

International Quality Regulations For The Coating of Building Components

Aluminium

**Steel and
Galvanized Steel**

GSB AL 631

GSB ST 663



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1 Foreword

The quality guidelines have been revised and re-structured. One of the objectives was to harmonise QR AL 631 and QR ST 663. Until now both sets of guidelines had the same formal procedures for coating businesses, galvanisation businesses and pre-treatment and coating material manufacturers. However, the structure and formulations were different. This made it more difficult in practice for coating businesses and material manufacturers who wanted to hold both quality labels.

Revision involved re-writing every section to achieve a uniform structure, and regulations that are relevant or applicable to both quality labels were summarised in one section where appropriate.

To keep the guidelines clear, cross references have been avoided as far as possible or only refer to the same section.

There are different requirements for aluminium, steel and galvanised steel, which have been taken from the previous quality guidelines.

Here is an overview of the individual parts and the areas to which they apply.

Part I: General

Regulations that apply to all businesses and material manufacturers irrespective of the quality label, licences and materials.



Part II: Pre-treatment chemicals

Material licence for alternative chemicals used for the pre-treatment of aluminium, steel and galvanised steel



Part III: Galvanisation businesses

Requirements of galvanisation businesses



Part IV: Coating materials

Material licence for powder and liquid paint for aluminium, steel and galvanised steel



Part V: Aluminium coating business

Requirements of aluminium coating businesses



Part VI: Steel and galvanised steel coating business

Requirements of steel and galvanised steel coating businesses



Part VII: Measurement and test procedures



Part VIII: Standards and guidelines



The structure and sequence of parts V and VI are the same. Only the requirements differ. They were not combined for reasons of clarity.

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Part I – General

1 Scope of application

These quality guidelines apply to the coating of the following types of construction components:

- **Aluminium and its alloys**
- **Steel**
 - Ungalvanised steel surfaces
 - Pre-galvanised steel surfaces (EN 10346)
 - Hot-dip galvanised steel surfaces (ISO 1461, single-piece galvanisation)

Coatings are applied to semi-finished products, finished products and prefabricated constructions for structures before their installation. Products checked and approved in accordance with these quality guidelines are used to pre-treat surfaces and produce coatings.

These quality guidelines do not provide regulations on selecting coating materials; they only make recommendations (section 7). The client should make the final decision or at least be consulted regarding the materials, depending on the weathering and corrosive conditions.

These guidelines do not apply to individual coatings produced on-site and coil coating.

These quality guidelines do not apply to maintaining and cleaning coated components. For this information, please refer to the RAL RG 632 quality and test specifications.

2 Amendments to the quality guidelines

Amendments and updates to these quality guidelines to conform to new standards will be suggested by the quality committee and require the approval of the board to be effective.

Important technical amendments require the consent of members. They come into force after a minimum period of four weeks after publication or on the date stated.

The new version or amendment replaces all previous editions. The current version printed and published on behalf of GSB International is legally valid.

3 Standards and guidelines

For these quality guidelines, the measuring and testing methods, standards and guidelines in parts VII and VIII apply.

As a rule, the underlying standards are European standards which have been drawn up by the European Committee for Standardization (CEN). They are uniformly identified by the abbreviation EN and a number. For standards which have been adopted by national standards institutes, the abbreviation of the national institute is placed in front. As a rule, no changes are made to the European standard. The standard is merely translated.

Example: EN 12206-1: Paints and varnishes - Coating of aluminium and aluminium alloys
 for architectural purposes.
 Part 1: Coatings prepared from coating powder

The standard was adopted by many national standards institutes in Europe, e.g.:

DIN EN 12206-1	Deutscher Institut für Normung (German Industrial Standard - DIN)
BS EN 12206-1	British Standard (BS)
SN EN 12206-1	Schweizerische Normen-Vereinigung (Swiss Association for Standardization - SNV)
ÖNorm EN 12206-1	Austrian Standards Institute

International standards drawn up by the International Organization for Standardization (ISO) are identified by the abbreviation ISO and a number. For standards which have been adopted by CEN, the abbreviation EN is placed in front. If standards are adopted by national standards institutes, the abbreviation of the national standards institute is placed in front (see above):

ISO 2360	Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating thickness - Amplitude-sensitive eddy current method
----------	--

Adopted by:

EN ISO 2360	European Committee for Standardization (CEN)
DIN EN ISO 2360	German Industrial Standard (DIN)

4 Legal regulations

The holder of the quality label and/or material licence must observe local laws and regulations. These quality guidelines do not cover inspections by GSB International.

5 General procedural regulations

5.1 General

The award of the quality label and the licence for pre-treatment chemicals and coating materials is conditional upon full membership of GSB International. To become a member, the membership application has to be completed and signed with legal effect (section 3).

The quality label, the licence for pre-treatment chemicals and coating materials, and the approval by GSB International only apply to products for which user rights or approval have been granted in accordance with the quality guidelines AL 631 and ST 663.

The holder of the quality label or the licence for pre-treatment chemicals and coating materials is responsible for complying with these quality guidelines and must make regular quality checks.

GSB International is entitled and obligated to check and monitor compliance with GSB AL 631 and GSB ST 663.

5.2 Right of use

To ensure fair competition and avoid misuse, the board can issue special regulations on the use of the quality label and the licence for pre-treatment chemicals and coating materials in standard and joint advertising material. This must not impede individual advertising. The same principle on fair competition applies here.

5.3 Holder of the quality label

GSB International is the only body permitted to have equipment produced for depicting the quality label (metal stamps, punches, printing blocks, seals, rubber stamps, etc.) and to define their uses.

A coating company granted the right to use the respective quality label is permitted to put it on business documents and printed materials.

A coating company which has had its quality label withdrawn must return the corresponding certificate immediately. They are not entitled to payments being reimbursed. The same applies if the quality label has been discontinued in another way.

The coating company must immediately inform its customers that the quality label has been withdrawn.

5.4 Holder of the material licence

Manufacturers of pre-treatment chemicals and coating materials are only permitted to use the licence number for products that meet the requirements of these quality guidelines and have been approved.

Manufacturers who have had their licence for pre-treatment chemicals and coating materials withdrawn must return the appropriate certificate immediately. They are not entitled to payments being reimbursed. The same applies if the material licence has been discontinued in any other way.

Manufacturers of pre-treatment chemicals and coating materials must immediately inform their customers that they no longer have a licence.

5.5 Expiry of a right of use

The right to use the quality label and/or the licence will expire when the membership ends in accordance with the membership rules.

The right of use also expires if:

- GSB International ceases activity in the field(s) in which the quality label applied
- It was cancelled in accordance with the statutes and if all financial and other obligations of the holder of the quality label in respect of GSB International are met
- After insolvency proceedings have begun, the meeting of creditors decides against the holder of the quality label or licence for pre-treatment chemicals and coating materials continuing to trade in accordance with sections 156 and 157 of the German Insolvency Order
- Insolvency proceedings are not opened due to insufficient assets
- Insolvency proceedings cease due to insufficient assets
- There are comparable insolvency conditions in other jurisdictions
- The holder of the quality label or licence enters into liquidation voluntarily
- The quality label or the licence has been withdrawn in accordance with these quality guidelines

5.6 Monitoring compliance with the quality guidelines

5.6.1 General

GSB International either assigns the monitoring of and compliance with the quality guidelines to a test institute accredited in accordance with ISO/IEC17025 or such work is carried out by experts trained and approved by GSB.

5.6.2 Test and monitoring costs

The coating company or material manufacturer must bear all the costs to test and monitor the quality label as well as the licence for pre-treatment chemicals and coating materials.

The current fee regulations of GSB International apply.

5.7 Objection

Members have a right to object to any decision made by the quality committee and the board on the basis of these quality guidelines.

The objection must be made in writing within four weeks of receipt of the decision to the offices of GSB. Reasons must be given for the objection.

If an objection is made, the decision will only become effective after the end of the objection proceedings.

No other legal recourse is permitted after the objection proceedings.

5.8 Publications

GSB International is entitled to publish the following information for members in newsletters and/or the Internet:

- Award of the quality seal and material licence
- Suspension of the material licence
- Expiry of the material licence and the right to use the quality label
- Colours which are no longer approved with information on the year they were disallowed

GSB News is only for internal use and must not be passed to third parties.

5.9 Correspondence

All correspondence with the offices of GSB must be in writing. E-mails and faxes are only valid if the offices of GSB have confirmed their receipt.

6 Training

6.1 Training course

Every two years the holder of the quality label and the material licence must send at least one member of their technical staff on a training course held by GSB International. The training courses are concluded with a written examination.

New members have to go on the next training course. A certificate is issued to prove participation.

Other interested parties are also permitted to take part in training courses.

6.2 Internal training

All employees of GSB International are advised to train their employees on the quality guidelines at regular intervals.

7 Recommendations on the coating of components

7.1 General

When selecting the coating for a component, consider the atmospheric conditions so you can prevent corrosion in the long term and maintain the desired appearance.

The choice of pre-treatment process and coating should be made according to the location of the building.

GSB coater with the additional labels GSB Seaproof (C 4) and GSB Sea Proof Plus (C 5) documents the currently highest level of corrosion protection for coated aluminum components.

7.2 Aluminium

Years of practical experience have shown that a broad range of approved pre-treatment processes and coating materials can be used. This permits the introduction of weather classes to choose a coating according to the state of the art.

According to what we currently know, filiform corrosion could occur in certain areas (maritime climates with high relative humidity). Pre-anodising (anodically generated conversion layer) has proven particularly good as the pre-treatment in such circumstances.

Classic rinse yellow chromating, green chromating and alternative chromate-free or chromium-free procedures are practical alternatives if – when degreasing, pickling with an alkali and post-treating the component with acid – precautionary measures are taken to remove the microcrystalline deformation layer that triggers filiform corrosion.

Table 1: Classes for GSB – coating materials

Coating material	UV exposure	Climate zone	Range of colours
Standard	Normal	Continental climate	All RAL and many special colours
Master	High	Mediterranean climate	Limited in accordance with information given by manufacturer
Premium	Very high	Middle East	Very limited in accordance with information given by manufacturer

Table 2: Weather classes

Weathering class	Impact of corrosion	Ambient conditions	Recommended pre-treatment	Corrosion test	GSB coating classes	Recommended cleaning interval
GSB - Countryside (C2)	Low	Dry or cold areas, Countryside/small towns with low pollution	Chromium-free/ Chromate-free/ Containing chromate*	Condensation – constant atmosphere	Approved	Annually
GSB - Industrial (C3)	Medium	Urban area with medium pollution or some effect of chlorides. Coastal areas with low deposition of chlorides	Chromium-free/ Chromate-free/ Containing chromate*	AASS	Master	Annually
GSB - Sea Proof (C4)	High	Urban areas, industrial areas with high pollution or substantial effect of chlorides. Coastal areas with medium deposition of chlorides	Chromium-free/ Chromate-free with documented process Containing chromate*	Filiform corrosion test (≤ 0.3) and AASS	Master Premium	Annually
GSB - Sea Proof Plus (C5)	Very high	Areas with very high pollution and significant effect of chlorides. Coastal areas/coast lines with high impact of chlorides	Pre-anodising	Filiform corrosion test (≤ 0.10) and AASS	Master / Premium	2 x per year

*Due to the REACH-Regulation (EU 348/2013) the use of Cr-VI containing solutions will be banned at September 21st, 2017 if no application for a certificate of exemption

Terms in accordance with DIN EN ISO 9223

Weathering behaviour and corrosion protection of aluminium see EN 1999-1-1 and EN 1090-3

7.3 Steel and galvanised steel

When choosing the surface pre-treatment and the coating composition, the corrosion categories and the expected term of protection (ISO 12944-1, DIN 55633, DIN 55634) have to be taken into account.

Table 3: Examples for powder coating systems for single-piece galvanisation (duplex systems)

Surface preparation	Primer(s)			Protective coating(s)			Coating system		Expected term of protection (see ISO 12944-1)																	
	Binder	Number of layers	Target layer thickness µm	Binder	Number of layers	Target layer thickness µm	Number of layers	Total target layer thickness µm	C 2			C 3			C 4			C 5-I			C 5-M					
									S	M	L	S	M	L	S	M	L	S	M	L	S	M	L			
Sw	--	--	--	SP	1	80	1	80	X	X	X	X	X	X	X											
ZnP		--	--		1	80	1	80	X	X	X	X	X	X	X	X										
Cr		--	--		1	80	1	80	X	X	X	X	X	X	X	X	X									
Sw		--	--		2	60	2	120	X	X	X	X	X	X	X	X	X									
Sw	EP	1	60		1	70	2	130	X	X	X	X	X	X	X	X	X	X	X	X						
ZnP		1	60		1	70	2	130	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Cr		1	60		1	70	2	130	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Cr		--	--		--	EP / SP	1	80	1	80	X	X	X	X	X	X	X	X	X	X	X				X	

Key:

Cr = chromate, ZnP = zinc phosphate, FeP = iron phosphate, Sw = sweep
 EP = epoxy resin, SP = polyester resin, EP/SP = epoxy polyester resin
 S, M, L denote the protective term that can be achieved for the coating in the respective corrosion category:
 S = short protective term (2–5 years), M = medium protective term (5–15 years), L = long protective term (>15 years)
 The corrosive categories C 2 – C 5 relate to the effect of the corrosion protection of the coating on the zinc.
 C 2 = low, C 3 = moderate, C 4 = high, C 5-I = very high (industrial environment), C 5-M = very high (sea climate)

EP and EP/SP do not fulfill the requirements of the UV resistance of the natural weathering

Table 4: Examples for liquid paint systems for single-piece galvanisation (duplex systems)

Surface preparation	Priming coat(s)			Protective coat(s)			Coating system		Expected term of protection (see ISO 12944-1)																
	Binder	Number of layers	Target layer thickness µm	Binder	Number of layers	Target layer thickness µm	Number of layers	Total target layer thickness µm	C 2			C 3			C 4			C 5-I			C 5-M				
									S	M	L	S	M	L	S	M	L	S	M	L	S	M	L		
Sw	--	--	--	PUR	1	80	1	80	X	X	X	X	X	X	X										
ZnP		--	--		1	80	1	80	X	X	X	X	X	X	X	X									
Cr		--	--		1	80	1	80	X	X	X	X	X	X	X	X									
Sw		--	--		1	80	1	80	X	X	X	X													
Sw	EP	1	40		1	80	2	120	X	X	X	X	X	X	X	X	X	X	X						
ZnP		1	40		1	80	2	120	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cr		1	40		1	80	2	120	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cr or ZnP		--	2		80	1	80	3	160	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sw	--	--	--	Si-SP	1	35	1	35	X	X	X	X	X												
ZnP		--	--		1	35	1	35	X	X	X	X	X	X											
Cr		--	--		1	35	1	35	X	X	X	X	X	X	X										
Sw		--	--		1	35	1	35	X			X													
Sw	EP	1	80	PVF	1	35	2	115	X	X	X	X	X	X	X	X	X	X	X				X		
ZnP		1	80	PVDF	1	35	2	115	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Cr		1	80	Si-SP	1	35	2	115	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Cr or ZnP		--	2	160		1	35	3	195	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Key (see Table 3 for additional details):

Cr = chromate, ZnP = zinc phosphate, FeP = iron phosphate, Sw = sweep, EP = epoxy resin, PUR = polyurethane, Si-SP = silicon polyester, PVF = polyvinyl fluoride, PVDF = polyvinyl difluoride Please note: The weathering resistance increases in the order PUR or Si-SP – PVF – PVDF.

8 Membership application

Membership application

The undersigned company hereby applies to **GSB International** to become a:

- [] Full member – coater*
- [] Full member – galvaniser*
- [] Full member – manufacturer of coating materials*
- [] Full member – manufacturer of pre-treatment chemicals*
- [] Associate member*

The undersigned company confirms to have understood the following and agrees to them without reservation:

- The international quality guidelines for coating components including accompanying data sheets
- The club rules of the *GSB International e.V.*
- The fee regulations

Company	: _____	Telephone	: _____
Road	: _____	Fax	: _____
Postcode, Town/City:	_____	E-mail	: _____
Country	: _____	Internet	: _____
Tax ID	: _____		

Person responsible:

Surname : _____

First name : _____

.....
Place/date

.....
Signature and company stamp

* Please place a cross in the relevant box

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Part II – Pretreatment chemicals

1 Granting and renewing the licence for pretreatment chemicals

1.1 General

GSB International will grant the licence to the manufacturer of pretreatment chemicals if the quality guidelines are fulfilled. The following quality labels can be granted:



If a material is produced at several locations, then the licence or revocation thereof covers all production locations, which are members of GSB International. This requires the licence of the pretreatment chemicals to be applied for as well as written confirmation of the chemicals sold.

The quality committee is permitted to inspect the production locations and material samples and request the documents cited in the quality guidelines.

1.2 Labelling of products

The licence for pretreatment chemicals has to include the licence number and follow the following pattern:



1.3 Making an application and product information

1.3.1 General

The application for a material licence has to be made in writing to GSB International (see section 5).

2 Granting of the material licence

2.1 Qualifying test

There are several stages to a new pre-treatment chemical being approved.

If manufacturers pass the individual stages, they will receive a certificate (see section 6).

2.1.1 Stage 1

The following evidence must be submitted:

- Presentation of company's own test results, based on GSB AL 631 or GSB ST 663
- Presentation of tested sample sheets
- Presentation of product and safety data sheets
- Process parameters
- Designation of reference objects (if possible)
- Evidence of product being suitable for immersion systems and/or spray systems
- Evidence of suitability for liquid and/or powder paint
- Practical regulation on determining the coating layer.

2.1.2 Stage 2

Pretreatment, coating and testing of samples takes place at a test institute or laboratory to be named by the quality committee.

- Samples for the "Aluminium" licence

Predominantly the following aluminium alloys are used for the samples:

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 70x140x 0.7-0.8 mm).

- Samples for the "Steel and galvanized steel" licence

The sample sheets have to be made from the following material:

- Technological properties

Continuously galvanized steel sheet of type
DX 51 D+ Z in accordance with DIN EN 10143
Size min. 70 x 140 x 0.5 mm

- Corrosion-prevention properties

Hot Dip galvanized steel sheet of type
DC01-A in accordance with DIN EN 10130
material no. 1.0244, size min. 70 x 140 x 1,5 mm and galvanized in accordance with
DIN EN ISO 1461, Zn >= 99,5%

- Technological and corrosion-prevention properties

Raw (black) steel sheet of type
DC01-A in accordance with DIN EN 10130
material no. 1.0244, size min. 70 x 140 x 0.5 mm

A surface pretreatment already approved by GSB serves as a reference. The pretreated samples are coated and tested in the same way.

A reference powder paint chosen by the quality committee is used as the coating material. If the manufacturer of the pretreatment chemical requires a licence for liquid paint, then they have to cite a product.

On request, pretreatment and coating can be carried out at the manufacturer's laboratory at their own risk. The tests remain with the test institute named by GSB.

2.1.3 Stage 3 – Provisional material licence

If stage 2 is passed successfully, a pilot experiment is carried out at a coating company (member of GSB International).

Stage 3 has to be carried out at a production facility and at least 500 m² of material surface has to be pre-treated. 25 m² from the middle and 25 m² from the end of the pretreatment batch have to be inspected and exposed to natural weathering like a building.

The approval of the quality committee regarding the property and the coating company is required.

The report on the trial coating should contain the following:

Products used

- Process parameters
- Concentrations
- pH values
- Bath temperatures
- Exposure times
- Application procedure
- Details of throughput rate and chemical consumption
- Determination of the coating layer and analysis monitoring
- Variation from the normal standard has to be recorded.

An observer assigned the task by the quality committee accompanies and documents stage 3.

The following test material has to be supplied from products made:

6 cont. m profile = 12 profile lengths of 1 m or corresponding formats,
2 x 1 m² sheet or corresponding formats

The samples are tested at a test institute to be named by the quality committee.

If the requirements in section 4 are met, then the material will receive a provisional licence. A corresponding certificate is issued.

2.1.4 Stage 4 – Full material licence

The sample material in stage 3 is moved outside into an industrial environment close to the sea (preferably Hoek van Holland).

- Natural weathering positive

After the results of the natural weathering are available, and if they are positive, a full licence for the pretreatment system can be granted.

A corresponding certificate is issued.

- Natural weathering negative

If natural weathering produces negative results, then stage 4 has not been passed.

A positive result in the prolongation test cannot make up for a negative natural weathering result.

GSB International withdraws the temporary licence from the material manufacturer.

3 Monitoring the material licence for pretreatment chemicals

3.1 General

A monitoring test is carried out annually.

For alternative pretreatment processes, once the results of stage 3 are available, and this processes are not used by an GSB coater the pretreatment manufacturer can decide whether they would like a fee-based prolongation test or whether they wish to withdraw their system. The offices of GSB have to be informed in writing.

3.2 Sample taking

The material samples required for the prolongation test are taken from current production by the inspector for the monitoring tests of the GSB coaters.

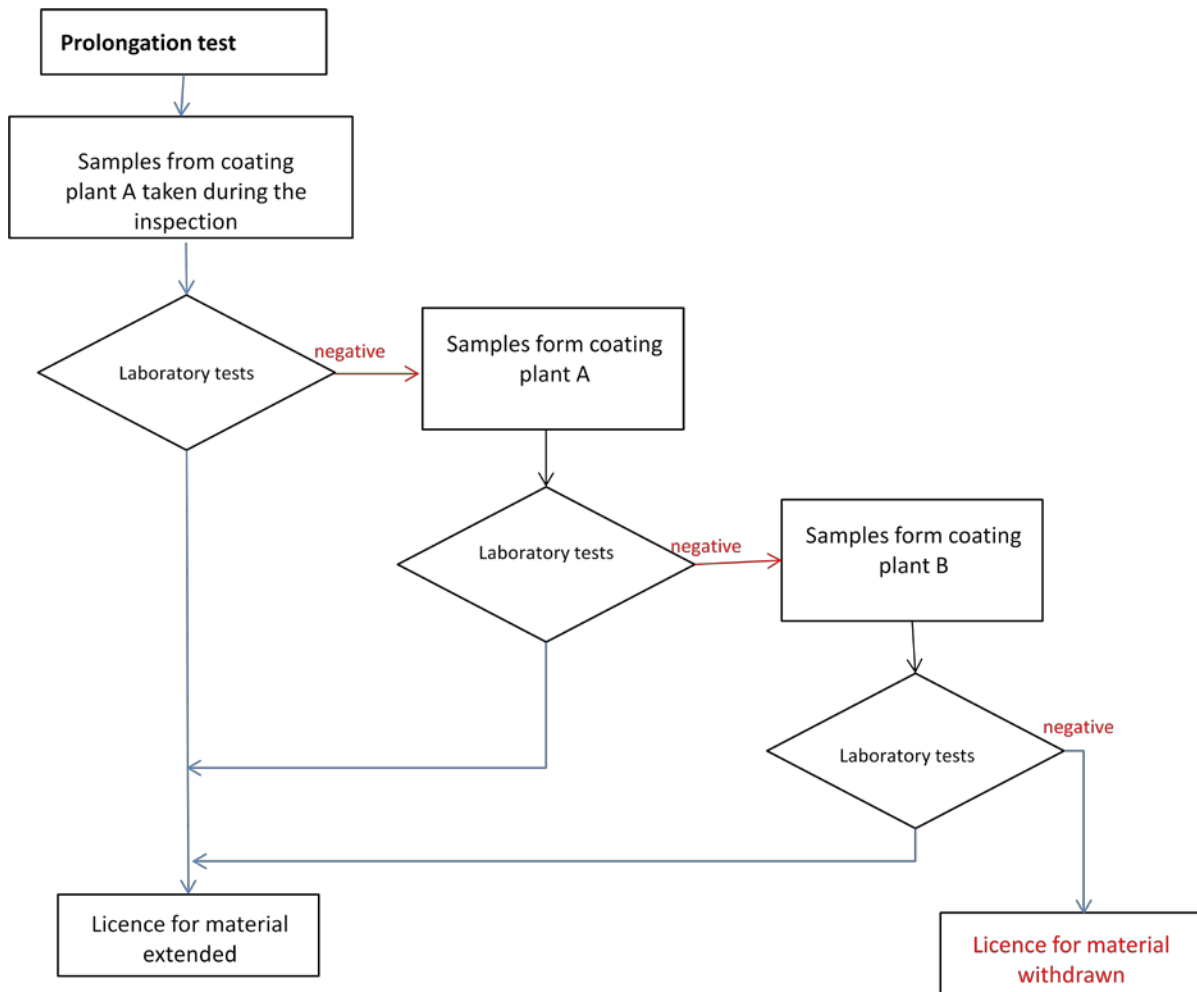
The samples are tested at a test institute to be named by the quality committee.

The prolongation test is performed in the same way as 2.1.2. The chemicals required to perform the test have to be made available by the test institute cited by the quality committee.

3.3 Extension of the licence

The material licence is extended if all requirements are met in accordance with section 4 – without natural weathering.

Principal workflow for prolongation test:



3.4 Expiry of the material licence

If just one part of the monitoring test is unsuccessful, then the whole test is unsuccessful. The GSB office will inform the chemical supplier on the negative result as soon as possible. The chemical supplier shall inform the coater immediately. The GSB office shall be informed otherwise the GSB will inform the coater directly.

The manufacturer can make a re-test request to the offices of GSB International within four weeks. The re-test is carried out at the same coating plant (incl. a 8D-report containing deviation and improvements.)

If the first re-test is negative it is possible to carry out a second re-test at another GSB coating plant where the process is used.

If an application is not made or if the second re-test is also unsuccessful, then GSB will withdraw the material licence from the respective manufacturer of pretreatment chemicals.

The certificate has to be sent back to the offices of GSB International without delay.

4 Requirements and tests for pretreatment chemicals





Tests	Re-licensing and monitoring test Aluminium	Re-licensing and monitoring test Steel/Galvanized steel
Determination of the coating layer	Procedure and value in accordance with the guidelines of the manufacturer	Procedure and value in accordance with the guidelines of the manufacturer
Layer thickness	In accordance with the coating used	In accordance with the coating used
Gloss	In accordance with the coating used	In accordance with the coating used
Cross cut	GT 0	GT 0
Mandrel bending test Cracking of coating	≤ 500 mm Not permitted	≤ 500 mm Not permitted
Cupping test Cracking of coating	≥ 5 mm Not permitted	≥ 5 mm Not permitted
Ball impact test (only for powder coatings) Cracking of coating	20 inch/pound Not permitted	20 inch/pound Not permitted
Cross linking test for liquid paints	OK	OK
Drilling, sawing (naked eye assessment)	No spalling of coating	No spalling of coating
Condensation constant atmosphere: Test period Blistering Infiltration at cross-section	1000 hours 0 (S0) $d_{max} \leq 1 \text{ mm}$	1000 hours 0 (S0) $d_{max} \leq 1 \text{ mm}$
Condensation variable atmosphere (0.2l SO ₂) Cycles Blistering	30 0 (S0) $d_{max} \leq 1 \text{ mm}$	30 0 (S0) $d_{max} \leq 1 \text{ mm}$
Pressure cooker test* Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT 0 / GT 1	0 (S0) GT 0 / GT 1
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	AASS 1000 hours $d_{max} \leq 1 \text{ mm}$ 0 (S0)	NSS 480 h $d_{max} \leq 5 \text{ mm}$ 0 (S0)
Filiform corrosion test Test period Thread length Thread frequency H Key figure $F = H \times l$	1000 hours ≤ 2 mm 1//10 mm ≤ 0.3 No extensive infiltration	
Natural weathering, Hook of Holland Test period Infiltration Thread length l_{max} Key figure $F = H \times l$	36 months $d_{max} \leq 1 \text{ mm}$ ≤ 2 mm ≤ 0.4 No extensive infiltration	36 months $d_{max} \leq 5 \text{ mm}$ No extensive infiltration

Note: Requirements and tests for pretreatment chemicals for steel are currently being developed.

5 Licence application for pretreatment chemicals

Licence application

The undersigned company hereby applies to **GSB International as a material manufacturer** to obtain the right to hold the licence:

				
Approved Pre-Treatment	Approved Pre-Treatment	Approved Pre-Treatment	Approved Pre-Treatment	
Cr-free	Cr VI-free	Cr-free	Cr VI-free	
()	()	()	()	Powder paint
()	()	()	()	Liquid paint
		()	()	Non-galvanized steel
		()	()	Galvanized steel

Please place a cross in the relevant box!

for the material: _____
(Standard market name)

The following documents are enclosed with the application:

- Presentation of the company’s own test results based on GSB AL 631 and/or GSB ST 663
- Presentation of tested sample sheets
- Presentation of product and safety data sheets
- If necessary the designation of reference objects
- Process parameters
- Evidence of product being suitable for immersion systems and/or spray systems
- Evidence of suitability for liquid and/or powder paint
- Practical regulation on determining the coating layer

.....
Place and date

.....
Signature and company stamp

6 Sample material licence certificate for pretreatment chemicals

	
 Approved Pre-Treatment Cr VI-free	<p>Material Zulassung</p> <p>Die GSB INTERNATIONAL verleiht nach positiver Prüfung des Beschichtungsmaterials xxx der Firma</p> <p>Material Licence</p> <p>The GSB INTERNATIONAL awards after a positive approval test of the coating material xxx to the company</p>
<p>Firma / Company Adresse / Address Land / Country</p>	
<p>unter der Zulassungsnummer xyz das Recht, dieses Beschichtungsmaterial wie nebenstehend zu kennzeichnen und damit alle Unternehmen, die Inhaber des Qualitätssiegels für die Stückbeschichtung von Bauteilen aus Aluminium sind, zu beliefern. Die Zulassung setzt voraus, dass die GSB Qualitätsrichtlinien AL 631 erfüllt werden.</p>	<p>with the licence number xyz the right to label the coating material as shown left. This includes the right to supply all users of the quality label for the piecework coating of aluminium building components with the material approved through this licence. The major prerequisite for doing so is the fulfillment of the GSB Quality Regulations AL 631.</p>
<p>Gültig bis: 31.07.2019</p> <p>Überwachung: jährlich</p>	<p>Valid till: 2019/07/31</p> <p>Monitoring: yearly</p>
<p>GSB INTERNATIONAL e. V., Am Bonnhof 5, D-40474 Düsseldorf March 10th, 2016</p>	
 Vorsitzender des Vorstandes Chairman of the Board	 Vorsitzender des Güteausschusses Aluminium Chairman of the Quality Committee Aluminium
	

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Part III – Galvanizers

1 Being granted and holding the quality label — galvanizing businesses

1.1 General

GSB International will grant the quality label to galvanising businesses who apply for it if the requirements in the quality guidelines are met.



1.2 Labelling of components

Quality labels attached directly onto coated components also have to include the company number shown here:



1.3 Application

The application has to be made in writing to GSB International (see section 6).

The application will be checked by the quality committee. The committee is permitted to inspect the business of the applicant, take samples and request and look at the documents required.

2 Granting the quality label and the additional label

2.1 General

The galvanising business must meet the requirements of the quality label (see section 5).

2.2 Qualifying test

Two independent tests (qualifying test part 1 and part 2) are carried out.

At least three months must pass between qualifying test part 1 and part 2.

Part 1 is by appointment. All additional tests are without appointment.

If the initial test is positive, the board will grant the applicant the desired quality label on the quality committee's recommendation. A certificate is issued (see section 7).

2.3 Failed initial test

If even part of the initial test is negative, the quality committee will reject the application giving reasons in writing. However, the applicant can apply for a re-test.

If the re-test is also unsuccessful, then the applicant has to wait three months before re-applying.

3 Monitoring the quality label

3.1 General

The monitoring test in section 0 is performed at least twice a year for each coating business without appointment.

If the business passes the monitoring test, then it continues to have the right to hold the quality label and the additional label. Special notification will not be given.

3.2 Negative monitoring test

If the quality committee finds problems with quality assurance, it will suggest punitive action to the board of GSB International.

The action to be taken depends on the severity of the violation:

- 1) Additional requirements within the scope of factory production control
- 2) Increased fee-based monitoring
- 3) Repeat check
- 4) Contractual penalty up to €1500
- 5) Temporary or permanent withdrawal of the quality label or material licence

The first four punitive measures can be combined.

If the result of a re-test is negative, the holder will have their quality label withdrawn immediately.

If a holder of the quality label repeatedly or seriously breaches the quality guidelines, they will have their quality label withdrawn temporarily or permanently. The same applies to holders of quality labels who delay tests or prevent them.

The quality guidelines also apply to deliveries already made if they clearly exhibit a poor coating quality and the origin of the deficient delivery is clear.

If up to 10 % of the tested parts have a fault, additional factory production control regulations will be considered.

If more than 10 % of the tested parts have a fault, there could be a fine, fee-based third-party monitoring or a temporary or permanent withdrawal of the quality label.

The holder of the quality label must hear the transgressions before 5) is effected and has the option of having the delivery checked by the test institute that works for GSB International. If the test institute finds the complaint to be justified, then the costs for this test will be borne by the holder of the quality label. If the complaint was unjustified, the complainant must bear the costs of the test.

The punitive action in this section becomes effective when it comes into legal force.

In urgent cases the chairman of GSB International can withdraw the quality label with immediate effect upon consultation with the chairman of the quality committee. This has to be confirmed by the board and quality committee within fourteen days.

3.3 Re-award

If the right to use the quality label has been withdrawn, it can be re-applied for no earlier than three months hence. The procedure follows that in section 2. The board of GSB International could, however, impose additional conditions.

4 Implementation of qualifying and monitoring tests

4.1 General

The galvanising business and finished products are tested.

The inspector produces a test log and the coater and offices of GSB International each receive a copy. Complaints must be supported with pictures or be confirmed by the coating business in writing.

The inspector can request or take samples from the coating business at any time. Such samples can also be taken in trading environments or from the recipient. Samples requested must be handed over without delay. The inspector can have a test performed on any operational system of the coating business at any time.

4.2 Test of the coating business

Tests are conducted in accordance with section 5 on the following:

- Production facility
- Test equipment
- Factory production control

5 Requirements of the galvanisation business

5.1 General

These technical guidelines apply to the approval and confirmation of hot dip galvanised steel materials that are subsequently industrially coated.

5.2 Requirements of the galvanisation process

ISO 1461 governs tests of zinc coatings and is binding. High-temperature galvanisation is an exception and, due to the procedure, gives different layer thicknesses. This has to be approved when the order is taken.

Upon conclusion of the contract, the galvanising business has to be informed about subsequent coating of the workpieces.

EN 15773 and ISO 1944 have to be complied with in respect of additional specialist requirements.

5.3 Requirements of the workpiece

5.3.1 Construction of the workpiece

Design principles on preventing corrosion are defined in ISO 14713 "Protection against corrosion of iron and steel in structures -- Zinc and aluminium coatings -- Guideline". The information and examples listed there have to be observed.

The maximum component size and the maximum weight have to be decided upon jointly by the galvanizer and the coater.

5.3.2 Base metal

Steels should be used whose Si and P contents are within the range suited to an iron-zinc reaction. The following table shows the different material compositions.

After hot dip galvanisation, the appearance of reactive steels (silicon and phosphorous are the most important factors) could be diminished upon subsequent coating and thermal hardening (recesses and bubbles). This is due in part to gas becoming trapped in the rough surface. If this is the case, the coater must indicate this. The steels described under 1 and 3 in the following table, in particular, should therefore be preferred by the metal fabricator.

No.	Silicon + phosphorus content in %	Zinc coating
1	Si + P < 0.03 %	Normal iron-zinc reaction, silvery, shiny coating, normal layer thickness
2	Si + P ≥ 0.03 - ≤ 0.13 %	Sandelin range, accelerated iron-zinc reaction, grey layer of zinc, thick layer
3	Si + P > 0.13% ≤ 0.28%	Sebisty range, normal iron-zinc reaction, silvery matt appearance, average layer thickness
4	Si + P > 0.28 %	Accelerated iron-zinc reaction, matt, grey, thick layer with increasing Si content, grey appearance

5.4 Requirements of the zinc coating

5.4.1 General

The zinc has to be a single connected coating and its visible surfaces must be free of errors; zinc ash residue is not permitted.

When ordering, the requirements to hot dip galvanisation have to be agreed in accordance with ISO 1461.

Provided nothing to the contrary has been arranged, at least one visual check for completeness and lack of errors has to be carried out. A test of the thickness of the zinc cover is carried out non-destructively. The type, quantity and scope of the tests are stipulated in ISO 1461.

5.4.2 Appearance and surface composition

The surface of the zinc cover must be suitable for bearing a subsequent coating. The coater must make sure of this before beginning coating work by looking at the logs and records provided by the galvanizer, which should contain information on application, layer thickness and type of zinc.

Suitable action must be taken to remove residue that could disrupt the application or adherence of a subsequent coating (e.g. dust, white rust, zinc ash). If the coating substrate – the zinc cover – has faults such as thicker points/bubbles, rough spots, dangerous zinc spikes or imperfections, then no further work should be carried out (e.g. coating or installation) until the matter has been resolved.

It is normally necessary to carry out additional work (e.g. smoothing) on the zinc cover to make it a better coating substrate.

This work exceeds the requirements of ISO 1461. Therefore, agreements on the type of implementation and who bears the costs must be made by those involved (customer, galvanizer and coater).

After treatment and corrections carried out by the galvanizers have to be agreed with the coater.

The structure of the zinc cover normally remains visible after coating.

5.4.3 Function

White rust must not be allowed to form. Avoid storage outdoors. If unavoidable, then remove such a layer immediately before coating. Store in a dry, well-ventilated and sheltered area. The same conditions apply to transport.

Imperfections in the zinc cover must be corrected in accordance with ISO 1461, section 6.3. Different arrangements can be made for coatings with thermal hardening. The galvanizer and coater should agree on corrections using zinc dust paint.

5.4.4 Layer thickness

ISO 1461, section 6.2 stipulates the measuring procedures permitted, the number of test samples, the quantity of measurements to be carried out and the minimum layer thicknesses.

High temperature galvanisation, which results in different layer thicknesses, is an exception.

This procedure has to be arranged separately upon conclusion of the contract.

If the client desires layer thicknesses that differ from applicable standards, then this has to be arranged separately upon conclusion of the contract.

5.4.5 Adhesion

Given the procedure used, the zinc cover will adhere to the base metal sufficiently, meaning that adhesion does not have to be checked.

If the adhesion does have to be checked, e.g. for workpieces that are subject to a larger mechanical load, then a test has to be carried out in accordance with ISO 16276-2. However, this has to be arranged separately.

5.5 Test equipment

5.5.1 General

Devices in every production site have to be functional.

Device failures and the failure dates have to be documented.

Repair and maintenance jobs should be presented to the inspector on request.

5.5.2 Standard equipment

- Layer thickness gauge that works in accordance with the magnetic process pursuant to ISO 2178 or according to the magneto-inductive process and eddy current process pursuant to ISO 2808.

5.6 Factory production control (FPC)

The galvanisation company has to carry out its own product tests in accordance with these quality guidelines, record the results and store the protocols. These documents should be kept available to be viewed by the inspector. The correct delivery state of the hot dip galvanised products has to be confirmed by a fabrication certificate in accordance with ISO 1461, section 7.

6 Application

Application to obtain the quality label

The undersigned company submits their application for a **licence for the right to use the quality label**

Approved Coated Zinc & Steel – Hot Dip Galvanizers



.....
Place and date

.....
Signature and company stamp

7 Sample certificate for Hot Dip Galvanizers

 <p>Approved Coated Zinc & Steel</p> <p>Hot Dip Galvanizer</p>	 <p>Verleihungs- urkunde</p> <p>Die GSB INTERNATIONAL verleiht nach positiver Prüfung der Firma für die Betriebsstätte</p> <p>Firma / Company Adresse / Address Land / Country</p> <p>das Recht, das durch Eintragung beim Europäischen Patentamt warenzeichenrechtlich geschützte nebenstehend abgebildete Qualitätssiegel für die Stückbeschichtung von Bauteilen aus Stahl mit der Firmen-Nr. xxx zu führen. Die Überwachung umfasst das beschichtete Produkt, den Beschichtungsprozess und die werkseigene Produktionskontrolle (WPK).</p> <p>Die Führung des Qualitätssiegels setzt voraus, dass die GSB Qualitätsrichtlinien ST 663 für dessen Verleihung erfüllt werden.</p> <p>Gültig bis: 31.07.2019</p> <p>Überwachung: 2 x jährlich</p> <p>GSB INTERNATIONAL e. V. Am Bonnheshof 5, D – 40474 Düsseldorf 10.03.2016 / 10th March 2016</p>  <p>Vorsitzender des Vorstandes Chairman of the Board</p>	 <p>Conferment Certificate</p> <p>GSB INTERNATIONAL awards after a positive initial test to the company for the establishment</p> <p>the right to use its quality label for the coating process of steel building components which is a registered trademark at the European Patent Office and is shown left. Registered company No. xxx</p> <p>The monitoring shall include the coated product, the coating process and the factory production control (FPC).</p> <p>The right to carry the quality label requires that the GSB Quality Regulations ST 663 are fulfilled.</p> <p>Valid till: 2019/07/31</p> <p>Monitoring: twice a year</p>  <p>Vorsitzender des Güteausschusses Chairman of the Quality Committee</p>
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6	Specimen material licence certificate for "Master" coating material

Part IV – Coating Materials

1 Granting and confirmation of licence for coating material

1.1 General

Upon the request of the manufacturer, GSB International shall issue the material manufacturer with the licence for the coating material, subject to the quality guidelines being fulfilled.

Coating materials can be licenced for aluminium – in the Standard, Master and Premium classes – as well as for steel, and then obtain the following quality label:



If a material is produced at several locations, then the licence or revocation thereof covers all production locations, which are members of GSB International. This requires the licence of the coating materials to be applied for as well as written confirmation of the coating materials sold.

The quality committee is permitted to inspect the production locations and material samples and request the documents cited in the quality guidelines.

1.2 Labelling of products

Quality labels attached directly onto coated components also have to include the company number shown here (example):



Licence No. 000

1.3 Making an application and product information

1.3.1 General

The application for a material licence has to be made in writing to GSB International (see section 5).

Coating material with effect pigments (metallics) is only licenced if a suitable sample material has been submitted for approval.

If the licence is only valid for uniform colours a clear advice has to be in the technical data sheet.

1.3.2 Gloss

For gloss measured at an angle of 60°, the material licence for a system allows for a nominal range of:

$$\begin{array}{l} \pm 10 \text{ E at } \leq 40 \text{ E (matt)} \\ \pm 15 \text{ E at } > 40 \text{ E (from satin finish)} \end{array}$$

The material licence is valid for gloss within the nominal range.

The permitted delivery tolerances for individual products of a licenced coating material must be $\pm 5 \text{ E}$.

Separate agreements should be made for metallic effect powders.

For coating materials with a structural effect, the gloss group (matt, satin finish, gloss finish) must be specified. The gloss tolerance is communicated by the material manufacturer (reflectometer value).

Every structural effect require a separately approval.

1.3.3 Curing conditions

If the curing conditions are subsequently changed, the offices of GSB International must be informed immediately and an application will need to be made for a new licence for the coating material.

1.3.4 Licence only for specific colour groups

The material manufacturer can apply for a licence for selected colour groups. In this case, a report must be filled out for each colour group.

The technical datasheet must make clear reference to this.

1.3.5 Coating material with restricted properties

If a coating material is submitted for a licence and it does not fulfil the quality guidelines for specific colours, the material manufacturer must indicate this in writing.

The material manufacturer is obligated to provide clear labelling if this material is delivered to GSB members.

GSB International will inform its members of this.

1.3.6 Coating material with special properties

The material manufacturer can apply for a special licence for coating substances with special properties different from section 4. In this case, the quality committee shall decide upon the appropriate test procedure.

2 Granting of the material licence

2.1 Sample material

2.1.1 General

The applicant must make the following available for the licence:

- The completed report (see section 5),
- the valid technical datasheet,
- the processing guidelines which clearly explain the curing conditions,
- the relevant safety data sheet,
- the coating material (2,5 kg each) in accordance with the following sections.

If no licence for effect paints (metallics) or specific other colours have been applied for, this must be clearly stated on the technical data sheet.

2.1.2 Top Coat

- Powder paints
 - Class - Standard:
RAL colours 3016, 8014 and 9001
So far as the licence should also be valid for metallic effect powders, an metallic effect paint sample (RAL 9006 or RAL 9007) instead of RAL 9001
 - Class - Master and Premium:
RAL colours 3009, 5003 and 9001
So far as the licence should also be valid for effect powders, an additional metallic effect paint sample (RAL 9006 or RAL 9007)
- Liquid paints
 - Class - Standard:
RAL colours 3016, 8014 and 9001
So far as the licence should also be valid for metallic effect powders, an metallic effect paint sample (RAL 9006 or RAL 9007) instead of RAL 9001
With basic lacquer, hardener and thinner
 - Class - Master and Premium:
RAL colours 3009, 5003 and 9001
So far as the licence should also be valid for effect powders, an additional metallic effect paint sample (RAL 9006 or RAL 9007)
With basic lacquer, hardener and thinner

2.1.3 Primer for multi-layer-coatings

2.1.4 Licence only for one colour group

- For every 2.5 kg in any three colours of the colour group applied for, as well as a technical datasheet, safety datasheet and report

2.2 Sample production

2.2.1 Sample sheets

- **Base material: Aluminium**

Predominantly the following aluminium alloys are used:

- Sheets: EN AW-5005a H 24 [AlMg1(B)] mill finish
The sample size is chosen in accordance with the rules of the respective tests
Preferably 70 x 140 x 0.7-0.8 mm

- **Base material: Steel and galvanized steel**

- Technological properties
Continuously galvanized steel sheet of type
DX 51 D+ Z in accordance with DIN EN 10143
Size min. 70 x 140 x 0.5 mm
- Corrosion-prevention properties
Hot Dip galvanized steel sheet of type
DC01-A in accordance with DIN EN 10130
material no. 1.0244, size min. 70 x 140 x 1,5 mm and galvanized in accordance with
DIN EN ISO 1461, Zn >= 99,5%
- Technological and corrosion-prevention properties
Raw (black) steel sheet of type
DC01-A in accordance with DIN EN 10130
material no. 1.0244, size min. 70 x 140 x 0.5 mm

2.2.2 Surface pretreatment

The chemical or electrochemical pretreatment and testing thereof is carried out in accordance with the relevant regulations. The sample sheets or profile sections must be pretreated in accordance with the following standard:

- Aluminium and aluminium alloys: Chromating in accordance with DIN EN 12487
- Steel and galvanized steel: Chromating based on DIN EN 12487
- With an alternative procedure approved by GSB

2.2.3 Application

The coating material must be processed in accordance with the specifications of the manufacturer.

The layer thickness of the sample sheets to be tested must be 50 µm to 80 µm unless otherwise stated by the material manufacturer.

For liquid paints on a silicone polyester or PVDF base, the minimum layer thickness on the visible surfaces exposed to weathering must not fall below the specifications of the material manufacturer submitted with the registration.

The samples must be produced in sufficient numbers in accordance with the minimum curing conditions specified (object temperature and dwell time); for two-component paints plus 60 minutes ageing at 120 °C or in accordance with the specifications of the manufacturer.

The processing parameters must be recorded in writing.

2.3 Qualifying test

2.3.1 General

The material licence (Standard, Master and Premium) is issued if all requirements of the coating materials are met in accordance with section 4 during the qualifying test.

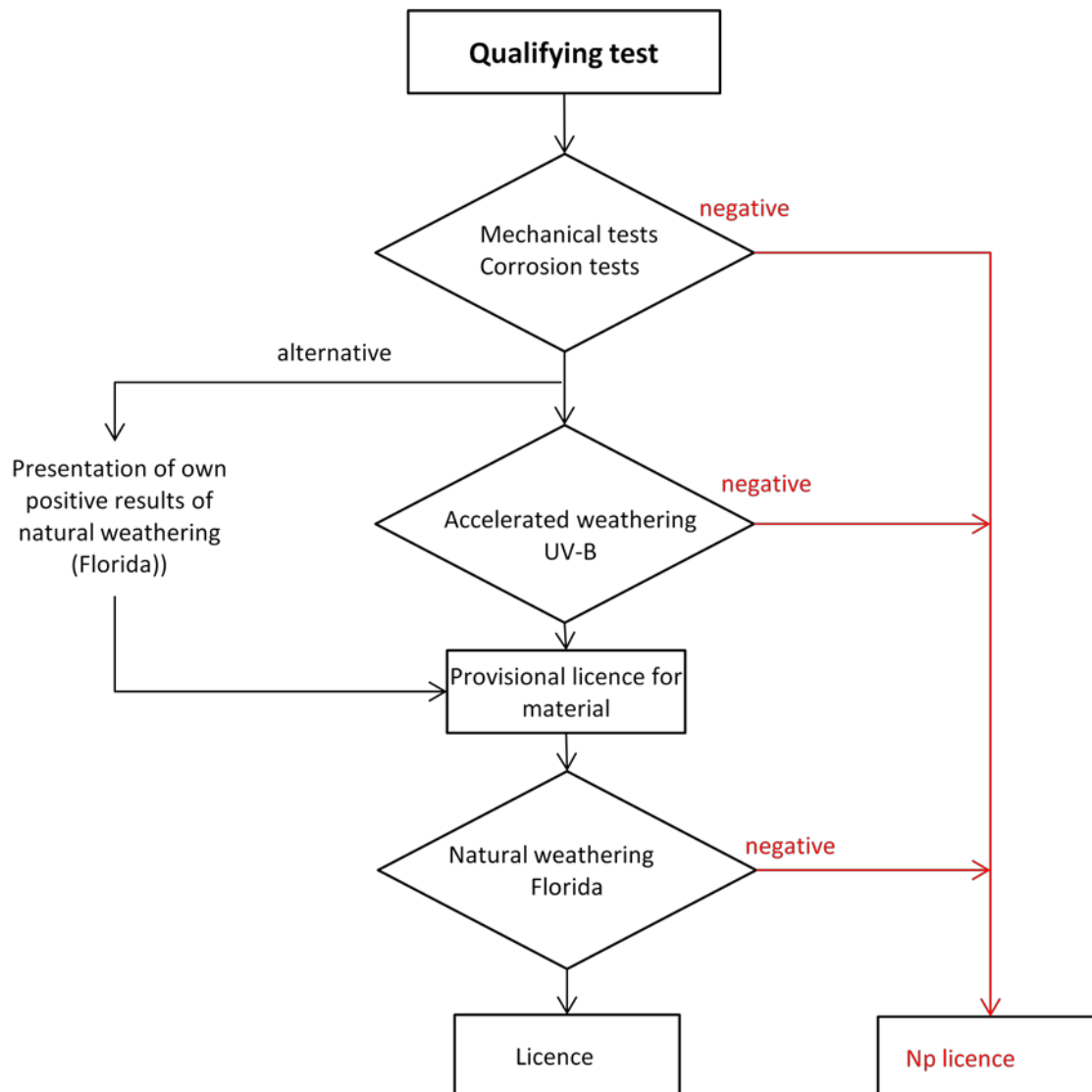
The material manufacturer will receive a certificate for the licence (see section 6).

Where materials are only submitted for approval for one colour group, with restrictions or with special properties, this will be specified on the certificate.

If an approval is requested for both base materials, the following tests are carried out on samples of one base material:

- Resistance to exposure to moisture
- Resistance to alkaline substances
- Adhesion of sealing compounds
- Accelerated weathering
- Natural weathering

2.3.2 Principal workflow for qualifying test



2.3.3 Provisional material licence

- Granting of provisional licence

If all the test results for the colours submitted are positive except for natural weathering, the provisional licence is issued for the coating material tested.

A corresponding certificate is issued.

Instead of accelerated weathering, the material manufacturer may present positive results for the colours submitted from natural weathering performed in advance in accordance with sections 4.2 and 4.3 by an independent, accredited weathering station in Florida.

The results must not be more than one year old.

- Non-issue of licence

A negative test result for any of the colours submitted - before completion of the natural weathering - shall result in the entire qualifying test being unsuccessful.

The material manufacturer will be notified in writing.

A new qualifying test can be applied for at the earliest 3 months after receipt of this notification.

2.3.4 Full material licence

- Granting of the full material licence

To receive the final licence, a positive result is required for the natural weathering in Florida for the colours submitted.

- Non-issue of licence

A negative test result for any of the colours submitted - before completion of the natural weathering - shall result in the entire qualifying test being unsuccessful.

The material manufacturer will be notified in writing.

The provisional licence and certificate must be returned immediately to the offices of GSB.

A new qualifying test can be applied for after receipt of this notification.

3 Monitoring of material licence for coating material

3.1 General

The approved coating material is checked annually.

The first prolongation test will be in the first year after the provisional licence was issued. A successful prolongation test cannot replace a negative result for natural weathering in the qualifying test.

The prolongation test will check whether the coating materials meet requirements. Contrary to the qualifying test, any two colours will be checked here. If the approval includes metal effect paints one of the both colours have to be a metal effect colour.

3.2 Sampling

The inspector takes the material samples required for the prolongation test as part of third-party monitoring at the site of a holder of the quality seal. If this was not possible in the last six months of the previous year, then an inspector commissioned by GSB International can remove the required material samples from one of the manufacturer's warehouses. If this is not possible, the offices of GSB can request that the material manufacturer provides the required material samples within a period of 4 weeks. If a licenced coating material is produced at different production locations, the annual prolongation test will use material samples from one of the named production locations.

3.3 Production of samples

Samples are produced for the prolongation test in accordance with section 2.2.

3.4 Extension of the licence

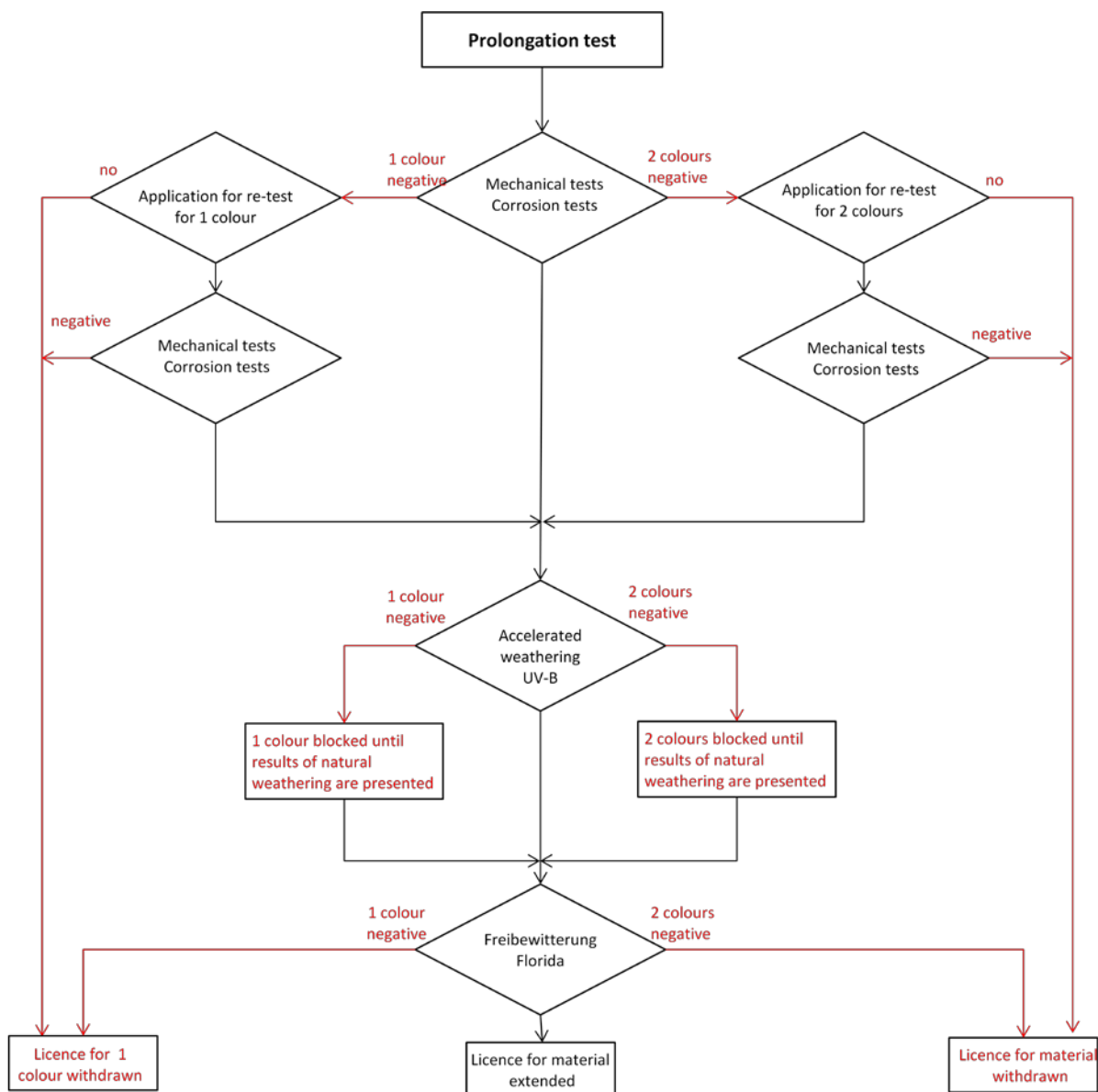
The material licence is extended until December 31st of the following year if all requirements for the coating materials are met in accordance with section 4 during the prolongation test.

If the material manufacturer omits the prolongation test or cancels the coating material the licence is valid until December 31st of the current year.

3.5 Cancellation of an approval

A licence of a coating material has to be cancelled until June 30th of the current year.

3.6 Principal workflow for prolongation test



3.7 Expiry of licence for material or individual colours

3.7.1 Prolongation test - without accelerated weathering and natural weathering - negative

- One colour does not meet requirements

In the event of negative results, a re-test can be applied for within a period of 4 weeks after receipt of the information.

If no application is made or if the re-test for this colour is also negative, then GSB International will withdraw the material licence for this colour from the material manufacturer in question.

The colour concerned must be labelled as "non-GSB-licenced colour for coating material".

Other colours for the material are not affected and remain licenced.

- Neither colour meets requirements

If both colours suffer a negative test result, then the entire prolongation test is deemed unsuccessful.

In the event of negative results, a re-test can be applied for within a period of 4 weeks after receipt of the information.

If no application is made or if the re-test for both colours is also negative, then GSB International will withdraw the material licence for this colour from the material manufacturer in question.

The certificate for the material must be returned immediately to the offices of GSB International.

3.7.2 Accelerated weathering - negative

- One colour does not meet requirements

If any accelerated weathering result is negative for a colour, then this colour has failed this part of the prolongation test.

These colours are no longer licenced until positive results from the natural weathering in Florida are presented.

The colour concerned must be labelled as "non-GSB-licenced colour for coating material".

All other colours continue to be licenced.

- Neither colour meets requirements

If any accelerated weathering result is negative for both colours, then this part of the prolongation test is deemed unsuccessful.

Neither colour is licenced until positive results from the natural weathering in Florida are presented.

The colours in question must be labelled as "non-GSB-approved colours for coating material".

All other colours continue to be licenced.

3.7.3 Natural weathering - negative

- One colour does not meet requirements

If any natural weathering result is negative for a colour, then this colour has failed the prolongation test.

GSB International will withdraw the material licence for this colour.

The colour concerned must be labelled as "non-GSB-licenced colour for coating material".

The colours for the material not affected remain licenced.

- Neither colour meets requirements

If any natural weathering result is negative for both colours, then the entire prolongation test is deemed unsuccessful.

GSB International will revoke the material licence for the material manufacturer in question. The certificate for the material must be returned immediately to the offices of GSB International.

3.7.4 Negative results in different partial tests

If, during a prolongation test, the requirements for both colours are not met in different partial tests in each case, then GSB International will revoke the licence for this material for the material manufacturer concerned.

The certificate for the material must be returned immediately to the offices of GSB International.

3.7.5 Repeated denial of licence for individual colours in prolongation test

If the licence for a colour is denied for three successive prolongation tests, the material manufacturer in question will then lose the licence for this material.

The certificate for the material must be returned immediately to the offices of GSB International.

3.8 Depleting time for blocked materials

After the licence has been withdrawn for a coating material, the material manufacturer can use up/sell existing stocks of the coating material affected by the withdrawal of the licence within a period of 6 months after the withdrawal of the licence.

The material manufacturer have to inform the GSB coater concerned.

The coater can use up the within 3 month after the end of the depleting time.

The evidence concerning the deadlines is approved based on the invoice.

However, the coating material to be used up must - apart from the material licence - meet all the requirements of the quality guidelines relating to this material; it is the responsibility of the material manufacturer to check this for each individual batch of the coating material to be used up before they bring coating material from this batch onto the market. The manufacturer must document these checks and present them to their customer and/or GSB upon request.

3.9 Renewed licence for material or individual colours

A renewed licence for the material or colour that is no longer licenced can be applied for immediately.

The licence will be renewed upon successful completion of the qualifying test.

4 Requirements for coating materials

4.1 General

The coating materials may not contain TGIC (triglycidyl isocyanurate) or pigments that require labelling.

4.2 Aluminium - Powder coating materials

Test	Aluminium Standard	Aluminium Master	Aluminium Premium
Layer thickness Thin-film powder Normal powder - colour-dependent Average layer thickness	20 ≤ 40 µm ≥ 60 µm - ≤ 120 µm 50 - 120 µm	20 ≤ 40 µm ≥ 60 µm - ≤ 120 µm 50 - 120 µm	20 ≤ 40 µm ≥ 60 µm - ≤ 120 µm 50 - 120 µm
Cross-cut	GT 0	GT 0	GT 0
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
Gloss 60° Nominal range for system approval	± 10 E at ≤ 40 E ± 15 E at > 40 E	± 10 E at ≤ 40 E ± 15 E at > 40 E	± 10 E at ≤ 40 E ± 15 E at > 40 E
Delivery tolerance	± 5 E	± 5 E	± 5 E
Condensation constant atmosphere Test period Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 3	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2
Condensation variable atmosphere (0.2l SOB _{2B}) [*] Cycles Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	30 0 (S0) d _{max} ≤ 1 mm max. level 1 max. level 3	30 0 (S0) d _{max} ≤ 1 mm max. level 1 max. level 2	30 0 (S0) d _{max} ≤ 1 mm max. level 1 max. level 2
Pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)
Resistance to exposure to moisture	Max. ΔL* 4	Max. ΔL* 4	Max. ΔL* 3
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	AASS 1000 h d _{max} ≤ 1 mm 0 (S0)	AASS 1000 h d _{max} ≤ 1 mm 0 (S0)	AASS 1000 h d _{max} ≤ 1 mm 0 (S0)
Degree of cross-linking			
Resistance to alkaline substances Colour and effect changes Change of colour and effect with metallics	max. level 1 max. level 3	max. level 1 max. level 2	max. level 1 max. level 2
Adhesion of sealing compounds Adhesive failure Cohesive failure	Not permitted Permitted	Not permitted Permitted	Not permitted Permitted
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300h ≥ 50 %	UV B (313 nm) 600h ≥ 50 %	UV B (313 nm) 1000h ≥ 50 %
Natural weathering - Florida Approx. test period (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL*, ΔC*	12 Max. 300 ≥ 50 % Section 4.7	36 Max. 840 ≥ 50 % Section 4.7	60 Max 1.400 ≥ 50 % Section 4.7

* This test is carried out only at the initial licence test.

4.3 Aluminium - Liquid coating materials

Test	Aluminium Standard	Aluminium Master	Aluminium Premium
Layer thickness	In accordance with manufacturer specifications	In accordance with manufacturer specifications	In accordance with manufacturer specifications
Cross-cut	GT 0	GT 0	GT 0
Mandrel bending test Thermally cured paints 2-component liquid paints Cracking of coating Adhesive tape removal	≤ 5 mm ≤ 12 mm Not permitted No removal of coating	≤ 5 mm ≤ 12 mm Permitted No removal of coating	≤ 5 mm ≤ 12 mm Permitted No removal of coating
Cupping test Thermally cured paints 2-component liquid paints Cracking of coating Adhesive tape removal	≥ 5 mm ≥ 3 mm Not permitted No removal of coating	≥ 5 mm ≥ 3 mm Permitted No removal of coating	≥ 5 mm ≥ 3 mm Permitted No removal of coating
Cross-linking test MEK – test (only applies to baking enamel and two-component liquid paints)	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
Gloss 60° Nominal range for system approval Delivery tolerance	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E
Condensation constant atmosphere Test period Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 3	1000h 0 (S0) d _{max} ≤ 1 mm none Max. level 2	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2
Condensation variable atmosphere (0.2l SOB _{2B})* Cycles Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 3	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2
Pressure cooker test Degree of blistering Cross-cut + adhesive tape removal	0 (S0) GT 0/GT 1 (with adhesive tape removal)	0 (S0) GT 0/GT 1 (with adhesive tape removal)	0 (S0) GT 0/GT 1 (with adhesive tape removal)
Resistance to exposure to moisture ΔL*	Max. ΔL* 4	Max. ΔL* 4	Max. ΔL* 3
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	ASS 500 h d _{max} ≤ 1 mm 0 (S0)	ASS 750 h d _{max} ≤ 1 mm 0 (S0)	ASS 1000 h d _{max} ≤ 1 mm 0 (S0)
Resistance to alkaline substances Colour and effect changes Change of colour and effect with metallics	Max. level 1 Max. level 3	Max. level 1 Max. level 2	Max. level 1 Max. level 2
Adhesion of sealing compounds Adhesive failure Cohesive failure	Not permitted Permitted	Not permitted Permitted	Not permitted Permitted
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300h ≥ 50 %	UV B (313 nm) 600h ≥ 50 %	UV B (313 nm) 1000h ≥ 50 %
Natural weathering - Florida Approx. test period (months); UV energy (MJ/m ²) Residual gloss Colour difference ΔL*, ΔC*	12 Max 300 ≥ 50 % Section 4.7	36 Max. 840 ≥ 50 % Section 4.7	60 Max. 1400 ≥ 50 % Section 4.7
* This test is carried out only at the initial licence test.			

4.4 Steel - Powder coating materials

Test	Galvanized steel Standard	Galvanized steel Master	Galvanized steel Premium
Layer thickness Thin-film powder Normal powder - colour-dependent Average layer thickness	80 – 130 μm $\geq 80 \mu\text{m}$ Twin-layer system $\geq 130 \mu\text{m}$	80 – 130 μm $\geq 80 \mu\text{m}$ Twin-layer system $\geq 130 \mu\text{m}$	80 – 130 μm $\geq 80 \mu\text{m}$ Twin-layer system $\geq 130 \mu\text{m}$
Cross-cut	GT 0	GT 0	GT 0
Mandrel bending test Cracking of coating Adhesive tape removal	$\leq 5 \text{ mm}$ Permitted No removal of coating	$\leq 5 \text{ mm}$ Permitted No removal of coating	$\leq 5 \text{ mm}$ Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	$\geq 5 \text{ mm}$ Permitted No removal of coating	$\geq 5 \text{ mm}$ Permitted No removal of coating	$\geq 5 \text{ mm}$ Permitted No removal of coating
Cross-linking test	Acetone TEST No matting, no smudging	Acetone TEST No matting, no smudging	Acetone TEST No matting, no smudging
Ball impact test Cracking of coating Adhesive tape removal	10 inch/pound twin-layer system 20 inch/pound Single-layer system Not permitted No removal of coating	10 inch/pound twin-layer system 20 inch/pound Single-layer system Not permitted No removal of coating	10 inch/pound twin-layer system 20 inch/pound Single-layer system Not permitted No removal of coating
Scratch resistance	No penetration until the substrate	No penetration until the substrate	No penetration until the substrate
Gloss 60° Nominal range for system approval Delivery tolerance	$\pm 10 \text{ E}$ at $\leq 40 \text{ E}$ $\pm 15 \text{ E}$ at $> 40 \text{ E}$ $\pm 5 \text{ E}$	$\pm 10 \text{ E}$ at $\leq 40 \text{ E}$ $\pm 15 \text{ E}$ at $> 40 \text{ E}$ $\pm 5 \text{ E}$	$\pm 10 \text{ E}$ at $\leq 40 \text{ E}$ $\pm 15 \text{ E}$ at $> 40 \text{ E}$ $\pm 5 \text{ E}$
Condensation constant atmosphere Test period Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	1000h 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 3	1000h 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 2	1000h 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 2
Condensation variable atmosphere (0.2l SOB _{2B})* Cycles Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	30 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 3	30 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 2	30 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 2
Pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)
Resistance to exposure to moisture	Max. $\Delta L^* 4$	Max. $\Delta L^* 4$	Max. $\Delta L^* 4$
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	NSS 480 h $d_{\text{max}} \leq 5 \text{ mm}$ 0 (S0)	NSS 480 h $d_{\text{max}} \leq 5 \text{ mm}$ 0 (S0)	NSS 480 h $d_{\text{max}} \leq 5 \text{ mm}$ 0 (S0)
Degree of cross-linking	ACETONE TEST No matting, no smudging	ACETONE TEST No matting, no smudging	ACETONE TEST No matting, no smudging
Resistance to alkaline substances Colour and effect changes Change of colour and effect with metallics	Max. level 1 Max. level 3	Max. level 1 Max. level 2	Max. level 1 Max. level 2
Adhesion of sealing compounds Adhesive failure Cohesive failure	Not permitted Permitted	Not permitted Permitted	Not permitted Permitted
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300 $\geq 50 \%$	UV B (313 nm) 600 $\geq 50 \%$	UV B (313 nm) 1000h $\geq 50 \%$
Natural weathering - Florida Approx. test period (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL^* , ΔC^*	12 Max. 300 $\geq 50 \%$ Section 4.7	36 Max. 840 $\geq 50 \%$ Section 4.7	60 Max. 140 $\geq 50 \%$ Section 4.7
Note:	For galvanized steel, as of the condensation constant atmosphere test, all further tests are carried out on a single layer. * This test is carried out only at the initial licence test.		

4.5 Steel - Liquid coating materials

Test	Galvanized steel Standard	Galvanized steel Master	Galvanized steel Premium
Layer thickness	In accordance with manufacturer specifications	In accordance with manufacturer specifications	In accordance with manufacturer specifications
Cross-cut	GT 0	GT 0	GT 0
Mandrel bending test Thermally cured paints 2-component liquid paints Cracking of coating Adhesive tape removal	≤ 5 mm ≤ 12 mm Permitted No removal of coating	≤ 5 mm ≤ 12 mm Permitted No removal of coating	≤ 5 mm ≤ 12 mm Permitted No removal of coating
Cupping test Thermally cured paints 2-component liquid paints Cracking of coating Adhesive tape removal	≥ 5 mm ≥ 3 mm Permitted No removal of coating	≥ 5 mm ≥ 3 mm Permitted No removal of coating	≥ 5 mm ≥ 3 mm Permitted No removal of coating
Cross-linking test MEK – test (only applies to baking enamel and two-component liquid paints)	MEK TEST No matting, no smudging	MEK TEST No matting, no smudging	MEK TEST No matting, no smudging
Scratch resistance	No penetration until the substrate	No penetration until the substrate	No penetration until the substrate
Gloss 60° Nominal range for system approval Delivery tolerance	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E
Condensation constant atmosphere Test period Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2
Condensation variable atmosphere (0.2l SOB _{2B})* Cycles Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 3	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2
Pressure cooker test Degree of blistering Cross-cut + adhesive tape removal	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)
Resistance to exposure to moisture ΔL*	Max. ΔL* 4	Max. ΔL* 4	Max. ΔL* 4
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	NSS 480 h d _{max} ≤ 5 mm 0 (S0)	NSS 480 h d _{max} ≤ 5 mm 0 (S0)	NSS 480 h d _{max} ≤ 5 mm 0 (S0)
Resistance to alkaline substances Colour and effect changes Change of colour and effect with metallics	Max. level 1 Max. level 3	Max. level 1 Max. level 2	Max. level 1 Max. level 2
Adhesion of sealing compounds Adhesive failure Cohesive failure	Max. level 1 Max. level 3	Max. level 1 Max. level 2	Max. level 1 Max. level 2
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300 h ≥ 50 %	UV B (313 nm) 600 h ≥ 50 %	UV B (313 nm) 1000 h ≥ 50 %
Natural weathering - Florida Approx. test period (months); UV energy (MJ/m ²) Residual gloss Colour difference ΔL*, ΔC*	12 Max. 300 ≥ 50 % Section 4.74.7	36 Max. 600 ≥ 50 % Section 4.7	48 Max. 1.400 ≥ 50 % Section 4.7
Note:	For galvanized steel, as of the condensation constant atmosphere test, all further tests are carried out on a single layer. * This test is carried out only at the initial licence test.		

4.6 Steel

The coating systems for steel shall meet the requirements of 4.4 or 0 except the NSS test:

Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	NSS 720 h $d_{max} \leq 1 \text{ mm}$ 0 (S0)
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4.7 Colour differences ΔL^* , ΔC^* after weathering

Colour is measured in accordance with DIN EN ISO 11664-4, illuminant: D65/10° standard observer; measurement geometry 45/0.

RAL	ΔL^*	ΔC^* from	RAL	ΔL^*	ΔC^* from	RAL	ΔL^*	ΔC^* from	RAL	ΔL^*	ΔC^* from
1000	± 1	± 2	3003	± 2	± 6	5013	± 6	± 1	6034	± 2	± 2
1001	± 1	± 2	3004	± 4	± 4	5014	± 3	± 3	6035*	± 3	± 5
1002	± 1	± 2	3005	± 4	± 4	5015	± 3	± 3	6036*	± 3	± 5
1003	± 2	± 3	3007	± 4	± 4	5017	± 3	± 3			
1004	± 2	± 5	3009	± 4	± 4	5018	± 3	± 5	7000	± 2	± 1
1005	± 2	± 5	3011	± 2	± 6	5019	± 3	± 3	7001	± 2	± 1
1006	± 2	± 7	3012	± 2	± 7	5020	± 3	± 5	7002	± 2	± 1
1007	± 2	± 7	3013	± 2	± 6	5021	± 3	± 3	7003	± 2	± 1
1011	± 1	± 3	3014	± 3	± 5	5022	± 4	± 5	7004	± 2	± 1
1012	± 1	± 3	3015	± 3	± 7	5023	± 3	± 3	7005	± 2	± 1
1013	± 1	± 1	3016	± 2	± 6	5024	± 3	± 3	7006	± 2	± 1
1014	± 1	± 2	3017	± 2	± 8	5025*	± 2	± 6	7008	± 3	± 3
1015	± 1	± 1	3018	± 2	± 8	5026*	± 2	± 6	7009	± 2	± 2
1016	± 2	± 7	3020	± 2	± 7				7010	± 2	± 2
1017	± 1	± 3	3022	± 2	± 7	6000	± 3	± 4	7011	± 2	± 1
1018	± 2	± 7	3027	± 2	± 7	6001	± 3	± 4	7012	± 2	± 1
1019	± 1	± 2	3031	± 2	± 7	6002	± 3	± 4	7013	± 2	± 1
1020	± 1	± 2	3032*	± 2	± 6	6003	± 3	± 4	7015	± 2	± 1
1021	± 2	± 7	3033*	± 2	± 6	6004	± 4	± 4	7016	± 3	± 3
1023	± 2	± 7				6005	± 4	± 4	7021	± 5	± 3
1024	± 1	± 2	4001	± 3	± 5	6006	± 4	± 4	7022	± 3	± 2
1027	± 1	± 3	4002	± 3	± 5	6007	± 4	± 4	7023	± 2	± 1
1028	± 2	± 8	4003	± 2	± 7	6008	± 4	± 4	7024	± 3	± 3
1032	± 2	± 5	4004	± 4	± 4	6009	± 4	± 4	7026	± 3	± 3
1033	± 2	± 7	4005	± 3	± 5	6010	± 3	± 6	7030	± 1	± 1
1034	± 2	± 7	4006	± 3	± 5	6011	± 2	± 3	7031	± 2	± 1
1035*	± 2	± 2	4007	± 4	± 5	6012	± 4	± 4	7032	± 1	± 1
1036*	± 2	± 4	4008	± 3	± 5	6013	± 2	± 3	7033	± 2	± 1
1037	± 2	± 7	4009	± 3	± 5	6014	± 4	± 4	7034	± 2	± 1
			4010	± 3	± 5	6015	± 4	± 4	7035	± 1	± 1
2000	± 2	± 6	4011*	± 2	± 7	6016	± 3	± 5	7036	± 2	± 1
2001	± 2	± 6	4012*	± 2	± 6	6017	± 3	± 5	7037	± 2	± 1
2002	± 2	± 7				6018	± 2	± 3	7038	± 1	± 1
2003	± 2	± 6	5000	± 3	± 3	6019	± 2	± 2	7039	± 2	± 1
2004	± 2	± 6	5001	± 3	± 3	6020	± 3	± 4	7040	± 1	± 1
2008	± 2	± 7	5002	± 3	± 4	6021	± 2	± 3	7042	± 1	± 1
2009	± 2	± 7	5003	± 3	± 3	6022	± 4	± 4	7043	± 3	± 3
2010	± 2	± 6	5004	± 6	± 1	6024	± 3	± 5	7044	± 1	± 1
2011	± 2	± 7	5005	± 3	± 3	6025	± 3	± 4	7045	± 1	± 1
2012	± 2	± 6	5007	± 3	± 3	6026	± 3	± 4	7046	± 1	± 1
2013*	± 2	± 4	5008	± 3	± 2	6027	± 2	± 2	7047	± 1	± 1
			5009	± 3	± 3	6028	± 4	± 4	7048*	± 3	± 1
3000	± 2	± 6	5010	± 4	± 5	6029	± 3	± 5			
3001	± 2	± 6	5011	± 6	± 1	6032	± 3	± 5	8000	± 2	± 2
3002	± 2	± 6	5012	± 3	± 3	6033	± 2	± 2	8001	± 2	± 2

RAL	ΔL^*	ΔC^* from	RAL	ΔL^*	ΔC^* from	RAL	ΔL^*	ΔC^* from	RAL	ΔL^*	ΔC^* from
8002	± 3	± 3	8019	± 3	± 4	9004	± 4	± 1			
8003	± 3	± 3	8022	± 4	± 4	9005	± 4	± 1			
8004	± 3	± 3	8023	± 2	± 2	9006*	± 1	± 1			
8007	± 3	± 4	8024	± 2	± 2	9007*	± 2	± 1			
8008	± 3	± 4	8025	± 2	± 2	9010	± 1	± 1			
8011	± 3	± 4	8028	± 4	± 4	9011	± 4	± 1			
8012	± 3	± 4	8029*	± 2	± 4	9016	± 1	± 1			
8014	± 3	± 4				9017	± 4	± 1			
8015	± 3	± 4	9001	± 1	± 1	9018	± 1	± 1			
8016	± 3	± 4	9002	± 1	± 1	9022*	± 1	± 1			
8017	± 3	± 4	9003	± 1	± 1	9023*	± 2	± 1			

Note: Colours marked with an asterisk * are not part of the RAL 841 GL register. Colour charts for these colours are contained in the main RAL register RAL 840 HR. However, these should not be used as a model for decorative coatings.

4.8 Permissible colour tolerances

To define permissible tolerances for RAL colour charts, it is recommended to observe and adhere to guideline VdL-RL 10 "Permissible colour tolerances" in the relevant issue. This guideline details reference samples, test methods and permissible colour tolerances for differences between charts and delivery, as well as between two deliveries. This guideline does not apply to the assessment of end-coated objects and components. It only relates to sample sheets produced under standard laboratory conditions.

5 Licence application for coating substances

Licence application

The undersigned company hereby applies to **GSB International as a material manufacturer** to obtain the right to hold the licence:



() () () () () ()

Please place a cross in the relevant box!

for the material: _____

(Standard market name)

Material system (GSB name)	Licence No.	Hardening conditions	Object temperature	Dwell time at object temperature	
				Minimum	Maximum
Gloss nominal range.....points* () Metallic effect	Minimum Average Maximum	...............	...............	...............
Gloss nominal range.....points* () Metallic effect	Minimum Average Maximum	...............	...............	...............
Gloss nominal range.....points* () Metallic effect	Minimum Average Maximum	...............	...............	...............
Gloss nominal range.....points* () Metallic effect	Minimum Average Maximum	...............	...............	...............
Gloss nominal range.....points* () Metallic effect	Minimum Average Maximum	...............	...............	...............

Particular details of the material manufacturer:

Minimum layer thickness:

Recommended sealant

Recommended pretreatment:

.....

.....

Place and date

Signature and company stamp

* Please ensure that you specify the gloss in **points** and not as a percentage.

6 Specimen material licence certificate for "Master" coating material

 <h1 style="margin: 0;">GSB</h1> <h2 style="margin: 0;">INTERNATIONAL</h2>		
 <div style="background-color: #f4a460; padding: 5px; text-align: center;"> MASTER Aluminium Coating Material ★★ </div>	<p>Material Zulassung</p> <p>Die GSB INTERNATIONAL verleiht nach positiver Prüfung des Beschichtungsmaterials xxx der Firma</p> <p>Firma / Company Adresse / Address Land / Country</p> <p>unter der Zulassungsnummer xyz das Recht, dieses Beschichtungsmaterial wie nebenstehend zu kennzeichnen und damit alle Unternehmen, die Inhaber des Qualitätssiegels für die Stückbeschichtung von Bauteilen aus Aluminium sind, zu beliefern. Die Zulassung setzt voraus, dass die GSB Qualitätsrichtlinien AL 631 erfüllt werden.</p> <p>Gültig bis: 31.07.2019</p> <p>Überwachung: jährlich</p> <p>GSB INTERNATIONAL e. V., Am Bonneshof 5, D-40474 Düsseldorf March 10th, 2016</p>	<p>Material Licence</p> <p>The GSB INTERNATIONAL awards after a positive approval test of the coating material xxx to the company</p> <p>Firma / Company Adresse / Address Land / Country</p> <p>with the licence number xyz the right to label the coating material as shown left. This includes the right to supply all users of the quality label for the piecework coating of aluminium building components with the material approved through this licence. The major prerequisite for doing so is the fulfillment of the GSB Quality Regulations AL 631.</p> <p>Valid till: 2019/07/31</p> <p>Monitoring: yearly</p>
	 Vorsitzender des Vorstandes Chairman of the Board	 Vorsitzender des Güteausschusses Aluminium Chairman of the Quality Committee Aluminium

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Part V – Coaters Aluminium

1 Being granted and holding the quality label for coaters aluminium

1.1 General

GSB International will grant three classes of quality label and two additional labels to coaters aluminium who apply for them if the respective requirements in the quality guidelines are met.

1.1.1 Quality labels

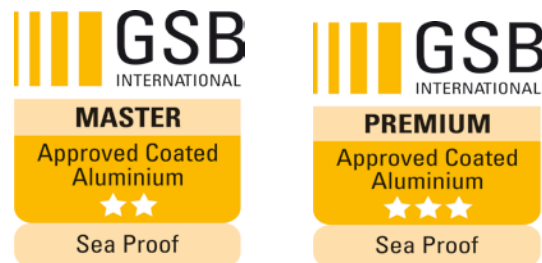
Coating companies can obtain the quality label in the classes: GSB Approved Coater, GSB Master Coater and GSB Premium Coater.



1.1.2 Additional label

If the requirements in the quality guidelines are met, then GSB Master Coaters can acquire the labels “Sea Proof” in addition to the quality label.

GSB Premium Coaters are automatically entitled to the additional label “Sea Proof” as they already meet its requirements.



1.1.3 Additional label

If the requirements in the quality guidelines are met, then Coater can acquire the label “Sea Proof Plus” for pre-anodisation in addition to the label “Sea Proof”.



1.2 Labelling of components

Quality labels attached directly onto coated components also have to include the company number shown here:



“Premium Quality”, however, can only be applied to components that have been coated by a GSB Premium Coater with coating materials of the “Master” class.

1.3 Application

The coating business will inform the offices of GSB about the quality labels and/or additional labels for which it has applied. The application has to be made in writing to GSB International (see section 6).

The application will be checked by the quality committee.

2 Granting the quality label and the additional label

2.1 General

The coating business must meet the requirements of the quality label and additional label (see section 5).

2.2 Qualifying test

Two independent tests (qualifying test part 1 and part 2) are carried out.

At least three months must pass between qualifying test part 1 and part 2.

Part 1 is by appointment. All additional tests are without appointment.

The qualifying test is carried out in accordance with section 4.

If the qualifying test is passed, the board will grant the applicant the desired quality label and additional label on the quality committee’s recommendation. A certificate is issued (see section 7).

If the qualifying test is failed, the quality committee will reject the application giving reasons in writing. However, the applicant can apply for a re-test of the failed part.

If the re-test is also failed, then the applicant can re-apply after at least three months have passed.

2.3 Categorisation in a higher quality class and/or application for an additional label

If the coating business applies for a quality label of a higher quality class, then two unannounced monitoring tests will be carried out.

If both monitoring tests are passed, then the board will grant the applicant the desired quality label on the quality committee's recommendation. A certificate is issued.

If any part of the monitoring test is failed, then the tests are assessed as monitoring tests based on the requirements of the previous quality label and additional label.

3 Monitoring the quality label

3.1 General

The monitoring test in section 4 is performed at least twice a year for each coating business without appointment.

If the business passes the monitoring test, then it continues to have the right to hold the quality label and the additional label. Special notification will not be given.

3.2 Negative monitoring test

If the quality committee finds problems with quality assurance, it will suggest punitive action to the board of GSB International.

The action to be taken depends on the severity of the violation:

1. Additional requirements within the scope of factory production control
2. Increased, fee-based monitoring
3. Repeat check
4. Contractual penalty of up to € 1,500
5. Reversion to a lower quality stage
6. Temporary or permanent withdrawal of the quality label and/or additional label

The first four punitive measures can be combined.

If the result of a re-test is negative, the holder will have their quality label withdrawn immediately.

If a holder of the quality label repeatedly or seriously breaches GSB AL 631, they will have their quality label withdrawn temporarily or permanently. The same applies to holders of quality labels who delay tests or prevent them.

GSB AL 631 also applies to deliveries already made if they clearly exhibit a poor coating quality and the origin of the deficient delivery is clear.

If up to 10 % of the tested parts have a fault, additional factory production control regulations will be considered.

If more than 10 % of the tested parts have a fault, there could be a fine, fee-based third-party monitoring or a temporary or permanent withdrawal of the quality label.

The holder of the quality label must hear the transgressions before 6 is effected and has the option to have the delivery checked by a test institute that works for GSB International. If the test institute finds the complaint to be justified, then the costs for this test will be borne by the holder of the quality label. If the complaint was unjustified, the complainant must bear the costs of the test.

The punitive action in this section becomes effective when it comes into legal force.

In urgent cases the chairman of GSB International can withdraw the quality label with immediate effect upon consultation with the chairman of the quality committee. This has to be confirmed by the board and quality committee within 14 days.

3.3 Re-award

If the right to use the quality label has been withdrawn, it can be re-applied for no earlier than three months hence.

The board of GSB International could, however, impose additional conditions.

4 Implementation of the monitoring tests

4.1 General

The coating business and the finished products are tested.

The inspector produces a test log and the coater and offices of GSB International each receive a copy. Complaints must be supported with illustrations or be confirmed in writing by the coating business.

The inspector can request or take samples from the coating business at any time. Such samples can also be taken in trading environments or from the recipient. Samples requested must be handed over without delay. The inspector can have a test performed on any running system of the coating business at any time.

4.2 Plants

4.2.1 General

In these quality guidelines a plant consists of many stages of pretreatment including a retained water dryer, application unit(s) and curing oven. The number of plants is determined by the number of pretreatments and/or curing ovens.

1 plant:	1 pretreatment,	1 curing oven
2 plants:	2 pretreatments,	1 curing oven
	1 pretreatment,	2 curing oven
	2 pretreatments,	2 curing oven

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

4.2.2 Additional requirements for GSB Premium Coaters

GSB International has to be informed of the number of coating systems and be given information on which ones should be used for GSB Premium coating.

If the coater has a vertical system, then at least one horizontal system has to be named which must comply with the requirements of a Premium Coater. The systems named are tested regularly.

4.3 Test of the coating company

The following equipment is tested:

- Fabrication facility
- Laboratory equipment
- Factory production control

4.4 Test of finished products

This test should only cover parts which the coating company has already checked and approved. Sufficient material has to be kept available for the test.

All batches in the coating business that are ready for dispatch, have been prepared or are in storage have to be made accessible to the inspector upon request so that additional random samples (see part VII) can be taken.

5 Requirements of the coating company

5.1 General

The following table shows what is required of the coating company at each quality stage. Detailed requirements on the pre-treatment of surfaces, application and thermal cross-linking or accelerated drying, organisation and training are explained in more detail in the following sections.

Requirements	Quality stages		
	GSB Approved Coater	GSB Master Coater	GSB Premium Coater
Surface pre-treatment			
Process sequence Cr-VI-free pretreatment documented	X	X	
Process sequence documented and stored with GSB			X
Approved surface pre-treatment procedure with annual monitoring test			X
Contact points on visible surfaces < 2 mm	X		
Final rinse	X	X	X
Drying of residual water	X	X	X
Immediate coating < 24 h	X	X	
Immediate coating < 12 h			X
Coating immediately < 72 h only for pre-anodising	X	X	X
Cleanliness and handling – pretreatment	X	X	X
Only touch pretreated parts with gloves	X	X	X
Application and thermal cross-linking or accelerated drying			
Coating cleanliness and handling	X	X	X
Monitoring curing conditions	X	X	X
Laboratory			
Standard equipment	X	X	X
Additional equipment			X
Product and coating material storage			
Defined storage conditions for the material to be coated		X	X
Defined storage conditions for the coating material		X	X
Quality check			
Documented quality management system			X
Provision of the product-characteristic and safety data sheets	X	X	X
Factory production control	X	X	X
Additional label			
Holding the “Sea Proof” label After the additional test FFC/AASS		X	X
Holding the “Sea Proof Plus” label With pre-anodising after additional test FFC/AASS		X	X

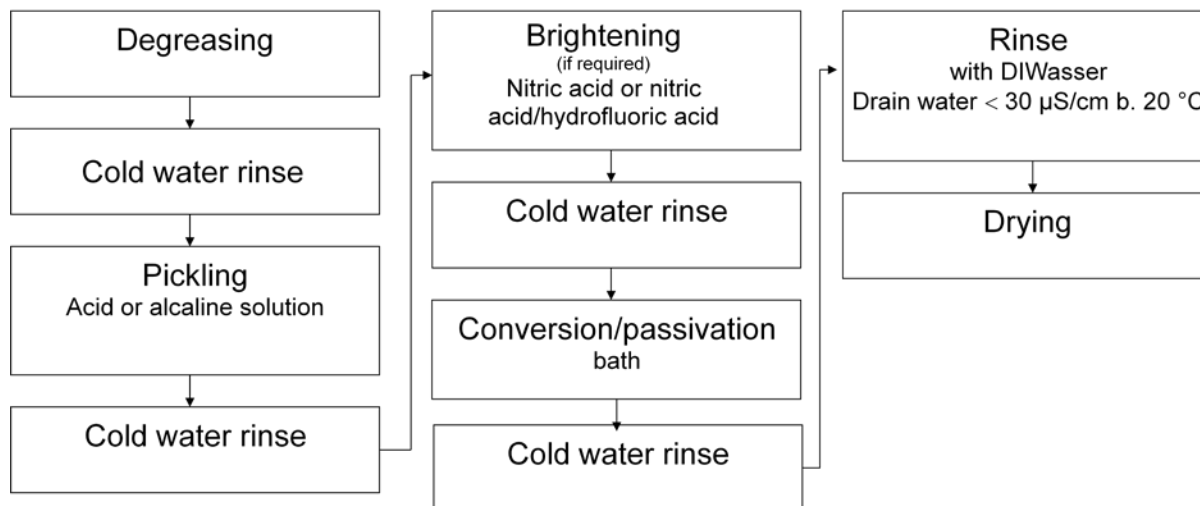
5.2 Surface pretreatment

5.2.1 General

The following procedures can be used:

- Yellow and green chromating in accordance with EN 12487¹
- Alternative pretreatment procedures – chromium-free and chromium(VI)-free
- Pre-anodising

Typical process flow chemical pre-treatment process flow:



The individual process flow should be tuned with the plant manufacturer and the chemical supplier. The individual process flow shall be documented and presented to the inspector on demand.

5.2.2 Additional requirement for GSB Premium Coaters

The process sequence for pretreatment has to be documented independently of the procedure and stored at the GSB offices.

An analysis certificate for the pretreatment chemicals has to be requested from the manufacturer and documented for every order.

The process sequence of every pretreatment system is approved separately by taking one coated product section during a monitoring test and having it tested by an accredited test institute for 1000 h AASS and filiform corrosion test.

If different metals are regularly pretreated in the same pretreatment system, then the respective process steps have to be carried out completely separately. The maximum content of foreign ions has to be decided upon together with the pretreatment supplier and documented when storing the process sequence. The concentration of these ions has to be determined and documented after every pre-treatment of foreign substrates (production diary.)

5.2.3 Suspension or positioning

5.2.3.1 Suspension or positioning (GSB Approved Coater)

The parts to be coated have to be suspended or positioned so that the contact points on a main surface that will later be visible are < 2 mm. The customer must be notified of this.

5.2.3.2 Suspension or positioning (GSB Master Coater and GSB Premium Coater)

The parts to be coated have to be suspended or positioned so that the contact points will not be on a main surface that will later be visible. Contact points are only permitted when they cannot be avoided

¹ Due to the REACH-Regulation (EU 348/2013) the use of Cr-VI containing solutions will be banned at September 21st, 2017 if no application for a certificate of exemption.

and only if marked on the respective piece or on drawings (diagrams). The customer must be notified of this.

5.2.4 Pickling process

The pickling process during chemical surface pre-treatment is greatly affected by the process parameters of semi-finished aluminium production. Setting a threshold value with a minimal tolerance is not worthwhile.

Recommended pickling rate for alloys EN AW-6060 and EN AW-6063: $\geq 1 \text{ g/m}^2$.

A suitable pickling rate has to be determined and stipulated for other alloys.

5.2.5 Yellow and green chromating

5.2.5.1 GSB Approved Coater and GSB Master Coater

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

Coating layer	Yellow chromating:	0.4 – 1.0 g/m ²
	Green chromating:	0.4 – 1.2 g/m ²

5.2.5.2 Additional requirement for GSB Premium Coaters

Only approved procedures may be used.

If the product test for yellow and green chromating rinse procedures is passed, then it serves as an approval criterion for the monitoring test provided that the GSB Premium Coater has used this procedure to pre-treat their products.

No-rinse procedures containing chromium always have to be approved by GSB International.

Layer weight:	Yellow chromating:	0.6 – 1.0 g/m ²
	Green chromating:	0.6 – 1.2 g/m ²

5.2.6 Alternative pretreatment procedures

5.2.6.1 General

Alternative pretreatment procedures have to be approved by GSB International.

This concerns non-system-specific product approvals. This is why every coating business is required to test and document the compatibility of the pretreatment system with their particular system and the respective coating material using a pressure cooker test with a subsequent cross cut and adhesive tape removal for every production batch. The work regulations of the manufacturer of the pre-treatment chemicals have to be complied with, e. g. rinsing with deionised water before application of the pretreatment chemicals.

The chemical supplier decides upon and documents the layer thickness for alternative pretreatment procedures, including tolerances and how to determine them. The test method to determine the layer shall be available at the plant.

If a coating business uses a new, alternative pretreatment system for series coating for the first time, then they must inform the offices of GSB of this in writing so that an unannounced monitoring test can be performed. They must do the same if a test operation exceeds four weeks.

5.2.7 Layer weight

The layer weight has to be determined on the semi-finished product used for production.

5.2.8 Final rinse

5.2.8.1 Rinse treatment

The products must be rinsed with deionised water so that the last water dripping off has a conductivity of $k_{20^{\circ}\text{C}} < 30.0 \mu\text{S/cm}$.

Befogging of the passivated surface is not a final rinse. Nevertheless the conductivity shall be $k_{20^{\circ}\text{C}} < 30.0 \mu\text{S/cm}$.

5.2.8.2 Final rinse or last rinse before the no-rinse treatment

It shall be possible to take a sample of the last water dripping off (inspection flap at a spray plant)

The products must be rinsed with deionised water so that the last water dripping off has a conductivity of $k_{20^{\circ}\text{C}} < 30.0 \mu\text{S/cm}$.

5.2.9 Pre-anodising

5.2.9.1 General

Pre-anodising does not require a special licence.

The quality committee has to be informed about the application of this procedure, which must be taken into account for the monitoring tests of the coating business by carrying out corresponding supplementary tests (see section 5.2.9).

Orders with pre-anodizing (pre-anodizing is carried out by a subcontractor) only GSB compliant if the regular supplementary examinations can be detected in routine inspections.

Orders considered with pre-anodising are only GSB compliant if the executive GSB coater can verify the required supplementary examinations of pre-anodising. The commissioned pre-anodiser must be a GSB coater or the owner of the Qualanod quality label.

The inspection report of the commissioned pre-anodised sample sheets shall be available at the coater.

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 pretreatment results using a modified treatment process, then they can continue in this way provided the supplementary monitoring tests of the coating business have been passed.

5.2.9.2 Process sequence and requirements of pre-anodising

The objects are immersed in an agitated bath solution to anodise them. A cooling facility has to be provided and the solution has to be sufficiently mixed 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 have to 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 have to be cleaned and pickled before anodising.

After anodising, the objects are rinsed, dried when not compacted, and coated in accordance with the quality guidelines.

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 $T \geq 20 \text{ }^\circ\text{C}$ and $\leq 80 \text{ }^\circ\text{C}$
3. Pickling
4. Rinsing with water, temperature $T \geq 20 \text{ }^\circ\text{C}$ and $\leq 80 \text{ }^\circ\text{C}$
5. De-smutting
6. Rinsing with water, temperature $T \geq 20 \text{ }^\circ\text{C}$ and $\leq 80 \text{ }^\circ\text{C}$
7. Anodising in accordance with the direct current sulphuric acid process

Parameters:

Electrolyte concentration:	180 – 200 g/l H_2SO_4
Aluminium content:	< 15 g/l
Temperature:	25–30 $^\circ\text{C}$ (with continual recording)
Current density:	0.8 – 2.0 A/dm ²
Layer thickness:	3 – 8 μm

8. Rinsing with water, temperature $T \geq 20 \text{ }^\circ\text{C}$ and $\leq 80 \text{ }^\circ\text{C}$
9. Rinsing with purified water, temperature $T \geq 20 \text{ }^\circ\text{C}$ and $\leq 80 \text{ }^\circ\text{C}$
The products must be rinsed with purified water so that the last water dripping off has a conductivity of $k_{20^\circ\text{C}} < 30.0 \text{ } \mu\text{S/cm}$ at 20 $^\circ\text{C}$.
10. Drying under 100 $^\circ\text{C}$
11. The dye spot test 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-anodising coating
 - a. Non-destructively and using the eddy current method in accordance with ISO 2360
 - b. A metallographic cross-section in accordance with ISO 1463 is carried out as an arbitration procedure
13. Subsequent treatment possible

5.2.9.3 Additional requirements of holders of the additional label “Sea Proof Plus”

The coater must inform the offices of GSB in advance of the date on which they plan to perform the pre-anodising treatment. The offices of GSB will inform the inspector, who will then decide whether to carry out a routine inspection at that time.

5.2.9.4 Final rinse or last rinse before the no-rinse treatment

The products must be rinsed with de-ionised water so that the last water dripping off has a conductivity of $k_{20\text{ }^{\circ}\text{C}} < 30.0 \mu\text{S/cm}$.

5.2.10 Drying of residual water

Immediately following chemical or electro-chemical pretreatment, the parts have to be dried in retained water dryer. The temperature of the object must not exceed 100 °C unless the manufacturer of the chemicals used for pretreatment of the surface has stipulated otherwise.

5.3 Interim transport

5.3.1 General

If the chemically pretreated parts are clean and dry, they should be coated immediately, though they must be coated within 24 hours. If storage is unavoidable, then the parts have to be stored so that the conversion film does not get dirty, e.g. dust and damp. They should also be protected, e.g. covered with sheets.

5.3.2 GSB Premium Coater

The chemically pretreated parts have to be coated within 12 hours. Avoid interim storage.

5.3.3 Pre-anodised components

The pre-anodised parts have to be coated within 72 hours.

5.4 Cleanliness and handling

The parts should be suspended and positioned on hangers and uncoupled and transported during manufacturing processes so that there can be no contamination with dust, sweat from hands, grease, electrolyte residue, condensation, damage, etc. Only touch the pretreated parts with clean gloves.

5.5 Application and thermal cross-linking or accelerated drying

5.5.1 General

The parts have to be coated in a suitable system.

The coated parts have to be dried or cross-linked thermally in a curing oven in accordance with the information provided by the material manufacturer (qualifying test).

Integrated gauges must constantly measure and record the circulating air temperature of the curing oven for three stationary points at least.

The layer thickness on the visible surfaces exposed to weathering (= labeled surface) must not be less than 50 μm and should not exceed 120 μm .

The measuring points have to be chosen so that the air temperature distribution of the curing oven can be ascertained accurately.

5.6 Technical laboratory equipment

5.6.1 General

A laboratory has to be available that is physically separate from the production facilities. It must be possible to carry out all factory production control tests in the laboratory.

Devices in every production site have to be functional.

Device failures and the failure dates have to be documented.

Repair and maintenance jobs should be presented to the inspector on request.

5.6.2 Standard equipment

- Two-layer thickness measuring devices that work using the eddy current method in accordance with ISO 2360
- Scales to determine the weight of the conversion / passivation layer and the pickling process to an accuracy of 0.1 mg
- Cutting devices and accessories for the cross-cut test in accordance with ISO 2409
- A device for the mandrel bend test in accordance with ISO 1519
- A device for testing adhesion and elasticity in the case of deformation (cupping test) in accordance with ISO 1520
- A device for the ball impact test in accordance with ASTM D 2794 (only required for powder coatings)
- Test equipment for the cross-linking test of the liquid paint coating (for coaters with liquid paint coating)
- A device for measuring the gloss in accordance with ISO 2813
- A gauge to record the object and circulating air temperature with at least three measurement points
- A conductivity gauge
- Devices for the boil test
- Devices for the layer detection of Cr-VI-pretreatments
- Devices for the quasi realtime pre-treatment monitoring (Introduction 1.1.2017)

5.6.3 Additional equipment for GSB Premium Coaters

- Colorimeter

5.7 Product and coating material store (GSB Master Coater / GSB Premium Coater)

5.7.1 Product store

The product to be coated (Al substrate) has to be stored so that the surface is not affected in a way detrimental to the quality of the coating, such as pre-corrosion or mechanical damage.

The information provided by the manufacturer must be taken into account.

5.7.2 Coating material store

The coating materials have to be stored in accordance with the information provided by the manufacturer. Any different storage conditions have to be arranged in writing with the manufacturer.

5.8 Product-characteristic and safety data sheets

Up-to-date technical data sheets and safety data sheets for all media used have to be made available for viewing at the relevant stages. Unobstructed access has to be ensured at all times. Checks on how up-to-date the data sheets are should be made at least once a year.

5.9 Quality assurance

5.9.1 Incoming goods check

The coating company must check the following as part of its duty of care:

- Process-relevant chemicals
- The coating material upon delivery
- Obvious surface imperfections of the material supplied to be coated

5.9.2 Factory production control (FPC)

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

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

It is advisable to produce at least one sample of every production batch. Before applying the coating material, the coating business must also check whether the processing parameters correspond with those of the qualifying test in accordance with the information in the list of approved systems (updated on the Internet). If there are changes, then they have to be reported in writing to the offices of GSB International without delay.

5.9.3 Additional requirement for GSB Premium Coaters

- Quality assurance system

Certification of the quality management system, preferably ISO 9001, is recommended.

If the Premium Coater is certified, they must submit a copy of the certificate to GSB.
- Colour measurement
 - Plain colours

Measurement of the standard and individual batches of different production runs of an object:

The results have to be recorded for Premium jobs.

It is advisable to comply with VdL-RL 10 “Richtlinie zulässige Farbtoleranzen für unifarbene Pulverlacke bei Architekturanwendungen” (Guidelines on permissible colour tolerances for plain-coloured powder paints used in architecture).
 - Metallic and effect paints

Instead of a colour measurement, a visual assessment is performed on metallic and effect paints using reference samples.
- Production journal

Premium Coaters have to keep a production journal (general documentation on production).
- Customer complaints

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

5.9.4 Scope of factory production control

5.9.4.1 Incoming goods check

		GSB Approved Coater and GSB Master Coater		GSB Premium Coater	
	Test	Minimum scope of the test	Documentation	Minimum scope of the test	Documentation
Coating material	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note	Every delivery	Yes, on delivery note
Coating substrate	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note	Every delivery	Yes, on delivery note
Chemicals	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note	Every delivery Visual inspection for cloudiness and flocculation	Yes, on delivery note Comparison of the analysis certificate with the previous delivery

5.9.4.2 Process check

	Test	GSB Approved Coater and GSB Master Coater		GSB Premium Coater	
		Minimum scope of the test	Documentation	Minimum scope of the test	Documentation
Pretreatment baths					
Immersion and spray pretreatment with automatic dosing	Bath analysis (temperature, concentration) In accordance with manufacturer's guidelines	1 x per day	Yes	1 x per day	Yes
Immersion and spray pretreatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes	1 x per shift	Yes
Immersion and spray pretreatment	Pickling rate	1 x per week	Yes	1 x per week	Yes
Conversion film baths containing chromium					
Immersion and spray pretreatment with automatic dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per day	Yes	1 x per day	Yes
Immersion and spray pretreatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes	1 x per shift	Yes
Conversion film	Coating layer	1 x per week	Yes	1 x per day	Yes
Passive layer baths – alternative pre-treatment Cr(VI)-free/Cr-free					
Immersion and spray pretreatment with automatic dosing	Bath analysis (temperature, concentration)	1 x per shift	Yes	1 x per shift	Yes
Passivation layer	Coating layer	In accordance with information provided by the manufacturer, at least daily	Yes	In accordance with information provided by the manufacturer, at least daily	Yes
quasi realtime pre-treatment monitoring (valid from 1.1.2017)	Resting potential analysis	2 x per week	Yes	2 x per week	Yes
Final rinse					
Dripping water	Conductivity	1 x per shift	Yes	1 x per shift	Yes
Retained water dryer					
Object temperature	Temperature with measuring strips or measuring device	1 x per week	Yes, with temperature measuring strips	3 x per week	Yes, with temperature measuring strips
Paint curing furnace					
Object temperature Retaining times and object temperatures in accordance with manufacturer's instructions	Temperature with measuring device with 3 object sensors	1 x per week	Yes, with temperature recording as evidence	3 x per week	Yes, with temperature recording as evidence
Alternatively: Evaluation of the heat equivalent	Temperature with measuring device with 3 object sensors	1 x per week	Yes, with temperature recording as evidence	3 x per week	Yes, with temperature recording as evidence

5.9.4.3 Testing finished parts and test sheets

	Test	GSB Approved Coater and GSB Master Coater		GSB Premium Coater	
		Minimum scope of the test	Documentation	Minimum scope of the test	Documentation
Layer thickness	Layer thickness	2 x per hour	Yes, minimum and maximum value	2 x an hour	Yes, minimum and maximum value
Gloss	Measurement of the gloss	4 x per day or upon every change of colour > 100 m ²	Yes, minimum and maximum value	4 x a day or upon every change of colour > 100 m ²	Yes, minimum and maximum value
Colour	Visual comparison with binding template (if arranged)	Upon every change of colour > 100 m ²	Yes	Upon every change of colour > 100 m ² Measurement with colorimeter (no metallics)	Yes
Adhesive strength	Cross cut	2 x per shift	Yes	Twice a shift, on finished products	Yes
Mechanical resilience	Drilling and sawing	2 x per shift	Yes	Twice a shift, on finished products	Yes
Quality of the pre-treatment (not for pre-anodising)	Boil test	2 x per shift	Yes	2 x per shift	Yes
Deformability	Cupping test mandrel bending test Ball impact test	2 x per shift	Yes	2 x per shift	Yes
Degree of cross linking (powder paint) Recommendation	Heat equivalent	1 x per week	Yes	3 x per week	Yes
Change of effect with metallics Recommendation	Caustic soda test	Each batch > 400 kg	Yes	Each batch > 400 kg	Yes
Degree of cross linking (liquid paint)	MEK-Test Buchholz hardness	2 x per shift	Yes	2 x per shift	Yes

5.9.4.4 Corrosion test (alternative pretreatment)

	Test	GSB master coater	
		Minimum scope of the test	Documentation
alternative pre-treatment	Acetic salt spray test	1 x per year	Yes
The AASS test in the first half year are carried out as part of the first monitoring test. The inspector takes samples for them. The tests are carried out in a test laboratory booked by GSB.			

5.9.4.5 Holding the additional test for additional label / test sheets

	Test	GSB master coater		GSB Premium Coater	
		Minimum scope of the test	Documentation	Minimum scope of the test	Documentation
Quality of the pre-treatment GSB - Sea Proof	Acetic salt spray test, FFC test	Every six months	Yes	Every six months	Yes
Quality of the pre-anodising Sea Proof Plus	Acetic salt spray test, FFC test	Every six months	Yes	Every six months	Yes
The AASS and FFC tests in the first half year are carried out as part of the first monitoring test. The inspector takes samples for them. The tests are carried out in a test laboratory booked by GSB. The coater can carry out the AASS and FFC tests in the second half of the year on their own initiative.					

5.9.5 Requirements of finished parts and test sheets

5.9.5.1 Powder coating

Test	Coating material Standard	Coating material Master	Coating material Premium
Layer thickness Thin layer powder Normal powder – colour-dependent Average coating thickness GSB Approved Coater, GSB Master Coater GSB Premium Coater	20 ≤ 40 μm ≥ 60 μm - ≤ 120 μm 50 – 120 μm 60 – 120 μm	20 ≤ 40 μm ≥ 60 μm - ≤ 120 μm 50 – 120 μm 60 – 120 μm	20 ≤ 40 μm ≥ 60 μm - ≤ 120 μm 50 – 120 μm 60 – 120 μm
Cross cut	GT0	GT0	GT0
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 --	20 inch/pound Permitted No removal of coating	20 inch/pound Permitted No removal of coating
Cutting, drilling, sawing (assessment with naked eye at distance of 20 – 30 cm)	No spalling of coating	No spalling of coating	No spalling of coating
Gloss 60° Nominal range for system approval Delivery tolerance	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E
Condensation constant atmosphere: Test period Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	1000 h 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 3	1000 h 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 2	1000 h 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 2
Condensation variable atmosphere (0.2l SOB _{2B}) Cycles Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	30 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 3	30 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 2	30 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 2
Pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)
Resistance to moisture	Max. ΔL* 4	Max. ΔL* 4	Max. ΔL* 3
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	AASS 1000 h d _{max.} ≤ 1 mm 0 (S0)	AASS 1000 h d _{max.} ≤ 1 mm 0 (S0)	AASS 1000 h d _{max.} ≤ 1 mm 0 (S0)
Degree of cross-linking			
Resistance to alkaline substances Colour and effect changes Change of colour and effect with metallics	Max. level 1 Max. stage 3	Max. level 1 Max. stage 2	Max. level 1 Max. stage 2
Adhesion of sealing compounds Adhesive failure Cohesive failure	Not permitted Permitted	Not permitted Permitted	Not permitted Permitted
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300 h ≥ 50 %	UV B (313 nm) 600 h ≥ 50 %	UV B (313 nm) 1000 h ≥ 50 %
Natural weathering - Florida Approximate test period (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL*, ΔC*	12 Max. 300 ≥ 50 % Part IV	36 Max. 840 ≥ 50 % Part IV	60 Max 1,400 ≥ 50% Part IV

5.9.5.2 Liquid paint

Test	Aluminium Standard	Aluminium Master	Aluminium Premium
Layer thickness	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines	In accordance with manufacturer's guidelines
Cross cut	GT0	GT0	GT0
Mandrel bending test Thermally cured paints Two-component liquid paints Cracking of coating Adhesive tape removal	≤ 5 mm ≤ 12 mm Not permitted No removal of coating	≤ 5 mm ≤ 12 mm Permitted No removal of coating	≤ 5 mm ≤ 12 mm Permitted No removal of coating
Cupping test Thermally cured paints Two-component liquid paints Cracking of coating Adhesive tape removal	≥ 5 mm ≥ 3 mm Not permitted No removal of coating	≥ 5 mm ≥ 3 mm Permitted No removal of coating	≥ 5 mm ≥ 3 mm Permitted No removal of coating
Cross-linking test MEK – test (only applies to thermally cured and two-component liquid paints)	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
Gloss 60° Nominal range for system approval Delivery tolerance	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E at ≤ 40 E ± 10 E at > 40 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E at ≤ 40 E ± 10 E at > 40 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E at ≤ 40 E ± 10 E at > 40 E
Condensation constant atmosphere: Test period Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	1000 h 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 3	1000 h 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 2	1000 h 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 2
Condensation variable atmosphere (0.2l SOB _{2B}) Cycles Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	30 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 3	30 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 2	30 0 (S0) d _{max.} ≤ 1 mm max. level 1 Max. stage 2
Pressure cooker test Degree of blistering Cross-cut + adhesive tape removal	0 (S0) GT 0/GT 1 (with adhesive tape removal)	0 (S0) GT 0/GT 1 (with adhesive tape removal)	0 (S0) GT 0/GT 1 (with adhesive tape removal)
Resistance to exposure to moisture ΔL*	Max. ΔL* 4	Max. ΔL* 4	Max. ΔL* 3
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	ASS 1000 h d _{max.} ≤ 1 mm 0 (S0)	ASS 1000 h d _{max.} ≤ 1 mm 0 (S0)	ASS 1000 h d _{max.} ≤ 1 mm 0 (S0)
Adhesion of sealing compounds Adhesive failure Cohesive failure	Not permitted Permitted	Not permitted Permitted	Not permitted Permitted
Resistance to alkaline substances Colour and effect changes Change of colour and effect with metallics	Max. level 1 Max. stage 3	Max. level 1 Max. stage 2	Max. level 1 Max. stage 2
Accelerated weathering TP Test duration Residual gloss	UV B (313 nm) 300 h ≥ 50 %	UV B (313 nm) 600 h ≥ 50 %	UV B (313 nm) 1000 h ≥ 50 %
Natural weathering - Florida (months) Approximate test period UV energy (MJ/m ²) Residual gloss Colour difference ΔL*, ΔC*	12 Max 300 ≥ 50 % Part IV	36 Max. 840 ≥ 50 % Part IV	60 Max 1,400 ≥ 50 % Part IV
The tests marked blue are checked as part of company and third-party monitoring.			

5.9.5.3 Additional labels for “Sea Proof” and “Sea Proof Plus”

Test	Sea Proof	Sea Proof Plus Only with pre-anodising
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	AASS 1000 h $d_{max.} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000 h $d_{max.} \leq 1 \text{ mm}$ 0 (S0)
Filiform corrosion test (FFC) Test period Thread length l_{max} Thread frequency H Key figure $F = H \times l$	1000 h $\leq 2 \text{ mm}$ 1/10 mm ≤ 0.3 No extensive infiltration	1000 h $\leq 2 \text{ mm}$ 1/10 mm ≤ 0.1 No extensive infiltration

6 Application

Application to obtain the quality label

The undersigned company submits their application for a licence for the **right to use the quality label**

- “Approved Coated Aluminium”*



- “Approved Coated Aluminium – MASTER”*



- “Approved Coated Aluminium – MASTER” and additional label “Sea Proof”*



- “Approved Coated Aluminium – MASTER” and additional label “Sea Proof Plus”*



- “Approved Coated Aluminium – PREMIUM” and additional label “Sea Proof”*



- “Approved Coated Aluminium – PREMIUM” and additional label “Sea Proof Plus”*



.....
Place and date

.....
Signature and company stamp

7 Sample certificate for coaters

 <p>MASTER Approved Coated Aluminium ☆☆</p> 	 <h2 style="text-align: center;">Verleihungs- urkunde</h2> <p>Die GSB INTERNATIONAL verleiht nach positiver Prüfung der Firma für die Betriebsstätte</p> <p>Firma / Company Adresse / Address Land / Country</p> <p>das Recht, das durch Eintragung beim Europäischen Patentamt warenzeichenrechtlich geschützte nebenstehend abgebildete Qualitätssiegel für die Stückbeschichtung von Bauteilen aus Aluminium mit der Firmen-Nr. xxx zu führen. Die Überwachung umfasst das beschichtete Produkt, den Beschichtungsprozess und die werkseigene Produktionskontrolle (WPK).</p> <p>Die Führung des Gütesiegels setzt voraus, dass die GSB Qualitätsrichtlinien AL 631 für dessen Verleihung erfüllt werden.</p> <p>Datum der Erstaussstellung: 03.05.1993</p> <p>Gültig bis: 31.07.2019</p> <p>Überwachung: 2 x jährlich</p> <p>GSB INTERNATIONAL e. V. Am Bonneshof 5, D – 40474 Düsseldorf 10.03.2016 / 10th March 2016</p>  <p>Vorsitzender des Vorstandes Chairman of the Board</p>	 <h2 style="text-align: center;">Conferment Certificate</h2> <p>GSB INTERNATIONAL awards after a positive initial test to the company for the establishment</p> <p>Registered company No. xxx</p> <p>the right to use its quality label for the coating process of aluminium building components which is a registered trademark at the European Patent Office and is shown left.</p> <p>The monitoring shall include the coated product, the coating process and the factory production control (FPC).</p> <p>The right to carry the quality label requires that the GSB Quality Regulations AL 631 are fulfilled.</p> <p>Date of first conferment: 1993/03/05</p> <p>Valid till: 2019/07/31</p> <p>Monitoring: twice a year</p>  <p>Vorsitzender des Güteausschusses Chairman of the Quality Committee</p>
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Part VI – Coaters Steel and Galvanized Steel

1 Being granted and holding the quality label for coating companies

GSB International will grant three classes of quality label and two additional labels to coaters aluminium who apply for them if the respective requirements in the quality guidelines are met.

1.1.1 Quality labels

Coating companies can obtain the quality label in the classes: GSB Approved Coater, GSB Master Coater and GSB Premium Coater.



1.2 Labelling of components

Quality labels attached directly onto coated components also have to include the company number shown here:



Company no.: 000

1.3 Application

The application has to be made in writing to GSB International (see section 5.9.5.3).

The application will be checked by the quality committee.

2 Granting the quality label

2.1 General

The coating business must meet the quality label requirements (see section 5).

2.2 Qualifying test

Two independent tests (qualifying test part 1 and part 2) are carried out.

At least three months must pass between qualifying test part 1 and part 2.

Part 1 is by appointment. All additional tests are without appointment.

The qualifying test is carried out in accordance with section 4.

If the qualifying test is positive, the board will grant the applicant the desired quality label on the quality committee's recommendation. A certificate is issued (see section 7).

If the qualifying test is failed, the quality committee will reject the application giving reasons in writing. However, the applicant can apply for a re-test of the failed part. If the re-test is also failed, then the applicant must first wait three months before reapplying.

3 Monitoring the quality label

3.1 General

The monitoring test in section 4 is performed at least twice a year for each coating business without appointment.

If the business passes the monitoring test, then it continues to have the right to hold the quality label and the additional label. Special notification will not be given.

3.2 Negative monitoring test

If the quality committee finds problems with quality assurance, it will suggest punitive action to the board of GSB International.

The action to be taken depends on the severity of the violation:

- 1) Additional requirements within the scope of factory production control
- 2) Increased fee-based monitoring
- 3) Repeat check
- 4) Contractual penalty up to €1,500
- 5) Temporary or permanent withdrawal of the quality label or material licence

The first four punitive measures can be combined. Measures 1- 3 are stipulated by the quality committee.

If the result of a re-test is negative, the holder will have their quality label withdrawn immediately.

If a holder of the quality label repeatedly or seriously breaches GSB ST 663, they will have their quality label withdrawn temporarily or permanently. The same applies to holders of quality labels who delay tests or prevent them.

GSB ST 663 also applies to deliveries already made if they clearly exhibit a poor coating quality and the origin of the deficient delivery is obvious.

If up to 10 % of the tested parts have a fault, additional factory production control regulations will be considered.

If more than 10 % of the tested parts have a fault, there could be a fine, fee-based third-party monitoring or a temporary or permanent withdrawal of the quality label.

The holder of the quality label must hear the transgressions before 5) is effected and has the option of having the delivery checked by the test institute that works for GSB International. If the test institute

finds the complaint to be justified, then the costs for this test will be borne by the holder of the quality label. If the complaint was unjustified, the complainant must bear the costs of the test.

The punitive action in this section becomes effective when it comes into legal force.

In urgent cases the chairman of GSB International can withdraw the quality label with immediate effect upon consultation with the chairman of the quality committee. This has to be confirmed by the board and quality committee within 14 days.

3.3 Re-award

If the right to use the quality label has been withdrawn, it can be re-applied for no earlier than three months hence.

The board of GSB International could, however, impose additional conditions.

4 Implementation of the monitoring tests

4.1 General

The coating business and the finished products are tested.

The inspector produces a test log and the coater, the offices of GSB International and the quality committee each receive a copy. Complaints must be supported with pictures or be confirmed by the coating business in writing.

The inspector can request or take samples from the coating business at any time. Such samples can also be taken in trading environments or from the recipient. Samples requested must be handed over without delay. The inspector can have a test performed on any operational system of the coating business at any time.

4.2 Plants

4.2.1 General

In these quality guidelines a plant consists of many stages of pretreatment including a retained water dryer, application unit(s) and curing oven. The number of plants is determined by the number of pretreatments and/or curing ovens.

1 plant:	1 pretreatment,	1 curing oven
2 plants:	2 pretreatments,	1 curing oven
	1 pretreatment,	2 curing ovens
	2 pretreatments,	2 curing ovens

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

4.2.2 Additional requirements for GSB Premium Coaters

GSB International has to be informed of the number of coating systems and be given information on which ones should be used for GSB Premium coating.

If the coater has a vertical system, then at least one horizontal system has to be named which must comply with the requirements of a Premium Coater. The systems named are tested regularly.

4.3 Test of the coating companies

The following equipment is tested:

- Fabrication facility
- Laboratory equipment
- Factory production control

4.4 Test of finished products

This test should only cover parts which the coating business has already checked and approved. Sufficient material has to be kept available for the test.

Random samples are taken as described in part VII.

All batches in the coating business that are ready for dispatch, have been prepared or are in storage have to be made accessible to the inspector upon request so that additional random samples can be taken.

5 Requirements of the coating company

5.1 General

The following table has an overview of what is required of the coating company, depending on the quality stages. Detailed requirements on the pretreatment of surfaces, application and thermal cross-linking or accelerated drying, organisation and training are explained in more detail in the following sections.

Requirements	Quality stages		
	GSB Approved Coater	GSB Master Coater	GSB Premium Coater
Surface pre-treatment			
Process sequence Cr-VI-free pretreatment documented	X	X	
Process sequence documented and stored with GSB			X
Approved surface pre-treatment procedure with annual monitoring test			X
Contact points on visible surfaces < 2 mm	X		
Final rinse	X	X	X
Drying of residual water	X	X	X
Immediate coating < 24 h	X	X	
Immediate coating < 12 h			X
Cleanliness and handling – pretreatment	X	X	X
Only touch pretreated parts with gloves	X	X	X
Application and thermal cross-linking or accelerated drying			
Coating cleanliness and handling	X	X	X
Monitoring curing conditions	X	X	X
Laboratory			
Standard equipment	X	X	X
Additional equipment			X
Product and coating material storage			
Defined storage conditions for the material to be coated		X	X
Defined storage conditions for the coating material		X	X
Quality check			
Documented quality management system			X
Provision of the product-characteristic and safety data sheets	X	X	X
Factory production control	X	X	X

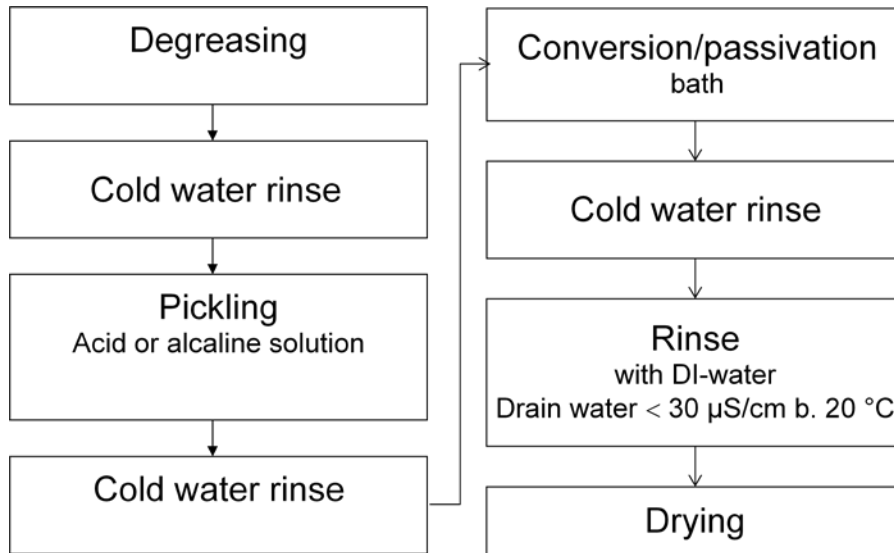
5.2 Surface pretreatment

5.2.1 General

The following procedures can be used:

- Mechanical surface pretreatment
- Chemical surface pretreatment¹
- Alternative pr-treatment procedure approved by GSB – chrome- or chrome(VI)-free.

Typical process flow chemical pre-treatment process flow:



The individual process flow should be tuned with the plant manufacturer and the chemical supplier. The individual process flow shall be documented and presented to the inspector on demand.

Before a coating can be applied to the metals described to decorate them or protect them against corrosion, the surface has to be smooth, free of grease and clean – i.e. all materials have to be removed that could impede the adhesion of the coating and the coating system, such as:

- Oxide layers, rolling scale, scale layers, products of corrosion (e.g. white rust)
- Rolling oils, greases
- Temporary corrosion protection agents
- Corrosion protection agents containing silicone
- Dust, dirt produced by handling, fingerprints
- Salts

Galvanised components with a chromate layer for temporary corrosion protection are pre-treated in accordance with EN 12487. The temporary corrosion protection is completely removed before pre-treatment. This might have to be coordinated with the pre-treatment manufacturer.

Other pre-treatment procedures can be used provided that they have been approved by GSB International.

The precise procedure for surface pre-treatment has to be coordinated with the client.

¹ Due to the REACH-Regulation (EU 348/2013) the use of Cr-VI containing solutions will be banned at September 21st, 2017 if no application for a certificate of exemption.

5.2.2 Additional requirement for GSB Premium Coaters

The process sequence for pretreatment has to be documented independently of the procedure and stored at the GSB offices.

An analysis certificate for the pretreatment chemicals has to be requested from the manufacturer and documented for every order.

The process sequence of every pretreatment system is approved separately by taking one coated product section during a monitoring test and having it tested by an accredited test institute for 480 h NSS test.

If different metals are regularly pretreated in the same pretreatment system, then the respective process steps have to be carried out completely separately. The maximum content of foreign ions has to be decided upon together with the pretreatment supplier and documented when storing the process sequence. The concentration of these ions has to be determined and documented after every pretreatment of foreign substrates (production diary.)

5.2.3 Suspension or positioning

5.2.3.1 Suspension or positioning (GSB Approved Coater)

The parts to be coated have to be suspended or positioned so that the contact points on a main surface that will later be visible are < 2 mm. The customer must be notified of this.

5.2.3.2 Suspension or positioning (GSB Master Coater and GSB Premium Coater)

The parts to be coated have to be suspended or positioned so that the contact points will not be on a main surface that will later be visible. Contact points are only permitted when they cannot be avoided and only if marked on the respective piece or on drawings (diagrams). The customer must be notified of this.

5.2.4 Mechanical surface pretreatment

Steel surfaces without a coating are prepared by blasting them with metallic (ISO 11124-1) or non-metallic (ISO 11126-1) abrasives. The degree of preparation has to comply with Sa 2 ½ in accordance with ISO 12944-4. For thin-walled components with a thickness of ≤ 3 mm, there is a danger of the components being deformed by the blasting.

Galvanised surfaces are prepared by sweep blasting them (ISO 12944-1) with non-metallic non-ferrous abrasives. Coatings must neither be penetrated at points nor worn down to the base by blasting. Lightly swept surfaces must have a uniform matt surface.

5.2.5 Chemical surface pretreatment

5.2.5.1 General

Frame constructions made of hollow profiles have to have sufficient rinse openings. The position and size have to be decided upon together by the client and contractor.

5.2.5.2 Chromating

Only galvanised surfaces are chromated and this is done in accordance with EN 12487. Mixed constructions made of ungalvanised and galvanised steel are not suitable for chromating. This does not apply to weld areas of galvanised steel profiles such as mitre cuts.

Ungalvanised areas (e.g. weld seams) have to be pre-treated mechanically. The degree of preparation has to conform to SA 2 ½, P St 3 or P Ma in accordance with ISO 12944-4 or conform to the coating system and corrosiveness class. If required, additional protection against corrosion, e.g. a suitable primer has to be planned.

5.2.5.3 Phosphating

The stipulations in EN 12476 apply to phosphating.

Phosphating is also suitable for steel, galvanised steel and mixed constructions made of ungalvanised and galvanised steel. Surfaces with temporary chromating cannot be given a phosphate coating.

The weight of the phosphate layer has to be between 1 and 5 g/m². Immediately following chemical pre-treatment, the parts have to be dried in a retained water dryer.

Ungalvanised areas (e. g. weld seams) have to be pre-treated mechanically. The degree of preparation has to conform to SA 2 ½, P St 3 or P Ma in accordance with DIN ISO 12944-4 or conform to the coating system and corrosiveness class. If required, additional protection against corrosion, e. g. a suitable primer has to be planned.

5.2.6 Alternative pretreatment procedures

5.2.6.1 General

Alternative pre-treatment procedures have to be approved by GSB International.

This concerns non-system-specific product approvals. This is why every coating business is required to test and document the compatibility of the pre-treatment system with their particular system and the respective coating material using a pressure cooker test with a subsequent cross cut and adhesive tape removal for every production batch. The work regulations of the manufacturer of the pre-treatment chemicals have to be complied with, e.g. rinsing with deionised water before application of the pre-treatment chemicals.

The layer thickness for alternative pre-treatment procedures including tolerances and how to determine them are decided upon and documented by the chemical supplier. The test method to determine the layer shall be available at the plant.

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

5.2.7 Final rinse

5.2.7.1 Rinse treatment

The products must be rinsed with deionised water so that the last water dripping off has a conductivity of $k_{20\text{ }^{\circ}\text{C}} < 30.0 \mu\text{S/cm}$.

Befogging of the passivated surface is not a final rinse. Nevertheless the conductivity shall be $k_{20\text{ }^{\circ}\text{C}} < 30.0 \mu\text{S/cm}$.

5.2.7.2 Final rinse or last rinse before the no-rinse treatment

It shall be possible to take a sample of the last water dripping off (inspection flap at a spray plant)

The products must be rinsed with deionised water so that the last water dripping off has a conductivity of $k_{20\text{ }^{\circ}\text{C}} < 30.0 \mu\text{S/cm}$.

5.2.8 Drying of residual water

Immediately following chemical or electro-chemical pretreatment, the parts have to be dried in a retained water dryer. The temperature of the object must not exceed 100 °C unless the manufacturer of the chemicals used for pretreatment of the surface has stated otherwise.

5.3 Interim transport

5.3.1 General

If the pre-treated parts are clean and dry, they should be coated immediately, and they must be coated within 24 hours. If unavoidable, then the parts have to be stored so that the conversion film is not dirtied by e. g. dust and damp. Protective action should be taken, e. g. covering with sheets.

Avoid interim storage.

5.3.2 GSB Premium Coater

The chemically pretreated parts have to be coated within 12 hours. Avoid interim storage.

5.4 Cleanliness and handling

The parts should be suspended and positioned on hangers and uncoupled and transported during manufacturing processes so that there can be no contamination with dust, sweat from hands, grease, electrolyte residue, condensation, damage, etc.

The pretreated parts are only permitted to be touched with clean gloves.

5.5 Application and thermal cross-linking or accelerated drying

5.5.1 General

The parts have to be coated in a suitable system.

The coated parts have to be dried or cross-linked thermally in a furnace in accordance with the information provided by the material manufacturer (qualifying test).

The nominal thickness of the coating structure must be conform to DIN 55633, DIN 55634 and ISO 12944-5. Differing nominal dry film thicknesses are to be agreed in advance in writing between the parties.

Integrated gauges must constantly measure and record the circulating air temperature of the curing oven for three stationary points at least.

The measuring points have to be positioned so that the air temperature distribution of the curing oven can be ascertained accurately.

The temperature of the parts to be coated has to be recorded and documented with a suitable gauge for at least three points.

5.6 Technical laboratory equipment

5.6.1 General

A laboratory has to be available that is physically separated from the production facilities. It must be possible to carry out all factory production control tests in the laboratory.

Devices in every production site have to be functional.

Device failures and the failure dates have to be documented.

Repair and maintenance jobs should be presented to the inspector on request.

5.6.2 Standard equipment

- Layer thickness gauge that works in accordance with the magnetic process pursuant to ISO 2178, or according to the magneto-inductive process and eddy current process pursuant to ISO 2808.
- It is advisable to use scales to determine the weight of the conversion / passivation layer and/or the pickling process to an accuracy of 0.1 mg.
- Cutting devices and accessories for the cross-cut test in accordance with ISO 2409
- A device for the mandrel bend test in accordance with ISO 1519
- A device for testing the adhesion and elasticity in the case of deformation (cupping test) in accordance with ISO 1520
- A device for the ball impact test in accordance with ASTM D 2794 (only required for powder coatings)
- Test equipment for the cross linking test of the powder coating using acetone and of the liquid coating using MEK
- A device for measuring the gloss in accordance with ISO 2813 (DIN 67 530)
- A measuring device for recording the object or circulating-air temperature with at least three measuring points (only for thermal curing paint systems)
- A conductivity measuring instrument for chemical surface pretreatment
- Devices for the boil test
- Devices for the layer detection of Cr-VI-pretreatments
- Devices for the quasi realtime pre-treatment monitoring (Introduction 1.1.2017)

5.6.3 Additional equipment for GSB Premium Coaters

- Colorimeter

5.7 Product and coating material store

5.7.1 Product store

The product to be coated has to be stored so that there can be no alterations to the surface that are detrimental to the quality of the coating, e.g. pre-corrosion or mechanical damage.

The information provided by the manufacturer must be taken into account.

5.7.2 Coating material store

The coating materials have to be stored in accordance with the information provided by the manufacturer. Any different storage conditions have to be arranged in writing with the manufacturer.

5.8 Product characteristic and safety data sheets

Current technical data sheets and safety data sheets of all media used have to be made available for viewing at the relevant stages. Unobstructed access has to be ensured at all times. Checks on how up-to-date the data sheets are should be made at least once a year.

5.9 Quality assurance

5.9.1 Incoming goods check

The coating company must check the following as part of its duty of care:

- Process-relevant chemicals
- The coating material upon delivery
- Obvious surface imperfections of the material supplied to be coated

5.9.2 Factory production control (FPC)

The coating company must constantly monitor its pre-treatment and production processes, record the results and store the test logs together with the accompanying correspondingly marked samples for five years or in accordance with legal provisions (this applies to production charges of over 100 m² or at a time interval of 2 h).

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

It is advisable to produce at least one sample of every production batch. Before applying the coating material, the coating business must also check whether the processing parameters correspond with those of the qualifying test in accordance with the information in the list of approved systems (updated on the Internet or appendix of the latest GSB News). If there are changes, then they have to be reported in writing to the offices of GSB International without delay.

5.9.3 Additional requirement for GSB Premium Coaters

- Quality assurance system

Certification of the quality management system, preferably ISO 9001, is recommended.

If the Premium Coater is certified, they must submit a copy of the certificate to GSB.

- Colour measurement

- Plain colours

Measurement of the standard and individual batches of different production runs of an object:

The results have to be recorded for Premium jobs.

It is advisable to comply with VdL-RL 10 "Richtlinie zulässige Farbtoleranzen für unifarbene Pulverlacke bei Architekturanwendungen" (Guidelines on permissible colour tolerances for plain-coloured powder paints used in architecture).

- Metallic and effect paints

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

- Production journal

Premium Coaters have to keep a production journal (general documentation on production).

- Customer complaints

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

5.9.4 Scope of the factory production control

5.9.4.1 Incoming goods check

		GSB Approved Coater and GSB Master Coater		GSB Premium Coater	
	Test	Minimum scope of the test	Documentation	Minimum scope of the test	Documentation
Coating material	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note	Every delivery	Yes, on delivery note
Coating substrate	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note	Every delivery	Yes, on delivery note
Chemicals	Delivery corresponds with delivery note	Every delivery	Yes, on delivery note	Every delivery Visual inspection for cloudiness and flocculation	Yes, on delivery note Comparison of the analysis certificate with the previous delivery

5.9.4.2 Process check

	Test	GSB Approved Coater and GSB Master Coater		GSB Premium Coater	
		Minimum scope of the test	Documentation	Minimum scope of the test	Documentation
Pretreatment baths					
Immersion and spray pretreatment with automatic dosing	Bath analysis (temperature, concentration) In accordance with manufacturer's guidelines	1 x per day	Yes	1 x per day	Yes
Immersion and spray pretreatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes	1 x per shift	Yes
Immersion and spray pretreatment	Pickling rate	1 x per week	Yes	1 x per week	Yes
Conversion film baths containing chromium					
Immersion and spray pretreatment with automatic dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per day	Yes	1 x per day	Yes
Immersion and spray pretreatment with manual dosing	Bath analysis (temperature, concentration) in accordance with information provided by the manufacturer	1 x per shift	Yes	1 x per shift	Yes
Conversion film	Coating layer	1 x per week	Yes	1 x per day	Yes
Passive layer baths – alternative pre-treatment Cr(VI)-free/Cr-free					
Immersion and spray pretreatment with automatic dosing	Bath analysis (temperature, concentration)	1 x per shift	Yes	1 x per shift	Yes
Passivation layer	Coating layer	In accordance with information provided by the manufacturer, at least daily	Yes	In accordance with information provided by the manufacturer, at least daily	Yes
quasi realtime pre-treatment monitoring (valid from 1.1.2017)	Resting potential analysis	2 x per week	Yes	2 x per week	Yes
Final rinse					
Dripping water	Conductivity	1 x per shift	Yes	1 x per shift	Yes
Retained water dryer					
Object temperature	Temperature with measuring strips or measuring device	1 x per week	Yes, with temperature measuring strips	3 x per week	Yes, with temperature measuring strips
Paint curing furnace					
Object temperature Retaining times and object temperatures in accordance with manufacturer's instructions	Temperature with measuring device with 3 object sensors	1 x per week	Yes, with temperature recording as evidence	3 x per week	Yes, with temperature recording as evidence
Alternatively: Evaluation of the heat equivalent	Temperature with measuring device with 3 object sensors	1 x per week	Yes, with temperature recording as evidence	3 x per week	Yes, with temperature recording as evidence

5.9.4.3 Testing finished parts and test sheets

	Test	GSB Approved Coater and GSB Master Coater		GSB Premium Coater	
		Minimum scope of the test	Documentation	Minimum scope of the test	Documentation
Layer thickness	Layer thickness	2 x per hour	Yes, minimum and maximum value	2 x an hour	Yes, minimum and maximum value
Gloss	Measurement of the gloss	4 x per day or upon every change of colour > 100 m ²	Yes, minimum and maximum value	4 x a day or upon every change of colour > 100 m ²	Yes, minimum and maximum value
Colour	Visual comparison with binding template (if arranged)	Upon every change of colour > 100 m ²	Yes	Upon every change of colour > 100 m ² Measurement with colorimeter (no metallics)	Yes
Adhesive strength	Cross cut	2 x per shift	Yes	Twice a shift, on finished products	Yes
Mechanical resilience	Drilling and sawing	2 x per shift	Yes	Twice a shift, on finished products	Yes
Quality of the pre-treatment	Boil test	2 x per shift	Yes	2 x per shift	Yes
Deformability	Cupping test mandrel bending test Ball impact test	2 x per shift	Yes	2 x per shift	Yes
Degree of cross linking (powder paint)	Aceton	1 x per shift	Yes	2 x per shift	Yes
Change of effect with metallics Recommendation	Caustic soda test	Each batch > 400 kg	Yes	Each batch > 400 kg	Yes
Degree of cross linking (liquid paint)	MEK-Test Buchholz hardness	1 x per shift	Yes	2 x per shift	Yes
Degree of cross linking (powder paint) Recommendation	Heat equivalent	1 x per week	Yes	3 x per week	Yes

5.9.4.4 Corrosion test (alternative pretreatment)

	Test	GSB master coater	
		Minimum scope of the test	Documentation
alternative pre-treatment	Acetic salt spray test	1 x per year	Yes
The NSS test in the first half year are carried out as part of the first monitoring test. The inspector takes samples for them. The tests are carried out in a test laboratory booked by GSB.			

5.9.5 Requirements of finished parts and test sheets

5.9.5.1 Powder coating

Test	Galvanized steel Standard	Galvanized steel Master	Galvanized steel Premium
Layer thickness Thin-film powder Normal powder - colour-dependent Average layer thickness	80 – 130 μm $\geq 80 \mu\text{m}$ Twin-layer system $\geq 130 \mu\text{m}$	80 – 130 μm $\geq 80 \mu\text{m}$ Twin-layer system $\geq 130 \mu\text{m}$	80 – 130 μm $\geq 80 \mu\text{m}$ Twin-layer system $\geq 130 \mu\text{m}$
Cross-cut	GT 0	GT 0	GT 0
Mandrel bending test Cracking of coating Adhesive tape removal	$\leq 5 \text{ mm}$ Permitted No removal of coating	$\leq 5 \text{ mm}$ Permitted No removal of coating	$\leq 5 \text{ mm}$ Permitted No removal of coating
Cupping test Cracking of coating Adhesive tape removal	$\geq 5 \text{ mm}$ Permitted No removal of coating	$\geq 5 \text{ mm}$ Permitted No removal of coating	$\geq 5 \text{ mm}$ Permitted No removal of coating
Cross-linking test	Aceton TEST No matting, no smudging	Aceton TEST No matting, no smudging	Aceton TEST No matting, no smudging
Ball impact test Cracking of coating Adhesive tape removal	10 inch/pound twin-layer system 20 inch/pound Single-layer system Not permitted No removal of coating	10 inch/pound twin-layer system 20 inch/pound Single-layer system Not permitted No removal of coating	10 inch/pound twin-layer system 20 inch/pound Single-layer system Not permitted No removal of coating
Scratch resistance	No penetration until the substrate	No penetration until the substrate	No penetration until the substrate
Gloss 60° Nominal range for system approval	$\pm 10 \text{ E}$ at $\leq 40 \text{ E}$ $\pm 15 \text{ E}$ at $> 40 \text{ E}$	$\pm 10 \text{ E}$ at $\leq 40 \text{ E}$ $\pm 15 \text{ E}$ at $> 40 \text{ E}$	$\pm 10 \text{ E}$ at $\leq 40 \text{ E}$ $\pm 15 \text{ E}$ at $> 40 \text{ E}$
Delivery tolerance	$\pm 5 \text{ E}$	$\pm 5 \text{ E}$	$\pm 5 \text{ E}$
Condensation constant atmosphere Test period Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	1000h 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 3	1000h 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 2	1000h 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 2
Condensation variable atmosphere (0.2l SOB _{2B})* Cycles Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	30 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 3	30 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 2	30 0 (S0) $d_{\text{max}} \leq 1 \text{ mm}$ max. level 1 Max. level 2
Pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)
Resistance to exposure to moisture	Max. $\Delta L^* 4$	Max. $\Delta L^* 4$	Max. $\Delta L^* 4$
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	NSS 480 h $d_{\text{max}} \leq 5 \text{ mm}$ 0 (S0)	NSS 480 h $d_{\text{max}} \leq 5 \text{ mm}$ 0 (S0)	NSS 480 h $d_{\text{max}} \leq 5 \text{ mm}$ 0 (S0)
Degree of cross-linking	ACETONE TEST No matting, no smudging	ACETONE TEST No matting, no smudging	ACETONE TEST No matting, no smudging
Resistance to alkaline substances Colour and effect changes Change of colour and effect with metallics	Max. level 1 Max. level 3	Max. level 1 Max. level 2	Max. level 1 Max. level 2
Adhesion of sealing compounds Adhesive failure Cohesive failure	Not permitted Permitted	Not permitted Permitted	Not permitted Permitted
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300 $\geq 50 \%$	UV B (313 nm) 600 $\geq 50 \%$	UV B (313 nm) 1000h $\geq 50 \%$
Natural weathering - Florida Approx. test period (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL^* , ΔC^*	12 Max. 300 $\geq 50 \%$ See part IV	36 Max. 840 $\geq 50 \%$ See part IV	60 Max. 140 $\geq 50 \%$ See part IV
Note:	For galvanized steel, as of the condensation constant atmosphere test, all further tests are carried out on a single layer		

5.9.5.2 Liquid coating

Test	Galvanized steel Standard	Galvanized steel Master	Galvanized steel Premium
Layer thickness	In accordance with manufacturer specifications	In accordance with manufacturer specifications	In accordance with manufacturer specifications
Cross-cut	GT 0	GT 0	GT 0
Mandrel bending test Thermally cured paints 2-component liquid paints Cracking of coating Adhesive tape removal	≤ 5 mm ≤ 12 mm Permitted No removal of coating	≤ 5 mm ≤ 12 mm Permitted No removal of coating	≤ 5 mm ≤ 12 mm Permitted No removal of coating
Cupping test Thermally cured paints 2-component liquid paints Cracking of coating Adhesive tape removal	≥ 5 mm ≥ 3 mm Permitted No removal of coating	≥ 5 mm ≥ 3 mm Permitted No removal of coating	≥ 5 mm ≥ 3 mm Permitted No removal of coating
Cross-linking test MEK – test (only applies to baking enamel and two-component liquid paints)	MEK TEST No matting, no smudging	MEK TEST No matting, no smudging	MEK TEST No matting, no smudging
Scratch resistance	No penetration until the substrate	No penetration until the substrate	No penetration until the substrate
Gloss 60° Nominal range for system approval Delivery tolerance	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E	± 10 E at ≤ 40 E ± 15 E at > 40 E ± 5 E
Condensation constant atmosphere Test period Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 3	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2	1000h 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2
Condensation variable atmosphere (0.2l SOB _{2B}) [*] Cycles Blistering Infiltration at cross-section Colour and effect changes Change of colour and effect with metallics	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 3	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2	30 0 (S0) d _{max} ≤ 1 mm max. level 1 Max. level 2
Pressure cooker test Degree of blistering Cross-cut + adhesive tape removal	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)	0 (S0) Gt 0/Gt 1 (with adhesive tape removal)
Resistance to exposure to moisture ΔL*	Max. ΔL* 4	Max. ΔL* 4	Max. ΔL* 4
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	NSS 480 h d _{max} ≤ 5 mm 0 (S0)	NSS 480 h d _{max} ≤ 5 mm 0 (S0)	NSS 480 h d _{max} ≤ 5 mm 0 (S0)
Resistance to alkaline substances Colour and effect changes Change of colour and effect with metallics	Max. level 1 Max. level 3	Max. level 1 Max. level 2	Max. level 1 Max. level 2
Adhesion of sealing compounds Adhesive failure Cohesive failure	Not permitted Permitted	Not permitted Permitted	Not permitted Permitted
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300 h ≥ 50 %	UV B (313 nm) 600 h ≥ 50 %	UV B (313 nm) 1000 h ≥ 50 %
Natural weathering - Florida Approx. test period (months); UV energy (MJ/m ²) Residual gloss Colour difference ΔL*, ΔC*	12 Max. 300 ≥ 50 % See part IV	36 Max. 600 ≥ 50 % See part IV	48 Max. 1.400 ≥ 50 % See part IV
Note:	For galvanized steel, as of the condensation constant atmosphere test, all further tests are carried out on a single layer.		

5.9.5.3 Steel

The coating systems for steel shall meet the requirements of 5.9.5.1 or 5.9.5.2 except the NSS test:

Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	NSS 720 h $d_{max} \leq 1 \text{ mm}$ 0 (S0)
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6 Application

Application to obtain the quality label

The undersigned company submits their application for a licence for the **right to use the quality label**

() Approved Coated Zinc & Steel – Standard



() Approved Coated Zinc & Steel – Master



() Approved Coated Zinc & Steel – Premium



.....
Place and date

.....
Signature and company stamp

7 Sample certificate for coaters steel and galvanized steel

 <p>MASTER Approved Coated Zinc & Steel ★★</p>		<h1>GSB</h1> <h2>INTERNATIONAL</h2>
	<h3>Verleihungs- urkunde</h3>	<h3>Conferment Certificate</h3>
	<p>Die GSB INTERNATIONAL verleiht nach positiver Prüfung der Firma für die Betriebsstätte</p>	<p>GSB INTERNATIONAL awards after a positive initial test to the company for the establishment</p>
	<p>Firma / Company Adresse / Address Land / Country</p>	
	<p>das Recht, das durch Eintragung beim Europäischen Patentamt warenzeichenrechtlich geschützte nebenstehend abgebildete Qualitätssiegel für die Stückbe- schichtung von Bauteilen aus Stahl mit der Firmen-Nr. xxx zu führen.</p>	<p>the right to use its quality label for the coating process of steel building components which is a registered trademark at the European Patent Office and is shown left. Registered company No. xxx</p>
	<p>Die Überwachung umfasst das beschichtete Produkt, den Beschichtungsprozess und die werkseigene Produktions- kontrolle (WPK).</p>	<p>The monitoring shall include the coated product, the coating process and the factory production control (FPC).</p>
	<p>Die Führung des Qualitätssiegels setzt voraus, dass die GSB Qualitätsrichtlinien ST 663 für dessen Verleihung erfüllt werden.</p>	<p>The right to carry the quality label requires that the GSB Quality Regulations ST 663 are fulfilled.</p>
	<p>Gültig bis: 31.07.2019</p>	<p>Valid till: 2019/07/31</p>
	<p>Überwachung: 2 x jährlich</p>	<p>Monitoring: twice a year</p>
	<p>GSB INTERNATIONAL e. V. Am Bonneshof 5, D – 40474 Düsseldorf 10.03.2016 / 10th March 2016</p>	
		
	<p>Vorsitzender des Vorstandes Chairman of the Board</p>	<p>Vorsitzender des Güteausschusses Chairman of the Quality Committee</p>

Part VII Measuring and Testing Methods

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1 General

The relevant requirements are set out in the corresponding tables:

Pretreatment	Part II section 4
Hot dip galvanizing	Part III section 5
Coating material	Part IV section 4
Requirements of finished parts and test sheets Aluminium	Part V section 5.9.5
Requirements of finished parts and test sheets steel	Part VI section 5.9.5

The instructions of the manufacturers have to be followed for installation and calibration the units.

2 Random Samples to be taken at the Coating Plant

The number of random samples to be taken during testing depends on the number of parts of the lot as set out in the table below:

Number of parts of the lot	Number of samples taken at random	Permissible number of failed samples
1 - 10	all	0
11 - 200	10	1
201 - 300	15	1
301 - 500	20	2
501 - 800	30	3
> 800	40	3

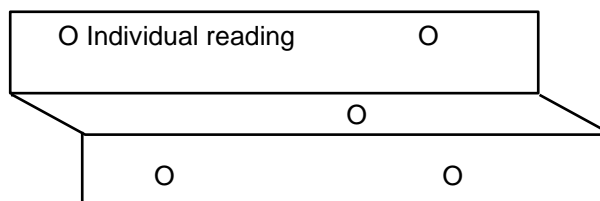
A lot consists of an entire order or a part order (charge) that is with the coater at the time of testing.

3 Film Thickness ISO 2360

Effects on the measuring device that may be caused by the composition of the substrate must be taken into account.

3.1 Evaluation in the coating plant

Each sample should be tested in a minimum of 5 places across the designated surface (1 cm²), distributed over the designated surface, one measurement has to be made.



If one of the individual readings shows less than 80 % of the required film thickness, the sample must be rejected as failed and recorded in the table in section 2 to the column 3.

The average reading taken at the 5 measuring points must correspond to the required film thickness as a minimum. If the average reading is below the required film thickness, but above the 80 % limit, the relevant sample must be rejected as failed and recorded in the above table in section 2 to the column 3.

The test result is deemed to be negative if the average reading taken from a sample is below 80 % of the required film thickness.

The assessment should be carried out in line with the following examples:

Example 1:	Measurement in μm : Assessment	58 64 70 64 60 This sample is entirely satisfactory.
Example 2:	Measurement in μm : Assessment	58 52 54 50 48 This sample is satisfactory because the average film thickness is above 50 μm and none of the measurement taken falls below 40 μm (80 % of 50 μm).
Example 3	Measurement in μm : Assessment	48 42 44 46 48 This sample is unsatisfactory and is therefore deemed as failed in line with section 2 in the table.
Example 4:	Measurement in μm : Assessment	58 52 54 50 38 This sample is unsatisfactory despite the fact that the average film thickness is above 50 μm , as the measurement of 38 μm falls below the tolerance limit of 80 % (40 μm). The sample is therefore deemed as failed.

The above does not apply for parts, which need to meet specific requirements on account of their geometric properties.

Specific requirements as specified by the client may also be excluded, provided these can be substantiated by an appropriate written agreement.

4 Visual Surface Assessment of Finished Goods

A visual assessment of the decorative appearance of the industrial manufactured surfaces in terms of the uniformity of colour, gloss and structure must be carried out without any measuring devices at a range of > 3 m for exterior parts and > 2 m for internal components. As a rule, all samples must be uniform in terms of gloss, colour and structure.

For the accurate evaluation of the overall uniformity in the appearance of building facades, it is recommended to extend the visual assessment range.

Any form of unevenness at the base of the surface such as scratches, drag marks and scars caused by corrosion or welding seams are to be discounted in the assessment of the quality of the coating.

Alternative visual assessment ranges and criteria may be agreed between the relevant contract partners.

5 Formability

5.1 Cross Cut Test ISO 2409

Cutter spacing: 2mm

5.2 Mandrel Bending Test ISO 1519

For coating materials of Master or Premium quality levels the assessment is concluded by an adhesive tape removal test as set out in section 9.

5.3 Erichsen Cupping Test ISO 1520

The Erichsen Cupping test is carried out in accordance with ISO.

For coating materials of Master or Premium quality levels the assessment is concluded by an adhesive tape removal test as set out in section 9.

5.4 Impact Test (Powders) ASTM D 2794

The impact test applies to powder coating materials only.

The test must be executed at 20 inch-pounds using a weight diameter of 15.9 mm, 70 μm +/- 10 μm of film thickness one hour after coating at a temperature of 20 °C to 25 °C. The result must be assessed by the naked eye.

For coating materials of Master or Premium quality levels the assessment is concluded by an adhesive tape removal test as set out in section 9.

6 Scratching Test ISO 1518-1.

7 Cross-Linking Tests

7.1 MEK-Test (for Stoving and Two-Component Liquid Lacquers)

A 5 cm square 4-layer paper fleece is placed on the surface to be tested, then soaked with 1 ml MEK (Methyl Ethyl Ketone) and covered immediately with a watch glass. Processing time: 2 min.

All residual solvent must be wiped away immediately on the removal of the paper.

Prior to hardness testing the sample must be aged artificially for 60 min. at 120 °C. The subsequently measured Buchholz Hardness must be at least 80 (at a depression length of \cong 1.25 mm). There must be no disturbances to the surface (such as wrinkling, loss of gloss, gloss reduction, flaking etc.).

7.2 Aceton test

See 7.2. Instead of 1 ml MEK use 1ml Aceton.

8 Adhesive Tape Removal

The adhesive tape is placed firmly onto the coated surface of the sample sheet after mechanical deformation in accordance with DIN EN ISO 2409, avoiding the formation of cavities or air pockets. After one minute the adhesive tape is removed swiftly at a right angle to the surface. The result must be assessed by the naked eye.

9 Milling and Drilling

The coated building components must be able to withstand treatment with conventional tools and cutting equipment without showing any signs of flaking or splitting in the coating. These tests must be carried out on suitable samples (i. e. profiled parts) that have been pretreated and coated appropriately.

10 Condensation Atmosphere with Constant Humidity ISO 6270-2

Prior to exposure the samples must be cross cut (Andreas Cross) using a scratching stylus according to Sikkens (1 mm).

Assessment: Degree of blistering in accordance with ISO 4628-2
Infiltration at the cut in accordance with ISO 4628-8

11 Condensation Atmosphere with Changing Humidity ISO 3231 (0.2 l SO₂).

The test is carried out in accordance with Prior to exposure the samples must be cross cut (Andreas Cross) using a scratching stylus according to Sikkens (1 mm).

Assessment: Degree of blistering in accordance with ISO 4628-2
Infiltration at the cross cut in accordance with ISO 4628-8

12 Salt Spray Test

• Neutral Salt Spray Test

The test is carried out in accordance with ISO 9227 (NSS=SS). Prior to exposure the samples must be cross cut (Andreas Cross) using a scratching stylus according to Sikkens (1 mm).

Assessment: Degree of blistering in accordance with ISO 4628-2
Infiltration at the cross cut in accordance with ISO 4628-8

• Acid Salt Spray Test

- The test is carried out in accordance with ISO 9227 (AASS=ESS). Prior to exposure the samples must be cross cut (Andreas Cross) using a scratching stylus according to Sikkens (1 mm).

Assessment: Degree of blistering in accordance with ISO 4628-2
Infiltration at the cross cut in accordance with ISO 4628-8

13 Filiform Corrosion Test (ISO 4623-2)

13.1 Procedure

The samples must be cut using a scratching stylus according to Sikkens (1 mm).

13.2 Assessment

The assessment is made by evaluating the relevant samples. If the fibrils are very fine or difficult to detect, the samples should be stripped prior to their evaluation (the stripping solution must not interact or attack the aluminium substrate). The fibril length is determined by measuring the distance between the mechanical damage (drag / cut mark) and the head of the fibril below 90 °. Fibril curving is to be discounted in the measurement. Counting the fibrils along the cut mark assesses the fibril frequency.

Fibril frequency (H) is evaluated to the left and right of the cut mark, whereby 5 mm at either end of the mark are to be discounted.

All horizontal and vertical corrosion fibrils to the left and right of the cut mark must be examined, whereby only the cut mark that shows the most obvious damage should be assessed on each sample. At least 2 samples have to be tested.

The average fibril length l (mm) and fibril frequency is taken and used to determine the coefficient F of the filiform corrosion.

$H = Z/L$	$F = l * H$	$l =$	mean fibril length (mm)
		$Z =$	number of fibrils
		$L =$	length of the drag / cut mark (mm)
		$H =$	fibril frequency
		$F =$	coefficient denoting the level of filiform corrosion

14 GSB-Boiling Water or Pressure Cooker Test

If blistering occurs during either the boiling water or pressure cooker test, a further sample must be coated using commercially available chromated aluminium sheeting and re-tested. If the blistering of the coating recurs, the test result is deemed to be negative.

14.1 GSB-Boiling Water with Cross Cut and Adhesive Tape Removal Test

Two hours in boiling deionised water followed by the immediate assessment of the surface.

Subsequently the sample must be rested for one hour at room temperature prior to the execution of the cross cut or the cross cut with adhesive tape removal test.

14.2 Steam Cooker Test EN 12206-1 with Cross Cut and Adhesive Tape Removal

The sample must be dipped in such a way that a maximum length of 25 mm is immersed in the water. The sample must be tested in the steam cooker for one hour at an excess pressure of 100 + 10 kPa.

After cooling the sample is visually assessed.

Once the sample has been rested at room temperature for one hour, the cross cut test with adhesive tape removal concludes the test.

15 Resistance to Moisture

15.1 Application and Purpose

This is to assess the suitability of coated aluminium building components for storage under the influence of condensation and temperature in closed / wrapped conditions.

This process requires lower moisture levels than the constant condensation or boiling water tests at increased temperatures.

15.2 Procedure

Five round filters Kat. Nr. 1001-055 with a diameter of 55 mm of the company Whatman are placed on top of each other onto an appropriately coated sample and are then saturated with 1.5 ml + 0.1 ml of fully demineralised water. The damp paper inserts are pressed down gently and are then covered with a watch glass. The watch glass is taped to the sample using insulating tape (Scotch Super 33+ of 3M) to ensure that no moisture can escape.

The so prepared sample is then stored for 4 hours \pm 5 min. in a drying cupboard at a sample temperature (peak metal temperature) of $T_{\text{Sample}} = 58 \pm 2$ °C. After cooling for 15 minutes, the watch glass and filter paper inserts are removed from the sample. The sample is conditioned at room temperature ($T = 23 \pm 2$ °C) for a period $t = 20 + 2$ h.

15.3 Assessment

To assess any colour changes, the colour of both an exposed and unexposed reference sample must be measured at three spots excluding gloss. The mean value is assessed. In addition the TC will visually assess the samples.

16 Adhesion of Sealant

An appropriately coated sample is cleaned with a paper napkin soaked in Isopropanol. Vertical and horizontal wiping must not cause any traces of lacquer to be detected on the napkin and the coated surface must not show any damage.

After 5 minutes approx two 100 mm long tracks of the relevant sealant, which is pre-determined by the TC (currently DC 791 Dow Corning) are applied. Alternative sealants may be used, provided the GSB International has been pre-advised accordingly by the material manufacturer and the sealant is recorded in the technical data sheet.

The sample is then stored at room temperature and 50 % relative moisture for a period of 7 days to bond the sealant, after which the adhesion of the first sealant track is examined, whereby the track is removed by hand, a small cut with a knife to the sealant as starting point is possible.

The sample is then stored in de-ionised water (conductivity $< 10\mu\text{S} / \text{cm}^2$) for a period of 7 days, on completion of which the second track of sealant is examined.

The applicability of the coating for structural glazing cannot be derived from this test.

17 Resistance to alkaline substances

17.1 Mortar test

Produce a mortar of 15 g of slaked lime, 41 g of cement and 244 g of sand with enough tap water, so that a smooth paste results (EN 12206-1).

Then the wet mortar composition - to the extent of about 5 cm \varnothing - apply to the coated samples at least 24 hours in advance. Then expose immediately the samples for 24 hours a 95-100 % relative humidity at T = 40 °C.

After removal of the mortar an acid dip in accordance with AAMA 603-98 can be used to remove the remaining acid lime scale. On the tested sample area a circular filter Cat. No. 1001-055, company Whatman \varnothing 55 mm, is placed. This is impregnated with 1.5 ml of a 10 % Hydrochloric Acid. After a contact time of 15 min, the sample is thoroughly cleaned with de-ionized water and dried. After 24 h in the cabinet the mortar has to be easy to remove without residue.

Let it dry and inspect the coating with normal or corrected eyesight.

Mechanical damage of the coating by sand particles is not taken into account. The evaluation of the metallic effect change is made in accordance with section 24.

If effect lacquers are to be used, which show an effect modification after the mortar test (see section 23) ≥ 3 this must be granted by the customer a written confirmation of acceptance. A mandatory submission of in the mortar test audited specimen shall be initialed by all parties.

17.2 GSB-Caustic soda test (alternative)

1ml NaOH-solution (2N) is dropped on the coated surface and covered with a watch glass. After 60 min the watch is removed. The Solution have to be absorbed by using a soft vlies. The surface should be rinsed by tap water and dried with a towel.

The evaluation must be carried out in accordance to Chapter 24.

Note: The test is not recommend for micaceous iron colours.

18 Colour Measurement

18.1 General

3 separate colour measurements are taken at different points at a minimum distance of 50 mm from each other on both the exposed and unexposed reference sample.

The arithmetic average is then taken from the colour measurements.

The conditions for metric colour measuring are as follows:

- A spectrometer or tribasic measuring device should be used in accordance with DIN 5033 part 4 and part 6;
- The graduation applicable is d/8/Spex. under exclusion of gloss values or 45/0;
- The colour metric assessment must be carried out for the standard illuminant D65 and the 10-degree standard observer in accordance with ISO 11664-2 and DIN 5033 part 7;
- The co-ordinates are calculated according to the CIELAB-colour graduation formula in accordance with ISO 11664-4 for both the exposed and the reference sample and the difference ΔL^* and ΔC^*_{ab} must be documented accordingly.

The differences are rounded to integer numbers and must not exceed the limits (basic measuring geometry 45/0). In case the thresholds are exceeded, the TC will visually assess the samples. If there is no matching RAL colour, the limits for the most similar RAL-colour should be used as a reference. The assignment may be done visually or using the colour metric method.

On application, the final decision and examination can be made by the "Bundesanstalt für Materialforschung und -prüfung (Federal Institute of Material Research) (BAM)" in Berlin using a spectrophotometer with a measuring geometry of d8/Spex. or 45/0.

18.2 Colour Difference ΔL^* , ΔC^* after Weathering

The colour measuring takes place according to ISO 11664-4, light type D65/10°, measuring geometry 45/0.

19 Gloss Measurement (Reflectometer Values)

Measuring with a reflectometer must be carried out in accordance with ISO 2813 (DIN 67 530) at a radiation angle of 60° for all tests. Reflectometer values must be documented in units (E).

Exception: Matt lacquer surfaces with a reference value of ≤ 40 E (measured at 60°) may on agreement be measured at a 85° geometry.

20 Weathering

20.1 Accelerated Weathering QUV-B (313 nm)

This test is carried out in accordance with ISO 16474-3, using accelerated weathering equipment QUV/SE with Solar Eye adjustment.

Emitter:	UVB-313 nm	
Cycle:	4 h dewing,	T = 40 °C +/- 2 °C
	4 h radiation,	T = 50 °C +/- 2 °C
Emission:	0,75 W/m ² /nm	

Alternative: Accelerated Weathering Equipment from Atlas „UV Test – UV Fluoreszenz lamp device”

20.2 Natural Weathering in Florida

The gloss and colour thresholds stipulated in the QR valid at the start of the natural weathering will be used for assessment. Dimension of samples: 100 x 300 x 0.7-0.8 (mm) (samples thickness is no binding). The gloss and colour threshold stipulated at the start of the natural weathering will be used for assessment.

- **Standard Coating Systems**

For a period of approx. 12 months from April on, the samples must be exposed to natural weather conditions in Florida at an inclination of 5° in a southerly direction until 300 MJ/m² TUVR (total UV-radiation) is reached. Prior to measuring reflectometer values, the samples should be cleaned applying gentle pressure, using a soft sponge with a 1 % aqueous solution of a wetting agent and then rinsed with de-mineralized water. As far as possible, the surface should be uniform and free from contamination.

- **Master Coating Systems**

For a period of approx. 36 months from April on, the samples must be exposed to natural weather conditions in Florida at an inclination of 45° in a southerly direction until 840 MJ / m² TUVR is reached.

Every 6 months, the samples should be cleaned applying gentle pressure using a soft sponge with a 1 % aqueous solution of a wetting agent and then rinsed with de-mineralized water. As far as possible, the surface should be uniform and free from contamination.

- **Premium Coating Systems**

For a period of approx. 60 months from April on, the samples must be exposed to natural weather conditions in Florida at an inclination of 45° in a southerly direction until 1.400 MJ / m² TUVR is reached. Every 6 months, the samples should be cleaned applying gentle pressure using a soft sponge with a 1 aqueous solution of a wetting agent and then rinsed with de-mineralized water. As far as possible, the surface should be uniform and free from contamination.

20.3 Natural Weathering in Hoek van Holland

Size of Samples: Sheets: Approx.10 x 20 cm

Profiles: Depending on the type of profiles used in the field trial, length approx. 10-30 cm

Samples are exposed and assessed once annually in April / May. The total period of exposure is 10 years. Samples are positioned at an inclination of 45° in a southerly direction. Interim assessments are carried out annually, whereby the samples should be cleaned with water prior to their assessment.

Assessed will be infiltration, fibril length and frequency.

After 3, 5 and 10 years an interim report has to be done for the pretreatment manufacturer and GSB International.

21 Measuring Conductivity

Measurements are taken of the conductivity of the water, which drips from the pre-treated objects that have undergone the final rinse with de-ionised water. Additional measurements are taken at the spray valves and in the storage vessel used for the final rinse.

The dripping water is gathered in a suitable vessel (glass beaker), which must be clean.

The device used to measure the conductivity must be tested with a suitable calibrating solution and adjusted to the relevant range. For devices that work without temperature compensation, the water temperature must be controlled and the device adjusted accordingly.

22 Test Procedures to assess Etching Rate

Samples of a minimum length of 10 cm must only be used once.

- **Preparation of Samples**

Surfaces must be cleaned with Acetone or Isopropanol.

Weighting of samples with the analytical balance (accuracy +/- 0.1 mg).

- **Treatment of Samples**

Samples must be handled in manufacturing conditions. Depending on the pretreatment plant, samples should be taken as follows from the production process:

- a. Pretreatment dip: Sample to be taken prior to chromate treatment / alternative pretreatment
or
sample to be taken prior to the drying of adhering water, removal of conversation / passivation coating by stripping the conversion layer
(Nitric Acid 65 %, density 1.4g / cm³, for 5-10 minutes at a temperature of 25 °C)

- b. Spray Installation

- **Assessment of the Etching Rate**

- a. Samples to be dried at 80 °C
- b. Weighting of samples with the analytical balance (accuracy +/- 0.1 mg)
- c. Calculation of the etching rate (loss of weight / sample surface)

23 Test Procedures for the Assessment of the Mass Loss per Unit Area

The thickness of the chemical pretreatment layer (chromate treatment or alternative pretreatment) is evaluated in accordance with the manufacturer's instructions. If there are no documented procedures, the following applies, whereby it is a pre-condition that the relevant chemical pretreatment may be removed with 65 % Nitric Acid at a temperature of 25 °C. This procedure can only be used for freshly generated pretreatment films.

Samples of a minimum length of 10 cm must only be used once.

- **Treatment of Samples**

- a. The samples must be pretreated in manufacturing conditions.
- b. Samples to be taken after chromate treatment / alternative pretreatment once drying from adhering water has taken place. Samples should be left to cool at 20 – 23 °C.
- c. Weighting of samples with the analytical balance (accuracy +/- 0.1 mg).
- d. Removal of conversation / passivation coating by stripping of the chemical pretreatment layer with Nitric Acid 65 %, density 1.4 g/cm³ for 5 -10 minutes at a temperature of 25 °C.

- **Calculating the Weight of the Chemical Pretreatment**

- a. Samples to be dried at 80 °C – Samples to be left to cool at 20-23 °C.
- b. Weighting of samples with the analytical balance (accuracy +/- 0.1 mg).
- c. Calculation of the etching rate (loss of weight / sample surface) in mg / m².

24 Assessment of Changes to the Metallic Effect

Any changes to the finish must be evaluated in accordance with ISO 4628 part 1 within the under mentioned parameters:

Grade 1	No difference between the exposed sample and unexposed surface
Grade 2	Barely visible changes to colour and finish
Grade 3	Visible changes to colour and finish
Grade 4	Clearly visible changes to colour and finish
Grade 5	Distinct changes to colour and complete loss of finish

The samples are evaluated in accordance with a reference table, available at the GSB head office.

25 Dye Spot Test to detect the “Open Porosity” of the Oxide Layer

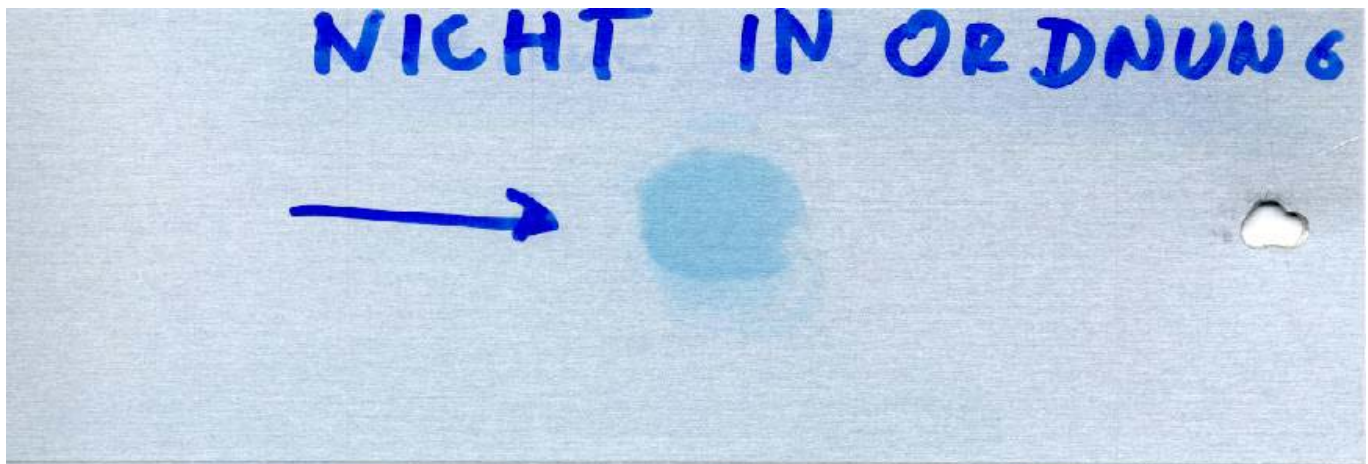
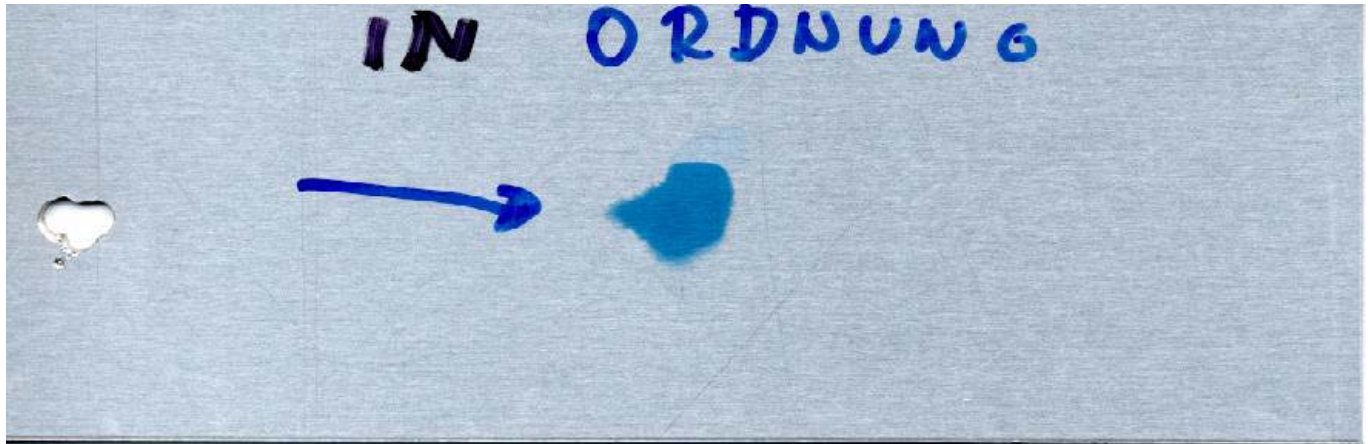
(In accordance to ISO 2143)

Prior to coating the dye spot test with Sanodal Blue 2 LW has to be applied to five different profile areas at the batch with third party pre-anodizing.

The use of dry and clean gloves is compulsory during the test.

Apply one drop of the dye solution (5 g/l Sanodal Blue 2LW pH 5.7 +/- 0.5) to the pre-anodised and properly rinsed surface of the sample profile for 1 minute and remove it using a soft cloth.

Is the result negative for the first time, repeat the test immediately.



As a reference for the “open porosity” of the oxide layer a specimen could be used treated with one drop of an acid solution and properly rinsed with demineralised water prior to applying the test solution.

(Acid solution: 25 ml/l H_2SO_4 (density: $\rho_{20}=1.84$ g/ml) and 10 g/l KF).

Teil VIII Standards and Guidelines

AAMA 2603-02	Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panel - 2002
ASTM D 2794	Prüfung von organischen Beschichtungen auf Beständigkeit gegen schnelle Verformung; Schlagbeanspruchung, genehmigt: 2010 Standard test method for resistance of organic coatings to the effects of rapid deformation (impact), edition 1993, reapproved: 2010
DIN 5033-7	Farbmessung; Messbedingungen für Körperfarben, Ausgabe: 2014-10 Colorimetry; Measuring conditions for object colors, edition: 2014-10
DIN 55633	Beschichtungsstoffe - Korrosionsschutz von Stahlbauten durch Pulverbeschichtungssysteme - Bewertung der Pulverbeschichtungssysteme und Ausführung der Beschichtung, Ausgabe: 2009-04 Paints and varnishes - Corrosion protection of steel structures by powder coating systems - Assessment of powder coating systems and execution of coating, edition 2009-04
DIN 55634	Beschichtungsstoffe und Überzüge - Korrosionsschutz von tragenden dünnwandigen Bauteilen aus Stahl, Ausgabe: 2010-04 Paints, varnishes and coatings - Corrosion protection of supporting thin-walled building components made of steel, edition: 2010-04 Nachfolge DIN 55928-8 Succession DIN 55928-8
EN 1090-3	Ausführung von Stahltragwerken und Aluminiumtragwerken - Teil 3: Technische Regeln für die Ausführung von Aluminiumtragwerken; Deutsche Fassung EN 1090-3:2008 Execution of steel structures and aluminium structures - Part 3: Technical requirements for aluminium structures; German version EN 1090-3:2008
EN 1999-1-1	Eurocode 9: Bemessung und Konstruktion von Aluminiumtragwerken - Teil 1-1: Allgemeine Bemessungsregeln; Deutsche Fassung EN 1999-1-1:2007 + A1:2009 + A2:2013 Eurocode 9: Design of aluminium structures - Part 1-1: General structural rules; German version EN 1999-1-1:2007 + A1:2009 + A2:2013
EN 10130	Kaltgewalzte Flacherzeugnisse aus weichen Stählen zum Kaltumformen - Technische Lieferbedingungen; Deutsche Fassung EN 10130, Berichtigung zu DIN EN 10130: 2007 Cold rolled low carbon steel flat products for cold forming Technical delivery conditions; German version EN 10130, correction to Din EN 10130: 2007
EN 10143	Kontinuierlich schmelztauchveredeltes Blech und Band aus Stahl - Grenzabmaße und Formtoleranzen; Deutsche Fassung EN 10143, Berichtigung zu DIN EN 10143: 2006 Continuously hot-dip coated steel sheet and strip - Tolerances on dimensions and shape; German version EN 10143, correction to DIN EN 10143: 2006

EN 10346	<p>Kontinuierlich schmelztauchveredelte Flacherzeugnisse aus Stahl zum Kaltumformen - Technische Lieferbedingungen; Deutsche Fassung EN 10346:2015</p> <p>Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions; German version EN 10346:2015</p>
EN 12206-1	<p>Beschichtungsstoffe - Beschichtungen auf Aluminium und Aluminiumlegierungen für Bauzwecke – Teil 1: Beschichtungen aus Beschichtungspulvern; Deutsche Fassung EN 12206-1:2004</p> <p>Paints and varnishes - Coating of aluminium and aluminium alloys for architectural purposes – Part 1: Coatings prepared from coating powder; German version EN 12206-1:2004</p>
EN 12487	<p>Korrosionsschutz von Metallen - Gespülte und no-rinse Chromatierüberzüge auf Aluminium und Aluminiumlegierungen; Deutsche Fassung EN 12487:2007</p> <p>Corrosion protection of metals - Rinsed and non-rinsed chromate conversion coatings on aluminium and aluminium alloys; German version EN 12487:2007</p>
EN 15773	<p>Industrielle Pulverbeschichtung von feuerverzinkten und sherardisierten Gegenständen aus Stahl [Duplex-Systeme] - Spezifikationen, Empfehlungen und Leitlinien; Deutsche Fassung EN 15773:2009</p> <p>Industrial application of powder organic coatings to hot dip galvanized and sherardized steel articles [duplex systems] - Specifications, recommendations and guidelines; German version EN 15773:2009</p>
ISO 1518-1	<p>Beschichtungsstoffe - Bestimmung der Kratzfestigkeit - Teil 1: Verfahren mit konstanter Last, Ausgabe: 2011-06</p> <p>Paints and varnishes - Determination of scratch resistance - Part 1: Constant-loading method, edition: 2011-06</p>
ISO 1520	<p>Beschichtungsstoffe – Tiefungsprüfung (ISO 1520:2006); Deutsche Fassung EN ISO 1520:2006</p> <p>Paints and varnishes – Cupping test (ISO 1520:2006); German version EN ISO 1520:2006</p>
ISO 1461	<p>Durch Feuerverzinken auf Stahl aufgebraute Zinküberzüge (Stückverzinken) – Anforderungen und Prüfungen (ISO 1461:2009); Deutsche Fassung EN ISO 1461:2009</p> <p>Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods (ISO 1461:2009); German version EN ISO 1461:2009</p>
ISO 1463	<p>Metall- und Oxidschichten - Schichtdickenmessung - Mikroskopisches Verfahren (ISO 1463:2003); Deutsche Fassung EN ISO 1463:2004, Ausgabe 2004-08</p> <p>Metallic and oxide coatings - Coating thickness measurement - Microscopical method (ISO 1463:2003); German version EN ISO 1463:2004, edition 2004-08</p>
ISO 1519	<p>Beschichtungsstoffe - Dornbiegeversuch (zylindrischer Dorn) (ISO 1519:2011); Deutsche Fassung EN ISO 1519:2011</p> <p>Paints and varnishes - Bend test (cylindrical mandrel) (ISO 1519:2011); German version EN ISO 1519:2011</p>

ISO 2143	<p>Anodisieren von Aluminium und Aluminiumlegierungen - Abschätzung der Anfärbbbarkeit von anodisch erzeugten Oxidschichten nach dem Verdichten - Farbtropfentest mit vorheriger Säurebehandlung (ISO 2143:2010); Deutsche Fassung EN ISO 2143:2010</p> <p>Anodizing of aluminium and its alloys - Estimation of loss of absorptive power of anodic oxidation coatings after sealing - Dye-spot test with prior acid treatment (ISO 2143:2010); German version EN ISO 2143:2010</p>
ISO 2178	<p>Nichtmagnetische Überzüge auf magnetischen Grundmetallen - Messen der Schichtdicke - Magnetverfahren (ISO 2178:1982); Deutsche Fassung EN ISO 2178:2015</p> <p>Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method (ISO 2178:1982); German version EN ISO 2178:2015</p>
ISO 2360	<p>Nichtleitende Überzüge auf nichtmagnetischen metallischen Grundwerkstoffen - Messen der Schichtdicke - Wirbelstromverfahren (ISO 2360:2003); Deutsche Fassung EN ISO 2360:2004</p> <p>Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating thickness - Amplitude-sensitive eddy current method (ISO 2360:2003); German version EN ISO 2360:2004</p>
ISO 2409	<p>Beschichtungsstoffe - Gitterschnittprüfung (ISO 2409:2013); Deutsche Fassung EN ISO 2409:2013</p> <p>Paints and varnishes - Cross-cut test (ISO 2409:2013); German version EN ISO 2409:2013</p>
ISO 2808	<p>Beschichtungsstoffe - Bestimmung der Schichtdicke (ISO 2808:2007); Deutsche Fassung EN ISO 2808:2007</p> <p>Paints and varnishes - Determination of film thickness (ISO 2808:2007); German version EN ISO 2808:2007</p>
ISO 2810	<p>Beschichtungsstoffe - Freibewitterung von Beschichtungen - Bewitterung und Bewertung (ISO 2810:2004); Deutsche Fassung EN ISO 2810:2004</p> <p>Paints and varnishes - Natural weathering of coatings - Exposure and assessment (ISO 2810:2004); German version EN ISO 2810:2004</p>
ISO 2813	<p>Beschichtungsstoffe - Bestimmung des Glanzwertes unter 20°, 60° und 85°, Ausgabedatum: 2014-10, Deutsche Fassung DIN EN ISO 2813: 2015</p> <p>Paints and varnishes - Determination of gloss value at 20 degrees, 60 degrees and 85 degrees, edition: 2014-10, german version DIN EN ISO 2813: 2015</p>
ISO 3231	<p>Beschichtungsstoffe - Bestimmung der Beständigkeit gegen feuchte, Schwefeldioxid enthaltende Atmosphären (ISO 3231:1993); Deutsche Fassung EN ISO 3231:1997</p> <p>Paints and varnishes - Determination of resistance to humid atmospheres containing sulfur dioxide (ISO 3231:1993); German version EN ISO 3231:1997</p>
ISO 4623-2	<p>Beschichtungsstoffe - Bestimmung der Beständigkeit gegen Filiformkorrosion Teil 2: Aluminium als Substrat, Ausgabe:2003-03, Deutsche Fassung EN ISO 4623-2: 2014</p> <p>Paints and varnishes - Determination of resistance to filiform corrosion - Part 2: Aluminium substrates, edition: 2003-03, german version EN ISO 4623-2: 2014</p>

ISO 4628-1	<p>Beschichtungsstoffe - Beurteilung von Beschichtungsschäden - Bewertung der Menge und der Größe von Schäden und der Intensität von gleichmäßigen Veränderungen im Aussehen - Teil 1: Allgemeine Einführung und Bewertungssystem (ISO 4628-1:2016); Deutsche Fassung EN ISO 4628-1, Ausgabe: 2014</p> <p>Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 1: General introduction and designation system (ISO 4628-1:2016); German version EN ISO 4628-1, edition: 2014</p>
ISO 4628-2	<p>Beschichtungsstoffe - Beurteilung von Beschichtungsschäden - Bewertung der Menge und der Größe von Schäden und der Intensität von gleichmäßigen Veränderungen im Aussehen – Teil 2: Bewertung des Blasengrades (ISO 4628-2:2016); Deutsche Fassung EN ISO 4628-2, Ausgabe: 2014</p> <p>Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects and of intensity of uniform changes in appearance – Part 2: Assessment of degree of blistering (ISO 4628-2:2016); German version EN ISO 4628-2, edition: 2014</p>
ISO 4628-8	<p>Beschichtungsstoffe - Beurteilung von Beschichtungsschäden - Beurteilung der Menge und der Größe von Schäden und der Intensität von gleichmäßigen Veränderungen im Aussehen – Teil 8: Bewertung der von einem Ritz oder einer anderen künstlichen Verletzung ausgehenden Enthaftung und Korrosion (ISO 4628-8:2012); Deutsche Fassung EN ISO 4628-8:2012</p> <p>Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects and of intensity of uniform changes in appearance – Part 8: Assessment of degree of delamination and corrosion around a scribe or other artificial defect (ISO 4628-8:2012); German version EN ISO 4628-8:2012</p>
ISO 6270-1	<p>Beschichtungsstoffe - Bestimmung der Beständigkeit gegen Feuchtigkeit – Teil 1: Kontinuierliche Kondensation (ISO 6270-1:1998); Deutsche Fassung EN ISO 6270-1:2002</p> <p>Paints and varnishes - Determination of resistance to humidity – Part 1: Continuous condensation (ISO 6270-1:1998); German version EN ISO 6270-1:2002</p>
ISO 6270-2	<p>Beschichtungsstoffe - Bestimmung der Beständigkeit gegen Feuchtigkeit – Teil 2: Verfahren zur Beanspruchung von Proben in Kondenswasserklimaten (ISO 6270-2:2005); Deutsche Fassung EN ISO 6270-2:2005</p> <p>Paints and varnishes - Determination of resistance to humidity – Part 2: Procedure for exposing test specimens in condensation-water atmospheres (ISO 6270-2:2005); German version EN ISO 6270-2:2005</p>
ISO 9001	<p>Qualitätsmanagementsysteme - Anforderungen (ISO 9001:2008); Dreisprachige Fassung EN ISO 9001:2008, Berichtigung zu DIN EN ISO 9001, Ausgabe 2015-09</p> <p>Quality management systems - Requirements (ISO 9001:2008); Trilingual version EN ISO 9001:2008, corrigendum to DIN EN ISO 9001, edition 2015-09</p>
ISO 9223	<p>Korrosion von Metallen und Legierungen - Korrosivität von Atmosphären - Klassifizierung, Bestimmung und Abschätzung (ISO 9223:2012); Deutsche Fassung EN ISO 9223:2012</p> <p>Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation (ISO 9223:2012); German version EN ISO 9223:2012</p>

ISO 9227	<p>Korrosionsprüfungen in künstlichen Atmosphären - Salzsprühnebelprüfungen (ISO 9227:2012); Deutsche Fassung EN ISO 9227:2015</p> <p>Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227:2012); German version EN ISO 9227:2015</p>
ISO 9717	<p>Metallische und andere anorganische Überzüge - Phosphatierüberzüge auf Metallen , Ausgabe 2010-12, Deutsche Fassung EN ISO 9717: 2013</p> <p>Metallic and other inorganic coatings - Phosphate conversion coating of metals, edition: 2010-12, german version EN ISO 9717: 2013</p>
ISO 11124-1	<p>Vorbereitung von Stahloberflächen vor dem Auftragen von Beschichtungsstoffen - Anforderungen an metallische Strahlmittel – Teil 1: Allgemeine Einleitung und Einteilung (ISO 11124-1:1993); Deutsche Fassung EN ISO 11124-1:1997</p> <p>Preparation of steel substrates before application of paints and related products - Specifications for metallic blast-cleaning abrasives – Part 1: General introduction and classification (ISO 11124-1:1993); German version EN ISO 11124-1:1997</p>
ISO 11126-1	<p>Vorbereitung von Stahloberflächen vor dem Auftragen von Beschichtungsstoffen – Anforderungen an nichtmetallische Strahlmittel – Teil 1: Allgemeine Einleitung und Einteilung (ISO 11126-1:1993, einschließlich Technische Korrekturen 1:1997 und 2:1997); Deutsche Fassung EN ISO 11126-1:1997</p> <p>Preparation of steel substrates before application of paints and related products – Specifications for non-metallic blast-cleaning abrasives – Part 1: General introduction and classification (ISO 11126-1:1993, including technical corrigenda 1:1997 and 2:1997); German version EN ISO 11126-1:1997</p>
ISO 11664-2	<p>Farbmessung - Teil 2: CIE Normlichtarten, Ausgabe: 2007-10, Deutsche Fassung EN ISO 11664-2: 2011</p> <p>Colorimetry - Part 2: CIE standard illuminants, edition: 2007-10, german version EN ISO 11664-2: 2011</p>
ISO 11664-3	<p>Farbmetrik - Teil 3: CIE-Farbwerte, Ausgabe 2012-04, Deutsche Fassung EN ISO 11664-3: 2013</p> <p>Colorimetry - Part 3: CIE tristimulus values, edition: 2012-04, german version EN ISO 11664-3: 2013</p>
ISO 11664-4	<p>Farbmetrik - Teil 4: CIE 1976 L*a*b* Farbenraum (ISO 11664-4:2008); Deutsche Fassung EN ISO 11664-4, Ausgabe: 2012-06</p> <p>Colorimetry - Part 4: CIE 1976 L * a * b * color space (ISO 11664-4:2008); German version EN ISO 11664-4, edition: 2012-06</p>
ISO 12944-1	<p>Beschichtungsstoffe - Korrosionsschutz von Stahlbauten durch Beschichtungssysteme – Teil 1: Allgemeine Einleitung (ISO 12944-1:1998); Deutsche Fassung EN ISO 12944-1:2016</p> <p>Paints and varnishes - Corrosion protection of steel structures by protective paint systems – Part 1: General introduction (ISO 12944-1:1998); German version EN ISO 12944-1:2016</p>
ISO 12944-4	<p>Beschichtungsstoffe - Korrosionsschutz von Stahlbauten durch Beschichtungssysteme – Teil 4: Arten von Oberflächen und Oberflächenvorbereitung (ISO 12944-4:1998); Deutsche Fassung EN ISO 12944-4:1998</p> <p>Paints and varnishes - Corrosion protection of steel structures by protective paint systems – Part 4: Types of surface and surface preparation (ISO 12944-4:1998); German version EN ISO 12944-4:1998</p>

ISO 12944-5	<p>Beschichtungsstoffe - Korrosionsschutz von Stahlbauten durch Beschichtungssysteme – Teil 5: Beschichtungssysteme (ISO 12944-5:2007); Deutsche Fassung EN ISO 12944-5:2008</p> <p>Paints and varnishes - Corrosion protection of steel structures by protective paint systems – Part 5: Protective paint systems (ISO 12944-5:2007); German version EN ISO 12944-5:2008</p>
ISO 14713-1	<p>Zinküberzüge - Leitfäden und Empfehlungen zum Schutz von Eisen- und Stahlkonstruktionen vor Korrosion – Teil 1: Allgemeine Konstruktionsgrundsätze und Korrosionsbeständigkeit (ISO 14713-1:2009); Deutsche Fassung EN ISO 14713-1:2009</p> <p>Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures – Part 1: General principles of design and corrosion resistance (ISO 14713-1:2009); German version EN ISO 14713-1:2009</p>
ISO 16276-2	<p>Korrosionsschutz von Stahlbauten durch Beschichtungssysteme - Beurteilung der Adhäsion / Kohäsion (Haftfestigkeit) einer Beschichtung und Kriterien für deren Annahme – Teil 2: Gitterschnitt- und Kreuzschnittprüfung (ISO 16276-2:2007); Deutsche Fassung EN ISO 16276-2:2007</p> <p>Corrosion protection of steel structures by protective paint systems - Assessment of, and acceptance criteria for, the adhesion / cohesion (fracture strength) of a coating – Part 2: Cross-cut testing and X-cut testing (ISO 16276-2:2007); German version EN ISO 16276-2:2007</p>
ISO 16474-3	<p>Beschichtungsstoffe - Künstliches Bestrahlen oder Bewittern in Geräten - Teil 3: UV-Fluoreszenzlampen, Ausgabe: 2013-11, Deutsche Fassung EN ISO 16474-3; 2013</p> <p>Paints and varnishes - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps, edition: 2013-11, german version EN ISO 16474-3, 2013</p>
ISO/IEC 17025	<p>Allgemeine Anforderungen an die Kompetenz von Prüf- und Kalibrierlaboratorien (ISO/IEC 17025:2005); Deutsche und Englische Fassung EN ISO/IEC 17025:2005</p> <p>General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005); German and English version EN ISO/IEC 17025:2005</p>
Qualanod	<p>Vorschriften für die Anodisierung von Aluminium auf Schwefelsäure-Basis zum Führen des Qualanod Gütezeichens</p> <p>Specification for the Qualanod Quality Label for Sulphuric Acid based anodizing of Aluminium</p>
VdL-RL 10	<p>Richtlinie zulässige Farbtoleranzen für unifarbene Pulverlacke bei Architekturanwendung, Ausgabe 2013-06</p> <p>Guidance document permitted colour tolerances of plain-coloured powder coatings in architectural applications, edition 2013-06</p>