Metallic-coated surfaces and anodised aluminium surfaces are therefore also referred to as 'living surfaces'.

The following is therefore essential and must be observed:

- The total amount of powder required per object must be ordered by us in one batch (1 lot)! We therefore ask you to provide us with the total square metres of the parts to be coated per BV!

- The individual partial deliveries to be coated should be as large as possible! This means that your order can always be produced on the same system, and system-related colour deviations can be largely limited! At the very least, the coating of individual construction phases (facade viewing surfaces) should always be carried out in one batch size!

Cleaning:

- Metallic coatings must be cleaned regularly and as soon as possible after contamination. Dried-on, old contamination can only be removed abrasively, which means damaging (scratching) the coating. The cleaning recommendations of the powder manufacturer must be observed in all cases. Joint sealants and other auxiliary materials such as glass installation aids, lubricants, drilling and cutting agents, etc., which come into contact with coated surfaces, must be pH neutral and free of substances that could damage the paintwork. They must be subjected to a suitability test by the processor in advance. Otherwise, follow our cleaning instructions!

NCS colour shades

- **Minimum order quantity – powder**
  20 kg for glossy finishes
  40 kg for SGL and MATT

  Approximately 80-100 m² of surface area can be coated with 20 kg of powder. This also applies to repeat orders. We therefore request that you specify the exact coating quantity at the latest upon delivery of the first partial order so that the powder can be ordered in a batch size.

- **Delivery time – powder**
  Approximately 4 weeks from order placement

Coatings

Metallic / fine texture / speckled colours

(including RAL 9006, RAL 9007, pearlescent mica, iron mica, DB colours, etc.):

ENGLISH

Metallic powder coatings

Processing guidelines for powder coatings with metallic effect in application categories A-D
Information sheet 44

ABCD

GENERAL INFORMATION FOR ALL METALLIC POWDER COATINGS (APPLICATION CATEGORIES A–D)

This data sheet is intended to assist users during coating and to inform them about the processing parameters that have a significant effect on the coating result. When processing powder coatings with a metallic effect, particular care is required. Before use, the suitability of the entire coating system must be checked. There are different application categories for metallic-effect powder coatings, categories A–D. To achieve a satisfactory result, the following recommendations must be observed in addition to the coating process itself and the associated pre- and post-treatment stages.

The cause of colour tone and effect variations in metallic-effect powder coatings can mainly be explained by the proportion of metallic-effect pigment. The metallic-effect pigment is predominantly used in the form of small flakes. The metallic effect, as well as the colour tone, depends on the orientation of these flakes in the coating matrix and also on the viewing angle and lighting conditions. Experience shows that the coating parameters influence the position of the metallic-effect flakes and thus the colour tone and brightness effect. With metallic-effect powder coatings, particular attention must be paid to ensuring that coating is carried out under specific, constant conditions on the system in order to achieve a uniform, reproducible finish. Coating on different systems is only permissible if close coordination and adaptation of settings are possible. Where specific equipment or process developments are required, they must be performed in close cooperation with the powder manufacturer. Standardised colour evaluation of metallic-effect powder coatings must be carried out under defined lighting conditions and a viewing angle of 90°, using possible light types (D65 daylight).

Even with careful working methods, colour tone and effect differences between different batches of metallic-effect powder coatings cannot be completely avoided. Due to supplier-related differences, colour tone and effect differences between various batches of metallic-effect powder coatings are slightly greater than those of non-metallic powder coatings. Colour deviations between process- and batch-dependent colour tone and effect developments must not be evaluated according to automotive or other specifically agreed standards or data sheets.

The achieved colour tone/effect mainly depends on the coating system used. Before processing, an incoming inspection of the coating system should be performed to ensure that the colour tone/effect differences caused by the system are kept as small as possible and that the entire coating system is always operated under constant, uniform conditions. The installation (standard: 30% return air) must be regularly checked. Manual coating will inevitably cause uneven powder layer thicknesses, which will in turn lead to variations in colour tone and effect.

To achieve a uniform colour tone/effect, powder feed to the guns must be consistent and remain uniform throughout the entire coating process, with the proportion of fresh powder not falling below 70%. A higher proportion of reclaimed powder is not permitted. If the metallic-effect powder coating is suitable for reclaiming, the respective proportion of reclaimed powder must be fixed using the effect master plate. An outgoing inspection of the colour tone/effect consistency is therefore essential.

When applying uniform coating thicknesses, note that too great a difference in layer thickness causes colour tone/effect and gloss variations. To avoid surface defects (e.g. pinholes) that could disrupt the orientation of effect pigments (e.g. sparkling effects) in thinner layers, a minimum layer thickness of 70 µm is recommended. In case of doubt, contact the powder manufacturer.

Different gun types, systems, and process parameters often lead to different results. The type and condition of the coated object also play a role. Preferably, well-ventilated spray booths with uniform powder clouds should be used (recommended air velocity: ca. 1 m/s). Regular cleaning of the powder circuit and removal of deposits from powder hoses and booths are necessary to avoid contamination and short circuits caused by powder accumulation in the guns. The importance of regular system cleaning and avoiding powder clouds should be noted. For metallic-effect powder coatings, fluidised powder feed systems are recommended.

When using metallic-effect powder coatings, care must be taken that the coating thickness is sufficient and that the coating is properly cured. This ensures the required consistency of colour tone and effect formation.

Generally, metallic-effect powder coatings are designed for decorative use and are specified as such. Suitability for other types of processing or coating must be verified. Metallic-effect coatings are transported to the coating point with the aid of metallic particles. This can result in a shift of colour tone/effect. Switching between electrostatic and tribostatic application is not permitted.

Difficult-to-coat parts must be coated separately. Subsequent touch-up may result in “clouding”. Any repair must be carried out over the entire surface section.

Coatings

Metallic / fine texture / speckled colours

(including RAL 9006, RAL 9007, pearlescent mica, iron mica, DB colours, etc.):

ABCD

NOTES FOR APPLICATION CATEGORY B:
METALLIC-EFFECT POWDER COATINGS WITH SLIGHTLY EXTENDED PROCESS CONTROL

In addition to the general notes and those in this category, the following must be observed:
All process parameters (e.g. system type, gun settings, curing parameters, conveyor speed) should be defined in writing during the first coating process and reused under the same conditions. They must be checked and documented regularly during coating to ensure compliance. Powder charging and application should also be regularly checked. Differences in application speeds when coating parts must be avoided.

Complex parts must be coated consistently, as subsequent touch-up can lead to colour tone/effect differences. The position of façade elements during coating (vertical or horizontal) must be determined and maintained throughout the coating order.

It is recommended that limit samples be created for quality control of colour tone/effect during processing. Written approval of these limit samples by the client before production is advised.

If possible, batch mixing of different orders should be avoided. In case of combined or successive powder orders/colours, a corresponding readjustment may be necessary.

NOTES FOR APPLICATION CATEGORY C:
METALLIC-EFFECT POWDER COATINGS WITH EXTENDED PROCESS CONTROL

In addition to the general notes and those for category B, the following must be observed:
All process parameters (e.g. system type, gun settings, curing parameters, conveyor speed) must be defined in writing during the first coating and reused under the same conditions, except for permissible fine adjustments. Written documentation of these parameters is mandatory.

Limit samples must always be created for process-accompanying quality control of colour tone/effect. Written approval of these by the client before coating release is recommended.

Before serial coating, a representative pre-series or sample batch under production conditions (mock-up sample) is strongly recommended. This should be presented to the client for written approval before the final coating release. The mock-up must meet identical light and object conditions as during series production. Only after these requirements are met should series coating begin.

NOTES FOR APPLICATION CATEGORY D:
APPLICATION-SENSITIVE METALLIC-EFFECT POWDER COATINGS

In addition to the general notes and those for categories B and C, the following must be observed:
For this metallic-effect category, significant colour tone and effect variations may occur. Even with careful processing, no uniform coating result can be expected.

OVERVIEW OF MAIN REQUIREMENTS FOR APPLICATION CATEGORIES A–D

	Category A	Category B Effects with slightly extended process control	Category C Effects with extended process control	Category D Application-sensitive effects
Technical incoming inspection	mandatory	mandatory	mandatory	mandatory
Creation of limit samples	recommended	recommended	mandatory	mandatory
Process parameter protocol	recommended	recommended	mandatory	mandatory
Pre-inspection of workpieces with complex geometry	recommended	mandatory	mandatory	mandatory
Creation of mock-up samples depending on project size	recommended	recommended	highly recommended	mandatory
Object-related order	recommended	mandatory	mandatory	mandatory

Coatings

Factory standard – powder coating of steel/iron

- **Powder coating of steel elements, steel sheets, steel profiles, etc.**

  No profiles should be permanently attached to steel or iron structures in such a way that grooves can form. Acid can enter these grooves and evaporate after a delay. The subsequent escape of acid removes the powder coating down to the bare metal. In general, covering these grooves during powder coating is only possible to a limited extent for electrostatic reasons.

  Doubling up on or within the structures is not permitted. There is a risk of layer separation.

  Steel structures must be galvanised and no additional profiles of any kind may be attached to them. The additional profiles must be supplied separately for separate coating. It is essential to use scale-free material.

- **Hot-dip galvanised**

  The provisions of the standards regarding material properties must be observed by the client. Inspection of the zinc coating is not the responsibility of the coater but of the galvaniser and the client.

  The coater can rightly assume that the hot-dip galvanised material supplied complies with the standard test criteria.

  Powder coating of hot-dip galvanised components (piece-coated components) is very costly and, due to the sometimes coarse zinc bloom, leads to a
  a) optical impairment of the powder film (unevenness) and
  b) to an unattractive appearance in the form of bubbles (caused by the so-called 'blowout effect'). This is triggered by thermal heat stress.

  This can be remedied by applying two powder coatings (1st process – pre-powdering and baking; 2nd process – actual powder coating process, final curing). The result of this process depends entirely on the raw material.
  Bubbles that form during the second baking process cannot be concealed. Note: A similar effect occurs when powder coating bare steel.

  A shimmering of coarse zinc flowers is unavoidable. Brittle iron (steel) material is inherently unsuitable for hot-dip galvanising. The galvaniser must take particular care with welded joints, rebates, grooves and drill holes.

  After hot-dip galvanising, the zinc coating must not be exposed or damaged by welding, drilling, milling or any other means.

  White rust and other corrosion and surface damage must be removed by the client prior to pre-treatment.

Coatings

Factory standard - powder coating of steel/iron

- **Electrogalvanising, Sendzimir galvanising**

  In electrogalvanising, as in strip galvanising (Sendzimir), the relevant standards must be strictly adhered to by the manufacturers. Layer surfaces (roughness) and coarse graininess (Sendzimir) can influence the surface finish of the coating.

  Attention:
  Zinc reacts to acidic substances.

- **Coating of bare (non-galvanised) steel-iron elements**

  Bare – non-galvanised – components, parts, etc. are not suitable for outdoor use. This also applies to components for façades, parapets, roof structures or similar elements that are installed indoors but connect to an outdoor element (cold bridging – condensation).

- **Warranty/guarantee for powder coating of steel/iron**

  No warranty or guarantee is provided for coating steel (iron parts). Particularly susceptible to attack: welded joints, grooves, flanges, small cavities, sharp-edged parts, etc.

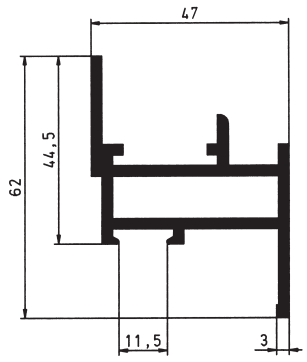
Powder coating

Calculation methods and examples

- **Profiles**

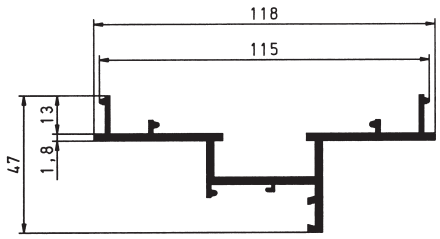
The settlement to be charged (Abw.) is determined as follows:
Diagonal = (greatest height + greatest width) x 2
For profiles whose effective development is 50% higher than the described development, the effective development is used for calculation.
The minimum billing length is 1000 mm.

Powder coating:
The minimum processing charge is 100 mm.
Mechanical processing (E1 - E5):
The minimum clearing width is 150 mm.
Otherwise, the billing area = effective processing area.



Example 1

Maximum width:	47 mm
Highest elevation:	62 mm
	109 mm x 2
Processing:	218 mm



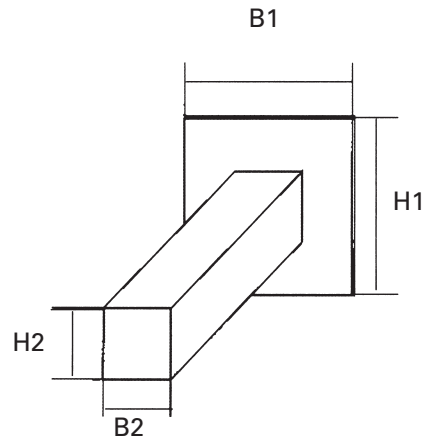
Example 2

Maximum width:	118 mm
Highest elevation:	47 mm
	165 mm x 2
Processing:	330 mm

Powder coating

- **Shaped tube uprights and profiles with base plate / welded parts**

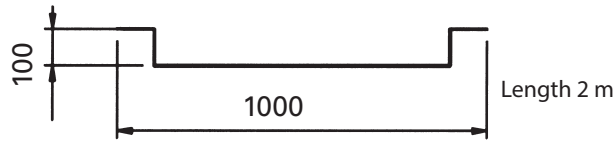
The average settlement is used for the calculation!
Average settlement:
(AW 1+ AW 2) :2
AW 1 = (B1+H1) x 2
AW 2 = (B2+H2) x 2



- **Sheets**

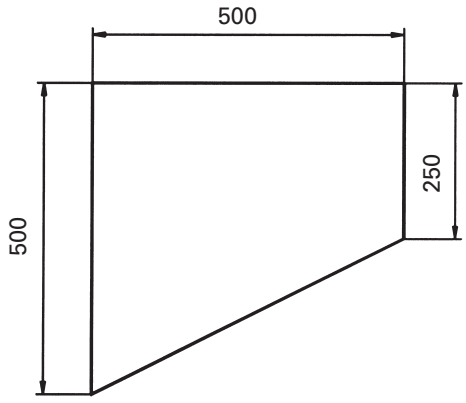
For sheet metal, the stretched length or stretched width is used as the basis for calculation. Calculation area = stretched length x stretched width x 2
The minimum billing area is 0.1 m².

Folded sheet metal:



Billing area = 2,0 x 1,2 x 2 = 4,8 m²

Flat sheet metal:



Billing area = 0,5 x 0,5 x 2 = 0,5 m²

Powder coating

- **Frame**

For frames, the longest length or highest height is used as the basis for calculation.

Billing area = longest length x highest height x 2 x cost factor d.

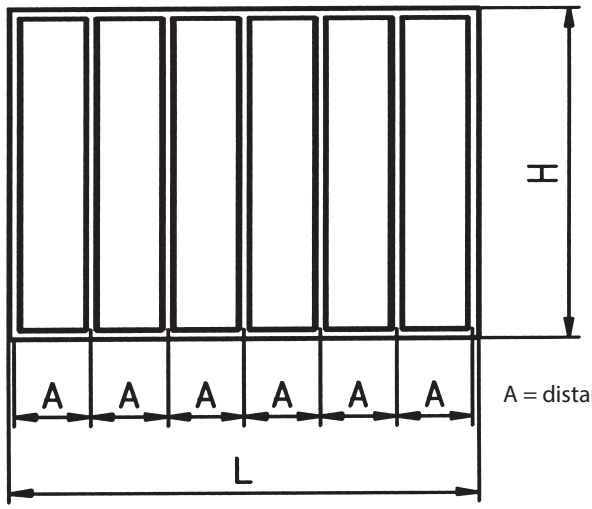
d = 0,9: Frame with a crossbar at maximum intervals of 500 mm (A) or no crossbar.

d = 1: Frame with glazing bars every 150–499 mm (A).

d = 1,5: Frame with bars every 80–149 mm (A) and plastic mesh elements.

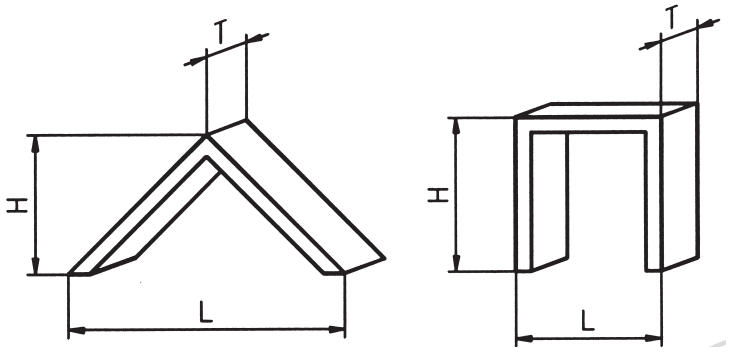
d = 2: Frame with bars at least every 80 mm (A) (e.g. slatted grille).

Mechanical processing of frames on request.



A = distance between rungs.

For round windows, D = H = L.
For U-shaped or L-shaped frames, the following dimensions are used for calculation (d = 0.9):



Maximum installation depth: T = 100 mm
Bulky and excessively long parts are charged based on bath utilisation or according to actual effort.

Coatings

Sheet metal

- **Single-sided coated sheets (ES)**

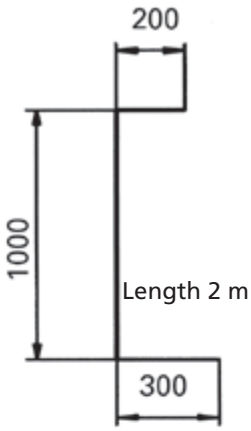
  For ES sheets, the stretched length and stretched width are used as the basis for calculation.

  Billing area =
  extended length x
  extended width x
  ES/EST surcharge.

  A surcharge of 10% is applied for single-sided coated sheets (ES surcharge).

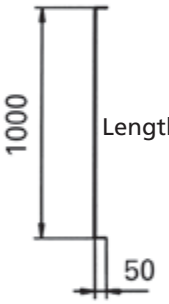
  For single-sided coated sheets with a construction depth of over 100 mm, a surcharge of 20% will be applied (EST surcharge).

  Sheet metal blanks up to 250 mm, whether coated on one or both sides, are charged as profiles.



settlement area =
ext. L x ext. B x EST
2 x 1,5 x 1,2 = 3,6 m²

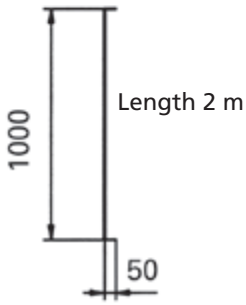
- **Double-sided coated sheets (BS)**



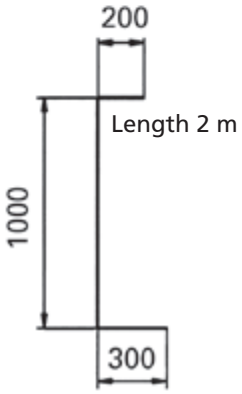
settlement area =
ext. L x ext. B x ES
2,0 x 1,10 x 1,1 = 2,42 m²

For BS sheets, the billing area =
straightened length x
extended width x 2.

For double-sided coated sheets with a construction depth of over 100 mm, a surcharge of 10% will be applied (BST surcharge).



settlement area =
ext. L x ext. B x 2
2,0 x 1,10 x 2 = 4,4 m²

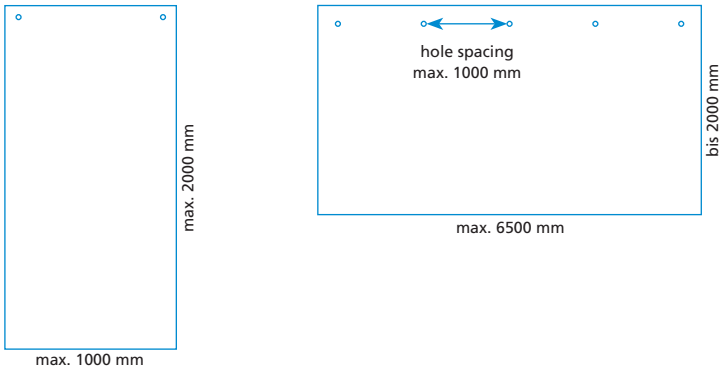


settlement area =
ext. L x ext. B x BST
2 x 1,5 x 2 x 1,1 = 6,6 m²

Coatings
Contact holes or drain holes

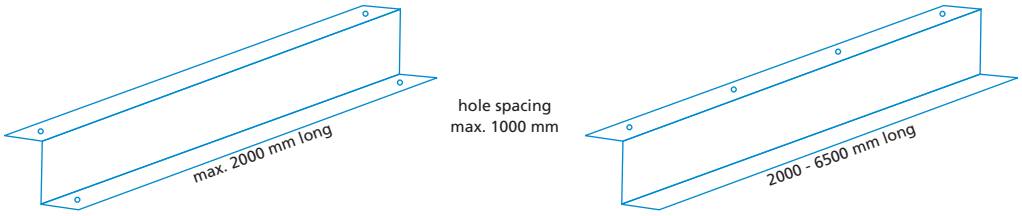
are necessary for proper processing. If this preparation is not carried out by the client, it will be carried out by AGRU and charged according to the actual work involved. The holes must be drilled by the customer according to the following sketches:

- **Flat sheets**

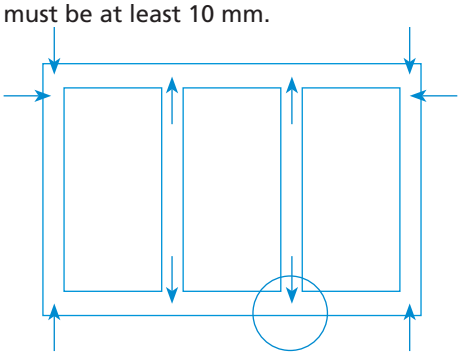


- **Folded sheets**

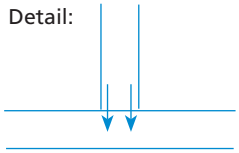
e.g. contact holes for Z-profiles



Drain holes/contact holes Drain holes for draining various pre-treatment liquids. The diameter of the holes must be at least 10 mm.



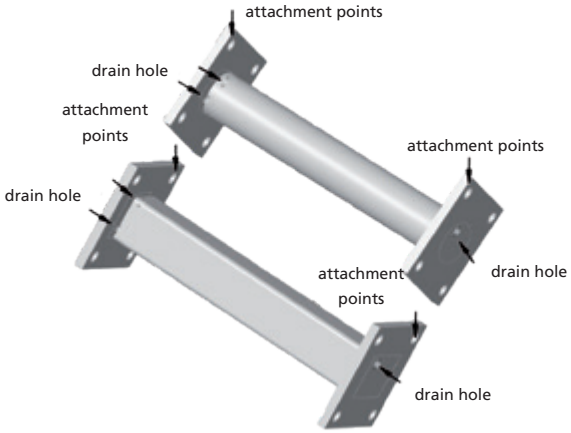
Detail:



Drill the drainage holes right at the edge (avoid dead corners and angles), as the frames are placed at an angle during pre-treatment and pre-treatment fluid will otherwise remain in the corner area.

Please note that the contact points on railings, fence constructions, etc. are positioned in the same way as they are installed (handrail at the top)! If the drainage holes are not correctly positioned or are blocked by chips, for example, the pre-treatment fluid cannot drain properly from the cavity. If reworking (paint removal and repowder coating) is necessary due to the error described above, we ask for your understanding that this will be carried out at your expense!

Stay-up:
Completely remove the inlet and vent openings as vertically as possible under the attachment point or base plate.

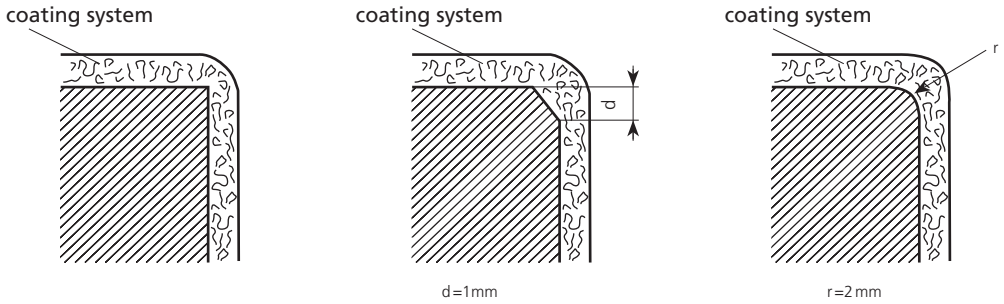


Coatings

Basic principles of corrosion protection

- Surfaces exposed to corrosion should be as small and as smooth as possible.
- Accessibility, availability, visibility
- Welded constructions are preferable to riveted and bolted constructions.
- Inclined or curved surfaces
- Avoid open-top profiles
- Broken (better: rounded) edges instead of sharp edges
- Smooth surfaces
- To prevent contact corrosion, components made of metals with different electrical potentials must be separated by insulating intermediate layers.

Avoid sharp edges:



sharp edge

poorly

broken edge

better

rounded edge

well

Coatings
Coating of insulating bars

It is state of the art that adhesion to KS insulating bars can be problematic when applying electrostatic powder coating to industrial composite profiles.

This results, among other things, from:

- The KS insulating bars are extremely poor electrical conductors, meaning that no electrical charge potential arises between the powder coating and the KS insulating bar.
- The chemical and physical properties of the composite webs (moisture content, surface roughness, etc.) can also have a negative effect on adhesion and lead to blistering in the powder layer.
- No bonding agent (e.g. chromate coating) can be applied to the KS insulating bars. This means that no high-quality bond between the base material and the powder coating can be achieved during polymerisation. Higher layer thicknesses have an increasingly negative effect on adhesion.

Due to the physical facts mentioned above, the occurrence of blistering, uneven powder application and even powder flaking in the area of the insulating bars cannot be ruled out. These areas could be corrected by subsequently applying a wet coat of paint.

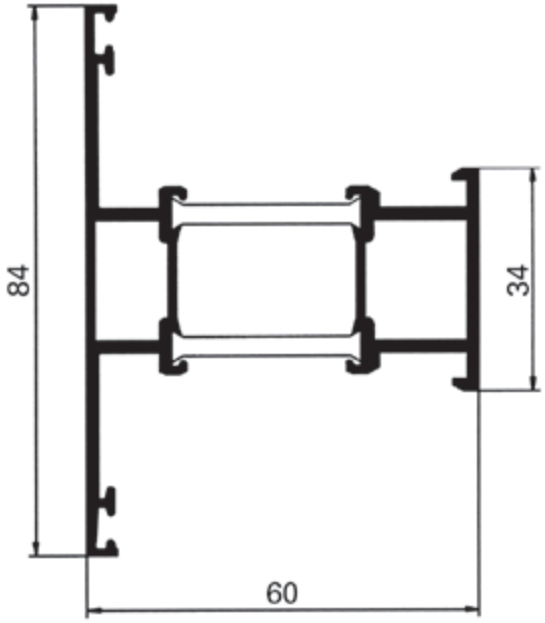
Special coatings

Double dyer

Only for thermally insulated profiles

Combinations	Price
ANODISING / ANODISING	on request
POWDER COATING. / POWDER COATING	on request
ANODISING / POWDER COATING	Not possible! The anodised layer cannot withstand the baking temperature (approx. 180 °C) of the powder coating (cracks in the anodised layer).

Important:
We kindly ask you to clarify the feasibility and delivery time by telephone.
No clear separation between the individual profile shells (colours) is possible.



General films:

Anodised or smooth, non-textured (e.g. no fine-textured powder) powder-coated profiles or sheet metal panels can be laminated! The film must be removed no later than 5 months after the date of sale (Agru = Agru-LS date)!

Important information

- **Visible surfaces**
  When powder coating angle profiles, U-profiles or flat material in bar stock, it is essential that the desired visible surfaces are marked on the delivery note.
  This also applies if the profiles in question are not delivered directly by you but by various dealers. If there is no note or sketch on the delivery note, please note that angles and U-profiles are generally coated on the outside and flat material on one side!
  When coating flat materials, angles or U-profiles on both or all sides, it should be noted that several contact surfaces are required for contact.
  If no information is provided regarding the visible side of sheet metal edge parts, the sheet metal edge parts will be coated on one side on the outside, provided that we can identify the outside. If we cannot identify the outside, the parts will be coated on both sides as best as possible (calculation will therefore also be based on BS).
  If no visible side is specified for sheet metal panels, both sides will be coated and charged accordingly.
  We do not cover threads, screws, etc. Powder coating on these parts is very likely, even if they are attached to the rear.

- **Subsequent deformation**
  If subsequent deformation of the coated workpieces occurs, suitability must be checked in advance. Microcracks in the powder coating surface can lead to corrosion damage.

- **Packaging**
  It must be ensured that packaging materials, including all auxiliary and transport materials, are used properly and can be removed easily when required (e.g. adhesive tape). Please note in particular that under unfavourable storage conditions, the combination of water accumulation (e.g. under packaging film) and heat can lead to milky-white spots on the powder coating or to imprints from the packaging film. This physical process, which may occur in isolated cases, is reversible through the application of heat (e.g. post-baking in an oven, industrial hair dryer).
  The protective film must be removed no later than 5 months after the date of sale (Agru (=Agru-LS date)).

- **Further processing**
  Joint sealants and other auxiliary materials such as glass installation aids, lubricants, drilling and cutting agents, etc., which come into contact with coated surfaces, must be pH neutral and free of substances that could damage the paintwork. They must be subjected to a suitability test by the processor in advance.

- **Guarantee/Warranty**
  The following materials can only be coated without guarantee and without warranty:
  - Steel parts, iron parts
  - Bulky parts that cannot be pre-treated properly (according to standards) due to their dimensions
  - Parts that are overcoated based on your order
  - Parts coated with zinc spray (cold galvanising)
  - Parts made of stainless steel or stainless steel (no proper pre-treatment – possible according to standard)
  - Parts with coarse ‘zinc flowers’, ‘zinc drops’ or unevenness, etc.
  - Aluminium with a wall thickness greater than 5 mm
  - Parts made of different materials (e.g. aluminium + steel/iron) on one workpiece. Pre-treatment can only be designed for one base material! This means that proper pre-treatment is not possible.
  - Parts that show severe corrosion or rust (which cannot be removed by chemical pre-treatment)!
  - Sheet metal etc. that has been folded after galvanising. (The zinc coating cracks in the folded area)!
  - Elements/parts with fillings (no pre-treatment possible – filling would absorb pre-treatment fluid).
  - Foamed profiles (foam could absorb pre-treatment fluid, pre-treatment residues in the profile cavity).
  - Elements/parts that are installed in environments/areas that are damaging to paintwork or aggressive (e.g. swimming pool areas, etc.).
  - Elements/parts that are excluded from a guarantee/warranty according to our warranty provisions (we will be happy to send these to you on request).
  - Soft-soldered parts
  - Double dyeing, as the powder is over-fired on one side due to the double firing time, making profile distortion very likely.

- **Thick-walled profiles / foamed profiles with sliding insulating bar**

  - When powder coating thick-walled profiles (the wall thickness of one shell is greater than that of the other profile shell, e.g. bulletproof profiles), the following must be observed:
  - When the powder coating is baked (approx. 180 °C – 200 °C), the different wall thicknesses result in different object temperatures (baking temperatures), which can cause colour differences between the outer and inner shells.
  - In addition, the two profile shells heat up at different rates and therefore expand at different rates. This can lead to deformation in thermally insulated profiles (plastic web)! A similar effect also occurs in foamed profiles and profiles with a sliding insulating web. AGRU cannot be held responsible for such complaints.

Cleaning instructions

for powder-coated surfaces

- Proper maintenance of the coated structure requires that the structure be cleaned at least twice a year at regular intervals, or more often in cases of heavy environmental pollution, in accordance with the guidelines of the Gütegemeinschaft für die Reinigung von Metallfassaden e.V. (GRM), executed by a member of the GRM using cleaning agents and cleaning aids approved by the GRM for quality-assured facade cleaning of coated surfaces in accordance with RAL-GZ 632 - before each initial cleaning and before each change to a different cleaning agent or cleaning aid during the ongoing cleaning intervals, these must also be tested for suitability on a test area of at least 2 m² on the south side in a non-exposed location – or, at least, cleaned (or previously cleaned) in accordance with the following guidelines. Metallic coatings must be cleaned regularly (minimum requirement see above) and immediately after soiling. Dried-on, old soiling can sometimes only be removed abrasively, which means damaging (scratching) the coating:
- In the case of metallic coatings, a suitability test must always be carried out due to the risk of colour or effect changes.
- Use only pure water, if necessary with a small amount of neutral detergent (pH 7) added, and soft, non-abrasive cloths, rags or industrial cotton wool. Do not rub vigorously.
- Greasy, oily or sooty substances can be removed using aromatic-free white spirit or isopropyl alcohol (IPA). Residues from adhesives, silicone rubber or adhesive tapes etc. can also be removed in this way. It is important to remove them immediately. Tests should be carried out on non-visible areas.
- Do not use solvents containing esters, ketones, alcohols, aromatics, glycol ethers, halogenated hydrocarbons or similar substances.
- Do not use scratchy, abrasive agents.
- Do not use acidic or strongly alkaline cleaning agents or wetting agents.
- Do not use cleaning agents of unknown composition.
- The cleaning agents must not exceed 25°C. Do not use steam jet cleaners.
- The surface temperature of the façade elements must also not exceed 25°C during cleaning.
- The maximum exposure time for these cleaning agents must not exceed one hour; if necessary, the entire cleaning process can be repeated after at least 24 hours.
- Immediately after each cleaning process, rinse with clean, cold water.
- If a coated component becomes contaminated during transport, storage or assembly, it must be cleaned immediately with clear, cold or lukewarm water. Neutral or mildly alkaline cleaning agents may be used for stubborn dirt.

Cleaning instructions
for powder-coated surfaces

- Joint sealants and other auxiliary materials such as glass installation aids, lubricants, drilling and cutting agents, adhesives, grouting compounds, putties, adhesive and masking tapes, etc., which come into contact with coated surfaces, must be pH-neutral and free of substances that could damage the paintwork. Exposure to sunlight increases the aggressiveness of these chemicals. The aforementioned substances must therefore be tested for their suitability for the coating before use.

- In addition to the cleaning recommendations of the powder coating manufacturer, special recommendations apply to façade elements coated with fine-structure powder coatings, which are aimed at the roughness of the surface, which is difficult to clean due to its nature: Use only pure water, if necessary with small amounts of neutral or slightly alkaline detergents. Do not use scratching or abrasive agents. Only use soft, lint-free cloths for cleaning. Do not rub vigorously. Do not use steam jet cleaners. Rinse with clean, cold water immediately after each cleaning process.

Further information on maintenance and cleaning can be obtained from, among others:

- Aluminium Headquarters Advisory and Information Service, D-40003 Düsseldorf

  Quality Association for the Cleaning of Metal Facades (GRM), D-73529 Schwäbisch-Gmünd

- American Architectural Manufacturer's Association (AAMA) USA, (AAMA 610-1979 Cleaning Producers)

- Our recommendations, both verbal and written, which we provide to assist you based on our experience and to the best of our knowledge in accordance with the current state of scientific and practical knowledge, are non-binding and do not establish any contractual legal relationship or ancillary obligation arising from the purchase contract. They do not release the buyer from their responsibility to check our products themselves for their suitability for the intended purpose.

- This information sheet replaces all previous ones on this topic. If the version date of this information sheet is more than 12 months old, please request a new one!

Important information

General:

- **Storage**
  If storage (temporary storage) at AGRU exceeds 4 weeks, AGRU cannot be held responsible for any damage (corrosion, mechanical damage)!
- **Bulky items**
  Powder coating and anodising of bulky parts can only be carried out at the client's risk! This applies to parts with dimensions exceeding the following measurements: 6800 x 2000 x 300 mm (L x H x W)
- **Cleaning**
  With regard to cleaning and preservation agents, we refer you to the agents and cleaning companies approved by the Quality Association for the Cleaning of Metal Facades (Nuremberg). We will be happy to send you a list on request. Please also note our cleaning recommendations!
- Pack **raw materials** securely for transport (do not deliver loose or unpacked; use temporary storage).

acceptance of goods:

- In order to speed up our goods acceptance and thus also the entire order processing, we ask you to label the individual packages (however, do not label parts on the visible side – adhesive labels and felt-tip pens are difficult to remove)! This enables us to assign/pick orders more quickly.
- **Each individual package should be labelled with the following information:**
  - **client name**
  - **delivery note number**
  - **colour tone**
  - **commission**
  - **Number/total of packaging units per delivery note (also note on delivery note)**
  - **1 colour shade = 1 LS = separate packaging unit(s)**
- The following is checked/carried out when we take delivery of goods:
- The number of packages delivered is compared with the number of packages noted on the delivery note. The packaging units are checked for external damage and then stored. If the packaging units are damaged on the outside, our customer and the supplier are notified immediately.
- The data on your delivery note (LS) will be recorded by us electronically. We assume that the quantities and items listed on the LS correspond to the goods actually delivered.
- The actual goods receipt inspection for damage/over-deliveries/shortages only takes place during the contact process!

  If damaged profiles are found, they are still powder-coated/anodised and delivered to our end customers. Damaged profiles are packed separately and marked with a red label. However, our customers and the supplier are notified immediately. This allows our customers to decide at this point whether a reorder is necessary or not.

LS: **1234**
Abs.: **Musterbetrieb, Wien**
Colour: **RAL 9010**
Comm.: **Schule Wien**

The order consists of:

2	belt		1	wood bundle			transport rack
1	parcel			sheet metal band		1	iron basket
	box			shed			mesh box
	pallet		1	crates			

Total number of packaging units: 6

Important information

Goods receipt/ Goods issue:

In order to ensure proper material transfer and distribution, we kindly request that you adhere to the following transfer times:

Monday to Thursday:
8:00 a.m. to 4:30 p.m.

Friday:
8:00 a.m. to 1:00 p.m.

If you would like to collect or deliver after these collection times, please notify our shipping department (DW 9949 or versand@agru.net).

General Terms of Business (GTB)
of agru Oberflächentechnik Gesellschaft m.b.H. (AGRU), version 01.10.2025

1. Scope
These general terms of business and delivery apply to all deliveries from AGRU to the customer. They also apply to future transactions, even if these sales conditions are not expressly referred to. Deviating or supplementary provisions, particularly the customer's general purchasing conditions, as well as oral agreements, are only valid if confirmed in writing by AGRU.

2. Quotations
Quotations are non-binding with regard to price, quantity and delivery. Prior sale is reserved.

3. Prices
Unless otherwise agreed, prices are quoted net, ex works Grünburg, exclusive of VAT.

4. Orders
Orders placed verbally, in writing, by fax or letter, or particularly by AGRU delivery notes, are binding and cannot be cancelled. Furthermore, an order is deemed placed as soon as the raw material from the pressing plant, profile system supplier, aluminium supplier, etc. has been delivered or handed over to us. If the order details are clear, orders will not be reconfirmed. An order confirmation will only be issued upon request of the customer.

5. Delivery
Delivery period: The stated delivery periods always apply as lead times ex works. They are valid from receipt or clarification of all commercial and technical documents necessary for processing the order. Delivery periods are approximate. Force majeure or other unforeseen obstacles in the AGRU plant or its subcontractors release AGRU from compliance with the agreed delivery time. AGRU accepts no liability for damages resulting from delayed delivery.
Insurance: Transport insurance will only be taken out at the customer's request and expense.
Shipping method and route: AGRU will select at its discretion the most cost-effective shipping method. Additional costs arising from special requests, express delivery, or specific modes of transport will be borne by the customer. Any special requests regarding shipping must be communicated in good time. AGRU's delivery obligation is fulfilled when the goods have left AGRU's works or AGRU has notified readiness for shipment.
Transfer of risk: Transfer of risk takes place according to the agreed Incoterms.

6. Regulations at the destination
The customer must inform AGRU of local, legal, or other regulations, in particular standards, that relate to the execution of the delivery and compliance with safety and approval regulations.

7. Prices and payment
All prices are non-binding and exclusive of VAT. AGRU prices are based on the current price lists and supplements.
Invoices are payable net within 30 days from the invoice date without deduction. If payment is made within 14 days from the invoice date, a 2% discount will be granted. In case of late payment, AGRU is entitled to charge default interest at the respective bank rate. The customer is not entitled to offset warranty or damage claims against its payment obligations or to withhold payment. Bills of exchange will only be accepted with AGRU's written consent, with all costs borne by the customer. Acceptance of bills of exchange or cheques is only on account of payment. If the customer fails to meet any payment obligation towards AGRU, even from another order, AGRU is entitled to declare all outstanding claims due, even if other payment terms were agreed. This also applies to bill liabilities. Payments made after the due date will always be offset against the oldest outstanding invoices.
In case of default of payment, AGRU is entitled to terminate price agreements without notice.

8. Place of performance, jurisdiction, applicable law
Place of performance for payment and delivery is AGRU Oberflächentechnik GmbH, 4595 Waldneukirchen, Steyrstr. 31.
In the event of disputes, the place of jurisdiction for both parties is Steyr, Upper Austria. Austrian law shall always apply. The applicability of international private law and the UN Convention on Contracts for the International Sale of Goods is excluded.

9. Retention of title
Goods remain our property until full payment has been received. If third parties attempt to seize AGRU-owned goods, the customer must point out AGRU's ownership or co-ownership and immediately notify AGRU in writing, specifying details such as court reference number, date of seizure, creditor, lawyer, and claim pursued. All costs incurred in safeguarding AGRU's ownership must be fully reimbursed by the customer.

General Terms of Business (GTB)
of agru Oberflächentechnik Gesellschaft m.b.H. (AGRU), version 01.10.2025

10. Warranty

AGRU's warranty obligation is limited to defects already present at the time of delivery to the customer. Goods must be inspected immediately after delivery. Any defects identified or identifiable must be reported in writing to AGRU without delay, at the latest within 14 days after delivery, stating the type and extent of the defect. Later complaints will not be accepted. Returns require AGRU's prior written consent. If the customer or third parties carry out modifications or repairs on the goods without AGRU's approval, all warranty claims lapse. Defects discovered later must be reported immediately after discovery. Failure to notify in due time constitutes acceptance of the goods. Assertion of warranty or compensation claims and rescission on grounds of error are excluded in such cases. Existence of a defect does not entitle the customer to remedy it personally or via third parties. AGRU must first be given the opportunity to remedy, replace, reduce the price, or rescind the contract within a reasonable period. Warranty period is 6 months. Reversal of the burden of proof pursuant to § 924 ABGB to AGRU's detriment is excluded. The customer must prove the existence of the defect at the time of delivery, the time of discovery, and the timeliness of the complaint. AGRU may remedy defects by repair or replacement. The customer's recourse claims against AGRU under § 933b ABGB are excluded. Warranty does not cover defects caused by natural wear, improper storage, disregard of operating instructions, excessive use, or improper interventions by the customer or third parties. Unjustified complaints that cause AGRU costs must be borne by the customer.

11. Limitation of liability

AGRU is liable for injury to life, body, or health according to statutory provisions. For other damages, AGRU is only liable for intent or extreme gross negligence. Liability is limited to the contract value exclusive of taxes. Compensation for loss of profit and for pure economic losses of the customer is excluded. Liability for consequential damages (such as operational interruptions, production stoppages, or other indirect or consequential damages) is expressly excluded. Claims for compensation expire 2 years after performance or delivery.

12. Packaging

All prices include standard packaging in paper, cardboard, or plastic film. Special requests such as export packaging or self-adhesive films will be charged separately after prior agreement. Long goods pallets are provided by AGRU on loan.

13. Technical execution

Technical execution is in accordance with the relevant Austrian standards (ÖNORM) and applicable quality regulations. Reference is expressly made to AGRU's technical catalogues.

14. Miscellaneous

If any provision of these general terms of business is held to be illegal, invalid or unenforceable, in whole or in part under any applicable enactment or rule of law, such illegality, invalidity or unenforceability shall not affect the remainder of this agreement, and AGRU and the customer shall in good faith attempt to substitute a legal, valid and enforceable provision which achieves to the nearest extent possible the same effect as would have been achieved by the illegal, invalid or unenforceable provision. In case of any inconsistency between the German and the English version of these general terms of business the German version shall apply.