



International Quality Regulations for the Coating of Building Components

GSB AL 631-4

GSB ST 663-4

Material approval for coating materials Aluminium, Steel and Galvanized steel

 Approved Coating Material Aluminium Florida 1	 Approved Coating Material Aluminium Florida 3	 Approved Coating Material Aluminium Florida 5	 Approved Coating Material Aluminium Florida 10	 Approved Coating Material Aluminium Primer	 Approved Coating Material Aluminium Clear Coat
 Approved Coating Material Steel Florida 1	 Approved Coating Material Steel Florida 3	 Approved Coating Material Steel Florida 5	 Approved Coating Material Steel Florida 10	 Approved Coating Material Steel Primer	
 Approved Coating Material Galvanized Steel Florida 1	 Approved Coating Material Galvanized Steel Florida 3	 Approved Coating Material Galvanized Steel Florida 5	 Approved Coating Material Galvanized Steel Florida 10	 Approved Coating Material Galvanized Steel Primer	

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GSB International e. V.
Fritz-Vomfelde-Straße 30
D-40574 Düsseldorf
Telefon: +49 (0) 211 / 4796-450
E-Mail: info@gsb-international.de
Internet: www.gsb-international.de

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1 Material approval for coating materials

1.1 Purpose

The content of this section covers the granting and confirmation of the material approval for coating materials.

GSB-CERT approves the coating material in accordance with the requirements of quality regulations GSB AL 631-4 and/or GSB ST 663-4.

1.2 Scope of application

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

1.3 Responsibilities

The GSB offices are responsible for providing quality guidelines GSB AL 631-4 and/or GSB ST 663-4 to the inspector and the named test institute.

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

Documents and statements must be treated as confidential.

1.4 Areas covered by license

On application, GSB-CERT grants a material approval if the requirements are met. The material approvals can be issued with the following quality seals:

GSB AL 631-4



GSB ST 663-4



If a coating material is approved, the material approval covers all production sites named by the manufacturer in which this material is produced and which are member of GSB.

2 Material approval process

2.1 Stage 1 – Application

2.1.1 General

The application for the material approval must be made in writing to GSB-CERT. The application is checked by GSB-CERT.

The following documents must be included with the application:

- Technical information sheets with curing conditions
- Material and safety data sheets (MSDS)
- Processing instructions
- Material samples
- Gloss (60° measurement angle)
- Reference sheets

If an application is made for a coating material approval for multiple substrates, the following tests are only carried out on one substrate.

- Resistance to the effects of moisture
- Resistance to alkalis
- Adhesion of sealing compounds
- Accelerated weathering
- Natural weathering

The approval for coating material is issued in the gloss approval range.

Approval range	Tolerance range
2 - 15 GU	± 5 GU
16 - 60 GU	± 10 GU
61 - 100 GU	± 15 GU

Structured surfaces are exempted (± 10 regardless of the submitted gloss). The approval range defines the tolerance that GSB allows for a submitted system. The tolerance range applies to an approved system and can also be within 2 approval ranges..

Regardless of approval and tolerance areas, the delivery tolerance is as follows:

Delivery tolerance for approval range > 15 GU and fine structure: Florida 1-10 ± 5 GU

Delivery tolerance for smoothly transitioning systems with an approval range of 2-15 GU: Florida 1-10: ± 3 GU

2.1.2 Material samples to be submitted

Material samples	GSB class	Single colours	+ metallics
Coating powder 1,5 kg	Florida 1	RAL 3016, 8014, 9001	Instead of RAL 9001 --> RAL 9006 or RAL 9007
	Florida 3, 5, 10	RAL 3009, 5003, 9001	Additionally RAL 9006 or RAL 9007
Liquid paint 1,5 kg	Florida 1	RAL 3016, 8014, 9001	Instead of RAL 9001 --> RAL 9006 or RAL 9007
Base paint with hardener and thinner	Florida 3, 5, 10	RAL 3009, 5003, 9001	Additionally RAL 9006 or RAL 9007
Aluminium specific			
Primer and topcoat	Florida 1,3,5,10	Topcoat one colour from 5000 series	Instead of 5000 series -> RAL 9006, 9007, DB703
Basecoat and clearcoat	Florida 1,3,5,10	Basecoat one colour from 5000 series	Instead of 5000 series -> RAL 9006, 9007, DB703
Steel specific			
Primer and topcoat		Topcoat one colour from 5000 series	Instead of 5000 series -> RAL 9006, 9007, DB703

2.1.3 Partial material approval

Partial material approval for primers, single colours, metallics, colours with a structural effect, colour groups or coating materials with limited or special properties are possible and must be agreed in advance with GSB-CERT.

With partial material approvals, the material manufacturer is obligated to provide clear labelling in the technical data sheet.

2.2 Florida 1, 3 & 5 material approval licence

2.2.1 Stage 2 – provisional material approval (see procedure section 3)

The coating materials are sent by the manufacturer to a test institute appointed by GSB-CERT. This test institute produces the samples for stage 2 in accordance with the details in the technical information sheets and carries out tests in accordance with GSB AL 631-4 and/or GSB ST 663-4. A pre-treatment chemical certified by GSB-CERT is used as pre-treatment.

The requirements in quality regulations GSB AL 631-4 and/or GSB ST 663-4 must be met for the material approval. UVB accelerated weathering can be replaced with the submission of results from an accredited weathering station in Florida. These results must not be more than one year old.

GSB-CERT grants a provisional material approval if the requirements are met.

If the curing temperature or curing time is reduced, GSB must be informed and an application for a new licence must be submitted.

2.2.2 Stage 3 – material approval (see procedure section 3)

The following requirement must be met for the **Florida 1** coating material approval:

The samples from stage 2 have met the requirements of GSB AL 631-4 and/or GSB ST 663-4 and have been subjected to a natural weathering test in Florida for 1 year.

If the natural weathering test in Florida has a negative result, the provisional material approval is withdrawn.

The following requirement must be met for the **Florida 3 & 5** material approval:

The samples from stage 2 have met the requirements of GSB AL 631-4 and/or GSB ST 663-4 and have been subjected to a natural weathering test in Florida for 3 & 5 years.

Florida 5 systems have an intermediate evaluation after 3 years.

If the natural weathering test result is negative for one of the colours submitted, the colour with a negative test will be blocked. The system receives its provisional material approval. A new material approval procedure must be carried out for the colour with the negative test result.

If the natural weathering test for this colour now gives a positive result, the system receives its material approval with quality seal.

If the natural weathering test for this colour once again gives a negative result, the provisional material approval for the entire system is withdrawn.

If the requirements of quality regulations GSB AL 631-4 and/or GSB ST 663-4 are met, the GSB-CERT grants a material approval with quality seal.

2.3 Florida 10 license

2.3.1 Stage 2 – provisional material approval (see procedure section 3)

The coating materials are sent by the manufacturer to a test institute appointed by GSB-CERT. This test institute produces the samples for stage 2 in accordance with the details in the technical information sheets and carries out tests in accordance with GSB AL 631-4 and/or GSB ST 663-4.

The following requirement must be met for the material approval:

1. The full, conclusive licence process (stage 3) has been carried out for **Florida 5** and the samples show $\geq 80\%$ residual gloss.

If the requirement is met, GSB-CERT grants a **Florida 10** provisional material approval.

2.3.2 Stage 3 – material approval (see procedure section 3)

The following requirement must be met for the **Florida 10** material approval:

Once the requirements from stage 2 are met, the samples are subjected to outdoor weathering for 5 additional years.

After a total of 10 years of outdoor exposure, the samples show a residual gloss of $\geq 50\%$.

If the requirements of quality regulations GSB AL 631-4 and/or GSB ST 663-4 are met, the GSB-CERT grants a material approval with quality seal.

3 Approval multi-layer system

3.1 General

Multi-layer systems consist of the following system buildups:

- Powder primer / powder topcoat
- Metallic powder basecoat / transparent powder clearcoat
- Liquid paint primer / Liquid paint topcoat pigmented
- Liquid paint basecoat / Liquid paint topcoat transparent

3.2 Multilayer system with primer

When approving a multi-layer system with primer, the following tests are not performed:

- Resistance to moisture
- Resistance to alkalis/ mortar
- Adhesion of sealants
- Accelerated weathering
- Natural weathering

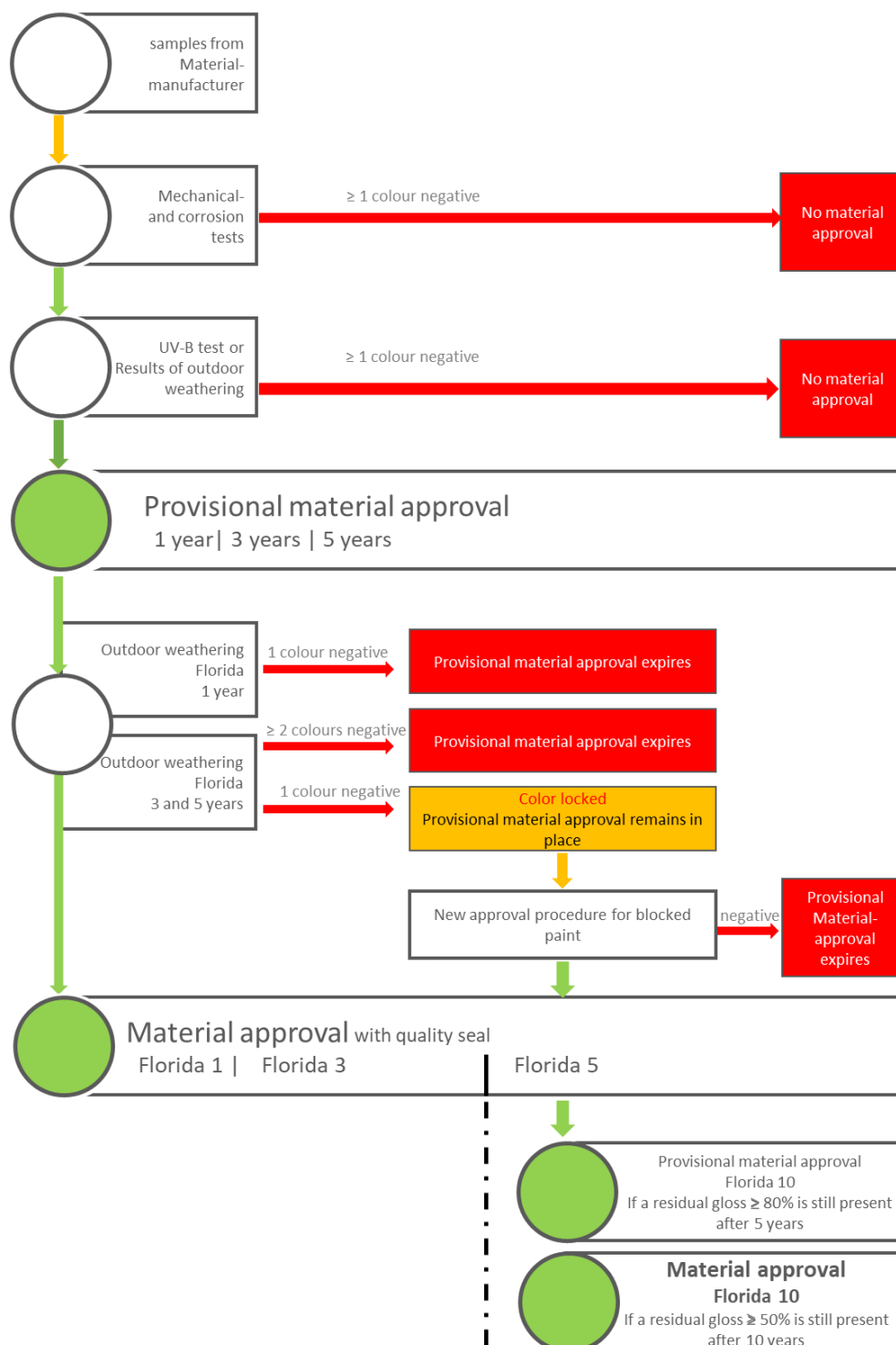
3.3 Multilayer system with transparent clearcoat

A powder clearcoat can only be approved in a multi-layer structure. The approval of a transparent clearcoat as a single-layer coating, i.e. without a pigmented basecoat, is not permitted. For the individual approval of the clearcoat coating material, the applicant must state on the approval number of the pigmented GSB coating material already approved coating material.

A clear coat may not be used directly on a primer.

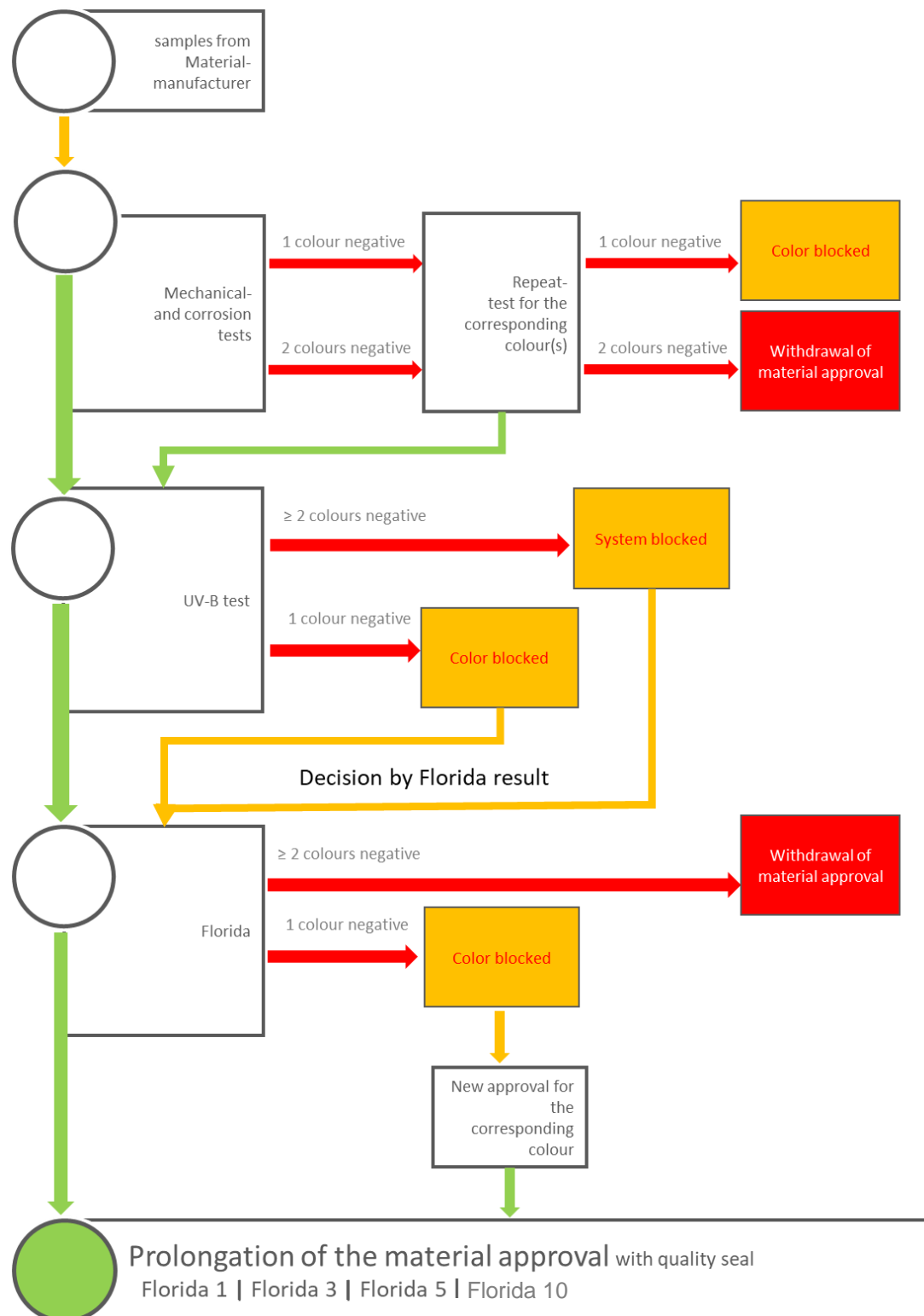
When approving powder clearcoat in a multi-layer system, the material manufacturer shall supply a GSB-approved basecoat. Either a pigmented basecoat of the RAL 5000 series (e.g. RAL 5017) or a metallic (e.g. RAL 9007) basecoat must be used. For a multi-layer system with a transparent topcoat (clearcoat), all tests are carried out as with single-coat systems. If a clearcoat in a multi-layer system has received approval, this applies to all substrates.

4 Schematic material approval process



5 Monitoring the material approval (see procedure section 5)

5.1 Prolongation test



Adherence to quality regulations GSB AL 631-4 and/or GSB ST 663-4 is monitored by means of annual prolongation tests.

For the prolongation test, any two colours from different colour groups are tested. If the coating material including metallic is approved, then one of the two colours must be a metallic colour.

The samples for the prolongation tests are taken from a GSB-certified coating company by an inspector named by GSB-CERT.

If this is not possible, an inspector commissioned by GSB-CERT can take the required material samples from one of the manufacturer's warehouses. Alternatively, GSB-CERT can request that the material manufacturer provide the material samples within 4 weeks.

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

If the requirements of the quality regulations GSB AL 631-4 and/or GSB ST 663-4 are met, the period of validity for the material approval is extended up to the end of the following year.

5.2 Negative result for prolongation test

If part of the prolongation test has a negative result for both colours, then the entire prolongation test is deemed unsuccessful. The manufacturer is informed by GSB-CERT.

If a colour does not meet the requirements in three successive prolongation tests, the material approval for this coating material is withdrawn.

The manufacturer can make an appeal in writing against the decision of GSB-CERT within 4 weeks.

The detailed process for the prolongation tests can be found in the corresponding graphic. The implications of partial tests must be taken into account here.

5.3 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.

6 Distribution list

- GSB-CERT
- GSB Office
- Members
- Inspector

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1 Production of samples

1.1 Test panels

- **Base material: aluminium**

Predominantly the following aluminium alloys are used:

- **Sheets:** EN AW-5005a H 14/24 [AlMg1(B)] mill finish
The sample size is chosen in accordance with the specifications of the respective test (preferably 70 x 140 x 0.7-0.8 mm).
- **Profiles:** EN AW-6060/6063 T5/T6

1.2 Surface pre-treatment

The chemical or electrochemical pretreatment and its testing is to be carried out in accordance with the relevant regulations. The test panels/profile sections must be pre-treated in accordance with the following standard:

- Approved chromium-free or chromium VI-free pre-treatment
- Pre-anodising
- Chromating in accordance with EN 12487

1.3 Application

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

The layer thickness of the test panels must be 50 µm to 80 µm unless otherwise specified by the material manufacturer.

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 written form.

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.

2 Requirements for the coating material

2.1 General

All tests are carried out in accordance with the GSB technical guidelines for measurement and test procedures and the standards referred to there.

2.2 Aluminium – powder coating material

The coating materials must not contain TGIC (triglycidyl isocyanurate).

Test	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness			
Thin layer powder	$20 \leq 40 \mu\text{m}$	$20 \leq 40 \mu\text{m}$	$20 \leq 40 \mu\text{m}$
Normal powder – colour-dependent	$\geq 60 \mu\text{m} - \leq 120 \mu\text{m}$	$\geq 60 \mu\text{m} - \leq 120 \mu\text{m}$	$\geq 60 \mu\text{m} - \leq 120 \mu\text{m}$
Standard layer thickness	50 – 120 μm	50 – 120 μm	50 – 120 μm
Cross cut	GT0	GT0	GT0
Mandrel bending test	$\leq 5 \text{ mm}$	$\leq 5 \text{ mm}$	$\leq 5 \text{ mm}$
Cracking of coating	Not permitted	Permitted	Permitted
Adhesive tape removal	No detachment of the coating	No detachment of the coating	No detachment of the coating
Cupping test	$\geq 5 \text{ mm}$	$\geq 5 \text{ mm}$	$\geq 5 \text{ mm}$
Cracking of coating	Not permitted	Permitted	Permitted
Adhesive tape removal	No detachment of the coating	No detachment of the coating	No detachment of the coating
Ball impact test	20 inch/pound	20 inch/pound	20 inch/pound
Cracking of coating	Not permitted	Permitted	Permitted
Adhesive tape removal	No detachment of the coating	No detachment of the coating	No detachment of the 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°	2 – 15 GU $\pm 5 \text{ GU}$	2 – 15 GU $\pm 5 \text{ GU}$	2 – 15 GU $\pm 5 \text{ GU}$
Approval range	16 – 60 GU $\pm 10 \text{ GU}$	16 – 60 GU $\pm 10 \text{ GU}$	16 – 60 GU $\pm 10 \text{ GU}$
	61 GU – 100 GU $\pm 15 \text{ GU}$	61 GU – 100 GU $\pm 15 \text{ GU}$	61 GU – 100 GU $\pm 15 \text{ GU}$
Structured surfaces are exempted (± 10 regardless of the submitted gloss). The approval range defines the tolerance that GSB allows for a submitted system. The tolerance range applies to an approved system and can also be within 2 approval ranges.			
Delivery tolerance for approval range >15 GU and fine structure	$\pm 5 \text{ GU}$	$\pm 5 \text{ GU}$	$\pm 5 \text{ GU}$
Delivery tolerance for smooth systems with an approval range of 2-15 GU	$\pm 3 \text{ GU}$	$\pm 3 \text{ GU}$	$\pm 3 \text{ GU}$
Condensation constant atmosphere*:			
Test period	1000 h	1000 h	1000 h
Blistering	0 (S0)	0 (S0)	0 (S0)
Delamination at the cross section	$d_{\text{max}} \leq 1 \text{ mm}$	$d_{\text{max}} \leq 1 \text{ mm}$	$d_{\text{max}} \leq 1 \text{ mm}$
Change of colour and effect with single colours	max. $\Delta L^* 1$	max. $\Delta L^* 1$	max. $\Delta L^* 1$
Change of colour and effect with metallics	max. key value 3	max. key value 2	max. key value 2

Condensation variable atmosphere (0.2l SO ₂)* Cycles Blistering Delamination at the T-Cut Change of colour and effect Change of colour and effect with metallics	30 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 3	30 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 2	30 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 2
Boil test / pressure cooker test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT 0/GT 1	0 (S0) GT 0/GT 1	0 (S0) GT 0/GT 1
Resistance to moisture	max. ΔL* 4	Florida 3: max. ΔL* 4 Florida 5: max. ΔL* 3	max. ΔL* 3
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000 h d _{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d _{max} ≤ 1 mm 0 (S0)	AASS 1000 hours d _{max} ≤ 1 mm 0 (S0)
Resistance to alkalis/mortar/NaOH Colour and effect changes Change of colour and effect with metallics	max. 50 % ΔL* max. key value 3	max. 50 % ΔL* max. key value 2	max. 50 % ΔL* max. key value 2
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300 h ≥ 50 %	UV B (313 nm) 600 h for Florida 3 1000 h for Florida 5 ≥ 50 %	
Natural weathering – Florida Approx. Test period (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL*, ΔC*	12 max. 300 ≥ 50 % See 0	36/60 max. 840 (36) max. 1400 (60) ≥ 50 % In the case of Florida 5 systems, the residual gloss after 36 months (or UV energy of max. 840 MJ/m ²) must be ≥ 75 %. See 0	120 ≥ 80% (60) ≥ 50% (120) -

Note: * This test is only carried out for the licence test

** The boil test/pressure cooker test is not carried in the case of pre-anodising.

The values for ΔL* can be found in chapter 2.4 Colour differences ΔL*, ΔC* after weathering.

2.3 Aluminium – liquid coating materials

Test	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
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	≤ 5 mm ≤ 12 mm	≤ 5 mm ≤ 12 mm	≤ 5 mm
Cracking of coating Adhesive tape removal	Not permitted No detachment of the coating	Permitted No detachment of the coating	Permitted No detachment of the coating
Cupping test			
Thermally cured paints Two-component liquid paints	≥ 5 mm ≥ 3 mm	≥ 5 mm ≥ 3 mm	≥ 5 mm ≥ 3 mm
Cracking of coating Adhesive tape removal	Not permitted No detachment of the coating	Permitted No detachment of the coating	Permitted No detachment of the coating
Cutting, drilling, sawing (naked eye assessment)	No spalling of coating	No spalling of coating	No spalling of coating
Gloss 60° Approval range	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU
Structured surfaces are exempted (± 10 regardless of the submitted gloss). The approval range defines the tolerance that GSB allows for a submitted system. The tolerance range applies to an approved system and can also be within 2 approval ranges.			
Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Condensation constant atmosphere*:			
Test period Blistering Delamination at the T-Cut Change of colour and effect Change of colour and effect with metallics	1000 h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	1000 h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	1000 h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Condensation variable atmosphere (0.2 l SO ₂)*			
Cycles Blistering Delamination at the T-Cut Change of colour and effect Change of colour and effect with metallics	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2

Boil test / pressure cooker test**			
Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT0 /GT1	0 (S0) GT0 /GT1	0 (S0) GT 0/GT1
Resistance to the effects of moisture	max. ΔL^* 4	Florida 3: max. ΔL^* 4 Florida 5: max. ΔL^* 3	max. ΔL^* 3
Resistance to salt water spray	ASS	ASS	AASS
Test period Delamination Degree of blistering	1000 hours $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	1000 hours $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	1000 hours $d_{\max} \leq 1 \text{ mm}$ 0 (S0)
Resistance to alkalis/mortar/NaOH Colour and effect changes Change of colour and effect with metallics	 max. 50 % ΔL^* max. key value 3	 max. 50 % ΔL^* max. key value 2	 max. 50 % ΔL^* max. key value 2
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300 h $\geq 50 \%$	UV B (313 nm) 600 h for Florida 3 1000 h for Florida 5 $\geq 50 \%$	
Natural weathering - Florida Approx. Test period (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL^* , ΔC^*	 12 max. 300 $\geq 50 \%$ See 0	 36/60 max. 840 (36) max. 1400 (60) $\geq 50 \%$ In the case of Florida 5 systems, the residual gloss after 36 months (or UV energy of max. 840 MJ/m ²) must be $\geq 75 \%$. See 0	 120 - $\geq 80\%$ (60) $\geq 50\%$ (120) -

Note: * This test is only carried out for the licence test.

** The boil test/pressure cooker test is not carried in the case of pre-anodising.

2.4 Colour differences ΔL^* , ΔC^* after weathering

Colour is measured in accordance with ISO 11664-4, illuminant: D65/10° standard observer; measurement geometry 45/0. The colour differences table applies to the Florida 1, 3 and 5 coating classes.

Florida 10 is in preparation.

RAL	ΔL^*	ΔC^* ab	RAL	ΔL^*	ΔC^* ab	RAL	ΔL^*	ΔC^* ab	RAL	ΔL^*	ΔC^* ab
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^*_{ab}	RAL	ΔL^*	ΔC^*_{ab}	RAL	ΔL^*	ΔC^*_{ab}	RAL	ΔL^*	ΔC^*_{ab}
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.

3. Requirements for the coating material – multi-layer systems

3.1 General

All coatings used in multi-layer systems must be produced by the same manufacturer. A combination of coatings from different manufacturers is not permitted.

3.2. Powder coating material

3.2.1 Primer/ topcoat pigmented

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness Primer Top coat - depending on colour	According to Manufacturer 60 - 80 µm	According to Manufacturer 60 - 80 µm	According to Manufacturer 60 - 80 µm
Cross cut (according to standard)	GT 0	GT 0	GT 0
Mandrel bending test cracking of coating Adhesive tape removal	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating	≤ 5 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating	≥ 5 mm Permissible no detachment of coating
Ball impact test cracking of coating Tape Tear	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating	20 inch/pound permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Condensation constant atmosphere* Test period Blistering Delamination at the T-cut Change of colour and effect change of colour and effect with metallics	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2

Condensation variable atmosphere (0,2l SO ₂)* Cycles Blistering Delamination at the T-cut Change of colour and effect Change of colour and effect with metallics	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Boil test / pressure Cooker Test* Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)

3.2.2 Basecoat/ transparent clearcoat

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness			
Metallic base coat (according to manufacturer)	60 - 80 µm	60 - 80 µm	60 - 80 µm
transparent top coat (depending on colour)	60 - 80 µm	60 - 80 µm	60 - 80 µm
Cross cut (according to standard)	GT 0	GT 0	GT 0
Mandrel bending test	≤ 5 mm	≤ 5 mm	≤ 5 mm
cracking of coating	Permissible	Permissible	Permissible
Adhesive tape removal	no detachment of coating	no detachment of coating	no detachment of coating
Cupping test	≥ 5 mm	≥ 5 mm	≥ 5 mm
cracking of coating	Permissible	Permissible	Permissible
Adhesive tape removal	no detachment of coating	no detachment of coating	no detachment of coating
Ball impact test	20 inch/pound	20 inch/pound	20 inch/pound
cracking of coating	permissible	permissible	permissible
Tape Tear	no detachment of coating	no detachment of coating	no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Gloss 60°	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU
Approvalrange			
Structured surfaces are exempted (±10 regardless of the submitted gloss). The approval range defines the tolerance that GSB allows for a submitted system. The tolerance range applies to an approved system and can also be within 2 approval ranges.			
Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU

Condensation constant atmosphere* Test period Blistering Delamination at the T-cut Change of colour and effect change of colour and effect with metallics	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Condensation variable atmosphere (0,2l SO ₂)* Cycles Blistering Delamination at the T-cut Change of colour and effect Change of colour and effect with metallics	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Resistance to moisture	max. ΔL^* 4	Florida 3: max. ΔL^* 4 Florida 5: max. ΔL^* 3	max. ΔL^* 3
Resistance to salt water spray Test period Delamination at T-cut Degree of blistering	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)
Resistance to alkalis/mortar/NaOH Colour and effect changes Change of colour and effect with metallics	 max. 50 % ΔL^* max. key value 3	 max. 50 % ΔL^* max. key value 2	 max. 50 % ΔL^* max. key value 2
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300h $\geq 50 \%$	UV B (313 nm) 600h for Florida 3 1000h for Florida 5 $\geq 50 \%$	Not applicable Preliminary stage Florida 5 $\geq 80 \%$
Natural weathering Florida Approx. testing time (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL^* , ΔC	12 max. 300 $\geq 50 \%$ See 2.4.	36/60 max. 840 (36) max. 1400 (60) $\geq 50 \%$ In the case of Florida 5 systems, the residual gloss after 36 months (or UV energy of max. 840 MJ/m ²) must be $\geq 75 \%$. See 2.4.	120 - $\geq 80 \%$ (60) $\geq 50 \%$ (120) See 2.4.

3.3 Liquid coating material

3.3.1 Primer / topcoat pigmented

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness Primer Top coat	According to Manufacturer	According to Manufacturer	According to Manufacturer
Cross cut (according to standard)	GT 0	GT 0	GT 0
Mandrel bending test cracking of coating Adhesive tape removal	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating
Cutting, drilling, sawing (nakes eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Condensation constant atmosphere* Test period Blistering Delamination at the T-cut Change of colour and effect change of colour and effect with metallics	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	1000h 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Condensation variable atmosphere (0,2l SO ₂)* Cycles Blistering Delamination at the T-cut Change of colour and effect Change of colour and effect with metallics	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)

3.3.2 Base material / transparent clearcoat

Testing	Aluminium Florida 1	Aluminium Florida 3 & 5	Aluminium Florida 10
Layer thickness Metallic basecoat transparent topcoat	According to the manufacturer	According to the manufacturer	According to the manufacturer
Cross cut (according to standard)	GT 0	GT 0	GT 0
Mandrel bending test cracking of coating Adhesive tape removal	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating	≤ 12 mm Permissible no detachment of coating
Cupping test cracking of coating Adhesive tape removal	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating	≥ 3 mm Permissible no detachment of coating
Cutting, drilling, sawing (naked eye assessment at distance of 20 - 30 cm)	no spalling of coating	no spalling of coating	no spalling of coating
Gloss 60° Approvalrange	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU
Structured surfaces are exempted (±10 regardless of the submitted gloss). The approval range defines the tolerance that GSB allows for a submitted system. The tolerance range applies to an approved system and can also be within 2 approval ranges.			
Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Condensation constant atmosphere* Test period Blistering Delamination at the T-cut Change of colour and effect change of colour and effect with metallics	1000h 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 3	1000h 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 2	1000h 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 2

Condensation variable atmosphere (0,2l SO ₂)* Cycles Blistering Delamination at the T-cut Change of colour and effect Change of colour and effect with metallics	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Boil test / pressure Cooker Test** Degree of blistering Cross-cut and adhesive tape removal	0 (S0) max. GT 1	0 (S0) max. GT 1	0 (S0) max. GT 1
Resistance to moisture	max. ΔL^* 4	Florida 3: max. ΔL^* 4 Florida 5: max. ΔL^* 3	max. ΔL^* 3
Resistance to salt water spray Test period Delamination Degree of blistering	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)	AASS 1000h $d_{\max} \leq 1 \text{ mm}$ 0 (S0)
Resistance to alkalis/mortar/NaOH Colour and effect changes Change of colour and effect with metallics	max. 50 % ΔL^* max. key value 3	max. 50 % ΔL^* max. key value 2	max. 50 % ΔL^* max. key value 2
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300h $\geq 50 \%$	UV B (313 nm) 600h for Florida 3 1000h for Florida 5 $\geq 50 \%$	Not applicable Preliminary stage Florida 5 $\geq 80 \%$
Natural weathering Florida Approx. testing time (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL^* , ΔC	12 max. 300 $\geq 50 \%$ See 2.4.	36/60 max. 840 (36) max. 1400 (60) $\geq 50 \%$ In the case of Florida 5 systems, the residual gloss after 36 months (or UV energy of max. 840 MJ/m ²) must be $\geq 75 \%$. See 2.4.	120 - $\geq 80\% (60)$ $\geq 50\% (120)$ See 2.4.

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1 Production of samples

1.1 Test panels

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

- Technological and corrosion-protection properties
steel sheet of type DC01-A in accordance with DIN EN 10130
size min. 70 x 140 x 0.5 mm
- Technological properties
Continuously galvanized steel sheet of type
DC 54 D Z140
Size min. 70 x 140 x 0.5 mm
- Corrosion-prevention properties
Continuously galvanized steel sheet of type
S250GD + Z275MA
Size min. 70 x 140 x 0.5 mm

1.2 Surface pre-treatment

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

- Approved chromium-free or chromium VI-free pre-treatment
- Chromating based on EN 12487
- With an alternative procedure approved by GSB

1.3 Application

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

The layer thickness of the test panels must be 50 µm to 80 µm unless otherwise stated by the material manufacturer.

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.

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.

2 Requirements for the coating material

2.1 General

All tests are carried out in accordance with the GSB technical regulations for measuring and testing methods.

2.2 Galvanised steel – powder coating material

The coating materials may not contain TGIC (triglycidyl isocyanurate).

Test	Galvanised steel Florida 1	Galvanised steel Florida 3 & 5	Galvanised steel Florida 10
Layer thickness			
Normal powder – colour-dependent	80 – 130 µm	80 – 130 µm	80 – 130 µm
Standard layer thickness	≥ 80 µm	≥ 80 µm	≥ 80 µm
	Two-layer system ≥ 130 µm	Two-layer system ≥ 130 µm	Two-layer system ≥ 130 µm
Cross cut	GT0	GT0	GT0
Mandrel bending test	≤ 5 mm	≤ 5 mm	≤ 5 mm
Cracking of coating	Not permitted	Permitted	Permitted
Adhesive tape removal	No detachment of the coating	No detachment of the coating	No detachment of the coating
Cupping test	≥ 5 mm	≥ 5 mm	≥ 5 mm
Cracking of coating	Not permitted	Permitted	Permitted
Adhesive tape removal	No detachment of the coating	No detachment of the coating	No detachment of the coating
Degree of crosslinking	ACETONE TEST No matting, no smudging	ACETONE TEST No matting, no smudging	ACETONE TEST No matting, no smudging
Ball impact test	10 inch/pound twin-layer system 20 inch/pound Single-layer system	10 inch/pound twin-layer system 20 inch/pound Single-layer system	10 inch/pound twin-layer system 20 inch/pound Single-layer system
Cracking of coating	Not permitted	Permitted	Permitted
Adhesive tape removal	No detachment of the coating	No detachment of the coating	No detachment of the coating
Scratch resistance	No penetration up to the substrate	No penetration up to the substrate	No penetration up to the substrate

Gloss 60° Approval range	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU
Structured surfaces are exempted (± 10 regardless of the submitted gloss). The approval range defines the tolerance that GSB allows for a submitted system. The tolerance range applies to an approved system and can also be within 2 approval ranges.			
Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Condensation constant atmosphere*: Test period Blistering Infiltration at T-cut Change of colour and effect Change of colour and effect with metalics	1000 h 0 (S0) $d_{\max} \leq 1$ mm max. 50 % ΔL^* max. key value 3	1000 h 0 (S0) $d_{\max} \leq 1$ mm max. 50 % ΔL^* max. key value 2	1000 h 0 (S0) $d_{\max} \leq 1$ mm max. 50 % ΔL^* max. key value 2

Condensation variable atmosphere (0.2 l SOB _{2B})* Cycles Blistering Infiltration at T-cut Change of colour and effect Change of colour and effect with metallics	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT 0/GT 1	0 (S0) GT 0/GT 1	0 (S0) GT 0/GT 1
Resistance to moisture	max. ΔL^* 4	Florida 3: max. ΔL^* 4 Florida 5: max. ΔL^* 3	max. ΔL^* 3
Resistance to salt water spray Test period Infiltration at cross-section Degree of blistering	NSS 480 hours $d_{\max} \leq 5 \text{ mm}$ 0 (S0)	NSS 480 hours $d_{\max} \leq 5 \text{ mm}$ 0 (S0)	NSS 480 hours $d_{\max} \leq 5 \text{ mm}$ 0 (S0)
Resistance to alkalis/mortar/NaOH Colour and effect changes Change of colour and effect with metallics	max. 50 % ΔL^* max. key value 3	max. 50 % ΔL^* max. key value 2	max. 50 % ΔL^* max. key value 2
Accelerated weathering Test duration Residual gloss	UV B (313 nm) 300 h $\geq 50 \%$	UV B (313 nm) 600 h $\geq 50 \%$	UV B (313 nm) 1000 h $\geq 50 \%$
Natural weathering - Florida Approx. Test period (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL^* , ΔC^*	12 max. 300 $\geq 50 \%$ See 2.4	36/60 max. 840 (36) max. 1400 (60) $\geq 50 \%$ In the case of Florida 5 systems, the residual gloss after 36 months (or UV energy of max. 840 MJ/m ²) must be $\geq 75 \%$. See 2.4	120 $\geq 80\%$ (60) $\geq 50\%$ (120) -
Note: For galvanised steel, as of the condensation constant atmosphere test, all further tests are carried out on a single layer. * This test is only carried out during the initial approval.			

2.3 Galvanised steel – liquid paint

Test	Galvanised steel Florida 1	Galvanised steel Florida 3 & 5	Galvanised steel Florida 10
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	≤ 5 mm ≤ 12 mm	≤ 5 mm ≤ 12 mm	≤ 5 mm ≤ 12 mm
Cracking of coating Adhesive tape removal	Not permitted	Permitted No detachment of the coating	Permitted No detachment of the coating
Cupping test			
Thermally cured paints Two-component liquid paints	≥ 5 mm ≥ 3 mm	≥ 5 mm ≥ 3 mm	≥ 5 mm ≥ 3 mm
Cracking of coating Adhesive tape removal	Not permitted No detachment of the coating	Permitted No detachment of the coating	Permitted No detachment of the coating
Cross-linking test	MEK test No matting, no smudging	MEK test No matting, no smudging	MEK test No matting, no smudging
Scratch test	No penetration up to the substrate	No penetration up to the substrate	No penetration up to the substrate
Gloss 60° Approval range	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU	2 – 15 GU ± 5 GU 16 – 60 GU ±10 GU 61 GU – 100 GU ±15 GU
Structured surfaces are exempted (±10 regardless of the submitted gloss). The approval range defines the tolerance that GSB allows for a submitted system. The tolerance range applies to an approved system and can also be within 2 approval ranges.			
Delivery tolerance for approval range >15 GU and fine structure	± 5 GU	± 5 GU	± 5 GU
Delivery tolerance for smooth systems with an approval range of 2-15 GU	± 3 GU	± 3 GU	± 3 GU
Condensation constant atmosphere*:			
Test period Blistering Infiltration at T-cut Change of colour and effect Change of colour and effect with metallics	720h 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 3	720 h 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 2	720 h 0 (S0) d _{max} ≤ 1 mm max. 50 % ΔL* max. key value 2

Condensation variable atmosphere (0.2 l SOB _{2B})* Cycles Blistering Infiltration at T-cut Change of colour and effect Change of colour and effect for metallics	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 3	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2	30 0 (S0) $d_{\max} \leq 1 \text{ mm}$ max. 50 % ΔL^* max. key value 2
Boil test / pressure cooker test Degree of blistering Cross-cut and adhesive tape removal	0 (S0) GT0 /GT1	0 (S0) GT0 /GT1	0 (S0) GT0 /GT1
Resistance to the effects of moisture	max. $\Delta L^* 4$	Florida 3: max. $\Delta L^* 4$ Florida 5: max. $\Delta L^* 3$	max. $\Delta L^* 3$
Resistance to salt water spray Test period Infiltration at T-cut Degree of blistering	NSS 480 hours $d_{\max} \leq 5 \text{ mm}$ 0 (S0)	NSS 480 hours $d_{\max} \leq 5 \text{ mm}$ 0 (S0)	NSS 480 hours $d_{\max} \leq 5 \text{ mm}$ 0 (S0)
Resistance to alkalis/mortar/NaOH Colour and effect changes Change of colour and effect with metallics	max. 50 % ΔL^* max. key value 3	max. 50 % ΔL^* max. key value 2	max. 50 % ΔL^* max. key value 2
Accelerated weathering TP Test duration Residual gloss	UV B (313 nm) 300 h $\geq 50 \%$	UV B (313 nm) 600 h $\geq 50 \%$	UV B (313 nm) 1000 h $\geq 50 \%$
Natural weathering – Florida Approximate test period (months) UV energy (MJ/m ²) Residual gloss Colour difference ΔL^* , ΔC^*	12 max. 300 $\geq 50 \%$ See 2.4	36/60 max. 840 (36) max. 1400 (60) $\geq 50 \%$ In the case of Florida 5 systems, the residual gloss after 36 months (or UV energy of max. 840 MJ/m ²) must be $\geq 75 \%$. See 2.4	120 $\geq 80\%$ (60) $\geq 50\%$ (120) -

Note: * This test is only carried out for the licence test.

- For galvanised steel, as of the condensation constant atmosphere test, all further tests are carried out on a single layer.

2.4 Colour differences ΔL^* , ΔC^* after weathering

Colour is measured in accordance with ISO 11664-4, illuminant: D65/10° standard observer; measurement geometry 45/0. The colour differences table applies to the Florida 1, 3 and 5 coating classes. Florida 10 is in preparation.

RAL	ΔL^*	ΔC^* ab	RAL	ΔL^*	ΔC^* ab	RAL	ΔL^*	ΔC^* ab	RAL	ΔL^*	ΔC^* ab
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^*_{ab}	RAL	ΔL^*	ΔC^*_{ab}	RAL	ΔL^*	ΔC^*_{ab}	RAL	ΔL^*	ΔC^*_{ab}
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 * 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.

3 Multi-layer systems

3.1 General

All coating materials used in the multi-layer system should be from one manufacturer. Each of the coating materials used must have a GSB material approval.

Multi-vendor use of coating materials is permissible if the primer and top coat each have a GSB material approval. In this case, the coater is obliged to check the in-between adhesion on his own responsibility.

3.2 Galvanized Steel Primer

Testing	
Crosscut	GT 0
Mandrel bending test	≤ 8 mm
cracking of the coating Tape Tear	Permissible no detachment of the coating
Cupping test	≥ 8 mm
Cracking of coating	zulässig keine Ablösung der Beschichtung
Adhesive tape removal	
Ball impact test	10 inch/pound
Cracking of coating	permissible no detachment of the coating
Adhesive tape removal	
Condensation constant atmosphere*	
Test period	1000h
Blistering	0 (S0)
Infiltration at the T-Cut	$d_{\max} \leq 1 \text{ mm}$
Condensation variable atmosphere (0,2l SOB2B)*	
Cycles	30
Blistering	0 (S0)
Infiltration at the T-Cut	$d_{\max} \leq 1 \text{ mm}$
Boil test / pressure cooker test	
Degree of blistering	0 (S0)
Cross-cut and adhesive tape removal	GT 0/GT 1
Resistance to salt water spray	NSS
Test period	1440 h
Infiltration at cross-section	$d_{\max} \leq 8 \text{ mm}$
Degree of blistering	0 (S0)

All tests are carried out with a GSB approved topcoat.

* For admission test only.

3.3 Steel Primer

Testing	
Crosscut	GT 0
Mandrel bending test	≤ 8 mm
cracking of the coating Tape Tear	Permissible no detachment of the coating
Cupping test	≥ 8 mm
Cracking of coating	zulässig keine Ablösung der Beschichtung
Adhesive tape removal	
Ball impact test	10 inch/pound
Cracking of coating	permissible no detachment of the coating
Adhesive tape removal	
Condensation constant atmosphere*	
Test period	1000h
Blistering	0 (S0)
Infiltration at the T-Cut	d _{max} ≤ 1 mm
Condensation variable atmosphere (0,2l SOB2B)*	
Cycles	30
Blistering	0 (S0)
Infiltration at the T-Cut	d _{max} ≤ 1 mm
Boil test / pressure cooker test	
Degree of blistering	0 (S0)
Cross-cut and adhesive tape removal	GT 0/GT 1
Resistance to salt water spray	NSS
Test period	1440 h
Infiltration at cross-section	d _{max} ≤ 3 mm
Degree of blistering	0 (S0)

All tests are carried out with a GSB approved topcoat.

* For admission test only.

Application for material approval

The manufacturer _____ hereby applies for a GSB-CERT-material approval for coating material _____ (standard market name).

<input type="checkbox"/>	Single-layer system	
<input type="checkbox"/>	Primer	
<input type="checkbox"/>	Clearcoat as a transparent version of the pigmented GSB-approved material system no.	

The coating material is used to coat the substrate:*

<input type="checkbox"/>	Aluminium
<input type="checkbox"/>	Steel
<input type="checkbox"/>	Galvanised steel

An application is made for the following material approvals:*

	Florida
<input type="checkbox"/>	1
<input type="checkbox"/>	3
<input type="checkbox"/>	5
<input type="checkbox"/>	10

*Please tick as appropriate. Only select one option in each case. Separate applications must be submitted for multiple selections.

The material approval application applies to the following production sites

Production sites	Details of contact person
	Name, Firstname _____
	Phone _____
	Mobil _____
	Email _____ _____

Material (GSB name)	system	Licence No.**	Hardening conditions	Object temperature in °C	Dwell time in minutes	
					Min.	Max.
Gloss licence value _____ GU*		_____	Minimum Average Maximum	_____ _____ _____	_____ _____ _____	_____ _____ _____
<input type="checkbox"/> Metallic effect						
Gloss licence value _____ GU*		_____	Minimum Average Maximum	_____ _____ _____	_____ _____ _____	_____ _____ _____
<input type="checkbox"/> Metallic effect						
Gloss licence value _____ GU*		_____	Minimum Average Maximum	_____ _____ _____	_____ _____ _____	_____ _____ _____
<input type="checkbox"/> Metallic effect						
Gloss licence value _____ GU*		_____	Minimum Average Maximum	_____ _____ _____	_____ _____ _____	_____ _____ _____
<input type="checkbox"/> Metallic effect						

* Please ensure that you specify the gloss in gloss units (**GU**) and not as a percentage.

** Only specify for a repeat test.

Specific information from the manufacturer	
Minimum layer thickness:	
Recommended sealant:	
Recommended pre-treatment:	

Documents to be enclosed:

- Product information sheet
- Processing instructions
- Material and safety data sheet

Place, date

Signature and company stamp

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

(PROVISIONAL)

**Material approval for
coating material**



GSB
INTERNATIONAL

Material approval number: XXXXg

Product: xxx
Type: Powder coating
Colours: Single colours, metallic

Class: Florida 1 Year
Substrate:

Manufacturer: Sample company
Sample Street
Sample Town

Confirmation: This material approval certifies that the requirements
GSB XX XXX-4 for coating materials have been met.

Restrictions: e.g. none (only RAL 6xxx)

Monitoring: Annual

Valid until: 31/07/2019 (2 years)

Date of issue: 12/4/2015 Rev: 0.0

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

GSB-CERT