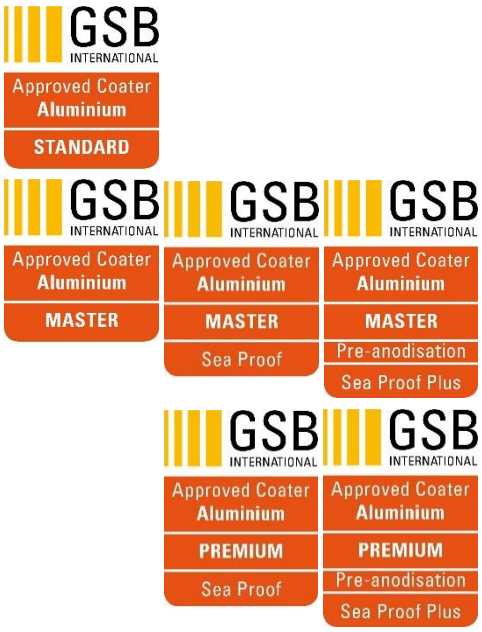
International Quality Regulations for the Coating of Building Components

GSB AL 631-5

Coater Aluminium



Edition: **December 2023**
Status: **07. December 2023**

GSB International e. V.
Firtz-Vomfelde-Straße 30
D-40547 Düsseldorf
Telefon: +49 (0) 211 / 4796-451
E-Mail: info@gsb-international.de
Internet: www.gsb-international.de

.

1 Certification of the aluminium coater

1.1 Purpose

The content of this section covers the granting and confirmation of the certification for coaters (AL).

GSB-CERT certifies the coating in accordance with the requirements of quality guideline GSB AL 631-5.

1.2 Scope of application

The regulations set out in this section apply to the granting and confirmation of the certification for the coating company by GSB-CERT.

1.3 Responsibilities

The GSB-CERT is responsible for providing quality regulation GSB AL 631-5 to the inspector, the coater (AL) and the named testing institutes.

The inspector and the named testing institutes are responsible for carrying out and documenting the tests. Information is exchanged exclusively with GSB-CERT.

Documents and statements must be treated as confidential.

1.4 Area of certification

On application, GSB-CERT issues a certificate if the requirements are met. The certificates can be awarded with the following quality seals:

The Master certificate can be supplemented with the following additional seals:*

The Premium certificate must be supplemented with at least one of the following additional seals:*

*The tests to be passed for the additional seals can be found in the following guidelines: "GSB AL 631-5 section 5: Technical requirements Sea Proof" and "GSB AL 631-5 section 6: Technical requirements for Sea Proof Plus".

2 Certification process

2.1 Stage 1 – Application

The application for certification must be made in written form to GSB-CERT. The application is checked by GSB-CERT.

2.2 Stage 2 – Provisional certification

For certification, the following aspects are tested:

- Production facility
- Laboratory equipment
- Factory Production Control (FPC)
- Coated components

Only the coated parts which the coater (AL) has already checked and authorized are tested. Sufficient material must be made available for the test.

The coater (AL) must allow the inspector access to any coated components that are stored, ready for dispatch or being prepared for dispatch at the time of the test.

The certification process has two stages:

Test E1:

The inspector carries out a test with the coater (AL) following prior notification.

If the requirements of quality regulation GSB AL 631-5 are met, the inspector will carry out test E2.

If the requirements of the quality regulation are not met, the coater (AL) will be informed of the discrepancies. After correcting these discrepancies, the coater (AL) informs GSB-CERT. Test E2 is carried out.

Test E2:

The inspector carries out a test unannounced.

Samples for the corrosion tests are taken from production and sent away for corrosion testing.

The corrosion tests are carried out in a test institute named by GSB-CERT.

If the requirements of the quality regulation GSB AL 631-5 are fulfilled except for the corrosion tests, GSB-CERT issues a provisional certificate.

2.3 Stage 3 – Certification

If the corrosion test is passed and the requirements of quality regulation GSB AL 631-5 are met. GSB-CERT issues a certificate with quality seal.

2.4 Upgrade Standard -> Master respectively Master -> Premium

In order to be able to change from standard to master, the inspector determines at the next company inspection whether the coater meets the requirements of a master coater. If this is the case, the upgrade to Master Coater takes place after a positive assessment of the test.

When upgrading from Master to Premium, the coater must meet the FPC according to the requirements of a Premium coater from the time of application. During the next inspection, the inspector checks whether the coater meets the requirements of a premium coater. If this is the case, the upgrade to Premium Coater takes place after a positive assessment of the test. If an additional seal (Sea Proof or Sea Proof Plus) is not yet available, it is mandatory to apply for this as a premium coater.

A new member has the possibility to become a Premium Coater from the beginning. The prerequisite is that all criteria of a Premium Coater are fulfilled without any shortcomings and that the GSB-CERT agrees.

3 Monitoring the certification

3.1 Prolongation test

Adherence to quality guideline GSB AL 631-5 the coater is monitored by means of unannounced prolongation tests in every half of the year.

The samples for the corrosion test are taken from production. The coater provides the sample material.

The tests are carried out in the first half of the year in an external test laboratory selected by the coater and in the second half of the year in a test institute designated by GSB-CERT. In both cases, the inspector draws the samples.

If the requirements of quality regulation GSB AL 631-5 are met, the period of validity of the certificate is prolonged up to the end of the following year.

If the coater (AL) applies for certification with higher requirements (for example, from Standard to Master), the required tests are carried out during the next monitoring test.

If the monitoring test is passed, the Board will grant the applicant the desired quality seal on GSB-CERTs recommendation. A certificate is issued.

If only one part of the monitoring test fails, then the test is assessed as a monitoring test based on the requirements of the existing quality seal and the existing additional seal (if applicable).

3.2 Negative result for prolongation test

If part of the prolongation test fails, GSB-CERT stipulates the following measures:

1. Additional requirements
2. Repeat test which is subject to a charge
3. Downgrade of the quality seal
4. Temporary or permanent withdrawal of the certificate

Measures 1 to 4 above can be combined with one another.

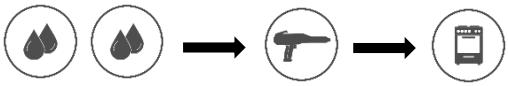
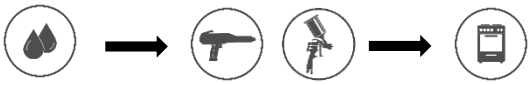
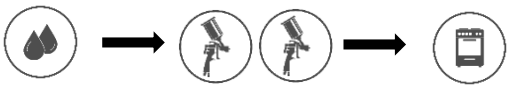
The coater (AL) can make an appeal in writing against the decision of GSB-CERT within 4 weeks.

4 Distribution list

- GSB-CERT
- GSB Office
- Members
- Inspector

1 Definition: Classification of one or more plants

A coating plant consists of a multi-stage pre-treatment process including a residual water dryer, application unit and furnace. The number of coating plants is determined by the number of pre-treatment lines, furnaces and different coating technologies.

Defined as one plant:	Defined as two plants:
	
	
	
	

Key


Surface pre-treatment or preparation


Application of powder coating


Application of liquid paint


Furnace

A similar classification applies to more than two coating plants.

If a coating company has several plants, all of them are tested during the initial test. The inspector will decide which plant is to be tested in the monitoring test.

2 Cleanliness and handling

The components must be suspended, positioned and taken down as well as transported during the various manufacturing processes in such a way that ensures there can be no contamination with dust, sweat from hands, grease, electrolyte residue, condensation and damage. The pre-treated components must only be handled with clean, suitable gloves.

3 Surface pre-treatment

3.1 General

Only the following chemical surface pre-treatment processes can be used in line with the legal guidelines.

- GSB-approved chromium-free or chromium VI-free process
- Yellow and green chromating in accordance with EN 12487

3.2 Contact points

The components that are to be coated must be suspended in such a way that avoids contact points on the main visible surfaces. If this is not possible, contact points of ≤ 2 mm in diameter are permitted on the main visible surfaces. The customer must be informed of contact points on the main visible surfaces.

3.3 Etch rate

Setting a limit value with narrow fluctuation ranges is not required.
Recommended etch rate for alloys in accordance with EN AW-6060 and EN AW-6063: ≥ 1 g/m². A suitable etch rate must be determined and stipulated for other alloys.

3.4 Yellow and green chromating

Yellow and green chromating (rinse procedure) do not require special certification.

Coating layer	Yellow chromating:	0.4 – 1.0 g/m²
	Green chromating:	0.4 – 1.2 g/m²

3.5 Chromium-free and chromium VI-free pre-treatment procedures

If a coating company uses a new pre-treatment system for series coating for the first time, they must inform the offices of GSB of this in written form so that an unannounced monitoring test can be performed. The same applies if a test operation is going to exceed four weeks.

3.6 Determining the layer weight

The layer weight must be determined on the semi-finished product used in production.

3.7 Monitoring the rinse

There must be an option to remove the run-off water (inspection flap for spray systems).

Rinse passivation (final rinse)

Rinsing after passivation with fully demineralized water (deionized water) must be carried out in such a way that the last rinsing water to drip off has a conductivity of ≤ 30.0 µS/cm.

No-rinse passivation (last rinse cycle)

Rinsing with fully demineralized water (DI water) prior to passivation must be carried out in such a way that the last rinsing water to drip off has a conductivity of ≤ 30.0 µS/cm. Fogging of the passivated surface: The conductivity of the water used must be ≤ 30.0 µS/cm.

3.8 Drying of residual water

Immediately following chemical pre-treatment, the components must be dried in a residual water dryer. If the manufacturer of the pre-treatment chemicals does not provide any information on the object temperature in its technical data sheet, the object temperature must not exceed 100°C for the process in which chromium (III) and chromium (VI) are used.

3.9 Multi-metal applications

In terms of quality assurance, the coater himself is responsible for determining the concentration of bath poisons that can arise in the case of multi-metal applications.

4 Coating

The coating must be applied within 24 hours after pre-treatment.

If the components to be coated need to be stored within these 24 hours, then they must be stored in a way that prevents them from being contaminated (e.g. by dust, fingerprints and moisture).

The coater may only use GSB-approved material for GSB-compliant coating. The coater must adhere to the prescribed periods of permitted use, irrespective of the weathering category of the material.

5 Furnace

Using integrated measuring equipment, the circulating air temperature of the furnace must be continuously measured and documented at **three stationary points** at least. The measuring points must be chosen so that an accurate circulating air temperature distribution in the furnace can be ascertained (e.g. top, centre and lower area). The measurement sensors must be read individually.

The documentation does not necessarily have to be done via continuous paper. The values can also be recorded and read digitally. A reading and digital recording is possible, for this the coater must read the values 1x per hour.

6 Obligatory laboratory equipment

6.1 General

There must be a laboratory which is in a separate room to the production facilities. It must be possible to carry out all of the tests for the Factory Production Control (FPC) in the laboratory.

Devices in every production site must be functional and calibrated (adherence to test periods).

Device failures and the failure dates must be documented. Replacement devices must be obtained.

Repair and maintenance jobs must be shown to the inspector on request.

6.2 Obligatory laboratory equipment

The following testing and measuring equipment must be in use at the laboratory of each production site and must be functional and calibrated.

- Scale to determine the weight of the conversion/passivation layer and/or the etch rate with a measurement accuracy of 0.1 mg for the process check
- 2 layer thickness measuring devices which work in accordance with the eddy current process as per ISO 2360 and/or in accordance with the magnetic-induction process and eddy current process as per ISO 2808
- Cutting devices and accessories for the cross-cut test in accordance with ISO 2409
- Mandrel bend test in accordance with ISO 1519
- Test of adhesion and elasticity in the case of deformation (cupping test) in accordance with ISO 1520.
- Ball impact test in accordance with ASTM D 2794 (only required for powder coatings)
- A device for measuring the gloss in accordance with ISO 2813
- A measuring device for recording the object and circulating air temperature with at least 3 measurement points (only for thermally cured coating systems)
- A conductivity measuring device for chemical surface pre-treatment
- Devices for the boil test
- Devices for determining the layers of chromium-free and chromium (VI)-free pre-treatment processes
- Devices for drilling and cutting

6.3 Recommended laboratory equipment

The following testing and measuring equipment is recommended.

- Devices for the rest potential analysis (RPA test)
- Colorimeter

7 Storage

7.1 Components to be coated

The components to be coated must be stored in a way that prevents any changes to the surface (e.g. corrosion, mechanical damage) which impair the quality of the coatings.

7.2 Coating material

The coating materials must be stored in accordance with the information in the manufacturer's technical data sheet. Different storage conditions must be arranged in writing with the manufacturer.

8 Technical material safety data sheets

The latest technical material safety data sheets (MSDS) for all pre-treatment chemicals and coating materials used must be made freely available for viewing at the relevant stages of the process.

9 Quality assurance

9.1 Test sheets

- Profile sections: EN AW-6060 T 66 [AlMgSi]/EN AW-6063 T 6 or T 66 [AlMg0.7Si], sheets: EN AW-5005a H 24 [AlMg1(B)] mill finish

- The sample size is chosen in accordance with the specifications of the respective test (preferably 70 x 140 x 0.7-0.8 mm).

9.2 Factory Production Control (FPC)

9.2.1 General

The coater must continuously monitor its production and processes, record the results and retain the test logs together with the accompanying samples (which have been appropriately marked) for 5 years or in accordance with the statutory provisions (this applies to production batches of over 100 m² or at an interval of 2 hours).

These documents must be kept available to be viewed by the inspector. Where possible, profile sections or other real products should be used instead of test sheets.

9.2.2 Mandatory Factory Production Control (FPC)

The following process and results checks are mandatory. The documentation and samples must be shown to the inspector on request

9.2.2.1 Goods inwards and issue inspection

Process step	Test	Minimum scope of the test	Documentation
Goods inwards inspection			
Substrate to be coated	Delivery corresponds with delivery note Check for visual defects and corrosion	Every delivery	Yes, on delivery note
Coating materials	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note
Chemicals	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note
Goods issue check			
Coated substrate	Order corresponds with delivery	Every delivery	FPC
Coated substrate	Delivery corresponds with delivery note	Every delivery	On delivery note / on order confirmation

9.2.2.2 Surface pre-treatment

Process step	Test	Minimum scope of the test	Documentation
Pre-treatment baths			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration) In accordance with manufacturer's guidelines	1 x per day	Yes
Dipping and spray pre-treatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes
Dipping and spray pre-treatment	Determining the etch rate	1 x per week	Yes
Conversion layer baths containing chromate			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per day	Yes
Dipping and spray pre-treatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes
Conversion layer	Coating layer	1 x per week	Yes
Passive layer baths CR(VI)-free/CR-free pre-treatment			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration)	1 x per shift	Yes
Passivation layer	Coating layer	In accordance with manufacturer's guidelines, at least once per day	Yes
Final rinse			
Dripping water	Conductivity	1 x per shift	Yes
Residual water dryer			
Object temperature	Temperature with measuring strips or measuring device	1 x per week	Yes

9.2.2.3 Coating

Process step	Test	Minimum scope of the test	Documentation
Coating result			
Layer thickness	Layer thickness	2 x per hour	Yes, minimum and maximum value
Gloss	Measurement of the gloss	4 x per day or with every change of colour > 100 m²	Yes, actual value
Colour	Visual comparison with binding template (if arranged)	With every change of colour > 100 m²	Yes
Adhesive strength	Cross cut	2 x per shift	Yes
Mechanical resilience	Drilling and sawing	2 x per shift	Yes
Quality of the pre-treatment (not for pre-anodising)	Boil test	2 x per shift	Yes
Deformability	Cupping test, mandrel bending test Ball impact test	2 x per shift	Yes
Change of effect with metallics (recommendation)	Sodium hydroxide test	Per batch > 400 kg	Yes
Degree of cross linking (liquid paint), optional	MEK test, Buchholz indentation test	2 x per shift	Yes
Furnace			
Object temperature Retaining times and object temperatures in accordance with manufacturer's instructions (Alternative: Evaluation of thermal equivalence)	Temperature with measuring device with 3 object sensors	1 x per week	Yes, with temperature recording as evidence

9.2.3 Recommended process check

Process step	Test	Scope of the test	Documentation
Passive layer baths / Cr(VI)-free/Cr-free pre-treatment			
Rest potential analysis (optional)	Rest potential	2 x per week	Yes
Coating			
Gloss	Gloss measurement (20°/60°/85° measurement angle)	Colour change > 100 m²	Min. and max. value
Colour (no metallics)	Measurement with colorimeter	With every change of colour > 100 m²	Yes
Colour (metallics)	Visual comparison with mandatory template	With every change of colour > 100 m²	Yes
Furnace			
Recording the curing conditions (Alternative: Assessment of thermal equivalence)	Temperature with measuring device with 3 object sensors	1 x per week	Yes with temperature record as proof

10 Characteristic values for tests on finished parts and test sheets

10.1 Powder coating

10.1.1 Technical values for single-layer systems

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Layer thickness			
Thin layer powder Normal powder – colour-dependent (Average layer thickness)	20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm	20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm	20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT 0 / GT 1	0 (S0) GT 0 / GT 1	0 (S0) GT 0 / GT 1
Mechanical values			
Mandrel bending test Cracking of coating Adhesive tape removal	≤ 5 mm Not permitted No removal of coating	≤ 5 mm Permitted No removal of coating	≤ 5 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 5 mm Not permitted No removal of coating	≥ 5 mm Permitted No removal of coating	≥ 5 mm Permitted No removal of coating
Ball impact test Cracking of coating Adhesive tape removal	20 inch/pound Not permitted No removal of coating	20 inch/pound Permitted No removal of coating	20 inch/pound Permitted No removal of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 – 30 cm)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.1.2 Technical values for multi-layer system

10.1.2.1 Primer / topcoat pigmented

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness			
Layer thickness Primer Top coat - depending on colour	 According to Manufacturer 60 - 80 µm	 According to Manufacturer 60 - 80 µm	 According to Manufacturer 60 - 80 µm
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test* Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) max. GT 1	 0 (S0) max. GT 1	 0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating
Ball impact test cracking of coating Tape Tear	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

10.1.2.2 Base material / transparent clearcoat

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness			
Layer thickness Metallic base coat (according to manufacturer) transparent top coat (depending on colour)	 60 - 80 µm 60 - 80 µm	 60 - 80 µm 60 - 80 µm	 60 - 80 µm 60 - 80 µm
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	 ± 5 GU	 ± 5 GU	 ± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	 ± 3 GU	 ± 3 GU	 ± 3 GU
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) max. GT 1	 0 (S0) max. GT 1	 0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating
Ball impact test cracking of coating Tape Tear	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	 no spalling of coating	 no spalling of coating	 no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

10.2. Liquid paint

10.2.1 Technical values for single-layer systems

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Layer thickness			
Single layer	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT0 / GT1	0 (S0) GT0 / GT1	0 (S0) GT0 / GT1
Mechanical values			
Mandrel bending test Cracking of coating Adhesive tape removal	≤ 5 mm Not permitted No removal of coating	≤ 5 mm Permitted No removal of coating	≤ 5 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 5 mm Not permitted No removal of coating	≥ 5 mm Permitted No removal of coating	≥ 5 mm Permitted No removal of coating
Cross-linking test MEK test	Buchholz hardness min. 80	Buchholz hardness min. 80	Buchholz hardness min. 80
Cutting, drilling, sawing (naked eye assessment)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.2.2 Technical values for double-layer system

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Layer thickness			
Double layer	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT0 / GT1	0 (S0) GT0 / GT1	0 (S0) GT0 / GT1
Mechanical values			
Mandrel bending test Cracking of coating Adhesive tape removal	≤ 12 mm Not permitted No removal of coating	≤ 12 mm Permitted No removal of coating	≤ 12 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 3 mm Not permitted No removal of coating	≥ 3 mm Permitted No removal of coating	≥ 3 mm Permitted No removal of coating
Cross-linking test MEK test	Buchholz hardness min. 80	Buchholz hardness min. 80	Buchholz hardness min. 80
Cutting, drilling, sawing (naked eye assessment)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.2.2.1 Primer / topcoat pigmented

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness			
Layer thickness Primer Top coat	According to Manufacturer	According to Manufacturer	According to Manufacturer
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

10.2.2.2 Base material / transparent clearcoat

Testing	**Aluminium Florida 1**	**Aluminium Florida 3 & 5**	**Aluminium Florida 10**
Layer thickness			
Layer thickness Metallic basecoat transparent topcoat	According to the manufacturer	According to the manufacturer	According to the manufacturer
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 5 GU
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) max. GT 1	 0 (S0) max. GT 1	 0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

11 11 Corrosion tests for aluminium Standard coater

-

Test	Weather class	Minimum scope of the test	Documentation
Acetic acid salt spray test	C3	1x per half year	Yes

12

The AASS tests in the first half of the year are carried out as part of the first monitoring test. For this, the inspector takes the samples and labels them. The coater can carry out the test on their own initiative.

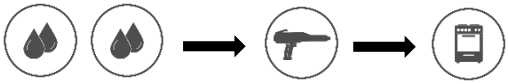
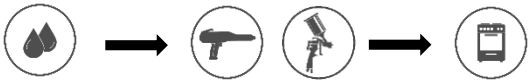
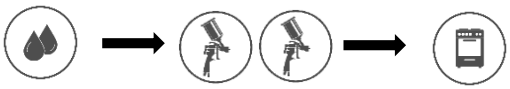
The AASS test is carried out as part of the second monitoring test. The inspector takes samples for them. The tests are carried out in a test laboratory commissioned by GSB.

13 Customer complaints

The inspector must be granted access to the list of customer complaints.

1 Definition: Classification of one or more plants

A coating plant consists of a multi-stage pre-treatment process including a residual water dryer, application unit and furnace. The number of coating plants is determined by the number of pre-treatment lines, furnaces and different coating technologies.

Defined as one plant:	Defined as two plants:
	
	
	
	

Key

Surface pre-treatment or preparation

Application of powder coating

Application of liquid paint

Furnace

A similar classification applies to more than two coating plants.

If a coating company has several plants, all of them are tested during the initial test. The inspector will decide which plant is to be tested in the monitoring test.

2 Cleanliness and handling

The components must be suspended, positioned and taken down as well as transported during the various manufacturing processes in such a way that ensures there can be no contamination with dust, sweat from hands, grease, electrolyte residue, condensation and damage. Only touch the pre-treated components with suitable clean gloves.

3 Surface pre-treatment

3.1General

Only the following chemical surface pre-treatment processes can be used in line with the legal guidelines.

- GSB-approved chromium-free or chromium VI-free process
- Pre-anodising (see supplementary document "Additional seal")
- Yellow and green chromating in accordance with EN 12487

3.2 Contact points

The parts to be coated must be suspended or positioned in such a way that there are no contact points on a main surface that will later be visible. Contact points are only permitted when they cannot be avoided and only if they are marked on the respective component or on drawings (sketches). The customer must be notified of this.

3.3 Etch rate

Setting a limit value with narrow fluctuation ranges is not required.
Recommended etch rate for alloys in accordance with EN AW-6060 and EN AW-6063: ≥ 1 g/m². A suitable etch rate must be determined and stipulated for other alloys.

3.4 Yellow and green chromating

Yellow and green chromating (rinse procedure) do not require special certification.

Coating layer	Yellow chromating:	0.4 – 1.0 g/m²
	Green chromating:	0.4 – 1.2 g/m²

3.5 Chromium-free and chromium VI-free pre-treatment procedures

If a coating company uses a new pre-treatment system for series coating for the first time, they must inform the GSB of this in written form so that an unannounced monitoring test can be performed. The same applies if a test operation is going to exceed four weeks.

3.6 Determining the layer weight

The layer weight must be determined on the semi-finished product used in production.

3.7 Monitoring the rinse

There must be an option to remove the run-off water (inspection flap for spray systems).

Rinse passivation (final rinse)

Rinsing after passivation with fully demineralized water (deionized water) must be carried out in such a way that the last rinsing water to drip off has a conductivity of ≤ 30.0 µS/cm.

No-rinse passivation (last rinse cycle)

Rinsing with fully demineralized water (DI water) prior to passivation must be carried out in such a way that the last rinsing water to drip off has a conductivity of ≤ 30.0 µS/cm. Fogging of the passivated surface: The conductivity of the water used must be ≤ 30.0 µS/cm.

3.8 Drying of residual water

Immediately following chemical pre-treatment, the components must be dried in a residual water dryer. If the manufacturer of the pre-treatment chemicals does not provide any information on the object temperature in its technical data sheet, the object temperature must not exceed 100°C for the process in which chromium (III) and chromium (VI) are used.

3.9 Multi-metal applications

In terms of quality assurance, the coater himself is responsible for determining the concentration of bath poisons that can arise in the case of multi-metal applications.

4 Coating

The coating must be applied within 24 hours after the pre-treatment.

If the components to be coated need to be stored within these 24 hours, then they must be stored in a way that prevents them from being contaminated (e.g. by dust, fingerprints and moisture).
The coater may only use GSB-approved material for GSB-compliant coating.

After pre-anodization a coating must be applied within 72 hours.

The coater must adhere to the prescribed periods of permitted use, irrespective of the weathering category of the material

5 Furnace

Using integrated measuring equipment, the circulating air temperature of the furnace must be continuously measured and documented at min. **3 stationary measuring points**. The measuring points must be chosen so that an accurate circulating air temperature distribution in the furnace can be ascertained (e.g. top, centre and lower area). The measurement sensors must be read individually.

The documentation does not necessarily have to be done via continuous paper. The values can also be recorded and read digitally. A reading and digital recording is possible, for this the coater must read the values 1x per hour.

6 Obligatory laboratory equipment

6.1 General

There must be a laboratory which is in a separate room to the production facilities. It must be possible to carry out all of the tests for the Factory Production Control (FPC) in the laboratory.

Devices in every production site must be functional and calibrated (adherence to test periods).

Device failures and the failure dates must be documented. Replacement devices must be obtained.

Repair and maintenance jobs must be shown to the inspector on request.

6.2 Obligatory laboratory equipment

The following testing and measuring equipment must be in use at the laboratory of each production site. The equipment must be functional and calibrated.

- Scale to determine the weight of the conversion/passivation layer and/or the etch rate with a measurement accuracy of 0.1 mg for the process check.
- 2 layer thickness measuring devices which work in accordance with the eddy current process as per ISO 2360 and/or in accordance with the magnetic-induction process and eddy current process as per ISO 2808.
- Cutting devices and accessories for the cross-cut test in accordance with ISO 2409.
- Mandrel bend test in accordance with ISO 1519.
- Test of adhesion and elasticity in the case of deformation (cupping test) in accordance with ISO 1520.
- Ball impact test in accordance with ASTM D 2794 (only required for powder coatings).
- A device for measuring the gloss in accordance with ISO 2813.
- A measuring device for recording the object and circulating air temperature with at least 3 measurement points (only for thermally cured coating systems).
- A conductivity measuring device for chemical surface pre-treatment.
- Devices for the boil test
- Devices for determining the layers of chromium-free and chromium (VI)-free pre-treatment processes
- Devices for drilling and cutting

6.3 Recommended laboratory equipment

The following testing and measuring equipment is recommended.

- Devices for the rest potential analysis (RPA test)
- Colorimeter

7 Storage

7.1 Components to be coated

The components to be coated must be stored in a way that prevents any changes to the surface (e.g. corrosion, mechanical damage) which impair the quality of the coatings.

7.2 Coating material

The coating materials must be stored in accordance with the information in the manufacturer's technical data sheet. Different storage conditions must be arranged in written form with the manufacturer.

8 Technical material safety data sheets

The latest technical material safety data sheets (MSDS) for all pre-treatment chemicals and coating materials used must be made freely available for viewing at the relevant stages of the process.

9 Quality assurance

9.1 Test sheets

- Profile sections: EN AW-6060 T 66 [AlMgSi]/EN AW-6063 T 6 or T 66 [AlMg0.7Si], sheets: EN AW-5005a H 24 [AlMg1(B)] mill finish

- The sample size is chosen in accordance with the specifications of the respective test (preferably 70 x 140 x 0.7-0.8 mm).

9.2 Factory Production Control (FPC)

9.2.1 General

The coater must continuously monitor its production and processes, record the results and retain the test logs together with the accompanying samples (which have been appropriately marked) for 5 years or in accordance with the statutory provisions (this applies to production batches of over 100 m² or at an interval of 2 hours).

These documents must be kept available to be viewed by the auditor. Where possible, instead of test sheets, profile sections or other real products should be used.

9.2.2 Mandatory Factory Production Control (FPC)

The following process and results checks are mandatory. The documentation and samples must be shown to the auditor on request.

9.2.2.1 Goods inwards and issue inspection

Process step	Test	Minimum scope of the test	Documentation
Goods inwards inspection			
Coating substrate	Delivery corresponds with delivery note Check for visual defects and corrosion	Every delivery	Yes, on delivery note
Coating materials	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note
Chemicals	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note
Goods issue check			
Coated substrate	Order corresponds with delivery	Every delivery	FPC
Coated substrate	Delivery corresponds with delivery note	Every delivery	On delivery note / on order confirmation

9.2.2.2 Surface pre-treatment

Process step	Test	Minimum scope of the test	Documentation
Pre-treatment baths			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per day	Yes
Dipping and spray pre-treatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes
Dipping and spray pre-treatment	Determining the etch rate	1 x per week	Yes
Conversion layer baths containing chromate			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per day	Yes
Dipping and spray pre-treatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes
Conversion layer	Coating layer	1 x per week	Yes
Passive layer baths CR(VI)-free/CR-free pre-treatment			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration)	1 x per shift	Yes
Passivation layer	Coating layer	In accordance with manufacturer's guidelines, at least once per day	Yes
Final rinse			
Dripping water	Conductivity	1 x per shift	Yes
Residual water dryer			
Object temperature	Temperature with measuring strips or measuring device	1 x per week	Yes, with temperature measuring strips

9.2.2.3 Coating

Process step	Test	Minimum scope of the test	Documentation
Coating result			
Layer thickness	Layer thickness	2 x per hour	Yes, minimum and maximum value
Gloss	Measurement of the gloss	4 x per day or with every change of colour > 100 m²	Yes, actual value
Colour	Visual comparison with binding template (if arranged)	With every change of colour > 100 m²	Yes
Adhesive strength	Cross cut	2 x per shift	Yes
Mechanical resilience	Drilling and sawing	2 x per shift	Yes
Quality of the pre-treatment (not for pre-anodising)	Boil test	2 x per shift	Yes
Deformability	Cupping test, mandrel bending test Ball impact test	2 x per shift	Yes
Change of effect with metallics (recommendation)	Sodium hydroxide test	Per batch > 400 kg	Yes
Degree of cross linking (liquid paint), optional	MEK test, Buchholz indentation test	2 x per shift	Yes
Furnace			
Object temperature Retaining times and object temperatures in accordance with manufacturer's instructions (Alternative: Evaluation of thermal equivalence)	Temperature with measuring device with 3 object sensors	1 x per week	Yes, with temperature recording as evidence

9.2.3 Recommended process check

Process step	Test	Scope of the test	Documentation
Passive layer baths / CR(VI)-free/CR-free pre-treatment			
Rest potential analysis (optional)	Rest potential	2 x per week	Yes
Coating			
Gloss	Gloss measurement (20°/60°/85° measurement angle)	Colour change > 100 m²	Min. and max. value
Colour (no metallics)	Measurement with colorimeter	With every change of colour > 100 m²	Yes
Colour (metallics)	Visual comparison with mandatory template	With every change of colour > 100 m²	Yes
Furnace			
Recording the curing conditions (Alternative: Assessment of thermal equivalence)	Temperature with measuring device with 3 object sensors	1 x per week	Yes with temperature record as proof

10 Characteristic values for tests on finished parts and test sheets

10.1 Powder coating

10.1.1 Technical values for single-layer systems

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Layer thickness			
Thin layer powder Normal powder – colour-dependent (Average layer thickness)	20 ≤ 40 µm > 50 µm - ≤ 120 µm	20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm	20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) GT 0/ GT 1	 0 (S0) GT 0/ GT 1	 0 (S0) GT 0/ GT 1
Mechanical values			
Mandrel bending test Cracking of coating Adhesive tape removal	≤ 5 mm Not permitted No removal of coating	≤ 5 mm Permitted No removal of coating	≤ 5 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 5 mm Not permitted No removal of coating	≥ 5 mm Permitted No removal of coating	≥ 5 mm Permitted No removal of coating
Ball impact test Cracking of coating Adhesive tape removal	20 inch/pound Not permitted No removal of coating	20 inch/pound Permitted No removal of coating	20 inch/pound Permitted No removal of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 – 30 cm)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.1.2 Technical values for multi-layer systems

10.1.2.1 Primer / topcoat pigmented

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Layer thickness			
Thin layer powder Normal powder – colour-dependent (Average layer thickness)	20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm	20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm	20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm
Surface finish			
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut (according to standard)	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT 0 / GT 1	0 (S0) GT 0 / GT 1	0 (S0) GT 0 / GT 1
Mechanical values			
Mandrel bending test Cracking of coating Adhesive tape removal	≤ 5 mm Not permitted No removal of coating	≤ 5 mm Permitted No removal of coating	≤ 5 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 5 mm Not permitted No removal of coating	≥ 5 mm Permitted No removal of coating	≥ 5 mm Permitted No removal of coating
Ball impact test Cracking of coating Adhesive tape removal	20 inch/pound Not permitted No removal of coating	20 inch/pound Permitted No removal of coating	20 inch/pound Permitted No removal of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 – 30 cm)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.1.2.2 Base material / transparent clearcoat

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness			
Layer thickness Metallic base coat (according to manufacturer) transparent top coat (depending on colour)	 60 - 80 µm 60 - 80 µm	 60 - 80 µm 60 - 80 µm	 60 - 80 µm 60 - 80 µm
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	 ± 5 GU	 ± 5 GU	 ± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	 ± 3 GU	 ± 3 GU	 ± 3 GU
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) max. GT 1	 0 (S0) max. GT 1	 0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating
Ball impact test cracking of coating Tape Tear	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	 no spalling of coating	 no spalling of coating	 no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

10.2. Liquid paint

10.2.1 Technical values for single-layer systems

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Layer thickness			
Single layer	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) GT0 /GT1	 0 (S0) GT0 /GT1	 0 (S0) GT0 /GT1
Mechanical values			
Mandrel bending test Cracking of coating Adhesive tape removal	≤ 5 mm Not permitted No removal of coating	≤ 5 mm Permitted No removal of coating	≤ 5 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 5 mm Not permitted No removal of coating	≥ 5 mm Permitted No removal of coating	≥ 5 mm Permitted No removal of coating
Cross-linking test MEK test	Buchholz hardness min. 80	Buchholz hardness min. 80	Buchholz hardness min. 80
Cutting, drilling, sawing (naked eye assessment)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.2.2 Technical values for double-layer systems

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Layer thickness			
Double layer	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) GT0 /GT1	 0 (S0) GT0 /GT1	 0 (S0) GT0 /GT1
Mechanical values			
Mandrel bending test Cracking of coating Adhesive tape removal	≤ 12 mm Not permitted No removal of coating	≤ 12 mm Permitted No removal of coating	≤ 12 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 3 mm Not permitted No removal of coating	≥ 3 mm Permitted No removal of coating	≥ 3 mm Permitted No removal of coating
Cross-linking test MEK test	Buchholz hardness min. 80	Buchholz hardness min. 80	Buchholz hardness min. 80
Cutting, drilling, sawing (naked eye assessment)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.2.2.1 Primer / topcoat pigmented

Testing	**Aluminium Florida 1**	**Aluminium Florida 3 & 5**	**Aluminium Florida 10**
Layer thickness			
Layer thickness Primer Top coat	According to Manufacturer	According to Manufacturer	According to Manufacturer
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

10.2.2.2 Base material / transparent clearcoat

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness			
Layer thickness Metallic basecoat transparent topcoat	According to the manufacturer	According to the manufacturer	According to the manufacturer
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating

Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

11 Corrosion tests for aluminium Master coater

Test	Weather class	Minimum scope of the test	Documentation
Acetic acid salt spray test	C3	1 x per half year	Yes

The AASS tests in the first half of the year are carried out as part of the first monitoring test. For this, the inspector takes the samples and labels them. The coater can carry out the test on their own initiative.

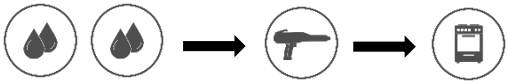
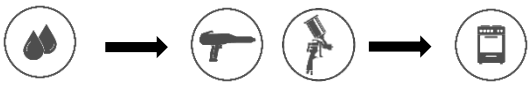
The AASS test is carried out as part of the second monitoring test. The inspector takes samples for them. The tests are carried out in a test laboratory commissioned by GSB.

12 Customer complaints

The inspector must be granted access to the list of customer complaints.

1 Definition: Classification of one or more plants

A coating plant consists of a multi-stage pre-treatment process including a residual water dryer, application unit and furnace. The number of coating plants is determined by the number of pre-treatment lines, furnaces and different coating technologies.

Defined as one plant:	Defined as two plants:
	
	
	
	

Key

- Surface pre-treatment or preparation
- Application of powder coating
- Application of liquid paint
- Furnace

A similar classification applies to more than two coating plants.

If a coating company has several plants, all of them are tested during the initial test. The inspector will decide which plant is to be tested in the monitoring test.

GSB International must be informed of the number of coating plants and provided with information on which ones are to be used for GSB Premium coating.

If the coater has a vertical coating plant, at least one horizontal coating plant must be named which must comply with the requirements of a Premium Coater. The appointed plants are tested regularly.

2 Cleanliness and handling

The components must be suspended, positioned and taken down as well as transported during the various manufacturing processes in such a way that ensures there can be no contamination with dust, sweat from hands, grease, electrolyte residue, condensation and damage. Only touch the pre-treated components with suitable clean gloves.

3 Surface pre-treatment

3.1 General

Only the following chemical surface pre-treatment process can be used in line with these guidelines.

- GSB-approved chromium-free or chromium VI-free process
- Pre-anodising (see document "Additional seal")
- Yellow and green chromating in accordance with EN 12487

The process sequence for pre-treatment must be documented independently of the procedure and stored at the GSB offices.

The process sequence of every pre-treatment plant is approved separately by taking one coated product section during a monitoring test and having it tested by an accredited test institute.

If different metals are regularly pre-treated in the same pre-treatment plant, the respective process steps must be performed strictly separately. The maximum content of foreign ions must be defined together with the pre-treatment supplier and documented when storing the process sequence. The concentration of these ions must be determined and documented after every pre-treatment of substrates foreign to aluminium. (Production log book).

3.2 Contact points

The parts to be coated must be suspended or positioned in such a way that there are no contact points on a main surface that will later be visible. Contact points are only permitted when they cannot be avoided and only if they are marked on the respective component or on drawings (sketches). The customer must be notified of this.

3.3 Etch rate

Setting a limit value with narrow fluctuation ranges is not required.
Recommended etch rate for alloys in accordance with EN AW-6060 and EN AW-6063: ≥ 1 g/m². A suitable etch rate must be determined and stipulated for other alloys.

3.4 Yellow and green chromating

If the product test for yellow and green chromating rinse procedures is passed, it serves as a certification criterion for the monitoring test, provided that the GSB Premium Coater has used this procedure to pre-treat their products for at least three years.

No-rinse procedures containing chromium must always be certified by GSB International.

Yellow and green chromating (rinse procedure) do not require special certification.

Coating layer	Yellow chromating:	0.6 – 1.0 g/m²
	Green chromating:	0.6 – 1.2 g/m²

3.5 Chromium-free and chromium VI-free pre-treatment procedures

If a coating company uses a new pre-treatment system for series coating for the first time, they must inform the offices of GSB of this in writing so that an unannounced monitoring test can be performed. The same applies if a test operation is going to exceed four weeks.

3.6 Determining the layer weight

The layer weight must be determined on the semi-finished product used in production.

3.7 Monitoring the rinse

There must be an option to remove the run-off water (inspection flap for spray systems).

Rinse passivation (final rinse)

Rinsing after passivation with fully demineralized water (deionized water) must be carried out in such a way that the last rinsing water to drip off has a conductivity of ≤ 30.0 µS/cm.

No-rinse passivation (last rinse cycle)

Rinsing with fully demineralized water (DI water) prior to passivation must be carried out in such a way that the last rinsing water to drip off has a conductivity of ≤ 30.0 µS/cm. Fogging of the passivated surface: The conductivity of the water used must be ≤ 30.0 µS/cm.

3.8 Drying of residual water

Immediately following chemical pre-treatment, the components must be dried in a residual water dryer. If the manufacturer of the pre-treatment chemicals does not provide any information on the object temperature in its technical data sheet, the object temperature must not exceed 100°C for the process in which chromium (III) and chromium (VI) are used.

3.9 Multi-metal applications

In terms of quality assurance, the coater himself is responsible for determining the concentration of bath poisons that can arise in the case of multi-metal applications

4 Coating

The coating must be applied within 12 hours of pre-treatment.

If the components to be coated need to be stored within these 12 hours, then they must be stored in a way that prevents them from being contaminated (e.g. by dust, fingerprints and moisture).

After pre-anodization a coating must be applied within 72 hours.

The coater may only use GSB-approved material for GSB-compliant coating.

The coater must adhere to the prescribed periods of permitted use, irrespective of the weathering category of the material.

5 Furnace

Using integrated measuring equipment, the circulating air temperature of the furnace must be continuously measured and documented at least at **3 stationary measuring points**. The measuring points must be chosen so that an accurate circulating air temperature distribution in the furnace can be ascertained (e.g. top, centre and lower area). The measurement sensors must be read individually.

The documentation does not necessarily have to be done via continuous paper. The values can also be recorded and read digitally. A reading and digital recording is possible, for this the coater must read the values 1x per hour.

6 Obligatory laboratory equipment

6.1 General

There must be a laboratory which is in a separate room to the production facilities. It must be possible to carry out all of the tests for the Factory Production Control (FPC) in the laboratory.

Devices in every production site must be functional and calibrated (adherence to test periods).

Device failures and the failure dates must be documented. Replacement devices must be obtained.

Repair and maintenance jobs must be shown to the inspector on request.

6.2 Obligatory laboratory equipment

The following testing and measuring equipment must be in use at the laboratory of each production site and must be functional and calibrated.

- Scale to determine the weight of the conversion/passivation layer and/or the etch rate with a measurement accuracy of 0.1 mg for the process check.
- 2 layer thickness measuring devices which work in accordance with the eddy current process as per ISO 2360 and/or in accordance with the magnetic-induction process and eddy current process as per ISO 2808.
- Cutting devices and accessories for the cross-cut test in accordance with ISO 2409.
- Mandrel bend test in accordance with ISO 1519.
- Test of adhesion and elasticity in the case of deformation (cupping test) in accordance with ISO 1520.
- Ball impact test in accordance with ASTM D 2794 (only required for powder coatings).
- A device for measuring the gloss in accordance with ISO 2813.
- A measuring device for recording the object and circulating air temperature with at least 3 measurement points (only for thermally cured coating systems).
- A conductivity measuring device for chemical surface pre-treatment.
- Devices for the boil test
- Devices for determining the layers of chromium-free and chromium (VI)-free pre-treatment processes
- Devices for drilling and cutting
- Colorimeter

6.3 Recommended laboratory equipment

The following testing and measuring equipment is recommended.

- Devices for the rest potential analysis (RPA test)

7 Warehouse

7.1 Components to be coated

The components to be coated must be stored in a way that prevents any changes to the surface (e.g. corrosion, mechanical damage) which impair the quality of the coatings.

7.2 Coating material

The coating materials must be stored in accordance with the information in the manufacturer's technical data sheet. Different storage conditions must be arranged in writing with the manufacturer.

8 Technical material safety data sheets

The latest technical material safety data sheets (MSDS) for all pre-treatment chemicals and coating materials used must be made freely available for viewing at the relevant stages of the process.

The latest version of the material safety data sheets must be made available.

9 Quality assurance

9.1 Test sheets

- Profile sections: EN AW-6060 T 66 [AlMgSi]/EN AW-6063 T 6 or T 66 [AlMg0.7Si], sheets: EN AW-5005a H 24 [AlMg1(B)] mill finish

- The sample size is chosen in accordance with the specifications of the respective test (preferably 70 x 140 x 0.7-0.8 mm).

9.2 Factory Production Control (FPC)

9.2.1 General

The coater must continuously monitor its production and processes, record the results and retain the test logs together with the accompanying samples (which have been appropriately marked) for 5 years or in accordance with the statutory provisions (this applies to production batches of over 100 m² or at an interval of 2 hours).

These documents must be kept available to be viewed by the inspector. Where possible, profile sections or other real products should be used instead of test sheets.

9.2.2 Mandatory Factory Production Control (FPC)

The following process and results checks are mandatory. The documentation and samples must be shown to the inspector on request.

9.2.2.1 Goods inwards and issue inspection

Process step	Test	Minimum scope of the test	Documentation
Goods inwards check			
Coating substrate	Delivery corresponds with delivery note Check for visual defects and corrosion	Every delivery	Yes, on delivery note
Coating materials	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note
Chemicals	Delivery corresponds with delivery note	Every delivery Visual inspection for cloudiness and flocculation	Yes, on delivery note
Goods issue check			
Coated substrate	Order corresponds with delivery	Every delivery	FPC
Coated substrate	Delivery corresponds with delivery note	Every delivery	On delivery note / on order confirmation

9.2.2.2 Surface pre-treatment

Process step	Test	Minimum scope of the test	Documentation
Pre-treatment baths			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per day	Yes
Dipping and spray pre-treatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes
Dipping and spray pre-treatment	Determining the etch rate	1 x per week	Yes
Conversion layer baths containing chromate			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per day	Yes
Dipping and spray pre-treatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes
Conversion film	Coating layer	1 x per day	Yes
Passive layer baths CR(VI)-free/CR-free pre-treatment			
Dipping and spray pre-treatment with automatic dosing	Bath analysis (temperature, concentration)	1 x per shift	Yes
Passivation layer	Coating layer	In accordance with manufacturer's guidelines, at least once per day	Yes
Final rinse			
Dripping water	Conductivity	1 x per shift	Yes
Residual water dryer			
Object temperature	Temperature with measuring strips or measuring device	3 x per week	Yes, with temperature measuring strips or recording of the measured value

9.2.2.3 Coating

Process step	Test	Minimum scope of the test	Documentation
Coating result			
Coating thickness	Coating thickness	2 x per hour	Yes, minimum and maximum value
Gloss	Measurement of the gloss	4 x per day or with every change of colour > 100 m²	Yes, actual value
Colour	Visual comparison with binding template (if arranged)	With every change of colour > 100 m²	Yes
Adhesive strength	Cross cut	2 x per shift, on finished products	Yes
Mechanical resilience	Drilling and sawing	2 x per shift, on finished products	Yes
Quality of the pre-treatment (not for pre-anodising)	Boil test	2 x per shift	Yes
Deformability	Cupping test, mandrel bending test Ball impact test	2 x per shift	Yes
Change of effect with metallics (recommendation)	Sodium hydroxide test	Per batch > 400 kg	Yes
Degree of cross linking (liquid paint), optional	MEK test, Buchholz indentation test	2 x per shift	Yes
Furnace			
Object temperature Retaining times and object temperatures in accordance with manufacturer's instructions (Alternative: Evaluation of thermal equivalence)	Temperature with measuring device with 3 object sensors	3 x per week	Yes, with temperature recording as evidence

9.2.2.4 Colour matching

- Uni colours

  Measurement of the standard and individual batches of different production runs of an object: The results must be recorded for premium jobs.

- Metallics and effect paints

  Instead of the colour measurement, a visual assessment is performed on metallics and effect paints using reference samples.

9.2.3 Recommended process check

Process step	**Test**	**Scope of the test**	**Documentation**
Passive layer baths / CR(VI)-free/CR-free pre-treatment			
Rest potential analysis (optional)	Rest potential	2 x per week	Yes
Coating			
Gloss	Gloss measurement (20°/60°/85° measurement angle)	Colour change > 100 m²	Min. and max. value
Colour (no metallics)	Measurement with colorimeter	With every change of colour > 100 m²	Yes
Colour (metallics)	Visual comparison with mandatory template	With every change of colour > 100 m²	Yes
Furnace			
Recording the curing conditions (Alternative: Assessment of thermal equivalence)	Temperature with measuring device with 3 object sensors	1 x per week	Yes with temperature record as proof

10 Characteristic values for tests on finished parts and test sheets

10.1 Powder coating

Technical values for single-layer systems

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Coating thickness			
Thin layer powder Normal powder – colour-dependent (Average layer thickness)	 20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm	 20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm	 20 ≤ 40 µm ≥ 50 µm - ≤ 120 µm
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	 No visual differences	 No visual differences	 No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) GT 0/ GT 1	 0 (S0) GT 0/ GT 1	 0 (S0) GT 0/ GT 1
Mechanical values			
Mandrel bend test Cracking of coating Adhesive tape removal	≤ 5 mm Not permitted No removal of coating	≤ 5 mm Permitted No removal of coating	≤ 5 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 5 mm Not permitted No removal of coating	≥ 5 mm Permitted No removal of coating	≥ 5 mm Permitted No removal of coating
Ball impact test Cracking of coating Adhesive tape removal	20 inch/pound Not permitted No removal of coating	20 inch/pound Permitted No removal of coating	20 inch/pound Permitted No removal of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 – 30 cm)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.1.1

10.1.2 Technical values for multi-layer systems

10.1.2.1 Primer / topcoat pigmented

Testing	**Aluminium Florida 1**	**Aluminium Florida 3 & 5**	**Aluminium Florida 10**
Layer thickness			
Layer thickness Primer Top coat - depending on colour	 According to Manufacturer 60 - 80 µm	 According to Manufacturer 60 - 80 µm	 According to Manufacturer 60 - 80 µm
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test* Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) max. GT 1	 0 (S0) max. GT 1	 0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating
Ball impact test cracking of coating Tape Tear	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

10.1.2.2 Base material / transparent clearcoat

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness			
Layer thickness Metallic base coat (according to manufacturer) transparent top coat (depending on colour)	 60 - 80 µm 60 - 80 µm	 60 - 80 µm 60 - 80 µm	 60 - 80 µm 60 - 80 µm
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	 ± 5 GU	 ± 5 GU	 ± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	 ± 3 GU	 ± 3 GU	 ± 3 GU
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) max. GT 1	 0 (S0) max. GT 1	 0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating
Ball impact test cracking of coating Tape Tear	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	 no spalling of coating	 no spalling of coating	 no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

10.2 Liquid paint

10.2.1 Technical values for single-layer systems

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Coating thickness			
Single layer	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) GT0 /GT1	 0 (S0) GT0 /GT1	 0 (S0) GT0 /GT1
Mechanical values			
Mandrel bend test Cracking of coating Adhesive tape removal	≤ 5 mm Not permitted No removal of coating	≤ 5 mm Permitted No removal of coating	≤ 5 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 5 mm Not permitted No removal of coating	≥ 5 mm Permitted No removal of coating	≥ 5 mm Permitted No removal of coating
Cross-linking test MEK test	Buchholz hardness min. 80	Buchholz hardness min. 80	Buchholz hardness min. 80
Cutting, drilling, sawing (naked eye assessment)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.2.2 Technical values for double-layer systems

Test	Coating material Florida 1	Coating material Florida 3	Coating material Florida 5, 10
Coating thickness			
Double layer	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Colour evaluation Visual comparison with template	No visual differences	No visual differences	No visual differences
Adhesive strength			
Cross cut	GT0	GT0	GT0
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	 0 (S0) GT0 /GT1	 0 (S0) GT0 /GT1	 0 (S0) GT0 /GT1
Mechanical values			
Mandrel bend test Cracking of coating Adhesive tape removal	≤ 12 mm Not permitted No removal of coating	≤ 12 mm Permitted No removal of coating	≤ 12 mm Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	≥ 3 mm Not permitted No removal of coating	≥ 3 mm Permitted No removal of coating	≥ 3 mm Permitted No removal of coating
Cross-linking test MEK test	Buchholz hardness min. 80	Buchholz hardness min. 80	Buchholz hardness min. 80
Cutting, drilling, sawing (naked eye assessment)	No spalling of coating	No spalling of coating	No spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d_{max} ≤ 1 mm 0 (S0)

10.2.2.1 Primer / topcoat pigmented

Testing	**Aluminium** **Florida 1**	**Aluminium** **Florida 3 & 5**	**Aluminium** **Florida 10**
Layer thickness			
Layer thickness Primer Top coat	According to Manufacturer	According to Manufacturer	According to Manufacturer
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

10.2.2.2 Base material / transparent clearcoat

Testing	**Aluminium Florida 1**	**Aluminium Florida 3 & 5**	**Aluminium Florida 10**
Layer thickness			
Layer thickness Metallic basecoat transparent topcoat	According to the manufacturer	According to the manufacturer	According to the manufacturer
Surface finish			
Gloss 60 Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Gloss 60° Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Adhesive strength			
Cross cut (according to standard)	GT 0	GT 0	GT 0
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Mechanical values			
Mandrel bending test cracking of coating Adhesive tape removal	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Corrosion protection			
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)	AASS 1000h d_{max} ≤ 1 mm 0 (S0)

11 Corrosion tests for aluminium Premium coater

Test	Weather class	Minimum scope of the test	Documentation
Acetic acid salt spray test	C3	1 x per half year	Yes

The AASS tests in the first half of the year are carried out as part of the first monitoring test. For this, the inspector takes the samples and labels them. The coater can carry out the test on their own initiative.

The AASS test is carried out as part of the second monitoring test. The inspector takes samples for them. The tests are carried out in a test laboratory commissioned by GSB.

12 Customer complaints

The inspector must be granted access to the list of customer complaints.

1 Additional seal (Sea Proof)

1.1 General

To achieve the additional seal "Sea Proof", the following test must be passed in addition to the AASS test.

1.2 Corrosion tests for "Sea Proof" additional seal

Test	Weather class	Minimum scope of the test	Documentation
FFC test	C4	1 x per half year	Yes

The FFC tests in the first half of the year are carried out as part of the first monitoring test. For this, the inspector takes the samples and labels them. The coater can carry out these tests on his own initiative.

The FFC tests in the second half of the year are carried out as part of the second monitoring test. The inspector takes samples for them. The tests are carried out in a test laboratory contracted by GSB.

The requirements to be met are listed in the following table.

Filiform corrosion test	
Test period	1000 h
Filament length l_{max}	≤ 2 mm
Key figure F = H* x l	≤ 0.3
	No extensive delamination

*The filament frequency H must be specified as a numerical value in the evaluation. It is used to calculate F

1 Additional seal (Sea Proof Plus)

1.1 General

The “Sea Proof” additional seal can only be issued for the pre-anodising pre-treatment.

Orders that involve pre-anodising are only considered to be compliant with GSB-CERT if there is evidence of regular supplementary monitoring tests (Sea Proof Plus). Pre-anodising can be carried out in house or by an external company.

The coater must inform GSB-CERT in advance of the date on which they plan to perform the pre-anodising pre-treatment. GSB-CERT informs the inspector, who then decides a date to carry out the supplementary test.

If the in-house pre-anodising coater has a Qualanod certification mark, the inspector does not carry out a supplementary test.

If the pre-anodising is carried out by an external company, the anodiser must be either a GSB-approved coater or hold a Qualanod quality mark. The test log of the external pre-anodisation and pre-anodised, coated test sheets must be stored at the coating company.

1.2 Recommendation for the process sequence and requirements of pre-anodising

Decorative oxide layers produced in accordance with the regulations of Qualanod do not always meet the conditions required here (high elasticity and low hardness). Therefore, the process sequence described in the next section is recommended to produce an oxide layer in the direct current sulphuric acid process with layer thicknesses of 3–8 µm.

If a GSB coater has good pre-treatment results using a modified treatment process, they can continue in this way provided the corrosion tests for the SPP additional seal have been passed.

The workpieces are immersed in an agitated bath solution for the pre-anodising. A cooling facility must be provided and the solution must be sufficiently mixed (air injection) to obtain a uniform coating quality. The rectifier has to be powerful enough to achieve the current density required.

The surfaces of the objects to be anodised must be clean, i.e. free of all types of solid dirt such as traces of metal, metal flakes, grinding dust, lubricant and oil carbon residue, products of corrosion and contamination caused by greases, all types of oil and hand sweat.

Therefore, the objects must be cleaned and etched before anodising.

After anodising, the objects are rinsed and dried, not sealed.

Consequently, anodising requires a certain sequence of treatment stages, depending on the surface state of the workpieces to be treated.

1. Degreasing
2. Rinsing with water, temperature T ≥ 20 °C and ≤ 80 °C
3. Etching
4. Rinsing with water, temperature T ≥ 20 °C and ≤ 80 °C
5. Pickling
6. Rinsing with water, temperature T ≥ 20 °C and ≤ 80 °C

7. Anodising in accordance with the direct current sulphuric acid process

Parameters:

Electrolyte concentration:	180 – 200 g/l free H2S04
Aluminium content:	< 15 g/l
Temperature:	25 – 30 °C (with continuous recording)
Current density:	0.8 – 2.0 A/dm^2
Layer thickness:	3 – 8 µm

8. Rinsing with water, temperature T ≥ 20 °C and ≤ 80 °C

9. Rinsing with purified water, temperature T ≥ 20 °C and ≤ 80 °C

   The products must be rinsed with de-ionised water so that the last water dripping off has a conductivity of κ20°C < 30.0 µS/cm at 20°C.

10. Drying < 100°C object temperature

11. The dye spot test based on ISO 2143 (intensity of the colour stain ≥ 4) is recommended to prove the open porosity of the oxide layer. The dye spot test is obligatory for anodising that is subcontracted.

12. Checking the thickness of the Pre-anodisation layer
    a. Non-destructively and using the eddy current method in accordance with ISO 2360.
    b. A metallographical cross-section in accordance with ISO 1463 is carried out as an arbitration procedure

13. Subsequent treatment with chromium-free passivation is permitted.

1.3 Corrosion tests for the "Sea Proof Plus" additional seal

The following test must be passed in addition to the AASS test.

Test	**Weather class**	**Minimum scope of the test**	**Documentation**
FFC test	C5	1 x per half year	Yes

The FFC tests in the first half of the year are carried out as part of the first monitoring test. For this, the inspector takes the samples and labels them. The coater can carry out these tests on his own initiative.

The FFC tests in the second half of the year are carried out as part of the second monitoring test. The inspector takes samples for them. The tests are carried out in a test laboratory contracted by GSB.

The requirements to be met are listed in the following table.

Filiform corrosion test	
Test period	1000 h
Filament length l_{max}	≤ 2 mm
Key figure F = H* x l	≤ 0.1
	No extensive delamination

*The filament frequency H must be specified as a numerical value in the evaluation. It is used to calculate F.

Application for certification

Coater _____ hereby applies for GSB-CERT certification for GSB aluminium coaters as a:*

	Approved Coater Aluminium **STANDARD**				
	Approved Coater Aluminium **MASTER**		with Sea Proof		with Sea Proof Plus
	Approved Coater Aluminium **PREMIUM**		with Sea Proof		with Sea Proof Plus

*Please tick as appropriate. For Premium, Sea Proof and/or Sea Proof Plus must be selected.

Name, First name _____

Phone _____

Mobile _____

Email _____

Contact person and contact details

_____ _____

Place, date Signature and company stamp

By registering as a contact person, I acknowledge that personal data is stored and used internally by GSB in connection with all matters relating to GSB quality guidelines. The data will be subject to the provisions of the General Data Protection Regulation (Datenschutz-Grundverordnung VO (EU) 2016/679).

(PROVISIONAL)

Certificate
GSB aluminium coaters

Certification number: 123g

Class:	Master
Additional seal:	x
Substrate:	Aluminium
Company:	Sample company Sample Street Sample Town
Coating Plant:	
Confirmation:	This certificate confirms that the requirements of GSB AL 631 – 5 for aluminium coating companies have been met.
Validity start date:	12/3/2001 (Date of first issue)
Monitoring:	2 x yearly
Valid until:	31/07/2019 (2 years)
Date of issue:	12/4/2015 Rev: 0.0

GSB International
Fritz-Vomfelde-Straße 30, 40547 Düsseldorf, Germany

GSB-CERT