



Specifications for Powder Manufacturers

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Chapter 1 - General Information

1. Scope

These Specifications apply to the QUALICOAT quality label, which is a registered trademark.

The current volume specifies the procedure for granting and renewing an approval to organic coatings, with the exception of coating materials used for decoration, which are specified in a separate volume. It also describes the testing programme to be followed by the laboratories involved and the requirements for every test.

2. Language

The official version of these Specifications is the English language version.

In the English language version, certain verbal forms have meanings which correspond to the requirements of the ISO/IEC Directives, Part 2, Clause 7.

The following verbal forms indicate strict requirements to be followed to comply with these Specifications and from which no deviation is permitted:

- Shall
- Shall not

The following verbal forms indicate that among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required. Additionally, in the negative form, a certain possibility or course of action is deprecated but not prohibited:

- Should
- Should not

The following verbal forms indicate a course of action permissible within the limits of these Specifications:

- May
- Need not

The following verbal forms are used for statements of possibility and capability—whether material, physical, or causal:

- Can
- Cannot

In case of ambiguities or uncertainties in any part of the Specifications, clarification shall be requested from QUALICOAT.

3. Terminology

Anodic pretreatment

Electrochemical process used to produce an anodic layer for coatings.

Approval

Confirmation that a specific material (coating or chemical conversion) meets the requirements of the QUALICOAT Specifications.

The following categories of approvals are available:

Classification	Description
P-No.	Approval for powder or liquid coating system
PF-No.	Approval for powder coating system suitable for postforming
A-No.	Approval for chemical pretreatment system (conversion coating) for etched material
AP-No.	Approval for chemical pretreatment system (conversion coating) for pre-anodised material
AN-No.	Approval for chemical pretreatment system (with modified processes or new technologies)

Chromate conversion

Chemical treatment using chromate or chromate-phosphate conversion.

Chemical pretreatment

Chemical treatment using non-chromate conversion.

Coating line

A production line used for coating aluminium for architectural applications that includes a single pretreatment cycle (surface preparation, conversion coating and drying) and a coating cycle (one or more spraying booths and ovens).

Continuous line

A production line where parts are pretreated, coated and cured without intermediate handling.

Curing index

A numerical index of cure value that quantifies directly from the curing graph the total coating cure experienced against the coating supplier's paint cure schedule

Licence/Sub-licence

Permission to use the quality label in accordance with the QUALICOAT Specifications for all coatings on aluminium for architectural applications produced on the coating line(s) at the production site inspected.

Licensee/Sub-licensee

The legal entity operating the inspected production site, holding the QUALICOAT licence for this specific production site and acting as this specific licensee on the market. This means marketing all coatings on architectural aluminium produced at this production site using the QUALICOAT label in accordance with the Specifications. The same legal entity may also operate other production sites and hold separate QUALICOAT licences for these.

General licence	Permission to grant licences and approvals in a certain territory.
General Licensee (GL)	National or international association holding the QUALICOAT general licence for a defined territory.
Material for postforming	Coated cold-rolled aluminium material suitable for postforming (sheets or coils).
Postforming	The act of working, by bending or forming (stamping), already coated aluminium sheets or coils.
Pretreatment cycle	A system of tanks for spray or dipping application of chemicals, rinses and/or electrochemical processes, creating a process sequence for pre-treating the workpieces to be coated. A single pretreatment cycle comprises one specific chemical conversion coating step or — in the case of preanodising — the preanodising bath.
Production site	A production facility for coating materials, chemicals, or coatings. In the case of a coating facility, the licensee may operate one or several coating lines in a production site. A production site shall have a distinct postal address.
Testing laboratories	Independent quality testing and/or inspection bodies duly authorised by the General Licensee or QUALICOAT.

4. Test methods and requirements

The test methods are based on international standards, where they exist (see table 1 below). It is the responsibility of the powder manufacturers to ensure that they always use the most recent version of the standards.

The requirements are specified by QUALICOAT based on practical experience and/or testing programs organized by QUALICOAT.

In the current volume, test methods and requirements are described in Chapter 4 (Granting of an Approval) under Section 3 (Testing programme).

5. Standards used by QUALICOAT¹

Nº	TITLE	RELEVANT TEST
ISO 2813	Paints and varnishes -- Determination of gloss value at 20° degrees, 60° and 85°	Gloss
ISO 2360	Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating thickness - Amplitude-sensitive eddy current method	Coating thickness
ISO 2409	Paints and varnishes -- Cross-cut test	Adhesion
ISO 2815	Paints and varnishes -- Buchholz indentation test	Buchholz Indentation
ISO 1520	Paints and varnishes -- Cupping test	Cupping test
ISO 1519	Paints and varnishes -- Bend test (cylindrical mandrel)	Bend test
EN 13523-7	Coil coated metals - Test methods - Part 7: Resistance to cracking on bending (T-bend test)	Bend test for postforming
EN 1396	Aluminium and aluminium alloys. Coil coated sheet and strip for general applications. Specifications	Bend test for postforming
ISO 6272-1	Paints and varnishes -- Rapid-deformation (impact resistance) tests -- Part 1: Falling-weight test, large-area indenter	Impact test
ISO 6272- 2	Paints and varnishes -- Rapid-deformation (impact resistance) tests -- Part 2: Falling-weight test, small-area indenter	Impact test
ASTM D2794	Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)	Impact test
ISO 22479	Paints and varnishes -- Determination of resistance to humid atmospheres containing sulphur dioxide	Resistance to humid atmospheres containing sulphur dioxide
ISO 4628-2	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	Blistering
ISO 9227	Corrosion tests in artificial atmospheres -- Salt spray tests	Acetic acid salt spray resistance
ISO 16474- 2	Paints and varnishes – Method of exposure to laboratory light sources –Part 2 – Xenon-arc lamps	Accelerated weathering test
ISO 11664-4	Colorimetry -- Part 4: CIE 1976 L*a*b* Colour space	Colour variation

¹ It is the responsibility of the powder manufacturers to ensure that they always use the most recent version of the standards

Nº	TITLE	RELEVANT TEST
ISO 2810	Paints and varnishes -- Natural weathering of coatings - - Exposure and assessment	Natural weathering test
EN 12206-1	Paints and varnishes – Coating of aluminium and aluminium alloys for architectural purposes – Part 1: Coatings prepared from coating powder	Resistance to mortar
ISO 6270-2	Paints and varnishes – Determination of resistance to humidity – Part 2: Procedure for exposing test specimens in condensation –water atmospheres	Constant climate condensation water test
ISO 4623–2	Paints and varnishes – Determination of resistance to filiform corrosion – Part 2 Aluminium substrates	Filiform corrosion test
ISO 4628-10	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 10 Assessment of degree of filiform corrosion	Filiform corrosion test
EN 16611	Furniture - Assessment of the surface resistance to micro scratching	Scratch and mar resistance test (Martindale)
EN 12487	Chemical conversion coatings – Rinsed and non-rinsed chromate conversion coatings on aluminium and aluminium alloys	Chromate conversion
ISO 3892	Conversion coatings on metallic materials -- Determination of coating mass per unit area -- Gravimetric methods	Chromate conversion
EN 1706	Aluminium and aluminium alloys - Castings - Chemical composition and mechanical properties	Cast accessories

Table 1 - List of relevant standards

6. Release and revision of the Specifications

The Specifications may be supplemented or amended with update sheets that set out and incorporate QUALICOAT’s resolutions until a new edition is issued.

These numbered sheets will state the subject of the resolution, the date when QUALICOAT passed the resolution, the effective date and the details of the resolution.

7. Impartiality

QUALICOAT does not allow commercial, financial or other pressures to compromise its impartiality. The Specifications may be amended when risks of impartiality have been identified or when they need to conform to new standards.

Chapter 2 –Principles for the Approval of Coating Materials

The organic coatings used in quality label coating shall be approved before they may be used.

1. Identification of coating materials

Every organic coating material can have a variety of gloss levels and appearances.

Approvals are granted for each organic coating material, gloss level and appearance, except for class 3 approvals which are granted by lightness category (see Section 1 of Chapter 4 and Section 4 of Chapter 5).

a) Classes (weathering resistance)

Organic coating materials are classified according to their performance during outdoor exposure, as outlined below.

Class	Natural Weathering Test (outdoor exposure in Florida)
1	1 year
1.5	2 years
2	3 years
3	10 years

b) Gloss categories

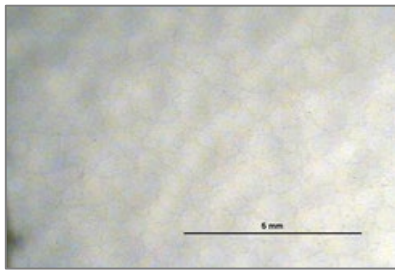
Category	Gloss range
1 (matt)	0 - 30
2 (satin)	31 - 70
3 (gloss)	71 - 100

c) Surface finishes

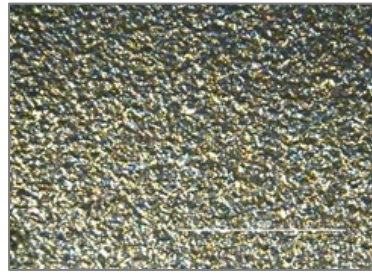
Like all other coatings, organic coating materials – after curing – can give the final organic coating different appearances, for example a smooth appearance or a structured appearance.

A structured appearance cannot be treated like a smooth appearance. Even if the change in formulation is based on special additives, an organic coating imparting an uneven appearance, which does not involve colour gloss or metallic effect, needs a special QUALICOAT approval in a different category from the approvals granted for smooth organic coatings.

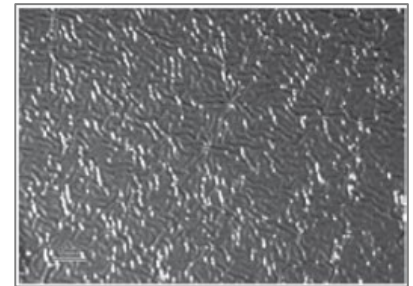
These structured finishes can be split into the following three types. An approval is necessary for each type (QUALICOAT designation a, b, c).



(a) Leathered or orange-peel appearance (waves)



(b) Textured or sandpaper appearance (sharp edges)



(c) Wrinkled or vein appearance (heterogeneous)

Figure 1 – Structured finishes

2. Special cases

a) Metallic finishes

If a manufacturer wishes to have an approval extended for metallic colours, tests shall be carried out on RAL 9006.

For class 3: if the tests are satisfactory, the extension shall be granted to all lightness categories related to the same gloss category.

b) Specific colours or applications

Special approvals or extensions of existing approvals may be granted for specific colours or applications such as decoration, as defined in QUALICOAT (QUALIDECO) Specifications

c) RAL families and lightness categories

The concept of Lightness categories is applied for granting class 3 approvals (*see Chapter 4*).

The concept of RAL families is applied for renewing class 2 and class 3 approvals. (*See Chapter 5*)

d) Two-coat organic coating materials

It is not permissible for coaters to apply a second coat for organic coating materials that are intended and approved for the application of a single coat.

When a two-coat organic coating material (primer and coloured topcoat) approved by QUALICOAT is used, the licensed coater may apply either a class 1, 1.5 or class 2 topcoat on the approved primer provided that the powder supplier gives written authorisation for it. It is not necessary to have an approval for each combination. However, the organic coating material (primer and coloured topcoat) used by the licensee shall originate from the same manufacturer.

Two-coat systems: metallic powder coatings that need a clear coat to have acceptable weathering resistance. These specific two-coat systems shall be approved separately by QUALICOAT.

e) Coating materials suitable for postforming

Powder coatings suitable for postforming shall be granted a specific approval number (PF-No).



3. Changes in formulation

Any modification of the chemical properties of the binder (resin(s) and/or hardening agent(s) is tantamount to a new product and absolutely requires a new QUALICOAT approval. Furthermore, if the physical appearance of the final coating is modified, a new specific QUALICOAT approval shall be required.

Any change in minimum, curing temperature and/or time also requires a new QUALICOAT approval.

Chapter 3 –Preliminary Conditions for the Approval of Organic Coatings

1. Formal application prior to testing

a) Application

Powder manufacturers who plan to submit an organic coating material for testing shall send a formal request to the General Licensee or to QUALICOAT in countries without a national association using the application form available on the [QUALICOAT website](#).

2. Type of Application		
Powder manufacturer	<input type="checkbox"/> Approval for the following organic powder coating systems ¹ :	<ul style="list-style-type: none"> • Click or tap here to enter text. • Click or tap here to enter text. • Click or tap here to enter text. • Click or tap here to enter text. • Click or tap here to enter text.

¹ Please give exact description of the system(s) submitted

Approvals are usually requested by the manufacturers themselves, but any third party interested may apply for approval of an organic coating material it wishes to sell under its own brand name provided that it clearly informs the General Licensee and QUALICOAT of the sources used.

An approval is granted for one single production site. If an approval holder changes its source, it shall advise the General Licensee and QUALICOAT and have such new organic coating materials approved.

b) Technical Data Sheet

General information

The Technical Data Sheet shall include at least the following information:

- Product description
- Curing conditions including a curing window with a minimum of 2 temperatures and minimum and maximum time for each temperature.
 - E.g.: - 12 min. to 30 min at 180°C
 - 7 min. to 20 min at 190°C
 - 5 min. to 15 min at 200°C
- Shelf life and maximum storage temperature (XX months <YY°C)
- Fire classification information, if available (e.g., EN 13501-1 – A2 s1d0).

Additional information requested for postforming:

The Technical Data Sheet shall include the following additional information:

- Substrate to be used for testing
- Bending value 'T' with the related maximum allowed coating thickness
- For the use in coil coating lines:
 - Identification as "*Suitable for IR curing*"
 - Curing conditions simulating the IR curing in a standard oven (for testing laboratories)

2. Minimum laboratory equipment

- Specular glossmeter
- Instruments for measuring coating thickness
- Apparatus for testing resistance to cracking on bending
- Cutting tools and instruments necessary for performing the adhesion test
- Instrument for measuring indentation hardness
- Apparatus for cupping test
- Impact tester
- Apparatus for controlling stoving temperature and time
- System for checking polymerisation
- Spectrophotometer
- Apparatus for accelerated weathering test²
- Light cabinet
- RAL GL cards
- Device to measure particle size

Each piece of apparatus shall have a data sheet showing the apparatus identification number and calibration checks.

3. Inspection of powder manufacturer's plant

A visit shall be required before granting a first approval to new applicants to check the laboratory equipment of the powder manufacturer's plant. The costs of such a visit will be paid by the applicant.

If a visit is considered unsatisfactory, the General Licensee (or QUALICOAT) retains the right not to grant the approval.

² The accelerated weathering test can be outsourced and carried out by a QUALICOAT approved laboratory or another laboratory accredited for this specific test according to ISO/IEC 17025.

Chapter 4 – Granting of Approvals

1. Basic colours

a) Standard approvals and metallic extension (P-No.)

The following basic colours shall be tested (independently of gloss category or appearance):

Classes 1, 1.5 and 2		Class 3 (approval by lightness category)		
RAL 3005	RED	LIGHT	MEDIUM	DARK
RAL 5010	BLUE	RAL 1015	RAL 1011	RAL 7016
RAL 9010	WHITE	RAL 7035	RAL 7040	RAL 8019
		RAL 9010	RAL 8024	RAL 9005

If a manufacturer wishes to have an approval extended for metallic colours, tests shall be carried out on **RAL 9006**.

For class 3, if the tests carried out on RAL 9006 are satisfactory, the metallic extension shall be granted to all lightness categories related to the same gloss category.

b) Coating materials suitable for postforming (PF-No.)

The basic colours are the same as for standard approvals. Approvals are granted for class 1 only.

c) Special approvals

If a coating material is produced for a **single colour**, tests shall be carried out only on the colour mentioned in the system name.

No other colours shall be produced under the same approval number.

2. Sampling

The manufacturer shall send coating materials and coated samples to the laboratory in charge, together with the relevant technical data sheet for each colour. The data sheet shall include at least the following information: colour, gloss value and curing conditions (including range of times and temperatures).

The testing laboratory shall prepare the test samples on its premises using chrome VI-free chemical pretreatment and the coating materials supplied by the manufacturer. The test samples may also be coated elsewhere provided that the inspector is present during the whole time of treatment.

The testing laboratory shall always select the minimum stoving time and temperature specified by the manufacturer.

3. Testing programme

TEST	GROUP	NUMBER OF DETERMINATIONS PER COLOUR	TYPE OF SAMPLES ³
COLOUR	PHYSICAL	3 ^(a)	panels and sections
GLOSS	PHYSICAL	5 ^(a)	panels and sections
COATING THICKNESS	PHYSICAL	All the samples used in the tests ^(a)	panels and sections
WATER SPOT TEST	PHYSICAL	1	Panels
DRY ADHESION	MECHANICAL	3	Panels
INDENTATION	MECHANICAL	5	Panels
CUPPING TEST	MECHANICAL	3	Panels
BEND TEST	MECHANICAL	3	Panels
BEND TEST FOR POSTFORMING	MECHANICAL	3	Panels
IMPACT TEST	MECHANICAL	5	Panels
MARTINDALE TEST	MECHANICAL	1	Panels
TEST	GROUP	TEST PIECES (PER COLOUR)	TYPE OF SAMPLES
RESISTANCE TO MORTAR	CHEMICAL	3 ^(b)	sections/panels
WET ADHESION	CORROSION	3	Sections
CONSTANT CLIMATE CONDENSATION WATER TEST	CORROSION	3 ^(b)	Sections
ACETIC ACID SALT SPRAY RESISTANCE	CORROSION	3 ^(b)	Sections
RESISTANCE TO HUMID ATMOSPHERES	CORROSION	3 ^(b)	Sections
ACCELERATED WEATHERING TEST (EXCEPT FOR CLASS 3)	WEATHERING	- 1 panel for renewal testing ^(c) - 3 panels for granting and repeat testing ^(c)	Panels
NATURAL WEATHERING TEST (FLORIDA)	WEATHERING	- 4 panels for class 1 - 7 panels for class 1.5 - 10 panels for class 10 - 13 panels for class 3	Panels

Table 2 - Testing programme (including sampling)

- a) All the samples must satisfy the requirements for the gloss category specified.
- b) 3 sections with sufficient dimensions to make the incision required for the tests.
- c) Dimensions depending on the apparatus in the laboratory.
- d) For the corrosion tests , the test samples shall be made of EN AW-6060 or EN AW-6063.

³ Alloy: EN AW-5005 (panels); EN AW-6060 or EN AW-6063 (sections).



A) Colour measurement

Test method

The colour of the organic coating on the significant surface shall be determined by means of a spectrophotometer calculating the coordinates of the CIE 1976 L*a*b* colour space, according to ISO 11664-4, including specular reflection. The colorimetric measurement shall be made with standard illuminant D65 and 10° normal observer.

Requirements

The colour difference (ISO 11664-4) from the certified RAL card shall not be greater than the limits prescribed below. The powder manufacturers shall indicate which RAL card they use on the label, so that the laboratory knows which reference to work with. QUALICOAT recommends using the RAL GL Card for categories 2 and 3 solid powder coatings and RAL HR for category 1 and for textured coatings.

The tolerances indicated in the table below may be extended with a corrective factor of 1.3 for matt and textured finishes in combination with a final visual assessment.

RAL	Tolerance	RAL	Tolerance	RAL	Tolerance	RAL	Tolerance	RAL	Tolerance	RAL	Tolerance
1000	2.0	3000	2.8	5000	2.0	6000	2.0	7000	2.0	8000	2.0
1001	2.0	3001	2.8	5001	2.0	6001	2.8	7001	2.0	8001	2.0
1002	2.0	3002	2.8	5002	2.0	6002	2.8	7002	1.4	8002	2.0
1003	3.6	3003	2.8	5003	2.0	6003	2.0	7003	1.4	8003	2.0
1004	3.6	3004	2.0	5004	2.0	6004	2.0	7004	1.0	8004	2.0
1005	3.6	3005	2.0	5005	2.0	6005	2.0	7005	1.4	8007	2.0
1006	3.6	3007	1.4	5007	2.0	6006	1.4	7006	1.4	8008	2.0
1007	3.6	3009	2.0	5008	2.0	6007	1.4	7008	2.0	8011	2.0
1011	2.0	3011	2.8	5009	2.0	6008	1.4	7009	1.4	8012	2.0
1012	2.8	3012	2.0	5010	2.0	6009	1.4	7010	1.4	8014	1.4
1013	1.0	3013	2.8	5011	2.0	6010	2.8	7011	1.4	8015	2.0
1014	2.0	3014	2.0	5012	2.0	6011	2.0	7012	1.4	8016	1.4
1015	1.0	3015	1.0	5013	2.0	6012	1.4	7013	1.4	8017	1.4
1016	2.8	3016	2.8	5014	2.0	6013	2.0	7015	1.4	8019	1.4
1017	2.8	3017	2.8	5015	2.0	6014	1.4	7016	2.0	8022	1.4
1018	2.8	3018	2.8	5017	2.0	6015	1.4	7021	1.4	8023	2.8
1019	1.0	3020	2.8	5018	2.0	6016	2.0	7022	1.4	8024	2.8
1020	2.0	3022	2.8	5019	2.0	6017	2.8	7023	1.4	8025	1.4
1021	3.6	3027	2.8	5020	2.0	6018	2.8	7024	1.4	8028	1.4
1023	3.6	3028	2.8	5021	2.0	6019	1.2	7026	2.0	9001	1.0
1024	2.0	3031	2.8	5022	2.0	6020	1.4	7030	1.0	9002	1.0
1027	2.8	4001	1.4	5023	2.0	6021	2.0	7031	2.0	9003	1.0
1028	3.6	4002	2.0	5024	2.0	6022	1.4	7032	1.0	9004	1.4
1032	3.6	4003	1.4			6024	2.8	7033	1.4	9005	1.4
1033	3.6	4004	2.0			6025	2.8	7034	1.4	9010	1.0
1034	2.8	4005	2.0			6026	2.0	7035	1.0	9011	1.4
1037	3.6	4006	1.4			6027	2.0	7036	1.0	9012	1.0
2000	3.6	4007	1.4			6028	2.0	7037	1.4	9016	1.0
2001	2.8	4008	1.4			6029	2.0	7038	1.0	9017	1.4
2002	2.8	4009	1.2			6032	2.8	7039	1.4	9018	1.0

RAL	Tolerance	RAL	Tolerance	RAL	Tolerance	RAL	Tolerance	RAL	Tolerance	RAL	Tolerance
2003	2.8	4010	2.0			6033	2.0	7040	1.0		
2004	3.6					6034	2.0	7042	1.0		
2008	3.6					6037	2.8	7043	1.4		
2009	3.6							7044	1.0		
2010	2.8							7045	1.0		
2011	3.6							7046	1.4		
2012	2.8							7047	1.0		

Table 3 - Colour tolerances before granting or renewing an approval

B) Gloss measurement

Test method

According to ISO 2813 using incident light at 60° to the normal

If the significant surface is too small or the finish of the coating (leathered or orange-peel appearance, highly metallic finishes) unsuitable for the gloss to be measured with the glossmeter, the gloss shall be compared visually with the reference sample provided by the powder coating supplier (from the same viewing angle).



Figure 2 - Glossmeter

Requirements

Gloss category	Gloss range	Acceptable variation*
1 (matt)	0 - 30	+/- 5 units
2 (satin)	31 - 70	+/- 7 units
3 (gloss)	71 - 100	+/- 10 units

* permissible variation from the nominal value specified by the coating supplier

C) Coating thickness

Test method

According to ISO 2360

The thickness of the organic coating on each part to be tested shall be measured on the significant surface at not less than five measuring areas (appr. 1 cm²).



Figure 3 - Thickness measurement

Requirements

Powder coating	Minimum average thickness
Class 1	60 µm
Class 1.5	60 µm
Class 2	60 µm
Class 3	50 µm
Two-coat powder coating (classes 1 and 2)	110 µm
Two-coat PVDF powder coating	80 µm

Liquid coating

To be defined by the liquid coating supplier and documented within a technical data sheet with the approval of the Executive Committee.

Other organic coatings may require different thicknesses, but they shall only be applied with the approval of the Executive Committee.

D) Dry adhesion

Test method

According to ISO 2409 (Cross-cut test)

The spacing of the cuts shall be 1 mm for organic coating thicknesses of up to 60 µm, 2 mm for thicknesses between 60 µm and 120 µm, and 3 mm for thicknesses over 120 µm.

An adhesive tape with an adhesive strength between 6 N per 25 mm width and 10 N per 25 mm width shall be used.

The tape shall be at least 25 mm wide.

Requirements

The result shall be 0.

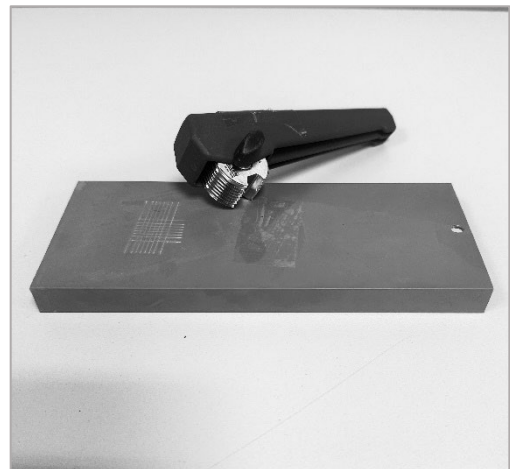


Figure 4 - Cross-cut

E) Buchholz indentation test

Test method

According to ISO 2815

Requirements

Minimum 80 at the required thickness.

F) Cupping test (only for QUALICOAT laboratory testing of organic coating)

Test method

According to ISO 1520 for class 1 powder coatings

According to ISO 1520 followed by a tape pull adhesion test for class 1.5, 2 and 3:

Tape pull adhesion test: Apply an adhesive tape to the significant surface of the test panel following the mechanical deformation. Cover the area by pressing down firmly against the coating to eliminate voids or air pockets. Pull the tape off sharply at right angles to the plane of the panel after 1 minute.

The test shall be performed on an organic coating with a thickness approximating the minimum required.

For the approval of coating materials suitable for postforming the test shall be carried out at a temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and at a relative humidity of $50\% \pm 5\%$, 24 h after curing.

Type of organic coating	Minimum indentation
Powder coatings (all classes)	5 mm
Two-component liquid coatings	3 mm
Water-thinnable liquid coatings	3 mm
Other liquid coatings	5 mm
Electrophoretic coatings	5 mm

In case of negative result, the test shall be repeated on a panel coated with a thickness of 60 to 70 μm (for classes 1, 1.5 and 2 powder coatings) and 50 to 60 μm (for class 3 powder coatings)

Postforming:

In case of uncertain results due to cracking of the aluminium support, a steel panel with a thickness of 0.51 mm shall be used (Q-panel: QD type/ ISO 3574: Type CR1 steel test panel Type 3).

Requirements

Class 1 powder coatings: Using normal corrected vision, the organic coating shall not show any sign of cracking or detachment.

Powder coatings (except class 1): Using normal corrected vision, the organic coating shall not show any sign of detachment after the tape pull adhesion test.

G) Bend test

Test method

According to ISO 1519 for class 1 powder coatings:

Class 1 powder coatings: ISO 1519

Other classes: ISO 1519 followed by a tape pull adhesion test

The test panels shall be made of the alloy EN AW-5005-H24 or -H14 (AlMg 1 - semihard) with a thickness of 0.8 or 1 mm, unless otherwise approved by QUALICOAT.

The test shall be performed on an organic coating with a thickness approximating the minimum required. It shall be carried out on the reverse side of the significant surface.



Figure 5 - Apparatus for testing the resistance to cracking on bending

ISO 1519 followed by a tape pull adhesion test for class 2, 1.5 and 3 powder coatings

Apply an adhesive tape (at least 25 mm wide) with an adhesive strength between 6 N per 25 mm width and 10 N per 25 mm width to the significant surface of the test panel following the mechanical deformation.

Cover the area by pressing down firmly against the coating to eliminate voids or air pockets. Pull the tape off sharply at right angles to the plane of the panel after 1 minute.

In case of a negative result, the test shall be repeated on a panel coated with a thickness of 60 to 70 μm (classes 1, 1.5 and 2) or 50 to 60 μm (class 3)

Requirements

Bending around a 5 mm mandrel for all organic coatings except for two-component and water-thinnable liquid coatings. For these, use an 8 mm mandrel.

Class 1 powder coatings

Using normal corrected vision, the coating shall not show any sign of cracking or detachment

Class 1.5, 2 and 3 powders coatings

Using normal corrected vision, the organic coating shall not show any sign of detachment following the tape pull adhesion test.

H) Bend test for postforming

Test method

including alternative device from EN 1396:2023

This test is specific for coated material that will be postformed and shall be conducted in place of the ISO 1519 bending test.

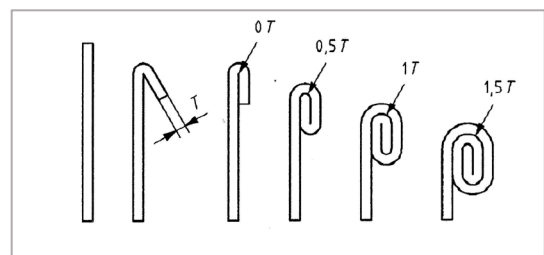


Figure 6 - T-bends

It shall be carried out on the production material (coils) or on Al samples obtained from the same raw Al material used for the production material (sheets).

The powder coating shall be applied with the maximum thickness indicated in the TDS on an aluminium test panel AA 5005 H24 0.81 mm thick (prepared with a chemical pretreatment).

The bend test shall be conducted according to [EN 13523-7](#), including the alternative device described in EN 1396:2023*, followed by a tape-pull adhesion test, as specified below:

The test is performed (rolling direction); if the transverse direction is used, it shall be specified in the inspection report. The bending radius is expressed as 'T' bend.

Apply an adhesive tape to the significant surface of the test panel following the mechanical deformation. Cover the area by pressing down firmly against the coating to eliminate voids or air pockets. Pull the tape off sharply at right angles to the plane of the panel after one minute.

In case of uncertain results due to cracking of the aluminium support, a steel panel with a thickness of 0.51 mm shall be used (Q-panel: QD type/ ISO 3574: Type CR1 steel test panel Type 3).

Bend test specific for postforming (according EN 1396:2023):

As an alternative to the devices covered in EN 13523-7, the following method may be used to carry out the bending:

- The test piece (at least 250 mm x 30 mm) is bent (at 1 cm from one extremity) over an angle of approximately 100 ° by hand or any convenient means.
- The bent test piece is then pressed using a vice or a hydraulic press until the two faces come into contact. This constitutes the '0T' bend.
- If the bent area shows cracks with apparent underlying metal, a second bend is carried out by folding the test piece over the first bend and then pressing it using a vice or press. This constitutes a '0,5T' bend.
- This procedure is continued until a crack-free bend is obtained.
- The bends shall be examined using a 10x magnifying glass.
- The test shall be carried out at a temperature of 23°C ± 2°C and at a relative humidity of 50% ± 5%, 24 h after curing.

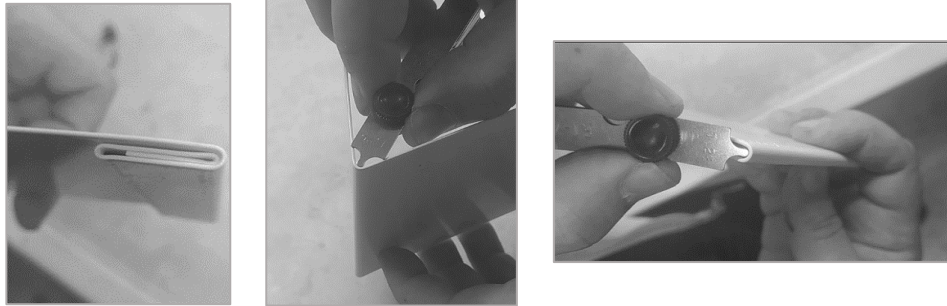


Figure 7 - Bend test for postforming - Pressing and Measurement

Requirements

Coating materials

The powder coating shall be considered suitable for postforming if the coated panel can be folded without cracking at a maximum value of 1.5T (the exact value shall be according to the value declared in the technical data sheet).

To limit the influence of the substrate, the test is conducted in the transverse direction.

I) Impact test (for powder coating only)

The test panels shall be made of the alloy EN-AW-5005-H24 or -H14 (AlMg 1 - semihard) with a thickness of 0.8 or 1.0 mm, unless otherwise approved by QUALICOAT.

The test shall be performed on an organic coating with a thickness approximating the minimum required. It shall be carried out on the reverse side of the significant surface.

Postforming

For the in-house control of coated material that will be postformed, the impact test shall be carried out on the production material (coils) or on samples obtained from the same raw aluminium material used for the production material (sheets).

In case of uncertain results due to cracking of the aluminium support, a steel panel with a thickness of 0.51 mm shall be used (Q-panel: QD type/ ISO 3574: Type CR1 steel test panel Type 3).



Figure 8 - Impact test

Test method

The impact shall be carried out on the reverse side, whereas the results shall be assessed on the coated side.

Type of powder coating	Energy	Standard
Class 1 (one- and two-coat)	2.5 Nm	ISO 6272-2 / ASTM D 2794 (indenter diameter: 15.9 mm)
Two-coat PVDF	1.5 Nm	ISO 6272-1 or ISO 6272-2 / ASTM D 2794 (indenter diameter: 15.9 mm)
Classes 1.5, 2 and 3	2.5 Nm	ISO 6272-1 or ISO 6272-2 / ASTM D 2794 (indenter diameter: 15.9 mm) followed by a tape pull adhesion test



Powder suitable for postforming	≥ 5 Nm	ISO 6272-1 or ISO 6272-2 / ASTM D 2794 (indenter diameter: 15.9 mm) according to the powder manufacturer's or coater's TDS or as per the written agreement between coater and customer
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Tape pull adhesion test (not applicable for class 1 powder coatings)

Apply an adhesive tape (at least 25 mm wide) with an adhesive strength between 6 N per 25 mm width and 10 N per 25 mm width to the significant surface of the test panel following the mechanical deformation.

Cover the area by pressing down firmly against the organic coating to eliminate voids or air pockets. Pull the tape off sharply at right angles to the plane of the panel after 1 minute.

In case of a negative result, the test shall be repeated on a panel coated with a thickness of 60 to 70 μm (classes 1, 1.5 and 2) or 50 to 60 μm (class 3).

Requirements

Class 1 powder coatings: Using normal corrected vision, the organic coating shall not show any sign of cracking to the base metal or detachment.

Powder coatings (except class 1): Using normal corrected vision, the organic coating shall not show any sign of detachment after the tape pull adhesion test.

J) Scratch and mar resistance (Martindale) test

Test method

According to EN 16611

The test shall be performed on one panel (dimensions: A5 or 150 x 150 mm). Any deformation of the test panels that could affect the results shall be avoided.

The thickness of the powder coating shall be between 60 µm and 90 µm.

The test panel shall be conditioned at 23 ± 2°C and 50 ± 5% RH for at least 16 hours.

The test surface shall be carefully wiped with a cleaning cloth before and after the test without scratching the surface, before taking gloss measurements.

The test panel shall be fixed on the table of the Martindale tester with a double-sided adhesive tape or other means, provided that the test surface remains substantially flat. The abrasive pad (3M Scotch Pad, CF-RL 7448, ultra-fine, grey) shall be fixed on the holder guide plate with a double-sided adhesive tape.

The holder for scrub material consists of a guide plate with an inner diameter of 90 ± 0,5 mm and a spindle (no additional ring weight) for a total of 155 ± 2 g.

The testing instrument shall be moved across the surface in a Lissajous figure of 1.5 Martindales, i.e. 24 movements (1 Martindale = a Lissajous figure with 16 movements).

The test shall be carried out at 23 ± 2°C and 50 ± 5 % RH. A new abrasion pad (3M Scotch Pad, CF-RL 7448, ultra-fine, grey) shall be used for each test and sample.

According to fig. 9, five gloss measurements (in accordance with ISO 2813 at a 60° angle of incidence) shall be made on the panels before and after the Martindale test. For the five measurements the gloss measurement device has to be placed and moved on the coated surface according to fig. 9.

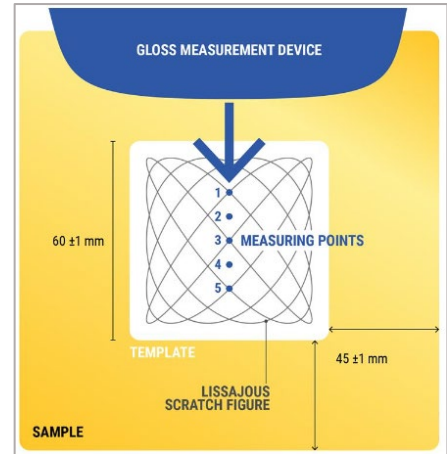


Figure 9 - Schematic representation of the measuring points on the sample

Requirements

Type of organic coating	Classes	Minimum average gloss retention*
Structured appearance	All classes	60 %
	Class 1 and 1.5	40 %
Smooth appearance	Class 2 and 3	30 %

$$*Gloss\ retention = \frac{\text{gloss value measured after testing}}{\text{initial gloss value}} \times 100$$

K) Resistance to mortar

Test method

Some metallic colours, especially those based on aluminium, may show variations in colour during tests that affect the surface of the coating. In this case, QUALICOAT accepts a slight variation in colour. In the case of metallic colours, the colour variations may differ depending on the angle of observation. This makes it difficult to perform a reliable measurement using any of the apparatus defined below.

For this reason, a reference scale has been defined using panels coated in an aluminium-based metallic colour (RAL 9006). After testing, high-resolution images were captured. These images have been approved and can be requested from the QUALICOAT Secretariat. Each accredited laboratory should have these approved pictures readily available (see figure below).

According to EN 12206-1 with the following changes:

- ❖ Amount of water: 60 – 65 g tap water
- ❖ Portions: 1 Portion (\varnothing 40 mm and 5-6 mm thickness) instead of 4 portions as mentioned in the standard.

Evaluation:

Distance: 20 - 40cm

Angle: not fixed

Light: D65 in the light cabinet

For information, the following low-resolution photographs show values 1 and 2 on the reference scale.



Figure 10 - Reference scale for mortar test

Requirements

The mortar shall be easy to remove without leaving any residues. Any mechanical damage to the organic coating caused by grains of sand shall be disregarded.

Any change in the appearance/colour of organic coatings with metallic or metallised effect shall not exceed 1 on the reference scale.

All other colours shall not show any change.

L) Wet adhesion test

Test method

Immerse a sample for two hours in boiling demineralised water (maximum $10 \mu\text{S}/\text{cm}$ at 25°C). Remove the test sample and allow it to cool down to room temperature.

After one hour but within a two-hour timeframe, a cross-cut shall be made.

Requirements:

No sign of detachment or blistering.

Cross-cut value 0.

Colour change is acceptable



Figure 11 - Wet adhesion test

M) Water spot test

Test method

The test shall be performed on one panel.

The demineralised water (maximum $10 \mu\text{S}/\text{cm}$ at 25°C) shall be heated up to 60°C in a beaker of the proper size and kept under stirring to uniform temperature.

The determination of the lightness coordinate L must be made on the panel to be tested in order to obtain the lightness change after the test.

The test panel shall be immersed in water in such a way that at least half of the area is inside water. Care must be taken not to put the panel in contact with the bottom of the beaker. The panel shall be immersed for 24 hours at $60 \pm 1^\circ\text{C}$. The glass shall be properly covered to avoid water evaporation.

At the end of the test, the panel shall be immediately cooled down in demineralised water at a temperature of $\leq 5^\circ\text{C}$. It shall then be dried with paper towels without rubbing. The immersed area of the panel shall be used for the determination of the lightness change. This determination shall be performed after 2 hours but not later than 3 hours after the water spot test.

Lightness change: ΔL CIELAB formula according to ISO 11664-4, measurement including specular reflection.

Requirements

The ΔL value shall be less than 4.

N) Constant climate condensation water test

Test method

According to ISO 6270-2 with the following changes:

A X-shape scribe mark with a width of at least 1 mm shall be made to score the organic coating down to the metal.

Testing duration:

For all organic coatings except class 3 powder coatings: : 1000 hours

For class 3 powder coatings: : 2000 hours

Requirements

No blistering in excess of 0 (S0) according to ISO 4628-2; the maximum infiltration at the cross is 1 mm.

The crossing point of the X-shape scribe mark has to be included in the evaluation.

O) Acetic acid salt spray test (AASS test)

Test method

According to ISO 9227 with the following changes:

A X-shape scribe mark with a width of 1 mm shall be made to cut the organic coating down to the metal. The crossing point of the X-shape scribe mark has to be included in the evaluation.

Testing duration:

For all organic coatings except class 3 powder coatings: : 1000 hours

For class 3 powder coatings: : 2000 hours

Coating materials used for postforming:

The panels used for testing the powder coatings for approval shall be in EN AW-5005 H24 alloy, suitable for 1T bending, correctly pre-treated.

The samples shall be prepared in accordance with EN 13523-8 (for example, panels with a bent area).

Requirements:

No blistering in excess of 0 (S0) according to ISO 4628-2. An infiltration of maximum 16 mm² is allowed over a scratch length of 10 cm but the length of any single infiltration shall not exceed 3 mm.

Specific requirements for PRE-OX endorsement)

No blistering in excess of 0 (S0) according to ISO 4628-2. An infiltration of maximum 8 mm² is allowed over a scratch length of 10 cm but the length of any single infiltration shall not exceed 2 mm.

Final assessment and proceedings

			Rating
A	3 samples satisfactory	0 sample unsatisfactory	satisfactory
B	2 samples satisfactory	1 sample unsatisfactory	satisfactory
C	1 sample satisfactory	2 samples unsatisfactory	unsatisfactory
D	0 sample satisfactory	3 samples unsatisfactory	unsatisfactory

Rating	Proceeding / Corrective action
A	No action
B	No action
C	<ul style="list-style-type: none"> ▶ Repetition of the acetic acid salt spray resistance test. ▶ If the result of this second test is C or D, all tests shall be repeated.
D	All laboratory tests shall be repeated

Table 4 – AASS test -Final assessment and proceedings

P) Resistance to humid atmospheres containing sulphur dioxide

Test method

According to ISO 22479 Method B (0,2 l SO₂ - 24 cycles)

X-shape scribe mark with a width of 1 mm shall be made to cut the organic coating down to the metal.

Requirements:

No infiltration exceeding 1 mm on both sides of the scratch, and no change in colour or blisters in excess of 2 (S2) according to ISO 4628-2.

The crossing point of the X-shape scribe mark has to be included in the evaluation.

If there is any colour change, the samples shall be heated at 105°C for 30 minutes and a new assessment of the colour change shall be made.

Dark / brown spots shall be cleaned by polishing (e.g. pumice flour sludge with melamine pad) and a new assessment of the colour shall be made

Q) Accelerated weathering test for all classes except class 3

Test method

According to ISO 16474-2 Method A (daylight filters) – Cycle 1 (102 min dry/18 min wet)

SAMPLING	Every single colour class 1	Every single colour class 1.5	Every single colour class 2	Banned colours all classes
Granting	3 panels	3 panels	3 panels	<i>not applicable</i>
Renewal	1 panel	1 panel	3 panels	3 panels

The test panels shall be tested in different areas of the climatic chamber. The position of all panels shall be changed approximately every 250 hours.

After 1000 hours exposure the test panels shall be rinsed with demineralised water and checked for:

- Gloss variation: ISO 2813 - angle of incidence 60°
- Colour change: CIELAB ΔE^*_{ab} using the formula in ISO 11664-4, measurement including specular reflection.

Three gloss and colour measurements are to be made on the test panels before and after the accelerated weathering test.

The colour of the organic coating on the significant surface shall be determined by means of a spectrophotometer calculating the coordinates of the CIE 1976 L*a*b* colour space, according to EN ISO 11664-4, including specular reflection. The colorimetric measurement shall be made with standard illuminant D65 and 10° normal observer.

Requirements

	Class 1	Class 1.5	Class 2
Gloss retention	50 %	75 %	90 %
Colour change ΔE	Specified limits (see table 6)	75 % of the limits specified in table 6	50 % of the limits specified in table 7

In case of an unsatisfactory result, an additional visual assessment shall be carried out for final decision on:

- category 1 organic coatings
- organic coatings with structured appearance in all gloss categories
- organic coatings with a metallic or metallised effect
- organic coatings in light colours (L > 70)

R) Weathering test for granting approvals to class 3 powder coatings

Test method

For class 3 the accelerated weathering test is replaced by a Florida exposure test of 3 years.

Requirements:

After 3 years exposure in Florida	
Gloss retention	80 %
Colour change ΔE	Not greater than 50% of the limits prescribed in table 8

S) Natural weathering (Florida) test

Test method

Exposure in Florida according to ISO 2810.

The test shall start in April.

	Class 1	Class 1.5	Class 2	Class 3
Number of panels per colour shade	4 ^(a)	7 ^(a)	10 ^(a)	13 ^(a)
Exposure angle	facing 5° south	facing 5° south	facing 5° south	facing 45° south
Exposure time	1 year	2 years with an annual evaluation	3 years with an annual evaluation	10 years ^(b)

- a) 3 panels per year for weathering and 1 reference
- b) All the test panels shall be cleaned annually by the laboratory in Florida. After 3, 5, and 7 years, three test panels will be sent back to the QUALICOAT laboratory in charge for evaluation. The remaining three test panels will finally be sent back to the laboratory in charge at the end of the 10-year exposure period.

Dimensions of the test panels: approx. 100 x 305 x 0.8 – 1.0 mm

After exposure, the exposed panels shall be cleaned using the following method:

Immerse in demineralised water (maximum temperature of 25°C) with a 1% surface-active agent for 24 hours, and then clean by wiping with a soft sponge with tap water applying gentle pressure, or using any other method approved by the Technical Committee. This process shall not scratch the surface.

The gloss shall be measured according to ISO 2813, at an angle of 60°.

The average is taken from the colorimetric measurements.

Colour variation: ΔE CIELAB formula according to ISO 11664-4, measurement including specular reflection.

The colour of the organic coating on the significant surface shall be determined by means of a spectrophotometer calculating the coordinates of the CIE 1976 L*a*b* colour space, according to EN ISO 11664-4, including specular reflection. The colorimetric measurement shall be made with standard illuminant D65 and 10° normal observer.

To determine the gloss and colour, three measurements will be made on the cleaned panels before and after the weathering test. These measurements shall be made at different points at least 50 mm apart.

Requirements:

Minimum gloss retention

	Assessment after					
	1 year	2 years	3 years	5 years	7 years	10 years
Class 1	50 %					
Class 1.5	65 %	50 %				
Class 2	75 %	60 %	50 %			
Class 3			80 %	70 %	60 %	50 %

Colour change

For class 1, 1.5 and 2, the ΔE values shall not exceed the maximum values prescribed in the tables below.

For class 3, the ΔE values shall not exceed 50% of the maximum values prescribed after 3 years, and shall not exceed the maximum values after 10 years in Florida.



Colour tolerances after the weathering test for Class 1 & 1.5 organic coatings ⁴																	
RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E
1000	3.0	2000	4.0	<u>3000</u>	5.0	4001	4.0	5000	4.0	6000	4.0	7000	3.0	8000	3.0	<u>9001</u>	2.0
<u>1001</u>	3.0	<u>2001</u>	5.0	3001	5.0	4002	4.0	5001	4.0	6001	4.0	<u>7001</u>	3.0	<u>8001</u>	3.0	<u>9002</u>	2.0
1002	3.0	2002	6.0	<u>3002</u>	5.0	<u>4003</u>	5.0	<u>5002</u>	4.0	<u>6002</u>	4.0	7002	3.0	8003	3.0	<u>9003</u>	2.0
<u>1003</u>	4.0	2003	6.0	<u>3003</u>	4.0	4004	4.0	<u>5003</u>	4.0	<u>6003</u>	4.0	7003	3.0	8004	3.0	<u>9004</u>	4.0
<u>1004</u>	4.0	<u>2004</u>	4.0	3004	4.0	<u>4005</u>	4.0	5004	4.0	6004	4.0	<u>7004</u>	3.0	<u>8007</u>	3.0	<u>9005</u>	4.0
1005	5.0	2008	6.0	<u>3005</u>	4.0	4006	4.0	<u>5005</u>	4.0	<u>6005</u>	3.0	7005	3.0	<u>8008</u>	3.0	<u>9006</u>	2.0
1006	5.0	<u>2009</u>	4.0	3007	4.0	4007	4.0	<u>5007</u>	3.0	6006	4.0	7006	3.0	<u>8011</u>	3.0	<u>9007</u>	2.0
<u>1007</u>	5.0	2010	6.0	<u>3009</u>	4.0	4008	4.0	<u>5008</u>	4.0	6007	3.0	7008	3.0	<u>8012</u>	3.0	<u>9010</u>	2.0
<u>1011</u>	3.0	2011	6.0	<u>3011</u>	4.0	4009	4.0	5009	4.0	6008	3.0	7009	3.0	<u>8014</u>	3.0	<u>9011</u>	4.0
<u>1012</u>	3.0	2012	4.0	<u>3012</u>	2.0	4010	4.0	<u>5010</u>	4.0	<u>6009</u>	4.0	7010	3.0	8015	3.0	9012	2.0
<u>1013</u>	2.0			3013	5.0			<u>5011</u>	4.0	<u>6010</u>	4.0	7011	3.0	8016	3.0	<u>9016</u>	2.0
1014	3.0			3014	4.0			5012	4.0	<u>6011</u>	4.0	<u>7012</u>	3.0	<u>8017</u>	3.0	9018	2.0
<u>1015</u>	2.0			3015	4.0			5013	4.0	<u>6012</u>	3.0	7013	3.0	<u>8019</u>	3.0	9022	2.0
1016	6.0			<u>3016</u>	5.0			<u>5014</u>	4.0	<u>6013</u>	3.0	<u>7015</u>	3.0	8022	3.0		
1017	3.0			3017	8.0			<u>5015</u>	3.0	<u>6014</u>	4.0	<u>7016</u>	3.0	<u>8023</u>	3.0		
1018	6.0			<u>3018</u>	6.0			<u>5017</u>	4.0	6015	3.0	<u>7021</u>	3.0	8024	3.0		
<u>1019</u>	3.0			<u>3020</u>	4.0			5018	4.0	<u>6016</u>	4.0	<u>7022</u>	3.0	8025	3.0		
<u>1020</u>	3.0			<u>3022</u>	4.0			5019	4.0	<u>6017</u>	4.0	7023	3.0	<u>8028</u>	3.0		
1021	6.0			3027	5.0			5020	4.0	<u>6018</u>	4.0	<u>7024</u>	3.0				
1023	6.0			3031	4.0			5021	4.0	6019	2.0	7026	3.0				
1024	3.0							5022	4.0	<u>6020</u>	3.0	7030	3.0				
1027	3.0							<u>5023</u>	4.0	<u>6021</u>	2.0	7031	3.0				
<u>1028</u>	8.0							5024	4.0	6022	3.0	<u>7032</u>	2.0				
1032	5.0									<u>6024</u>	3.0	7033	3.0				
1033	8.0									6025	4.0	7034	3.0				
1034	4.0									<u>6026</u>	4.0	<u>7035</u>	2.0				
1037	5.0									6027	2.0	7036	3.0				
										6028	4.0	<u>7037</u>	3.0				
										<u>6029</u>	4.0	<u>7038</u>	2.0				
										<u>6032</u>	3.0	<u>7039</u>	3.0				
										<u>6033</u>	3.0	<u>7040</u>	3.0				
										<u>6034</u>	2.0	<u>7042</u>	3.0				
												<u>7043</u>	3.0				
												<u>7044</u>	2.0				
												7045	3.0				
												7046	3.0				
												<u>7047</u>	2.0				

Table 5 - Colour tolerances after Florida test (Classes 1 and 1.5)

⁴ Underlined colours are colours that have already been tested.



Colour tolerances after the weathering test for Class 2 organic coatings ⁵																	
RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E
1000	3.0	2000	6.0	<u>3000</u>	6.0	4002	4.0	5000	4.0	6000	5.0	7000	4.0	8000	4.0	<u>9001</u>	2.0
1001	3.0	<u>2001</u>	5.0	3001	6.0	<u>4003</u>	5.0	<u>5001</u>	4.0	6001	5.0	<u>7001</u>	3.0	<u>8001</u>	3.0	<u>9002</u>	2.0
<u>1002</u>	3.0	2002	8.0	<u>3002</u>	6.0	4004	5.0	<u>5002</u>	4.0	<u>6002</u>	4.0	7002	4.0	8003	3.0	<u>9003</u>	2.0
<u>1004</u>	4.0	2003	6.0	<u>3003</u>	4.0	<u>4005</u>	4.0	<u>5003</u>	4.0	<u>6003</u>	5.0	7003	4.0	8004	4.0	<u>9004</u>	5.0
1005	6.0	2008	6.0	3004	4.0	4006	5.0	5004	5.0	6004	5.0	<u>7004</u>	4.0	<u>8007</u>	4.0	<u>9005</u>	5.0
1006	6.0	<u>2009</u>	4.0	<u>3005</u>	4.0	4007	5.0	<u>5005</u>	4.0	<u>6005</u>	3.0	7005	4.0	8008	4.0	<u>9006</u>	2.0
<u>1007</u>	6.0	2010	6.0	<u>3007</u>	4.0	4008	4.0	<u>5007</u>	3.0	6006	4.0	7006	4.0	<u>8011</u>	4.0	<u>9007</u>	2.0
<u>1011</u>	3.0	2012	4.0	<u>3009</u>	4.0	4009	4.0	<u>5008</u>	5.0	6007	4.0	7008	4.0	8012	4.0	<u>9010</u>	2.0
1012	3.0			<u>3011</u>	5.0	4010	5.0	5009	4.0	6008	5.0	7009	4.0	<u>8014</u>	3.0	<u>9011</u>	5.0
<u>1013</u>	2.0			<u>3012</u>	2.0			<u>5010</u>	4.0	<u>6009</u>	4.0	7010	4.0	8015	4.0	<u>9012</u>	2.0
1014	3.0			3013	6.0			<u>5011</u>	5.0	<u>6010</u>	5.0	7011	4.0	8016	4.0	<u>9016</u>	2.0
<u>1015</u>	2.0			3014	4.0			5012	4.0	<u>6011</u>	4.0	<u>7012</u>	4.0	<u>8017</u>	4.0	9018	2.0
1016	6.0			<u>3016</u>	5.0			5013	5.0	<u>6012</u>	4.0	7013	4.0	<u>8019</u>	3.0	9022	2.0
1017	3.0			3020	4.0			<u>5014</u>	4.0	<u>6013</u>	3.0	7015	4.0	8022	5.0		
1018	6.0			<u>3022</u>	4.0			<u>5015</u>	3.0	<u>6014</u>	4.0	<u>7016</u>	3.0	<u>8023</u>	4.0		
<u>1019</u>	2.5			3027	6.0			<u>5017</u>	5.0	6015	4.0	<u>7021</u>	4.0	8024	4.0		
<u>1020</u>	6.0			3031	4.0			5018	5.0	<u>6016</u>	5.0	<u>7022</u>	4.0	8025	4.0		
1021	6.0							<u>5019</u>	4.0	<u>6017</u>	5.0	7023	3.0	<u>8028</u>	3.0		
1023	3.0							5020	5.0	<u>6018</u>	4.0	7024	4.0				
1024	3.0							5021	4.0	6019	2.0	7026	4.0				
1027	3.0							5022	5.0	<u>6020</u>	2.0	7030	2.0				
1032	6.0							<u>5023</u>	4.0	<u>6021</u>	4.0	7031	4.0				
1034	4.0							5024	4.0	6022	4.0	<u>7032</u>	2.0				
1037	6.0									<u>6024</u>	3.0	7033	3.0				
										6025	5.0	7034	3.0				
										<u>6026</u>	5.0	<u>7035</u>	2.0				
										6027	2.0	7036	3.0				
										6028	5.0	<u>7037</u>	2.5				
										<u>6029</u>	4.0	<u>7038</u>	2.0				
										<u>6032</u>	3.0	<u>7039</u>	4.0				
										<u>6033</u>	2.0	<u>7040</u>	3.0				
										<u>6034</u>	2.0	<u>7042</u>	3.0				
												<u>7043</u>	3.0				
												<u>7044</u>	2.0				
												7045	3.0				
												7046	4.0				
												<u>7047</u>	2.0				

Table 6 - Colour tolerances after Florida test (Class 2)

⁵ Underlined colours are colours that have already been tested.



Colour tolerances after the weathering test for Class 3 organic coatings													
RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E	RAL	Δ E
1000	3.0	3005	5.0	5000	5.0	6000	5.0	7000	4.0	8000	4.0	9001	3.0
1001	3.0	3007	5.0	5004	5.0	6004	5.0	7001	4.0	<u>8001</u>	4.0	9002	3.0
1002	3.0	3009	5.0	5007	5.0	6005	5.0	7002	4.0	8002	4.0	9003	3.0
1011	3.0	3011	5.0	5008	5.0	6009	5.0	7003	4.0	8003	4.0	9004	5.0
<u>1013</u>	3.0	3012	5.0	5014	5.0	6010	5.0	7004	4.0	8004	4.0	<u>9005</u>	5.0
1014	3.0			5015	5.0	6017	5.0	7005	4.0	8007	4.0	<u>9006</u>	4.0
1015	3.0			5017	5.0	<u>6021</u>	5.0	7006	4.0	8008	4.0	<u>9007</u>	4.0
1019	3.0			5018	5.0	6028	5.0	7008	4.0	8011	4.0	<u>9010</u>	3.0
1020	6.0			5021	5.0	6033	5.0	7009	4.0	8012	4.0	9011	5.0
<u>1024</u>	3.0			5023	5.0			7010	4.0	<u>8014</u>	4.0	9016	3.0
				5024	5.0			7011	4.0	8015	4.0	9017	5.0
								7012	4.0	8016	4.0	9018	3.0
								7013	4.0	8017	4.0	9022	4.0
								<u>7015</u>	4.0	8019	4.0		
								<u>7016</u>	4.0	8022	5.0		
								7021	4.0	8023	4.0		
								7022	4.0	<u>8024</u>	4.0		
								7023	4.0	8025	4.0		
								7024	4.0	8028	4.0		
								7026	4.0				
								7030	4.0				
								7031	4.0				
								<u>7032</u>	3.0				
								7033	4.0				
								7034	4.0				
								7035	3.0				
								7036	4.0				
								7037	4.0				
								7038	3.0				
								7039	4.0				
								7040	4.0				
								7042	4.0				
								7043	4.0				
								7044	3.0				
								7045	4.0				
								7046	4.0				
								<u>7047</u>	3.0				

Table 7 - Colour tolerances after Florida test (Class 3)

Visual assessment

In case of unsatisfactory result, an additional visual assessment shall be carried out for

- category 1 organic coatings
- organic coatings with structured appearance in all gloss categories
- organic coatings with a metallic or metallised effect
- organic coatings in light colours (L > 70)

In case of doubt, the Florida WG may carry out an additional visual assessment on coated panels in all classes and categories even if they do not belong to the above list of candidates for visual assessment.

The decision of the Florida WG after visual assessment is non-reversible.

4. Summary of test requirements

TESTS	QUALICOAT SPECIFICATIONS			
	CLASS 1	CLASS 1.5	CLASS 2	CLASS 3
COLOUR	The colour deviation from the certified RAL card shall not be greater than the limit prescribed in Table 3 –(Colour tolerances before granting or renewing an approval)	Same as class 1	Same as class 1	Same as class 1
GLOSS	Permissible variation from the nominal value specified by the coating supplier: Gloss cat. 1: 0 – 30 +/- 5 units Gloss cat. 2: 31 - 70 +/- 7 units Gloss cat. 3: 71 – 100 +/- 10 units	Same as class 1	Same as class 1	Same as class 1
COATING THICKNESS	Minimum thickness = 60 µm None of the values measured shall be less than 80% of the specified minimum value	Same as class 1	Same as class 1	Same as class 1
DRY ADHESION	The result shall be 0.	Same as class 1	Same as class 1	Same as class 1
BUCHHOLZ INDENTATION	Minimum 80 with the specified required coating thickness	Same as class 1	Same as class 1	Same as class 1
CUPPING TEST	Minimum 5 mm Using normal corrected vision, the coating shall not show any sign of cracking or detachment.	Minimum 5 mm Using normal corrected vision, the coating shall not show any sign of detachment following the tape pull adhesion test.	Same as class 1.5	Same as class 1.5
BEND TEST	Minimum 5 mm Using normal corrected vision, the coating shall not show any sign of cracking or detachment.	Minimum 5 mm Using normal corrected vision, the coating shall not show any sign of detachment following the tape pull adhesion test.	Same as class 1.5	Same as class 1.5
IMPACT TEST	Minimum 5 mm Using normal corrected vision, the coating shall not show any sign of cracking or detachment.	Minimum 5 mm Using normal corrected vision, the coating shall not show any sign of detachment following the tape pull adhesion test.	Same as class 1.5	Same as class 1.5



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TESTS	QUALICOAT SPECIFICATIONS			
	CLASS 1	CLASS 1.5	CLASS 2	CLASS 3
RESISTANCE TO HUMID ATMOSPHERES	After 24 cycles No infiltration exceeding 1 mm on both sides of the scratch, and no change in colour or blisters in excess of 2 (S2) according to ISO 4628-2	Same as class 1	Same as class 1	Same as class 1
ACETIC ACID SALT SPRAY RESISTANCE	Testing time: 1000 hours RATING A = 3 samples ok, 0 not ok RATING B = 2 samples ok, 1 not ok RATING C = 1 sample ok, 2 not ok RATING D = 0 sample ok, 3 not ok Evaluation: A/B : test result satisfactory C: test result unsatisfactory (repetition of AASS test) D: test result unsatisfactory (repetition of all laboratory tests)	Same as class 1	Same as class 1	Testing time: 2000 hours Same evaluation as class 1
ACCELERATED WEATHERING TEST	Exposure time: 1000 hours Gloss retention: at least 50% Colour change: according to the ΔE values stipulated in Table 6	Exposure time: 1000 hours Gloss retention: at least 75% Colour change: not greater than 75% of the limits prescribed in Table 6	Exposure time: 1000 hours Gloss retention: at least 90% Colour change: not greater than 50% of the limits prescribed in Table 7	Exposure time: 3 years in Florida Gloss retention: at least 80% Colour change: not greater than 50% of the limits prescribed in Table 8
RESISTANCE TO MORTAR	There shall not be any change in appearance/colour after the mortar test	Same as class 1	Same as class 1	Same as class 1
WET ADHESION	Using normal corrected vision, the coating shall not show any sign of blistering or detachment	Same as class 1	Same as class 1	Same as class 1
CONSTANT CLIMATE CONDENSATION WATER TEST	Testing time: 1000 hours No blistering in excess of 0 (S0) according to ISO 4628-2; the maximum infiltration at the cross is 1 mm.	Same as class 1	Same as class 1	Testing time: 2000 hours No blistering in excess of 2 (S2) according to ISO 4628-2; the maximum infiltration at the cross is 1 mm.
WATER SPOT TEST	Colour change The ΔL value shall be less than 4	Same as class 1	Same as class 1	Same as class 1
SCRATCH AND MAR RESISTANCE TEST (Martindale)	Gloss retention <ul style="list-style-type: none"> • 40% for coatings with smooth appearance • 60% for organic coatings with structured appearance 	Same as class 1	Gloss retention <ul style="list-style-type: none"> • 30% for coatings with smooth appearance • 60% for organic coatings with structured appearance 	Same as class 2



TESTS	QUALICOAT SPECIFICATIONS			
	CLASS 1	CLASS 1.5	CLASS 2	CLASS 3
NATURAL WEATHERING TEST (FLORIDA)	5° south 4 panels per colour shade Exposure time: 1 year Gloss retention at least 50% Colour change: The ΔE values shall not exceed the maximum values stipulated in Table 6	5° south 7 panels per colour shade Exposure time: 2 years with an annual evaluation Gloss retention After 1 year : at least 65% After 2 years : at least 50% Colour change: After 2 years: within the limits prescribed in Table 6	5° south 10 panels per colour shade Exposure time: 3 years with annual evaluation Gloss retention After 1 year : at least 75% After 2 years : at least 60% After 3 years : at least 50% Colour change: After 3 years: within the limits prescribed in Table 7	45° south 13 panels per colour shade Exposure time: 10 years with evaluation after 3, 5 and 7 years Gloss retention After 3 years: at least 80% After 5 years: at least 70% After 7 years :at least 60% After 10 years: at least 50% Colour change: After 3 years : max. 50% of the limits prescribed in Table 8 After 10 years: within the limits prescribed in Table 8

Table 8 - Summary of test requirements (all classes)

5. Assessment of test results

The testing laboratory shall submit the test report to the General Licensee or to QUALICOAT in countries where there is no General Licensee.

The inspection reports shall be assessed by the General Licensee. Under the supervision of QUALICOAT, the General Licensee shall decide whether or not to grant an approval or an extension.

- If the results of all tests (excluding the natural weathering test) meet the requirements for all basic colours an approval or extension shall be granted.
- If the results of all tests (excluding the natural weathering test) meet the requirements for the basic colours but not for the metallic one, an approval shall be granted for all colours excluding metallic ones.
- If the results of any of the tests (excluding the natural weathering test) on a basic colour do not meet the requirements, the manufacturer of the organic coating material tested shall be informed that no approval or extension can be granted for the time being, stating the details and reasons.
- If the results of all tests (excluding the natural weathering test) are satisfactory for the metallic colour but not for the basic colours, the manufacturer of the organic coating material tested shall be informed that no approval can be granted for the time being, stating the details and reasons.

The approval shall be confirmed if the results of the natural weathering test in Florida are satisfactory for all basic colours.

If the result is unsatisfactory for the metallic colour alone, the approval shall be maintained for all colours except metallic ones.



In all other cases, the approval shall be withdrawn at the end of the year, but the single failed basic colour shall already be banned by the end of September.

QUALICOAT shall publish the Florida test results including the deadlines on www.qualicoat.net at the end of August.

Within 30 working days after receiving the Florida test results from QUALICOAT, the General Licensee shall inform the powder manufacturer of the unsatisfactory result and of the resulting ban of the failed colour.

The table below shows the different deadlines until when the powder manufacturer may still produce and sell the different colours and until when a licensee may use them.

DEADLINES					
Production of QUALICOAT approved products		Sale of QUALICOAT approved products		Use of QUALICOAT approved products by licensee	
Single failed basic colour	Remaining colours	Single failed basic colour	Remaining colours	Single failed basic colour	Remaining colours
30.09.xx	31.12.xx	30.03.yy	30.03.yy	End of original shelf life	

xx = current year yy = following year

6. Overview of the granting procedure

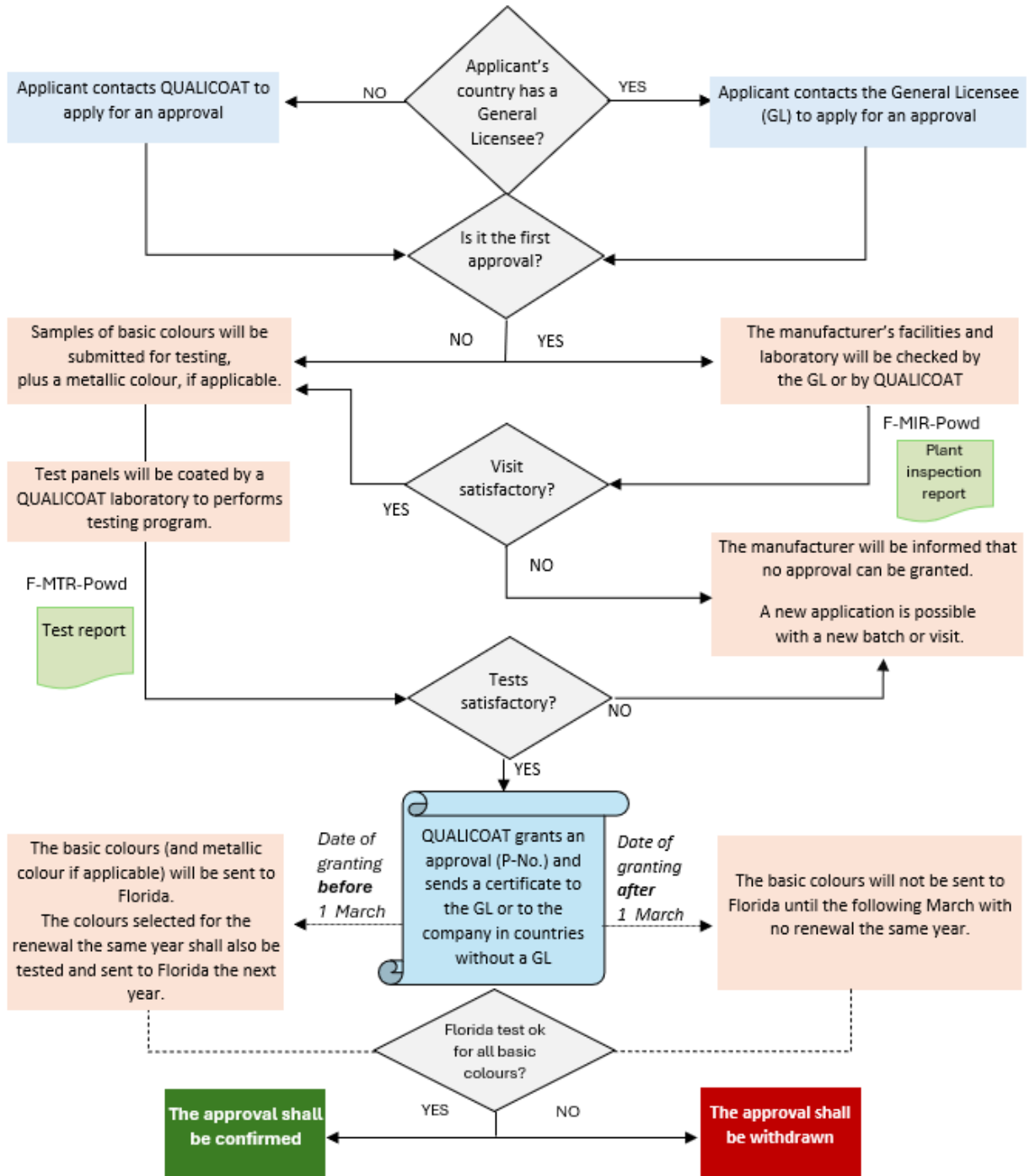


Figure 12 - Flow chart Granting of Approvals

Chapter 5 – Renewal of Approvals

1. Principles

After an approval has been granted to a coating material, laboratory tests and Florida exposure shall be performed annually, and the manufacturer shall provide the coaters and the testing laboratory in charge with the following information:

a) Technical Data Sheet

The relevant technical data sheet shall include at least the following information:

- QUALICOAT + P-No.
- Product description
- Curing conditions including a curing window with a minimum of 2 temperatures and minimum and maximum time for each temperature.
- Shelf life and maximum storage temperature (XX months <YY°C)
- Fire classification information, if available (e.g., EN 13501-1 – A2 s1d0).

b) Labels

Labels shall include at least the following information:

- QUALICOAT + P-No.
- Colour description
- Product code
- Batch number
- Gloss value
- Curing conditions (min. and max. for time and temperatures)
- Best before date at <YY°C)

2. Renewal of class 1 and class 1.5 approvals

Consistent quality of approved organic coating materials is monitored with all the tests described in [Table 2](#) (Testing programme) being performed on two colours chosen from the three colours specified by QUALICOAT each year.

One metallic colour specified by QUALICOAT (RAL 9006 and RAL 9007 alternately) shall also be tested every year if there is an extension for metallic colours.

3. Renewal of class 2 approvals

Consistent quality of approved organic coating materials is monitored with all the tests described in [Table 2](#) (Testing programme) being performed on two colours chosen from the three colours of the same RAL family specified by QUALICOAT each year, excluding critical RAL colours, based on the following classification:

a) RAL families and critical colours for class 2

SUMMARY	
Number of solid RAL colours (excluding metallic and pearl RAL colours)	191
Solid RAL colours (non-critical)	182
Critical solid RAL colours	9
Number of RAL families	30

9 CRITICAL RAL COLOURS (colours excluded from the RAL families)			
RAL 1003	RAL 2004	RAL 3015	RAL 4001
RAL 1028	RAL 2011	RAL 3017	
RAL 1033		RAL 3018	

If a powder supplier himself considers a colour or a family specified by QUALICOAT to be critical, he shall inform QUALICOAT and this information will be mentioned on the approval certificate and published on the QUALICOAT website. QUALICOAT will specify an alternative colour or family for the renewal.

182 SOLID RAL COLOURS (non-critical)	
30 RAL FAMILIES	

RAL 1XXX	FAMILY 1/A	FAMILY 1/B	FAMILY 1/C	FAMILY 1/D
DESCRIPTION	IVORY AND BEIGE	GREENISH YELLOW	REDDISH YELLOW	OCHRE / DARK YELLOW
RAL	1000 - 1001 - 1002 - 1013 - 1014 - 1015	1012 - 1016 - 1018 - 1021 - 1023	1004 - 1005 - 1006 - 1007 - 1017 - 1032 - 1034 - 1037	1011 - 1019 - 1020 - 1024 - 1027
Total 24 colours	6	5	8	5

RAL 2XXX	FAMILY 2/A	FAMILY 2/B
DESCRIPTION	YELLOWISH ORANGE	REDDISH ORANGE
RAL	2000 - 2003 - 2008 - 2009 - 2010	2001 - 2002 - 2012
Total 8 colours	5	3

RAL 3XXX	FAMILY 3/A	FAMILY 3/B	FAMILY 3/C
DESCRIPTION	LIGHT RED AND PINK	RED	DARK RED
RAL	3012 - 3014 - 3022	3000 - 3001 - 3002 - 3003 - 3013 - 3016 - 3020 - 3027 - 3028 - 3031	3004 - 3005 - 3007 - 3009 - 3011
Total 18 colours	3	10	5

RAL 4XXX	FAMILY 4/A	FAMILY 4/B	FAMILY 4/C
DESCRIPTION	REDDISH VIOLET	BLUEISH VIOLET	DARK AND PASTEL VIOLET



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RAL	4002 - 4003 - 4010	4004 - 4005 - 4006 - 4008	4007 - 4009
Total 9 colours	3	4	2

RAL 5XXX	FAMILY 5/A	FAMILY 5/B	FAMILY 5/C	FAMILY 5/D
DESCRIPTION	REDDISH BLUE	GREENISH BLUE	DARK BLUE	LIGHT BLUE
RAL	5000 - 5002 - 5003 - 5005 - 5010 - 5013 - 5017 - 5022	5001- 5007 - 5009 - 5018 - 5019 - 5021	5004 - 5008 - 5011 - 5020	5012 - 5014 - 5015 - 5023 - 5024
Total 23 colours	8	6	4	5

RAL 6XXX	FAMILY 6/A	FAMILY 6/B	FAMILY 6/C	FAMILY 6/D	FAMILY 6/E
DESCRIPTION	BLUISH GREEN	YELLOWISH GREEN	INORGANIC GREEN	DARK GREEN	LIGHT GREEN
RAL	6000 - 6004 - 6005 - 6009 - 6016 - 6026	6001 - 6002 - 6006 - 6010 - 6017 - 6018 - 6024 - 6029 - 6032 - 6033 - 6037	6003 - 6011 - 6013 - 6014 - 6025 - 6028	6007 - 6008 - 6012 - 6015 - 6020 - 6022	6019 - 6021 - 6027 - 6034
Total 33 colours	6	11	6	6	4

RAL 7XXX	FAMILY 7/A	FAMILY 7/B	FAMILY 7/C
DESCRIPTION	LIGHT GREY WITH L > 70	MEDIUM GREY WITH L < 70 AND > 50	DARK GREY WITH L < 50
RAL	7032 - 7035 - 7038 - 7044 - 7047	7000 - 7001 - 7002 - 7003 - 7004 - 7005 - 7023 - 7030 - 7033 - 7034 - 7036 - 7037 - 7040 - 7042 - 7045 - 7046	7006 - 7008 - 7009 - 7010 - 7011 - 7012 - 7013 - 7015 - 7016 - 7021 - 7022 - 7024 - 7026 - 7031 - 7039 - 7043
Total 37 colours	5	16	16

RAL 8XXX	FAMILY 8/A	FAMILY 8/B	FAMILY 8/C
DESCRIPTION	LIGHT BROWN	MEDIUM BROWN	DARK BROWN
RAL	8000 - 8001 - 8004 - 8023 - 8024 - 8025	8002 - 8003 - 8007 - 8008 - 8012 - 8015	8011 - 8014 - 8016 - 8017 - 8019 - 8022 - 8028
Total 19 colours	6	6	7

RAL 9XXX	FAMILY 9/A	FAMILY 9/B	FAMILY 9/C
DESCRIPTION	WHITE	CREAM AND GREY WHITE	BLACK
RAL	9003 - 9010 - 9012 - 9016	9001 - 9002 - 9018	9004 - 9005 - 9011 - 9017
Total 11 colours	4	3	4

b) Metallic extension for class 2

One metallic colour specified by QUALICOAT (RAL 9006 and RAL 9007 alternately) shall also be tested every year if there is an extension for metallic colours.

4. Renewal of class 3 approvals

Consistent quality of approved organic coating materials is monitored with all the tests described in [Table 2](#) (Testing programme) being performed on two colours chosen from the three colours of the same RAL family specified by QUALICOAT each year, excluding critical RAL colours, based on the following classification:

a) RAL families and critical colours for class 3

SUMMARY	
Number of solid RAL colours (excluding metallic and pearl RAL colours)	190
Solid RAL colours (non-critical)	101
Critical solid RAL colours	89
Number of RAL families	16
Lightness category LIGHT (L>70)	4 RAL families - 21 RAL colours
Lightness category MEDIUM (<70 > 40)	6 RAL families - 52 RAL colours
Lightness category DARK (L<40)	6 RAL families - 28 RAL colours

89 CRITICAL RAL COLOURS (colours excluded from the RAL families)						
RAL 1004	RAL 1003	RAL 2000	RAL 3000	RAL 4001	RAL 5001	RAL 6001
RAL 1005	RAL 1012	RAL 2001	RAL 3001	RAL 4002	RAL 5002	RAL 6002
RAL 1006	RAL 1016	RAL 2002	RAL 3002	RAL 4003	RAL 5003	RAL 6003
RAL 1007	RAL 1018	RAL 2003	RAL 3003	RAL 4004	RAL 5005	RAL 6006
RAL 1017	RAL 1021	RAL 2004	RAL 3004	RAL 4005	RAL 5009	RAL 6007
RAL 1032	RAL 1023	RAL 2008	RAL 3013	RAL 4006	RAL 5010	RAL 6008
RAL 1034	RAL 1027	RAL 2009	RAL 3014	RAL 4007	RAL 5011	RAL 6011
RAL 1037	RAL 1028	RAL 2010	RAL 3015	RAL 4008	RAL 5012	RAL 6012
	RAL 1033	RAL 2011	RAL 3016	RAL 4009	RAL 5013	RAL 6013
		RAL 2012	RAL 3017	RAL 4010	RAL 5019	RAL 6014
			RAL 3018		RAL 5020	RAL 6015
			RAL 3020		RAL 5022	RAL 6016
			RAL 3022			RAL 6018
			RAL 3027			RAL 6019
			RAL 3028			RAL 6020
			RAL 3031			RAL 6022
						RAL 6024
						RAL 6025
						RAL 6026
						RAL 6027
						RAL 6029
						RAL 6032
						RAL 6034
						RAL 6037

If a powder supplier himself considers a colour or a family specified by QUALICOAT to be critical, he shall inform QUALICOAT and this information will be mentioned on the approval certificate and published on the QUALICOAT website. QUALICOAT will specify an alternative colour or family for the renewal.

101 SOLID RAL COLOURS (non-critical)⁶

16 RAL FAMILIES

RAL 1XXX	FAMILY 1/LIGHT	FAMILY 1/MEDIUM
DESCRIPTION	IVORY AND BEIGE	OCHRE / YELLOW MEDIUM
RAL	1000 - 1001 - 1002 - 1013 -1014 – <u>1015</u>	<u>1011</u> - 1019 - 1020 -1024
Total 10 colours	6	4

RAL 3XXX	FAMILY 3/MEDIUM	FAMILY 3/DARK
DESCRIPTION	LIGHT RED AND PINK	DARK RED
RAL	3012*	3005* - 3007* - 3009* - 3011*
Total 5 colours	1	4

RAL 5XXX	FAMILY 5/LIGHT	FAMILY 5/MEDIUM	FAMILY 5/DARK
DESCRIPTION	LIGHT BLUE	MEDIUM BLUE	DARK BLUE
RAL	5014* - 5015* - 5023* - 5024*	5000* - 5007* - 5017* - 5018* - 5021*	5004* -5008*
Total 11 colours	4	5	2

RAL 6XXX	FAMILY 6/MEDIUM	FAMILY 6/DARK
DESCRIPTION	MEDIUM GREEN	DARK GREEN
RAL	6000* –6010* – 6017* - 6021* - 6033*	6004* – 6005* - 6009* - 6028*
Total 9 colours	5	4

RAL 7XXX	FAMILY 7/LIGHT	FAMILY 7/MEDIUM	FAMILY 7/DARK
DESCRIPTION	LIGHT GREY	MEDIUM GREY	DARK GREY
RAL	7032 – <u>7035</u> - 7038 - 7044 - 7047	7000 - 7001 - 7002 - 7003 - 7004 - 7005 - 7006 - 7008 - 7009 - 7010 - 7011 - 7012 - - 7015 - 7023 - 7030 - 7031 - 7033 - 7034 - 7036 - 7037 - 7039 - <u>7040</u> - 7042 – 7043 - 7045 - 7046	7013 – <u>7016</u> - 7021 - 7022 - 7024 - 7026
Total 37 colours	5	26	6

RAL 8XXX	FAMILY 8/MEDIUM	FAMILY 8/DARK
DESCRIPTION	MEDIUM BROWN	DARK BROWN
RAL	8000 - 8001 - 8002 - 8003 - 8004 - 8008 - 8012 – 8015 -8023 - <u>8024</u> -8025	8007 - 8011- 8014 - 8016 - 8017 – <u>8019</u> - 8022 - 8028
Total 19 colours	11	8

RAL 9XXX	FAMILY 9/LIGHT	FAMILY 9/DARK
DESCRIPTION	WHITE - CREAM AND GREY WHITE	BLACK
RAL	9001- 9002 - 9003 – <u>9010</u> - 9016 - 9018	9004 – <u>9005</u> - 9011- 9017
Total 10 colours	6	4

⁶ Colours underlined = basic colours (see Section 4.1.4)

* These colours have to be assessed every two years.

b) Metallic extension for class 3

One metallic colour specified by QUALICOAT (RAL 9006 and RAL 9007 alternately) shall also be tested every year if there is an extension for metallic colours. One set of tests is valid for all lightness categories within the same gloss category.

5. Renewal of approvals for postforming (PF-No.)

Consistent quality of approved organic coating materials is monitored with all the tests listed in [Table 2](#) (Testing programme) being performed on two colours chosen from the three colours specified by QUALICOAT each year. The colours are chosen from RAL families that do not contain critical colours.

The following families are considered as **non-critical** for the approval of powder coatings suitable for postforming (Class 1)

21 RAL FAMILIES (139 RAL colours suitable for postforming)

FAMILY 1/A	FAMILY 1/D	FAMILY 3/C	FAMILY 5/A	FAMILY 5/B
IVORY AND BEIGE	OCHRE / DARK YELLOW	DARK RED	REDDISH BLUE	GREENISH BLUE
1000 - 1001 - 1002 - 1013 - 1014 - 1015	1011 - 1019 - 1020 - 1024 - 1027	3004 - 3005 - 3007 - 3009 - 3011	5000 - 5002 - 5003 - 5005 - 5010 - 5013 - 5017 - 5022	5001 - 5007 - 5009 - 5018 - 5019 - 5021
6	5	5	8	6

FAMILY 5/C	FAMILY 5/D	FAMILY 6/A	FAMILY 6/B	FAMILY 6/C
DARK BLUE	LIGHT BLUE	BLUISH GREEN	YELLOWISH GREEN	INORGANIC GREEN
5004 - 5008 - 5011 - 5020	5012 - 5014 - 5015 - 5023 - 5024	6000 - 6004 - 6005 - 6009 - 6016 - 6026	6001 - 6002 - 6006 - 6010 - 6017 - 6018 - 6024 - 6029 - 6032 - 6033 - 6037	6003 - 6011 - 6013 - 6014 - 6025 - 6028
4	5	6	11	6

FAMILY 6/D	FAMILY 6/E	FAMILY 7/A	FAMILY 7/B	FAMILY 7/C
DARK GREEN	LIGHT GREEN	LIGHT GREY WITH L > 70	MEDIUM GREY WITH L < 70 AND > 50	DARK GREY WITH L < 50
6007 - 6008 - 6012 - 6015 - 6020 - 6022	6019 - 6021 - 6027 - 6034	7032 - 7035 - 7038 - 7044 - 7047	7000 - 7001 - 7002 - 7003 - 7004 - 7005 - 7023 - 7030 - 7033 - 7034 - 7036 - 7037 - 7040 - 7042 - 7045 - 7046	7006 - 7008 - 7009 - 7010 - 7011 - 7012 - 7013 - 7015 - 7016 - 7021 - 7022 - 7024 - 7026 - 7031 - 7039 - 7043
6	4	5	16	16

FAMILY 8/A	FAMILY 8/B	FAMILY 8/C
LIGHT BROWN	MEDIUM BROWN	DARK BROWN
8000 - 8001 - 8004 - 8023 - 8024 - 8025	8002 - 8003 - 8007 - 8008 - 8012 - 8015	8011 - 8014 - 8016 - 8017 - 8019 - 8022 - 8028
6	6	7



FAMILY 9/A	FAMILY 9/B	FAMILY 9/C
WHITE	CREAM AND GREY WHITE	BLACK
9003 - 9010 – 9012 - 9016	9001- 9002 - 9018	9004 - 9005 - 9011- 9017
4	3	4

6. Renewal of special approvals

For renewals of special approvals, the same colours as for granting an approval shall be tested in a laboratory and in Florida every year.

7. Sampling

There are three options for sampling systems to be tested for renewal of approvals:

- The inspector takes samples of the required colours during routine inspections at the coaters' production sites.
- The inspector takes samples directly at the system manufacturer's premises.
- The powder manufacturers send organic coating materials and coated panels to the laboratory in charge from 1 January and not later than 31 May of the current year together with their data sheet for each colour.

The data sheet shall include at least the following information: colour, gloss value and curing conditions (including range of times and temperatures).

The coating material may be applied to the test panels in the testing laboratory, at a local licensed coater's production site or at the coating manufacturer's premises under the auspices of the inspector according to Section 2 (Sampling) of Chapter 4 (Granting of Approvals).

8. Assessment of laboratory test results

The testing laboratory shall submit the test report via the web interface. QUALICOAT shall assess the results and decide whether to renew or withdraw the approval or to ban colours as follows:

If the results of any of the laboratory test(s) do not meet the requirements for a colour, all the laboratory tests shall be repeated for this particular colour within one month, using new samples.

If the results of this second series of tests are again unsatisfactory, the colour shall be banned.

Within 10 working days after receiving the laboratory test results from QUALICOAT, the General Licensee shall send the reports and inform the powder manufacturer of all the results and their consequences (e.g. request for repetition or ban of a colour).

9. Assessment of the Florida test results

The Florida Working Group shall submit the test results to QUALICOAT.

For all classes

The approval shall be renewed if the result of the natural weathering test in Florida is satisfactory.

If the result is unsatisfactory for one colour, the colour shall be banned.



Additional rules for classes 2 and 3

If the colour change result is unsatisfactory for two colours of the same RAL family, the RAL family shall be banned.

If the gloss retention result is unsatisfactory for two colours of the same RAL family, only those two colours shall be banned.

If a powder manufacturer has failed for any reason to submit the required colours to the laboratory on time and if no samples were sent to Florida as a result, two renewal colours specified by the Florida Working Group and one metallic colour (if there is an extension to metallic colours) shall be banned.

10. Banned colours

QUALICOAT shall publish on www.qualicoat.net the colours currently banned according after the assessment of the Florida test results, including those with “suspended” status, for every approved organic coating P-No. by the end of August.

Within 30 working days after receiving the Florida test reports and results from QUALICOAT, the General Licensee shall inform the powder manufacturer of the unsatisfactory reports, test results, and of the resulting ban of the failed colour.

The powder manufacturer shall have the banned colour tested again by sending organic materials and coated panels to the testing laboratory before the end of May of the following year. To have the Florida exposure started the following year, the powder manufacturer shall send the banned colours to the testing laboratory before the end of November of the current year.

Banned colours shall not be used under QUALICOAT’s approval.

The tables below show the different deadlines until when the powder manufacturer may still produce and sell a single failed colour or a banned colour family and until when a licensee may use it.

For all classes

DEADLINES					
Production of QUALICOAT approved products		Sale of QUALICOAT approved products		Use of QUALICOAT approved products by licensee	
Single failed colour	Remaining colours	Single failed colour	Remaining colours	Single failed colour	Remaining colours
30.09.xx	----	30.03.yy	---	End of original shelf life	---

For a class 2 or 3 banned colour family

DEADLINES					
Production of QUALICOAT approved products		Sale of QUALICOAT approved products		Use of QUALICOAT approved products by licensee	
Single failed colour	Remaining colours of the banned family	Single failed colour	Remaining colours of the banned family	Single failed colour	Remaining colours of the banned family
30.09.xx	31.12.xx	30.03.yy	30.03.yy	End of original shelf life	

xx = current year yy = following year



11. Suspended colours

A colour shall have the status “suspended” in case of:

- an unsatisfactory accelerated weathering test, with samples sent to Florida for the natural weathering test
- satisfactory results of the laboratory tests on a banned colour, with samples sent to Florida for the natural weathering test.

Like banned colours, suspended colours shall not be used under QUALICOAT’s approval. However, they shall not be considered when counting colours for the withdrawal of an approval.

Suspended colours shall be indicated with an asterisk in the list of approved powder coatings published on www.qualicoat.net.

The number of suspended colours and the duration of the suspension shall be limited as follows:

	Number of suspended colours allowed by P-No	Maximum duration of suspension
Class 1	Maximum 2	Two years
Class 1.5	Maximum 3	Three years
Class 2	Maximum 4	Four years
Class 3	Maximum 8	Ten years

If these limits are exceeded, the colours concerned shall be banned.

Suspended colours that meet the requirements after the full natural weathering test period shall have their suspension lifted after the Florida Working Group’s meeting.

Suspended colours that fail again in the Florida test shall be banned

12. Procedure for unbanning colour families for class 2

If a family is banned, the two banned colours plus the third colour selected for that family in the relevant renewal period shall be tested.

After the outdoor exposure test:

- If all three colours are satisfactory, the family shall be unbanned.
- If two colours are satisfactory and one colour is unsatisfactory, the family shall be unbanned, but the unsatisfactory colour shall remain banned.
- If two or three colours are unsatisfactory, the family shall remain banned.

13. Withdrawal of an approval or extension

a) Withdrawal by QUALICOAT

Classes 1 and 1.5

The approval shall be withdrawn as soon as four non-metallic colours are banned. In applying this rule suspended colours will not be considered.



Classes 2 and 3

The approval shall be withdrawn as soon as one of the following conditions is met:

- two RAL families are banned; or
- four solid, i.e. non-metallic, colours belonging to at least two different RAL families are banned.

For all classes

The extension for metallic colours shall be withdrawn as soon as both RAL 9006 and RAL 9007 are banned.

A special approval valid for a single colour shall be withdrawn as soon as this single colour is banned.

The approval shall be withdrawn at the end of the year, but a single failed colour shall already be banned by the end of September.

QUALICOAT shall publish the Florida test results including the deadlines on www.qualicoat.net at the end of August.

The table below shows the different deadlines until when the powder manufacturer may still produce and sell a single failed colour and until when a licensee may use it.

DEADLINES					
Production of QUALICOAT approved products		Sale of QUALICOAT approved products		Use of QUALICOAT approved products by licensee	
Single failed colour	Remaining colours	Single failed colour	Remaining colours	Single failed colour	Remaining colours
30.09.xx	31.12.xx	30.03.yy	30.03.yy	End of original shelf life	

b) Voluntary withdrawal

In case of voluntary withdrawal of approval by a powder manufacturer, the following administrative procedure will be followed:

Withdrawal request	ADMINISTRATION
January – March XX	<ul style="list-style-type: none"> • Date of cancellation: 31.03.XX • No approval fees will be charged for year XX • Any panels still remaining on the Florida exposure field will be removed.
April – December XX	<ul style="list-style-type: none"> • Date of cancellation: 31.12.XX • Full approval fees will have to be paid for year XX • Florida test results assessed by the Florida WG in the summer YY will be communicated to powder manufacturer.

The table below depicts the different deadlines that determine until when a powder manufacturer may still produce and sell a withdrawn product, and until when a licensee may use it:

Withdrawal request	Deadline for stopping production	Deadline for stopping sale	Use of product by licensee
January – December XX	Date of withdrawal request	30.03.YY	End of original shelf life

14. Overview of the renewal procedure

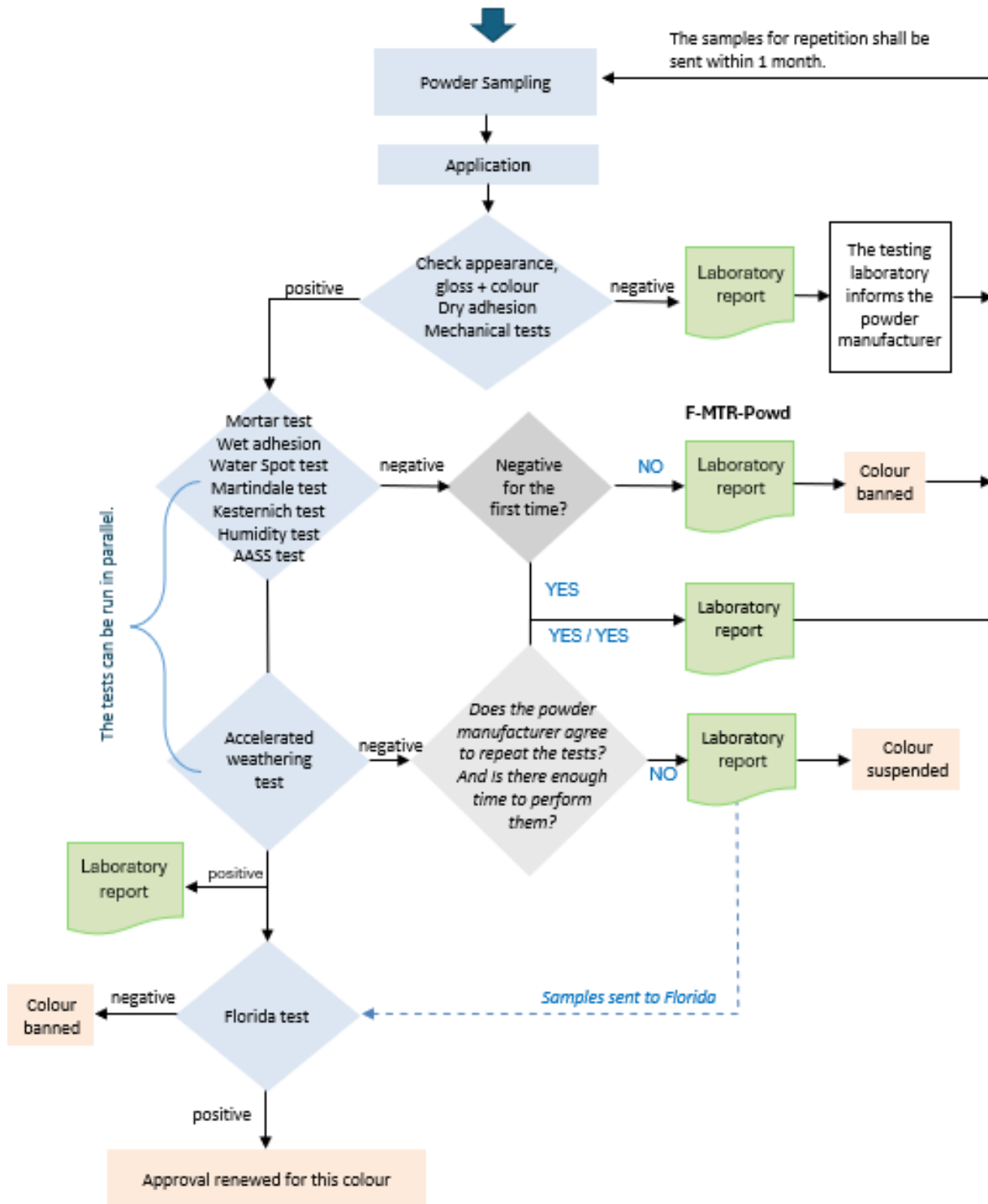


Figure 13 - Flow chart Renewal of Approval

Chapter 6 – Routine Inspections of coating manufacturers plants

1. Principles

The powder manufacturers shall perform the following tests during production:

REFERENCE. (in chapter 4)	TEST
A	COLOUR MEASUREMENT
B	GLOSS MEASUREMENT
C	COATING THICKNESS MEASUREMENT
H	BEND TEST FOR POSTFORMING
I	IMPACT TEST
----	PARTICLE SIZE MEASUREMENT

An announced inspection of the coating manufacturer’s plant shall be carried out every three years (36 months).

2. Inspection form

The inspector shall check the following using the inspection form approved by QUALICOAT:

a) Inspection of laboratory equipment

The inspector shall ensure that the equipment listed in section 2 of chapter 3 is available, functional, and properly used. He or she shall also verify whether there are relevant standards or written operating instructions.

b) Review of in-house control and registers

The inspector will check that in-house control has been carried out on finished products and recorded by the powder manufacturer as follows:

TEST	FREQUENCY
COLOUR MEASUREMENT	At least once per pre-mix
GLOSS MEASUREMENT	
COATING THICKNESS MEASUREMENT	
BEND TEST FOR POSTFORMING	
IMPACT TEST	
PARTICLE SIZE MEASUREMENT	

In the in-house control register the inspector will check that the results recorded coincide with the results of the test panels. For this reason, all test panels shall be kept and held at the inspector’s disposal for one year.

c) Review of technical information

Technical Data Sheet

If the powder manufacturer has more than 5 approved systems, the inspector shall select 5 TDS from different approvals and check if the following information is included:

- QUALICOAT + P-No.
- Product description
- Curing conditions including a curing window with a minimum of 2 temperatures and minimum and maximum time for each temperature.
- Shelf life and maximum storage temperature (XX months <YY°C)
- Fire classification information, if available (e.g., EN 13501-1 – A2 s1d0)
- T bend value and max. impact value (only for postforming).

Labels

If the powder manufacturer has more than 5 approved systems, the inspector shall select 5 labels from different approvals and check if the following information is included:

- QUALICOAT + P-No.
- Colour description
- Product code
- Batch number
- Gloss value
- Curing conditions (min. and max. for time and temperatures)
- Best before date at <YY°C)

d) Use of logo

The inspector will check if the powder manufacturer uses the QUALICOAT logo in accordance with Chapter 7.

3. Assessment of inspection reports

The inspector shall complete a powder master inspection report and record the findings on the appropriate summarizing sheet. These documents shall then be submitted to the GL or to the QUALICOAT Certification Body in countries without GL within one month.

The GL shall review the inspection report, add his/her comments and recommendations and submit the report to the QUALICOAT Certification Body via Email.

The QUALICOAT Certification Body shall assess the inspection report, and send a confirmation email stating the final inspection result to the GL or directly to the powder manufacturer if the manufacturer is directly managed by QUALICOAT.

a) Nonconformities and issues

TOPICS	ISSUES *	NONCONFORMITIES **
Failure to admit an inspector to carry out an inspection		X
Missing laboratory equipment		X
Any of the following laboratory equipment out of order: <ul style="list-style-type: none"> • Spectrophotometer • Specular glossmeter • Instruments for measuring coating thickness • Cutting tools and instruments necessary for performing the adhesion test • Apparatus for testing resistance to cracking on bending • Impact tester • Apparatus for controlling stoving temperature and time 		X
Any of the following laboratory equipment out of order: <ul style="list-style-type: none"> • Instrument for measuring indentation hardness • Apparatus for cupping test • System for checking polymerisation • Apparatus for accelerated weathering test • Light cabinet • Device to measure particle size 	X	
Calibrations missing	X	
RAL cards expired for more than 1 year without in-house comparison with original data obtained from this specific RAL card***.	X	
Missing curing conditions in TDS		X
Incorrect P-No/PF-No in TDS		X
Other Missing information in TDS	X	
Incorrect P-No/PF-No on label		X
Other missing information on label	X	
Misuse of the QCT logo		X

* Refusal or failure to comply with a requirement not included in the list of nonconformities defined by QUALICOAT.

** Failure to comply with a requirement leading to a repetition of the inspection.

*** Maximum allowed deviation is 0.2 dE2000 between the measured value and the original data obtained from this specific RAL card.



b) Proceedings

The following rules apply for the first inspection and routine visits:

SITUATION	RESULT	CONSEQUENCES
No issues or non-conformities	Inspection satisfactory	No follow-up necessary. Next inspection in 36 months.
Up to three issues	Corrective action requested	Manufacturer must prove within 3 months that the issues have been resolved. *
One non-conformity or more than three issues	Inspection unsatisfactory	Visit must be repeated within 3 months. In case of unsatisfactory repetition, the plant will be inspected every 3 months until a satisfactory assessment is available. **

* If the manufacturer fails to prove that the issues have been resolved within the defined period, the inspection will be considered unsatisfactory, and a repetition visit shall be conducted within **3 months**. If the GL and QUALICOAT consider the proof satisfactory, the inspection is positive.

** During this period, no new approvals will be granted.

Chapter 7 - Use of the QUALICOAT Label

1. Ownership of the quality Label

The Quality Label is owned by QUALICOAT and shall not be used by anyone unless authorised to do so by QUALICOAT.

Authorisation to use the Quality Label may be granted on condition that the applicant operates in accordance with the Specifications. This authorisation is governed by a contract.

The granting of a licence entitles the licensee to use the Quality Label for the products specified. A licence cannot be transferred.

2. Logo

a) Description

The logo exists in black and white, in white and blue (PANTONE Reflex Blue CV; RGB: 14-27-141; CMYK: 100-72-0-6) and in blue and silver (PANTONE Silver 877u; RGB: 205-211-215; CMYK: 8-3-3-9).



The words "Quality Label for Architectural Coating on Aluminium" (or a text appropriate to national legal requirements) may be added in the space to the right.

b) Use of the logo by manufacturers

The QUALICOAT logo shall not appear on packaging or labels.

In their business literature and documents, the manufacturers shall only use the logo for products approved by QUALICOAT, stating: «Product approved by QUALICOAT». Wherever the logo is used, the phrase «QUALICOAT is a quality label for licensed coaters» should also appear in the document.

For any other use of the logo, the manufacturers are required to submit all new documents mentioning QUALICOAT to their national association. In countries without a General Licensee, these documents shall be submitted directly to the QUALICOAT Secretariat before publication.

Chapter 8 – Right of Appeal

1. Definitions

Appeal

Written formal objection against a certification decision taken by the QUALICOAT Certification Body and submitted by any actor of the QUALICOAT (QUALIDECO) certification scheme.

Appellant

Person, company (coating applicator / powder and/or chemical manufacturer) or any actor of the QUALICOAT (QUALIDECO) certification scheme that submits a written request to reconsider a decision taken by the QUALICOAT Certification Body..

2. General procedure

The powder manufacturer shall receive a copy of each test and inspection report. If the results do not meet the requirements, full details and reasons shall be given.

The powder manufacturer shall be entitled to appeal to the General Licensee, or to QUALICOAT in countries where there is no General Licensee, within 10 working days after receiving notification of the laboratory /Florida tests, and/or inspection results from the GL or from QUALICOAT in countries where there is no General Licensee.

The appellant has to specify which decision or which elements of the decision have to be reconsidered and to explain the reasons for its request. Any documents can be sent to justify the request.

The General Licensee or the QUALICOAT Certification Body in countries with no General Licensee acknowledge receipt of the formal appeal within 5 working days of receipt and make a corresponding entry in the complaint and appeal Register.

The General Licensee or the QUALICOAT Certification Body in countries with no General Licensee have 10 working days to provide to the appellant full details (e.g. laboratory test results, inspection report, confirmation) of the decision.

In case the appellant is not satisfied with the decision from the General Licensee or from the QUALICOAT Certification Body in countries with no General Licensee, the appellant has the right to bring the appeal up to the Label Committee in writing to the QUALICOAT Certification Body explaining the reason for the appeal.

The QUALICOAT Certification Body acknowledges the receipt of the appeal to the Label committee within 5 working days and shall inform the Label committee at the same time.

The final decision of the Label Committee shall be notified in writing to the appellant and to all parties involved within 10 working days of the decision taken by the Label Committee, specifying the reasons for the decision.

Should the appellant inform the General Licensee or the QUALICOAT Certification Body in countries with no General Licensee in writing that he/she gives up the appeal during any stage of the appeal procedure, the appeal procedure shall be considered as terminated and closed.



3. Appeal after Florida exposure

The powder manufacturer has the right to see the test and reference panels at the premises of the responsible testing laboratory.

In case this is not possible following alternative options are possible and shall be chosen depending on the situation:

Pictures of the test and reference panels shall be taken and sent to the General Licensee and appellant.

A video conference call shall be setup between the General Licensee or the QUALICOAT Certification Body in countries with no General Licensee, testing laboratory and appellant to show the test and reference panels

In exceptional cases the testing laboratory shall cut the test and reference panels in two parts and send one part to the appellant. After a physical review by the appellant, the appellant shall send the test and reference panels back to the testing laboratory within 15 working days.