SPECIFICATIONS
FOR A QUALITY LABEL
FOR PAINT, LACQUER AND POWDER COATINGS
ON ALUMINIUM
FOR ARCHITECTURAL APPLICATIONS

☞ 11th Edition ☜

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Main changes compared with the 10th edition issued in April 2003

- Update No 1 of the 10th Edition : BATCH CHROMATE TREATMENT (appendix A8)
- Update No 2 of the 10th Edition : IMPACT TEST
- Update No 3 of the 10th Edition : DRYING AFTER PRETREATMENT
- Update No 4 of the 10th Edition : ALTERNATIVE PRETREATMENT SYSTEMS (new appendix A6)
- Update No 5 of the 10th Edition : COATING ON CAST ACCESSORIES (new appendix A5)
- Update No 6 of the 10th Edition : EVALUATION OF CLASS 2 POWDERS
- Update No 7 of the 10th Edition : DEGREE OF BLISTERING
- Update No 8 of the 10th Edition : AVAILABILITY OF STANDARDS OR OPERATING INSTRUCTIONS
- Update No 9 of the 10th Edition : AVAILABILITY REGISTER OF COMPLAINTS
- Update No 10 of the 10th Edition : SIGNIFICANT SURFACE
- Update No 11 of the 10th Edition : MINIMUM EQUIPMENT FOR POWDER SUPPLIERS
- Update No 12 of the 10th Edition : LABORATORY EQUIPMENT
- Update No 13 of the 10th Edition : ASSESSMENT OF COLOUR AFTER MORTAR TEST
- Update No 14 of the 10th Edition : MAXIMUM TIME BETWEEN COATING AND DECORATION
- Update No 15 of the 10th Edition : MEASUREMENT OF COLOUR VARIATION NATURAL WEATHERING TEST
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- Update No 17 of the 10th Edition : RULES FOR ASSESSING METALLIC COLOURS
- Update No 18 of the 10th Edition : RULES FOR GRANTING AN APPROVAL TO THIRD PARTIES
- Update No 19 of the 10th Edition : CONDUCTIVITY OF THE FINAL RINSE PRECEDING CHROMATE TREATMENT
- Update No 20 of the 10th Edition : UNIFORM PRETREATMENT
- Update No 21 of the 10th Edition : LIST OF RELEVANT STANDARDS (appendix A9)
- Update No 22 of the 10th Edition : INDICATION OF THE NAME “QUALICOAT” TOGETHER WITH HE APPROVAL NUMBER ON PACKAGING AND LABELS
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- Update No 24 of the 10th Edition : RULES REGARDING BANNED COLOURS
- Update Delta E (appendix A7)

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Chapter 1

General Information

1. General Information

These Specifications apply to the QUALICOAT quality label, which is a registered trademark. The regulations for use of the quality label are set out in Appendix A1.

The aim of these Specifications is to establish minimum requirements which plant installations, coating materials and finished products must meet.

These Specifications are designed to ensure high-quality coating on products for use in architectural applications, whatever kind of coating is used. Any aftertreatment not stipulated in these Specifications may affect the quality of a coated product and is the responsibility of whoever applies it.

The Specifications for plant installations are the minimum requirements for producing good quality. Other methods may only be used if they have been previously approved by the Executive Committee.

The aluminium or aluminium alloy material must be suitable for the coating processes specified in this document. It must be free from corrosion and must not have any anodic or organic coating (except anodic pre-treatment as described in these specifications). It must also be free from all contaminants, especially silicone lubricants. The edge radii must be as large as possible.

Finishing plants holding the quality label must treat all products intended for architectural applications in accordance with these Specifications and may only use coating materials approved by QUALICOAT for such products. For external architectural applications, other coating materials may be used only at the customer's written request and only if there are technical reasons for doing so. It is not permitted to use unapproved powders, paints and lacquers for purely commercial reasons.

These Specifications form the basis for granting and renewing the quality label. All requirements in these Specifications must be met before a quality label can be granted. The quality assurance representative in the company holding the label must always have the latest version of the Specifications.

The Specifications may be supplemented or amended with update sheets that set out and incorporate the 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.

The Specifications and update sheets will be distributed to all coating plants which have been or are about to be granted the quality label and to holders of an approval. The Specifications and update sheets are also published on Internet (www.qualicoat.net).

These Specifications do not apply to coil coating.

TERMINOLOGY

Licence:	Permission to use the quality label.
Approval:	Confirmation that a specific manufacturer's product (powder coating, liquid coating or chemical product) meets the requirements of the Specifications.
General licensee (GL):	National association holding the Qualicoat general licence for the whole country in question.
Testing laboratories:	These are independent quality testing and inspection bodies duly authorised by the general licensee or QUALICOAT.

Chapter 2

Test Methods and Requirements

2. Test Methods and Requirements

The test methods described below are used to test finished products and/or coating systems for approval (see chapters 4 and 5).

For the mechanical tests (sections 2.6, 2.7 and 2.8), the test panels must be made of the alloy AA 5005-H24 or -H14 (AlMg 1 - semihard) with a thickness of 0.8 or 1 mm, unless otherwise approved by the Technical Committee.

Tests using chemicals and corrosion tests should be performed on extruded sections made of AA 6060 or AA 6063.

2.1. Appearance

The appearance will be evaluated on the significant surface.

The **significant surface** must be defined by the customer and is the part of the total surface which is essential to the appearance and serviceability of the item. Edges, deep recesses and secondary surfaces are not included in the significant surface.The coating on the significant surface must not have any scratches through to the base metal. When the coating on the significant surface is viewed at an oblique angle of about 60° to the upper surface, none of the defects listed below must be visible from a distance of 3 metres: excessive roughness, runs, blisters, inclusions, craters, dull spots, pinholes, pits, scratches or any other unacceptable flaws.

The coating must be of even colour and gloss with good coverage. When viewed on site, these criteria must be fulfilled as follows:

- for parts used outside: viewed at a distance of 5 m
- for parts used inside: viewed at a distance of 3 m

2.2. Gloss

ISO 2813 - using incident light at 60° to the normal.

Note: if the significant surface is too small or unsuitable for the gloss to be measured with the glossmeter, the gloss should be compared visually with the reference sample (from the same viewing angle).

REQUIREMENTS:

Category 1	:	0	-	30	+/-	5	units
Category 2	:	31	-	70	+/-	7	units
Category 3	:	71	-	100	+/-	10	units

(permissible variation from the nominal value specified by the coating supplier)

2.3. Coating thickness

EN ISO 2360

The thickness of the coating on each part to be tested must be measured on the significant surface at not less than *five measuring areas* (appr.1 cm^2) with *3 to 5 separate readings* taken at each area. The average of the separate readings taken at one measuring area gives a *measurement value* to be recorded in the inspection reports. None of the values measured may be less than 80% of the specified minimum value otherwise the thickness test as a whole will be considered unsatisfactory.

REQUIREMENTS:

<u>Powders:</u>		
Class 1[1]	:	60 µm
Class 2	:	60 µm
Two-coat powder system (classes 1 et 2)	:	110 µm
Two-coat PVDF powder system	:	80 µm
<u>Liquid coating</u>		
Two-coat PVDF system	:	35 µm
Three-coat metallized PVDF system	:	45 µm
Silicon polyester without primer (minimum 20% silicon resin)	:	30 µm
Water-thinnable paints	:	30 µm
Other thermosetting paints	:	50 µm
Two-component paints	:	50 µm
<u>Electrophoretic coating</u>	:	25 µm

Other coating systems may require different coating thicknesses, but they may only be applied with the approval of the Executive Committee.

The results must be assessed as shown by **four typical examples** (minimum coating thickness for powder coatings: 60 µm):

<u>Example 1:</u>

Measured values in µm : 82, 68, 75, 93, 86 average: 81

Rating:
This sample is perfectly satisfactory.

<u>Example 2:</u>

Measured values in µm : 75, 68, 63, 66, 56 average: 66

[1] There are two different classes of powders that must meet different requirements. The particular class is stated in the approval.

Rating:
This sample is good because the average coating thickness is more than 60 µm and because no value measured is less than 48 µm (80% of 60 µm).

Example 3:

Measured values in µm : 57, 60, 59, 62, 53 average: 58

Rating:
This sample is unsatisfactory and comes under the heading "rejected samples" in table 5.1.4.

Example 4:

Measured values in µm : 85, 67, 71, 64, 44 average: 66

Rating:
This sample is unsatisfactory although the average coating thickness is more than 60 µm. The inspection must be considered failed because the measured value of 44 µm is below the tolerance limit of 80% (48 µm).

2.4. Adhesion

EN ISO 2409

The adhesive tape must be conform to the standard (strength adhesion = (10 +/- 1) N per 25 mm width). The spacing of the cutters must be 1 mm for coating thicknesses of up to 60 µm, 2 mm for thicknesses between 60 µm and 120 µm, and 3 mm for thicker coatings.

REQUIREMENTS:

The result must be 0.

2.5. Indentation

EN ISO 2815

REQUIREMENTS:

Minimum 80 with the specified required coating thickness.

2.6. Cupping test

All powder systems except Class 2 powders[2]: **EN ISO 1520**

Class 2 powders:
EN ISO 1520 followed by a tape pull adhesion test as specified below:

Apply an adhesive tape (see section 2.4) to the coated side of the test panel following the mechanical deformation. Cover the area by pressing down firmly against the

[2] See previous footnote.

coating to eliminate voids or air pockets. Pull the tape off sharply at right angles to the plane of the panel after 1 minute.

REQUIREMENTS:

- Minimum 5 mm for powder coatings (Classes 1 and 2)
- Minimum 5 mm for liquid coatings except
  - two-component paints and lacquers : minimum 3 mm
  - water-thinnable paints and lacquers : minimum 3 mm
- Minimum 5 mm for electrophoretic coatings

To be indicative, the test must be performed on a coating with a thickness approximating the minimum required.

Viewed with the naked eye, the coating must not show any sign of cracking or detachment, except for Class 2 powders.

Class 2 powders :
Viewed with the naked eye, the coating must not show any sign of detachment following the tape pull adhesion test.

2.7. Bend test

All powder systems except Class 2 powders: **EN ISO 1519**

Class 2 powders :
EN ISO 1519 followed by a tape pull adhesion test as specified below:

Apply an adhesive tape (see section 2.4) to the coated side 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.

To be indicative, the test must be performed on a coating with a thickness approximating the minimum required.

REQUIREMENTS:

Bending around a 5 mm mandrel, or an 8 mm mandrel for two-component and water-thinnable paints and lacquers.

Viewed with the naked eye, the coating must not show any sign of cracking or detachment, except for Class 2 powders.

Class 2 powders:
Viewed with the naked eye, the coating must not show any sign of detachment following the tape pull adhesion test.

2.8. Impact test

(for powder coatings only)

The impact must be carried out on the back side, whereas the results must be assessed on the significant side.

- Class 1 powders (one- and two-coat), energy: 2.5 Nm: **EN ISO 6272 / ASTM D 2794** (impactor diameter: 15.9 mm)
- Two-coat PVDF powders, energy: 1.5 Nm: **EN ISO 6272 / ASTM D 2794** (impactor diameter: 15.9 mm)
- Class 2 powders, energy: 2.5 Nm: **EN ISO 6272 / ASTM D 2794** (impactor diameter: 15.9 mm;) followed by a tape pull adhesion test as specified below.

  Apply an adhesive tape (see section 2.4) to the coated side 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.

To be indicative, the test must be performed on a coating with a thickness approximating the minimum required.

REQUIREMENTS:

Viewed with the naked eye, the coating must not show any sign of cracking or detachment, except for Class 2 powders.

Class 2 powders:
Viewed with the naked eye, the coating must not show any sign of detachment following the tape pull adhesion test.

2.9. Resistance to humid atmospheres containing sulphur dioxide

EN ISO 3231 (0,2 l SO_2 - 24 cycles). A cross-cut incision with a width of 1 mm must be made to cut the 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.

2.10. Acetic acid salt spray resistance

ISO 9227 (testing time: 1000 hours). A cross-cut incision with a width of 1 mm must be made to cut the coating down to the metal. The test must be carried out on three extruded sections of AA 6060 or AA 6063.

REQUIREMENTS:

No blistering in excess of 2 (S2) according to ISO 4628-2. An infiltration of max. 16 mm^2 is allowed over a scratch length of 10 cm but the length of any single infiltration must not exceed 4 mm.

The inspector takes three samples of different sections from different lots. The results are classified according to the scale below:

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

Rating :

	APPROVAL	**LICENCE**
A	Satisfactory	Satisfactory
B	Satisfactory	Satisfactory with a comment to the coating plant
C	Unsatisfactory	Repetition of the acetic acid salt spray resistance test. If the result of this second test is A or B, the inspection is satisfactory, otherwise it is unsatisfactory.
D	Unsatisfactory	Unsatisfactory

2.11. Machu test

(Accelerated corrosion test, on sections only)

Before immersion, a cross-cut incision with a width of 1 mm must be made with a special tool to cut the coating down to the metal.

Test solution :

NaCl	:	50 ± 1 g/l
CH3COOH (Glacial)	:	10 ± 1 ml/l
H2O2 (30%)	:	5 ± 1 ml/l
Temperature	:	$37^{o} \pm 1$°C
Testing time	:	48 ± 0.5 hours

The pH of this solution is 3.0 - 3.3. After 24 hours, another 5 ml/l of hydrogen peroxide (H_2O_2 30%) should be added and the pH adjusted with glacial acetic acid or caustic soda. A new solution must be prepared for each test.

REQUIREMENTS:

No infiltration exceeding 0.5 mm on both sides of the scratch.

2.12. Accelerated weathering test

EN ISO 11341

Luminous intensity : 550 ± 20 W/m2 (290 - 800 nm)

Black standard temperature : 65 ± 5°C

Demineralised water: maximum 10 µS

Special UV filter (290 nm)

Cycles of 18 minutes in a wet medium and 102 minutes in a dry medium.

After 1000 hours exposure, the samples should be rinsed with fully demineralised water and checked for:

- Gloss variation: ISO 2813
  angle of incidence 60°
- Colour change: ΔE CIELAB formula according to ISO 7724/3, with gloss.

3 colour measurements are to be made on the weathered sample and on the unexposed reference sample.

REQUIREMENTS:

Gloss retention: the loss of gloss after the accelerated weathering test must not be greater than 50% of the original value, or 10% for Class 2 powders.

Colour change: according to the ΔE values stipulated in the annexed table. For Class 2 powders, the colour change ΔE must not be greater than 50% of the limits prescribed in the annexed table (see appendix A7).

2.13. Natural weathering test

Exposure in Florida according to ISO 2810.

The test must start in April.

The samples must be exposed to the elements facing 5° south for 1 year; Class 2 powders must be exposed for 3 years with an annual evaluation.

For Class 2 approvals, 10 test panels per colour shade are required (3 per year for weathering and 1 reference panel), while 4 panels per colour shade are required for the other coating systems (3 for weathering and 1 reference panel).

Dimensions of the samples: approx. 100 x 305 x 0.8 - 1 mm

After exposure, the exposed samples are to be cleaned using the following method :

Immersion in demineralised water with a 1% surface-active agent for 24 hours, then cleaning by wiping with a soft sponge soaked with an aqueous solution of a 1% surface-active agent, applying gentle pressure, or using any other method approved by the Technical Committee. This process must not scratch the surface.

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

The average is taken from the colorimetric measurements. The conditions for measurement and colorimetric evaluation are:

- Colour variation: ΔE CIELAB formula according to ISO 7724/3, measurement including specular reflection.
- The colorimetric evaluation must be made for the standard illuminant D65 and the ten-degree normal observer.

To determine the gloss and colour, three measurements will be made on the cleaned, weathered samples and on the unexposed reference panels. These measurements are to be made at different points at least 50 mm apart.

REQUIREMENTS:

Gloss

The residual gloss must be at least 50% of the original gloss.

The following values apply to Class 2 powders and liquid coatings:

after 1 year in Florida : at least 75%

after 2 years in Florida : at least 65%

after 3 years in Florida : at least 50%

Colour change

The ΔE values must not exceed the max. values prescribed in the annexed table.(see appendix A7).

The following values apply to Class 2 powders and liquid coatings:

After 1 and 2 years : not greater than 50% of the limits prescribed in the table.

After 3 years : within the limits prescribed in the table

2.14. Polymerisation test

Prescribed solvent for liquid coatings: MEK or as specified by the paint or lacquer manufacturer and approved by the Technical Committee.

Prescribed solvent for powder coatings: xylene or as specified by the paint or lacquer manufacturer and approved by the Technical Committee.

Saturate a swab of cotton wool with solvent. Within 30 seconds, rub it lightly back and forth 30 times in each direction over the part to be tested. Wait 30 minutes before making the assessment.

The polymerisation quality is assessed according to the following ratings:

1. The coating is very dull and quite soft.
2. The coating is very dull and can be scratched with a finger-nail.
3. Slight loss of gloss (less than 5 units)
4. No perceptible change. Cannot be scratched with a finger-nail.

REQUIREMENTS:

Ratings 3 and 4 are satisfactory.

Ratings 1 and 2 are unsatisfactory.

For powder coatings, this test is optional in in-house control; it is merely indicative and cannot alone cast doubt upon the quality of the coating.

2.15. Resistance to mortar

The test must be performed according to the **ASTM D 3260** standard. The mortar should be made of sand, lime and water. This represents type N according ASTM C 207. The testing time is 24 hours.

REQUIREMENTS:

The mortar must be easy to remove without leaving any residues. Any mechanical damage to the coating caused by grains of sand should be disregarded. There must not be any change in appearance/colour after the mortar test.

2.16. Resistance to boiling water

Method 1 with boiling water:

2 hours in boiling, demineralised water (maximum 10 µS at 20°C). Remove the sample and allow it to cool down to room temperature. Apply an adhesive tape (see section 2.4) to the surface, ensuring that no air is trapped. After one minute, remove the tape at an angle of 45° with a sharp even pull.

Method 2 with a pressure cooker :
(to be used for powder and electrophoretic coatings only)

Add demineralised water (maximum 10 µS at 20°C) to a pressure cooker with an internal diameter of about 200 mm to a depth of 25 mm and place a test sample measuring 50 mm in it.

Place the lid in position and heat the pressure cooker until steam escapes from the valve. The weighted needle valve must be adjusted to produce an internal pressure of 100 +/- 10 kPA (1 bar). Continue heating for 1 hour, timing from the moment when steam first escapes from the valve. Cool the pressure cooker, remove the sample and allow it to cool down to room temperature.

Apply an adhesive tape (see section 2.4) to the surface, ensuring that no air is trapped. After one minute, remove the tape at any angle of 45° with a sharp even pull.

REQUIREMENTS:

No blistering in excess of 2 (S2) according to ISO 4628-2. There must not be any defects or detachment . Some colour change is acceptable.

2.17. Constant climate condensation water test

DIN 50017

A cross-cut incision with a width of at least 1 mm must be made to score the coating down to the metal. The test lasts 1000 hours.

REQUIREMENTS:

No blistering in excess of 2 (S2) according to 4628-2; the maximum infiltration at the cross is 1 mm.

2.18. Sawing, milling and drilling

The good quality of the coating is tested using sharpened tools suitable for aluminium.

REQUIREMENTS:

The coating must not crack or chip when sharp tools are used.

Chapter 3

Work Specifications

3. Work Specifications

3.1. Storage of the parts to be treated and layout of equipment

The layout of the equipment should be designed to avoid any form of contamination. The parts to be treated must either be stored in a separate room or at least a good distance away from the processing baths. They must also be protected against condensation and dirt.

3.2. Pre-treatment for powder and liquid coatings

The parts to be treated must either be attached to the jig individually or placed in a basket as stipulated in the appendix A8. Each part must be treated fully in one pass, at each stage.

3.2.1 Etching

An initial aluminium etching stage must be carried out for all pre-treatments for powder and liquid coatings.

This etching stage carried out in an acid medium or an alkaline plus acid medium must result in an aluminium etching degree of at least 1g/m^2 for extruded sections made of alloys AA 6060 or AA 6063. The etching degree is not specified for rolled products or castings. Etching is optional for such products.

The etching degree is measured by taking the difference in the weight of a test sample before and after the etching stage. If a sample cannot be taken (for example, vertical lines), the method used to test the etching degree will have to be defined by common consent with the national association or directly with QUALICOAT.

3.2.2 Chromate Pre-treatment

This chromate or chromate-phosphate pre-treatment must be carried out according to **DIN 50939**.

The conductivity of the final rinse preceding chromate pretreatment must comply with the supplier's instructions and be checked by the inspector.

Demineralised water must be used for the final rinse after chromate treatment before drying. The conductivity of the dripping water must not exceed a maximum of 30 μS/cm at 20°C. The conductivity should only be measured for open sections and not for hollow sections.

The weight of the chromate conversion layer must be between 0.6 and 1.2 g/m² for chromate treatment (yellow) and between 0.6 and 1.5 g/m² for chromate-phosphate treatment (green).

Pre-treated parts must not be stored for more than 16 hours. As a rule, they should be coated immediately after pre-treatment. The risk of insufficient adhesion increases the longer the parts are stored.

Pre-treated parts must never be stored in an atmosphere that is dusty and detrimental to them. Good atmospheric conditions must always be maintained in the storage area. All workers handling pre-treated parts must wear clean textile gloves to avoid contamination of the surface.

The parts must be dried at the following temperatures: :

chromate treatment (yellow) : maximum 65°C

chromate-phosphate treatment (green) : maximum 85°C

The maximum drying temperature allowed for continuous treatment is 100°C. The specified temperatures apply to the temperature of the metallic parts and not to the air temperature. The products must be dried thoroughly before the coating is applied, irrespective of the production method (continuous/ discontinuous).

3.2.3 Anodic pre-treatment

The aluminium surface must be treated to eliminate all impurities that could pose problems in the anodising.

The anodising conditions must be chosen so as to produce a film with a thickness of at least 3 µm (not more than 8 µm) without powdering and without surface flaws.

The anodising parameters can be as follows:

- Acid concentration (sulphuric acid) : 180-220 g/l
- Aluminium content : 5-15 g/l
- Temperature : 20-30°C (± 1°C of the temperature chosen by the coater)
- Current density : 0.8-2.0 A/dm²
- Agitation of the electrolyte

After anodising, the aluminium must be rinsed with demineralised water (conductivity less than 30 µS/cm at 20°C) for as long and at such a temperature (less than 60°C) as is required to remove the acid from the pores.

Pre-treated parts must not be stored for more than 16 hours. As a rule, they should be coated immediately after pre-treatment. The risk of insufficient adhesion increases the longer the parts are stored.

Plants using this type of pre-treatment must perform the following additional tests :

Anodising bath:

- the acid concentration and aluminium content must be analysed every 24 hours of operation
- the temperature must be checked 1 hour after anodising starts, then every 8 hours.

Testing of the coated finished products:

- Before application, each coating (of a system or supplier) must be tested for resistance to boiling water, followed by an adhesion test (see section 2.4).
- During application, resistance to boiling water should be tested, followed by an adhesion test every 4 hours.

Coating plants which decide to use such treatments must inform their national association, or QUALICOAT if there is not a national association.

3.2.4 Alternative pre-treatments

Alternative pre-treatments are treatments other than the pre-treatments described above.

Such alternative pre-treatments may not be used until they have been approved by QUALICOAT, following a test programme.

Coating plants which decide to use such treatments must inform their national association, or QUALICOAT if there is not a national association. The coating plants and suppliers must comply with the special specifications set out in Appendix A6.

3.3. Pre-treatment for electrophoretic coatings

All parts to be coated must be cleaned by adapted treatment in an alkaline or acid solution. The cleaned surfaces must be rinsed in demineralised water with a maximum conductivity of 30 μS at 20°C prior to coating. The surfaces must be wettable with water.

The parts must be coated immediately.

All workers handling pre-treated parts must wear clean textile gloves to avoid contamination of the surface.

3.4. Oven drying

After pretreatment and before the application of coating, the parts must be dried thoroughly in an oven. For this purpose, a drying oven must be installed in each plant.

3.5. Stoving

The conditions between the spray booth and the oven must be absolutely free of dust and contamination.

All coatings must be stoved immediately after application. The oven must bring the metallic parts to the required temperature and maintain them at that temperature for the whole length of the stoving time.

The temperature of the metallic parts and the stoving time must match the values recommended in the manufacturer's technical specifications.

It is recommended to keep the difference in temperature between the coldest and hottest sections of the treated parts below 20°C.

It must be possible to measure the temperature over the whole length of the oven.

The oven must be fitted with an alarm system which operates as soon as the temperature moves outside the prescribed temperature range.

3.6. Laboratory

The coating plant must have laboratory facilities which are separate from the production facilities. The laboratory must have the apparatus and chemicals necessary for testing and controlling the process solutions and finished products. The laboratory must at least be equipped with the following apparatus:

1) specular glossmeter
2) 2 instruments for measuring coating thickness
3) 1 analytical balance (precision 0.1 mg)
4) cutting tools and instruments necessary for performing the adhesion test
5) instrument for measuring indentation hardness
6) apparatus for testing adhesion and elasticity (cupping test)
7) impact tester (EN ISO 6272)
8) recorder for stoving temperature and time with four different measuring points, three on the parts and one to measure the air temperature.
9) conductivity meter
10) apparatus for testing resistance to cracking on bending
11) test solution, material and special cutting tool for the Machu test
12) test solutions for the polymerisation test
13) pH-meter

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

3.7. In-house control

Coating plants holding the quality label are obliged to monitor their production processes and inspect their finished products in accordance with chapter 6.

3.8. Operating Instructions

For every test the coater must have the relevant standards or operating instructions based on these standards. These standards or operating instructions must be available to all operators carrying out the tests.

3.9. Registers

The coater must maintain registers for :

- production of QUALICOAT products
- in-house control
- customers' complaints.

Chapter 4

Approval of Coatings

4. Approval of Coatings

The powder and liquid coatings used in quality label coating must be approved before they may be used.

When a two-coat system (primer and coloured topcoat) approved by QUALICOAT is used, the coating plant may apply either a Class 1 or Class 2 topcoat on the approved primer. It is not necessary to have two systems approved. However the two system components used by the coating plant must originate from the same supplier.

It is not permissible to apply a second coat for systems that are intended and approved for the application of one coat.

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 (see app. A3). Furthermore, if the physical appearance of the final coating is modified, the powder manufacturer must obtain a specific QUALICOAT approval and may not use the approval granted for a smooth coating (see app. A3).

4.1. Granting of an approval

Paint systems have a reference identifying a specific chemical formulation. Every system can have a variety of gloss levels (matt, satin and/or gloss) and finishes (see Appendix A3). Approvals are granted for each system, gloss level and finish.

Approvals are usually requested by the manufacturers themselves, but any third party interested may apply for approval of a system he wishes to sell under his own brand name provided that he clearly informs the national association and QUALICOAT of the sources used. An approval is granted for one single production site. If an approval holder changes his source, he must advise the national association and QUALICOAT and have such new systems tested.

In order for an approval to be granted, the following conditions must be met:

4.1.1 Minimum laboratory equipment

1) Gloss meter
2) Impact tester
3) Apparatus for testing adhesion and elasticity (cupping test)
4) Thickness gauge

4.1.2 Tests

The following tests must be made:

1) Gloss (*2. 2)*
2) Coating thickness (*2.3)*
3) Adhesion (*2.4)*
4) Indentation (2.5)
5) Cupping test (*2.6)*
6) Bend test (*2.7)*

7) Impact test (*2.8)*
8) Resistance to humid atmospheres (*2.9)*
9) Acetic acid salt spray resistance (*2.10)*
10) Accelerated weathering test (2.12)
11) Polymerisation test (2.14)
12) Resistance to mortar (2.15)
13) Resistance to boiling water (2.16)
14) Condensation water test (2.17)
15) Natural weathering (Florida) (*2.13)*

The tests must be made on three test panels (for mechanical tests) and on three sections (for corrosion tests) coated by a laboratory approved by the Executive Committee. The average of the three samples will be taken to determine the results.

The following colours must be tested in triplicate

white	RAL 9010
blue	RAL 5010
red	RAL 3005

plus a metallic colour (see Appendix A4) unless the supplier states in writing that no metallic colour is produced for the system concerned.

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The inspector prepares the test panels in the testing laboratory using the coating materials supplied by the manufacturer and performs the above tests on them. The test panels may also be coated elsewhere provided that the inspector is present during the whole time of treatment. The inspector must always select the minimum stoving time and temperature specified by the manufacturer.

A visit may be required by the general licensee or by QUALICOAT in countries without a national association. The costs for such a visit will be paid by the applicant.

The inspector submits the inspection report to the general licensee.

The inspection reports are assessed by the general licensee. Under the supervision of QUALICOAT, the general licensee decides whether or not to grant an approval.

- If the results of tests 1 to 14 on the basic colours do not meet the requirements, the manufacturer of the product tested will be informed that no approval can be granted for the time being, stating the details and reasons.
- If the results of tests 1 to 14 are satisfactory for the metallic colour but not for the basic colours, the manufacturer of the product tested will be informed that no approval can be granted for the time being, stating the details and reasons.
- In the case of a visit which is considered unsatisfactory, the general licensee or QUALICOAT retains the right not to grant the approval..

The manufacturer must wait at least three months to have tests 1 to 14 repeated.

- If the results of tests 1 to 14 on the basic colours and on the metallic colour meet the requirements an approval will be granted for all colours provided.

- If the results of tests 1 to 14 meet the requirements for the basic colours but not for the metallic one, an approval will be granted for all colours excluding the metallic ones.

This approval will be confirmed if the results of test 15 (natural weathering test in Florida) are satisfactory for the three basic colours and the metallic colour. If the result is unsatisfactory for the metallic colour alone, the approval will be maintained for all colours except metallic ones. In all other cases, the approval will be withdrawn.

4.2. Renewal of approved systems

Consistent quality of approved systems is monitored annually with tests 1 to 15 (see section 4.1) being performed on two colours plus one metallic colour (unless the supplier states in writing that no metallic colour is produced for the system concerned). Each year, QUALICOAT will specify the two colours (that have not been tested before).

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 coating plants.
- The inspector takes samples directly at the system supplier's premises.
- The supplier sends samples of the colours to the inspector. In countries where there is neither a national association nor a testing laboratory, the coating suppliers must send the selected colours to a laboratory approved by QUALICOAT.

The inspector submits the inspection report to the general licensee.

The inspection reports are assessed by the general licensee. Under the supervision of QUALICOAT, the general licensee decides whether to renew or withdraw the approval.

- If the results of tests 1 to 14 do not meet the requirements, tests 1 to 14 must be repeated within one month, using samples taken from a different lot, before submission to the Florida test.
- If the results of this second series of tests are again unsatisfactory, the system will remain approved except for the colour(s) which produced unsatisfactory results.
- If the results of tests 1 to 14 are satisfactory, the natural weathering test in Florida will be started. If one (or more) of the colours tested annually produce(s) an unsatisfactory result, the system concerned will continue to be approved with the exception of the unsatisfactory colour(s).

QUALICOAT will publish a list of all colours (currently) banned.

The suppliers must have banned colours tested again. As soon as three banned colours[3] are registered for any one system, the supplier must submit the three basic colours for another series of QUALICOAT tests. If one of the basic colours produces an unsatisfactory result, the approval will be cancelled. If the results for the basic colours are satisfactory, the approval will be maintained but the banned colours will remain banned.

An approval will be withdrawn if more than five banned colours are registered.

[3] In applying this rule, only new colours banned will be counted.

4.3. Use of the logo by coating manufacturers

The use of the logo must comply with the Regulations for use of the QUALICOAT quality label (Appendix A1).

Chapter 5

Licensing of Coating Plants

5. Licensing of Coating Plants

This chapter does not apply to decoration licences. The procedures for granting and renewing a QUALICOAT decoration licence are set out in appendix A2.

5.1. Granting of a licence (quality label)

Two consecutive inspections must be satisfactory before a licence is granted. These inspections will be made at the coater's request. The first inspection will be conducted by appointment. The second will be unannounced and will only take place once all the results of the first inspection (including the acetic acid salt spray resistance test) have been found satisfactory.

During these inspections, the inspector will check the following:

5.1.1 Inspection of laboratory equipment

As specified in section 3.6 to ensure that the equipment is available and functional. The inspector will also verify whether there are relevant standards or written operating instructions according to section 3.8.

5.1.2 Inspection of plant and equipment

According to sections 3.1 and 3.4.

5.1.3 Inspection of pre-treatment

According to section 3.2 or 3.3.

5.1.4 Inspection of finished products

Certain tests may be carried out on the finished products themselves but the full range of tests must be performed on test panels processed concurrently with a production lot (see section 5.1.5).

Only parts which have been released by the plant inspector are to be tested (all parts ready for dispatch are deemed to have been released by the plant inspector).

The samples for measuring coating thickness are to be taken according to the table below; a minimum of 30 parts must be tested in every case.

Lot size (')	Number of samples (random selection)	Acceptance limit for rejected samples
1 - 10	All	0
11 – 200	10	1
201 – 300	15	1
301 – 500	20	2
501 – 800	30	3
801 – 1'300	40	3
1'301 – 3'200	55	4
3'201 – 8'000	75	6
8'001 – 22'000	115	8
22'001– 110'000	150	11

(') Lot: 1 lot represents a customer's complete order in one colour or that part of the order which is in the coating plant.

The inspector must perform the following tests on the coated parts:

- Appearance (to test the uniformity of production) (*2.1)*
- Coating thickness (*2.3)*
- Adhesion (*2.4)*
- Indentation (*2.5)*
- Acetic acid salt spray test (*2.10)*
- Machu test (*2.11)*
- Polymerisation (2*.14)*
- Sawing test (*2.18)*

During the first inspection, the Machu test is carried out prior to the acetic acid salt spray test. If the result of the Machu test is satisfactory, the acetic acid salt spray test will then be performed. However, if the result of the Machu test is unsatisfactory, the first inspection will be considered unsatisfactory and must be repeated. The inspection is satisfactory when the acetic acid salt spray test has been passed.

In the second inspection, only the Machu test will be carried out. If the result of the Machu test is unsatisfactory, the second inspection must be repeated.

5.1.5 Inspection of the test panels

The full range of tests must be performed on test panels processed concurrently with a production lot.

- Gloss (*2.2)*
- Coating thickness (*2.3)*
- Adhesion (*2.4)*
- Indentation (2.5)
- Cupping test (2*.6)*
- Bend test (*2.7)*
- Impact test (*2.8).*

5.1.6 Examination of registers

The inspector must check that the coating plant maintains registers according to section 3.9.

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

5.1.7 Final assessment for granting the licence

The inspector submits the inspection report to the general licensee.

The inspection reports are assessed by the general licensee. Under the supervision of QUALICOAT, the general licensee decides whether or not to grant a licence.

- If the results of both inspections meet the requirements, a licence to use the quality label will be granted.
- If the results of one of the two inspections do not meet the requirements, the coater will be informed that the licence to use the quality label cannot be granted for the time being, stating all details and reasons. The coater must wait three months before making a new application for a licence to use the quality label.

5.2. Routine inspections of licensees

After a plant has been granted a licence to use the quality label, it will be inspected at least twice but no more than five times a year. Routine inspections must be made without prior notice and must include:

- Inspection of laboratory equipment as described in 3.5.
- Inspection of pre-treatment as described in 3.2 or 3.3.
- Inspection of finished products as described in 5.1.4 and inspection of test panels as specified in 5.1.5.
- An acetic acid salt spray test to be carried out at least once a year.
- A check of the registers according to 5.1.6.
- The coating plant must check the accuracy of the oven's temperature indicator or have it checked at least twice a year. The results of this check are to be entered in a special register which is to be presented to the inspector when he makes the routine inspections.

The inspector submits the inspection report to the general licensee.

The inspection reports are assessed by the general licensee. Under the supervision of QUALICOAT, the general licensee decides whether to renew or withdraw the licence.

- If the results of the inspection meet the requirements, authorisation to use the quality label will continue.
- If the results of the inspection do not meet the requirements, another inspection must be made within one month (allowing for holiday periods).

- If the second inspection again produces unsatisfactory results, the licence to use the quality label will be withdrawn immediately. The coating plant must wait at least three months before making a new application for a licence to use the quality label.

5.3. Use of the logo by coaters

The use of the logo must comply with the Regulations for use of the QUALICOAT quality label (Appendix A1).

Chapter 6

Specifications for In-House Control

6. Specifications for In-House Control

6.1. Testing the parameters

6.1.1 Pre-treatment baths

The chemical elements defined by the supplier of the pre-treatment products must be analysed **at least**:

once a day (24 hours) per bath.

The coater must increase the frequency of the analyses of his own accord if it proves necessary on account of the analyses made.

The results of these analyses must be entered in charts or some other record (register) readily accessible to the inspector. They must show the nominal values, maximum values not to be exceeded, actual values recorded and the number of shifts worked. A separate record must be kept for each bath.

If necessary, any corrective measures must be noted on the chart opposite the date of the analysis. If not, they must be recorded in the register.

6.1.2 Water Quality

The conductivity of the final rinsing preceding chromate bath and of the demineralised rinsing water must be measured **at least**:

once a day (24 hours)

The coater must increase the frequency of the analyses of his own accord if it proves necessary on account of the analyses made.

The results of these analyses must be entered in charts or some other record (register) readily accessible to the inspector. They must show the nominal values, maximum values not to be exceeded, actual values recorded and the number of shifts worked.

6.1.3 Measuring the temperature of pre-treatment and rinsing baths

The temperature of the pre-treatment baths and the final rinse, if a hot water rinse, must be measured **at least**:

once a day (24 hours) per bath

The results of these measurements must be entered in charts or some other record (register) readily accessible to the inspector. They must show the nominal values, maximum values not to be exceeded, actual values recorded and the number of shifts worked.

6.1.4 Measuring the drying temperature

The drying temperature must be measured **at least**:

once a week

The temperature on the workpiece and, simultaneously, the temperature displayed on the visual display unit must be read and recorded.

The temperature should be measured using a recording instrument or some other means such as thermochromic pencils or tablets.

The results of these measurements should be recorded and retained and the drying curves classified on some record (register) readily accessible to the inspector.

6.2. Quality control in the production process

6.2.1 Testing the etching degree

The degree of aluminium removal during the etching stage must be tested at least once a week using the method described in section 3.2.1 on extruded sections made of alloy AA 6060 or AA 6063.

6.2.2 Testing the weight of the conversion coating (DIN 50939)

The weight of the conversion coating must be tested in accordance with DIN 50939, table 4, method 1, **at least**:

once a day (24 hours)

using the testing method described in section 3.2.2.

6.2.3 Testing the stoving conditions

The stoving conditions according to section 3.4 must be tested **at least**:

- twice in every 24 hours: the displayed temperature must be recorded
- once a week: a stoving curve must be made
- once a month: a stoving curve must be made for a small section (cover-strip type) and a large section (curtain wall type).

The results of these tests should be recorded and retained and the stoving curves classified on some record (register) readily accessible to the inspector.

6.3. Quality control of the finished products

6.3.1 Gloss test (ISO 2813)

The gloss of the coating on finished products and sample panels must be tested **at least** once in every 8-hour work shift for each colour shade and each supplier.

The results of these analyses must be entered in some record (register) readily accessible to the inspector, showing the nominal values, maximum values not to be exceeded, the actual values recorded and the number of work shifts.

6.3.2 Coating thickness test (EN ISO 2360)

The coating thickness must be measured on at least as many samples as specified below:

Lot size (')	Number of samples (random selection)	Acceptance limit for rejected samples
1 - 10	All	0
11 – 200	10	1
201 – 300	15	1
301 – 500	20	2
501 – 800	30	3
801 – 1'300	40	3
1'301 – 3'200	55	4
3'201 – 8'000	75	6
8'001 – 22'000	115	8
22'001– 110'000	150	11

* lot : *a customer's complete order in one colour or the part of the order that has already been coated.*

The results of these measurements (minimum and maximum values) must be entered and retained on some record readily accessible to the inspector.

6.3.3 Appearance test

Lot size (')	Number of samples (random selection)	Acceptance limit for rejected samples
1 - 10	All	0
11 – 200	10	0
201 – 300	15	0
301 – 500	20	0
501 – 800	30	0
801 – 1'300	40	0
1'301 – 3'200	55	0
3'201 – 8'000	75	0
8'001 – 22'000	115	0
22'001– 110'000	150	0

* lot : *a customer's complete order in one colour or the part of the order that has already been coated*

The results of these measurements must be entered and retained on some record readily accessible to the inspector.

6.3.4 Adhesion test (EN ISO 2409)

The adhesion must be tested on sample panels **at least** once in every 8-hour work shift for each colour shade and gloss category and for each supplier.

The results must be entered and retained on some record readily accessible to the inspector.

6.3.5 Indentation (EN ISO 2815)

The indentation test must be carried out on sample panels **at least** once in every 8-hour work shift for each colour shade and gloss category and for each supplier.

The results must be entered and retained on some record readily accessible to the inspector.

6.3.6 Polymerisation test

This test is used to check that the coating polymerisation is good. In in-house control, this test is **optional for powder coatings**.

The polymerisation test must be carried out on sample panels at least once in every 8-hour work shift for each colour shade and gloss category and for each supplier.

The results must be entered and retained on some record readily accessible to the inspector.

6.3.7 Cupping test (EN ISO 1520)

The cupping test must be carried out on sample panels **at least** once in every 8-hour work shift for each colour shade and gloss category and for each supplier

The results must be entered and retained on some record readily accessible to the inspector.

6.3.8 Bend test (EN ISO 1519)

The resistance to cracking on bending must be tested on sample panels at least once in every 8-hour work shift for each colour shade and gloss category and for each supplier.

The results must be entered and retained on some record readily accessible to the inspector.

6.3.9 Impact test (EN ISO 6272 / ASTM D 2794)

The impact test must be carried out on sample panels **at least** once in every 8-hour work shift for each colour shade and gloss category and for each supplier

The results must be entered and retained on some record readily accessible to the inspector.

6.3.10 Machu test

The Machu test must be carried out **at least** once a week

The results must be entered and retained on some record readily accessible to the inspector.

6.4. Quality control registers

6.4.1 Control register for the production process

This register is to be maintained by the laboratory supervisor.

It is either a bound register (not a spiral binding) with numbered pages, or a computer listing

It must show the following information:

- the temperature of the baths,
- the chemical parameters specified by the suppliers,
- the results of the etching degree test,
- the results of the tests of the conversion coating weight,
- the results of the water conductivity tests,
- the results of the tests of the drying and stoving conditions.

General remark: the drying and stoving temperature curves must be archived

6.4.2 Control register for sample panels

This register is to be maintained by the laboratory supervisor.

It is either a bound register (not a spiral binding) with numbered pages, or a computer listing.

It must show the following information:

- the production date
- the references of the powder used: RAL or some other reference for identification, lot number, producer's name
- the results of the tests:
    - gloss test,
    - thickness test,
    - adhesion test,
    - indentation test,
    - polymerisation test (optional for powder coatings),
    - cupping test,
    - bend test,
    - impact test,
    - Machu test,
    - colour shade inspection (visual inspection to compare colour with the colour shade required by the customer).

6.4.3 Control register for finished products

This register is to be kept at the end of the production line.

It is either a bound register (not a spiral binding) with numbered pages, or a computer listing.

It must show the following information

- the customer's name and the order or lot identification data,
- the production date,
- the reference of the powder used,
- the results of the tests:
    - coating thickness test,
    - inspection of the colour shade and its gloss
    - appearance

6.5. Table summarising the specifications for In-House Control

Object tested		Minimum frequency	Results to be recorded in:
Pre-treatment baths, degreasing, pickling, chromating, rinsing	Chem. parameters	Once a day (24 hours) per bath	Chart or register
	Temperature	Once a day (24 hours) per bath	Chart or register
Conductivity of the water		Once a day (24 hours)	Chart or register
Temperature of pre-treatment and rinsing baths		Once a day (24 hours) per bath	Chart or register
Etching degree		Once a week	Chart or register
Drying temperature		Once a week	Chart or register
Weight of the conversion coating		Once a day (24 hours)	Chart or register
Stoving conditions		Twice a day: record the displayed temperature Once a week: make 1 stoving curve Once a month: make 1 curve for small and large sections	Chart or register
Gloss		Once in every 8-hour work shift for each shade and supplier	Chart or register
Coating thickness		According to the lot size of the order	Chart or register
Appearance		According to the lot size of the order	Chart or register
Adhesion		Once in every 8-hour work shift for each shade and supplier	Chart or register
Indentation		Once in every 8-hour work shift for each shade and supplier	Chart or register
Polymerisation (optional for powder coatings)		Once in every 8-hour work shift for each shade and supplier	Chart or register
Cupping test		Once in every 8-hour work shift for each shade and supplier	Chart or register
Bend test		Once in every 8-hour work shift for each shade and supplier	Chart or register
Impact test		Once in every 8-hour work shift for each shade and supplier	Chart or register
Machu test		Once a week	Chart or register

Appendices

Appendices

A1 – Regulations for use of the QUALICOAT quality label for paint, lacquer and powder coatings on aluminium for architectural applications

1. Definitions

For the purposes of these regulations, the QUALICOAT "Quality Label" denotes the trademark registered by the Association for Quality Control in the Lacquering, Painting and Coating Industry (QUALICOAT), Zurich, with the Federal Patent and Trademark Office on 8 May 1987 under trademark no. 352 316 and in the International Trademark Register on 14 August 1987 under no. 513 227 and published in the Swiss Official Gazette of Commerce on 5 May 1987

"QUALICOAT" means the Association for Quality Control in the Lacquering, Painting and Coating Industry, Zurich

"GL" means the General Licensee of a country.

"Licence" is a statement issued by or on behalf of the Association authorising the holder to use the Quality Label in accordance with these regulations.

"Specifications" are the "Specifications for a Quality Label for Paint, Lacquer and Powder Coatings on Aluminium for Architectural Applications".

"Holder" is the company authorised to use the Quality label.

2. Ownership of the Quality Label

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

QUALICOAT has granted to the GL a general licence in respect of the Quality Label for ..... (country) with powers to authorise the use of the Quality Label in accordance with these regulations.

3. Qualifications of applicant

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 or approval entitles the Holder to use the Quality Label for the products specified. The licence or approval may not be transferred.

4. Register of holders

QUALICOAT shall keep a register showing (in addition to other details which may be resolved upon now or later) the name, address and trade description of each Holder, the date on which the licence or approval was granted to the Holder, the number assigned to each Holder, the date of withdrawal of the licence or approval and any other details which QUALICOAT may deem necessary.

The Holder shall notify the GL forthwith of any changes in name or address and the GL shall in turn inform QUALICOAT in order for the change to be recorded in the register.

5. Use of the logo by coaters and suppliers

5.1 Use in general

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.

The Holder may not make any alteration or addition to the logo when using it. In the event that the Holder's own brands or trademarks are used separately on or in connection with his products, these regulations may not be infringed in any manner whatsoever. Holders of an approval or licence shall at any time provide the GL with all information required as to the use of the logo.

Improper use of the logo may lead to the sanctions stipulated in § 9.

5.2 Use of the logo by coaters

By applying the logo to a product, the coating plant guarantees that the quality of the product supplied meets all the requirements of the Specifications.

If a licence holder operates more than one coating plant and not all these plants are authorised to use the quality label, the quality label may only be used by the authorised plants.

The logo may be used on the products themselves, business stationery, quotations or invoices, price lists, cards, display boxes and on all company literature and brochures or in catalogues and newspaper advertisements.

Whenever a coating plant makes mention or reference to QUALICOAT, it must systematically indicate its licence number. This shall apply both to the use of the logo and in texts.

Licence nº xxxx

5.3 Use of the logo by suppliers (coating manufacturers and manufacturers of alternative pre-treatment systems)

The QUALICOAT logo must not appear on packaging or labels. They may only show the name “QUALICOAT” followed by the approval number (P-XXXX or A-XXXX) of the packed product.

In their business literature and documents, the coating manufacturers may 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 coating manufacturers are required to submit all new documents mentioning QUALICOAT to their national association. In countries without a general licensee, these documents should be submitted directly to the QUALICOAT Secretariat before publication.

6. Other conditions for use of the logo

Some businesses using coated products may wish to use the logo on their finished products or business literature.

They must request written authorisation which may be granted on condition that they:

- ♦ undertake to use solely aluminium products coated by licensed coating plants;
- ♦ undertake to submit all documents that refer to QUALICOAT to the national associations for approval or directly to QUALICOAT in countries where there is no national association;
- ♦ undertake to undergo inspections and controls by the national associations or QUALICOAT.

Such authorisation may require payment of an annual fee.

7. Conditions for granting and renewing approvals and licenses

As stipulated in chapter 4 for coating manufacturers.

As stipulated in chapter 5 for coaters.

As stipulated in Appendix A6 for manufacturers of chemicals

As stipulated in Appendix A2 for decorators.

The granting of an approval or licence shall require payment of an annual fee.

8. Withdrawal of approvals and licences

8.1 Failure to comply with the Regulations

The GL shall withdraw the approval or licence if the Holder ceases to comply with these regulations and in particular if the Holder is guilty of any improper use of the Quality Label or has failed to pay the annual fee.

In the event of withdrawal of an approval or licence, the Holder shall be given notice in writing by the GL and such notice shall be effective immediately. In such event, all tags, labels, bands, stencils, stamps, wrappers, containers, price lists, business notices, business cards and any other objects in or upon which the Quality Label is affixed shall either be delivered to the GL or, upon the GL's instructions, kept at the disposal of the GL until a new approval or licence is granted.

8.2 Significant changes in a company

In the case of any significant event in a company (change in shareholders or key personnel, new lines), that company must notify the GL immediately. The GL shall be authorised to make a supplementary visit in order to ensure that the Holder continues to satisfy all the conditions stipulated in the Specifications.

If the Holder ceases to trade, all tags, labels, bands, stencils, stamps, wrappers, containers, price lists, business notices, business cards and any other objects in or upon which the Quality Label is affixed shall either be delivered to the GL or, upon the GL's instructions, kept at the disposal of the GL until a new approval or licence is granted.

8.3 Voluntary withdrawal

In the event of voluntary withdrawal of an approval or licence, all tags, labels, bands, stencils, stamps, wrappers, containers, price lists, business notices, business cards and any other objects in or upon which the Quality Label is affixed shall either be delivered to the GL or, upon the GL's instructions, kept at the disposal of the GL until a new approval or licence is granted.

9. Sanctions

In the event of improper use of the Quality Label or of any behaviour or action which could impair the image of the Quality Label, the following sanctions may be imposed either by the GL or by QUALICOAT in countries without a national association:

1. *official statement*
2. *reprimand*
3. *withdrawal of the label*

The party concerned shall have the right to appeal first at the GL's level and finally at the QUALICOAT Executive Committee's level whose decision is final.

10. Amendments to the Regulations

These Regulations may be amended if and when necessary. However, the Holder of the label shall be allowed 4 months from the date of publication in which to comply with any such amendment.

11. Notices

Any notice required to be given to or by the Holder under these regulations shall be effective if sent by correctly stamped and addressed letter.

A2 – Specifications for Decoration

1. Purpose of the Specifications

Due to continuous research to develop new finishes, widening the field of applications for coated aluminium, it is important to define evaluation criteria in order to judge compliance with the specifications and laws now in force.

New technologies producing special finishes (such as wooden effect), called decorations, have been developed. Different kinds of technology have been established. They are based for example on the transfer of images on coated supports, or on a powder on powder application using suitable technologies.

The object of the following procedure is to ensure constant control of the finished product so that a QUALIDECO licence can be granted for external use.

The procedure does not include process tests because the technology is patented.

2. Steps for granting and renewing a QUALIDECO licence

2.1 Preliminary conditions

The company which performs the coating cycle must hold the QUALICOAT quality label to guarantee that it applies the coating under the best conditions and has the equipment for the tests.

The powder coating must be approved by QUALICOAT.

2.2 Work Specifications

2.2.1 Stoving

To obtain decorated finishes, it is necessary to have a stoving process that operates with a system to check the metal temperature, under the conditions prescribed by the supplier of the decoration system.

2.2.2 Laboratory

The decorator must at least be equipped with the following apparatus:

- specular glossmeter
- instrument for measuring coating thickness

2.2.3 In-house control

The decorator is obliged to monitor the production processes and inspect the decorated products in accordance with the following procedure:

- **Incoming materials control**

  The decorator must have a register showing all data concerning the material received and to be decorated (date, lot, coater, coater's licence, powder supplier, approval number of the powder, basic colour).

  All the coated material must be delivered with a certificate of conformity. This certificate must be archived by the decorator.

The maximum time between coating and decoration is one week. In this period, the material shall be protected against dust or any kind of dirt.

♦ **Gloss test (ISO 2813)**

The gloss of the coating on decorated products must be tested for every lot (one lot represents a customer's complete order in one colour or that part of the order which is in the coating plant).

The results of these analyses must be entered in some record (register) readily accessible to the inspector, showing the nominal values and the range.

♦ **Coating thickness test (EN ISO 2360)**

The coating thickness must be measured on at least as many samples as specified below:

Lot size (')	Number of samples (random selection)	Acceptance limit for rejected samples
1 - 10	All	0
11 – 200	10	1
201 – 300	15	1
301 – 500	20	2
501 – 800	30	3
801 – 1'300	40	3
1'301 – 3'200	55	4
3'201 – 8'000	75	6
8'001 – 22'000	115	8
22'001– 110'000	150	11

The results of these measurements (minimum and maximum values) must be entered and retained on some record readily accessible to the inspector.

2.3 Granting a QUALIDECO licence

The decorator has to submit for test every decoration for which it asks for a licence. By decoration we mean one aspect in one colour connected with an approved powder system designated by name.

Before a licence is granted, it is necessary first to carry out the laboratory tests to approve the decoration and second, to carry out an inspection.

2.3.1 Laboratory tests

The following tests have to be performed on samples taken from a production lot for architectural application. For the first three tests, the limits are the same as stipulated in the chapter 2 of the QUALICOAT Specifications.

- **Gloss** (Specifications, 2.2.)
- **Coating thickness** (Specifications 2.3)
- **Resistance to humid atmospheres containing sulphur dioxide** (Specifications 2.9.)
- **Accelerated weathering test** (Specifications 2.12.)

  Even though the colour is not uniform, it is still possible to measure the colour change with instrumental apparatus. In this case a provisional limit can be Delta E (see definition in QUALICOAT Specifications, 2.12) = 2 for light base and 3 for dark base. In every case the final evaluation is based on visual inspection.

- **Light fastness test**

  This test must be performed according to ISO 105/B 02 with a minimum value of 7 on the blue scale.

- **Florida test**

  The test must be carried out in the same condition as prescribed by QUALICOAT specifications. The acceptable limits provisionally are the same stipulated in accelerated test. The samples for the Florida test should be prepared from sections of the daily production.

2.3.2 Inspection *(see § 3.test report)*

The inspection includes the following :

- **Inspection of plant and equipment**

  According to § 2.2.1.

- **Inspection of laboratory equipment**

  As specified in § 2.2.2 to ensure that the equipment is available and functional.

- **Inspection of decorated products**

  The inspector must perform the following tests on the decorated parts :

  - Appearance (Specifications, 2.1)

  - Gloss (Specifications, 2.2.)

  - Coating thickness (Specifications 2.3)

- **Examination of registers**

  The inspector must check that the plant maintains a control register *(see § 4 Check-list for in-house control).*

The inspector submits the inspection report to the general licensee.

The inspection reports are assessed by the general licensee. Under the supervision of QUALICOAT, the general licensee decides whether or not to grant a QUALIDECO licence.

If the results meet the requirements, a QUALIDECO licence will be granted.

If the results do not meet the requirements, the decorator will be informed that the QUALIDECO licence cannot be granted for the time being, stating all details and reasons. The decorator must wait at least three months before making a new application for a licence to use the quality label.

2.4 Renewal of the QUALIDECO licence

2.4.1 Laboratory tests

In order for a licence to be renewed, two decorations selected either by the General Licensee or by QUALICOAT will be tested every year.

The tests are the same as for the granting of the QUALIDECO licence.

If the results of one test for one decoration do not meet the requirements, the test must be repeated.

If the results of the test are again unsatisfactory, the decoration is not valid.

2.4.2 Inspection

After a plant has been granted a QUALIDECO licence, it will be inspected once a year according to § 2.3.2.

The business records must also be examined in order to check that the QUALIDECO licence is only used for approved decorations.

The inspector submits the inspection report to the general licensee.

The inspection reports are assessed by the general licensee. Under the supervision of QUALICOAT, the general licensee decides whether to renew or withdraw the QUALIDECO licence.

- If the results of the inspection meet the requirements, the QUALIDECO licence will be renewed.
- If the results of the inspection do not meet the requirements, another inspection must be made within one month (allowing for holiday periods).
- If the second inspection again produces unsatisfactory results, the QUALIDECO licence will be withdrawn immediately. The decorator must wait at least three months before making a new application for a QUALIDECO licence.

3. Test report

An official test report can be obtained from the national association or directly from the QUALICOAT Secretariat.

4. Check-list for in-house control

See following page

Check-list for in-house control

Date	Reference Coater	Customer	QUALICOAT approval base	Decoration code	Paper code	Process Oven		Product			Notes
								Before decoration		After decoration	
						Day	Week	Thickness	Gloss	Appearance	

5. Logo

5.1 Qualifications of Decorator

Authorisation to use the QUALIDECO logo may be granted on condition that the Decorator operates in accordance with the Specifications. This authorisation is governed by a contract.

The granting of a licence entitles the Decorator to use the logo for the products specified. The licence may not be transferred.

5.2 Register of Decorators

QUALICOAT shall keep a register showing the name, address and trade description of each Decorator, the date on which the licence was granted to the Decorator, the number assigned to each Decorator, the approved decorations, the date of withdrawal of the licence and any other information or details which QUALICOAT may deem necessary at any time.

The Decorator shall notify the General Licensee ("GL") forthwith of any changes in name or address and the GL shall in turn inform QUALICOAT in order for the change to be recorded in the register.

5.3 Use of the logo

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 Decorator may not make any alteration or addition to the logo when using it. In the event that the Decorator's own brands or trademarks are used separately on or in connection with his products, these regulations may not be infringed in any manner whatsoever. Holders of a QUALIDECO licence shall at any time provide the GL with all information required as to the use of the logo.

Whenever a decorator makes mention or reference to QUALIDECO, it must systematically indicate its licence number. This shall apply both to the use of the logo and in texts.

Improper use of the QUALIDECO logo may lead to the sanctions stipulated in § 5.5.

5.4 Withdrawal of licences

Failure to comply with the Regulations

The GL shall withdraw the licence if the Decorator ceases to comply with these regulations and in particular if the Decorator is guilty of any improper use of the logo or has failed to pay the annual fee.

In the event of withdrawal of a licence, the Decorator shall be given notice in writing by the GL and such notice shall be effective immediately. In such event, all tags, labels, bands, stencils, stamps, wrappers, containers, price lists, business notices, business cards and any other objects in or upon which the logo is affixed shall either be delivered to the GL or, upon

the GL's instructions, kept at the disposal of the GL until a new QUALIDECO licence is granted.

Significant changes in a company

In the case of any significant event in a company (change in shareholders or key personnel, new lines), that company must notify the GL immediately. The GL shall be authorised to make a supplementary visit in order to ensure that the Decorator continues to satisfy all the conditions stipulated in the Specifications.

If the Decorator ceases to trade, all tags, labels, bands, stencils, stamps, wrappers, containers, price lists, business notices, business cards and any other objects in or upon which the logo is affixed shall either be delivered to the GL or, upon the GL's instructions, kept at the disposal of the GL until a new QUALIDECO licence is granted.

Voluntary withdrawal

In the event of voluntary withdrawal of a licence, all tags, labels, bands, stencils, stamps, wrappers, containers, price lists, business notices, business cards and any other objects in or upon which the logo is affixed shall either be delivered to the GL or, upon the GL's instructions, kept at the disposal of the GL until a new QUALIDECO licence is granted.

5.5 Sanctions

In the event of improper use of the QUALIDECO logo or of any behaviour or action which could impair the image of the Quality Label, the following sanctions may be imposed either by the GL or by QUALICOAT in countries without a national association:

1. *official statement*
2. *reprimand*
3. *withdrawal of the label*

The party concerned shall have the right to appeal first at the GL's level and finally at the QUALICOAT Executive Committee's level whose decision is final.

5.6 Amendments

The regulations stipulated in section 5 of these Specifications for Decoration may be amended if and when necessary. However, the Decorator shall be allowed 4 months from the date of publication in which to comply with any such amendment.

5.7. Notices

Any notice required to be given to or by the Decorator under these regulations shall be effective if sent by correctly stamped and addressed letter.

A3 – Compulsory declaration of changes in formulation for powders approved by QUALICOAT

Like all coatings, powders essentially consist of 4 kinds of components:

- binder
- pigments
- extenders
- additives

These are the powder components that determine the powder's characteristics.

1. BINDER

The binder consists of resin(s) + hardening agent together; it imparts the principal characteristics to the powder (reactivity, application properties, mechanical properties etc.). The main types of resins used in Europe are:

- saturated carboxylated polyester
- saturated hydroxylated polyester
- epoxy
- acrylic

These different types of resins can be used with several different kinds of hardeners.

It is quite obvious that variations in the chemical composition of the different resins or changes in the chemical molecular structure of the hardening agent can bring about modifications in the properties or characteristics of the powder and require a new QUALICOAT approval.

2. PIGMENTS

Pigments can be organic, inorganic or metallic and impart colour, appearance and opacity to the coating film.

3. EXTENDERS

Extenders improve the rheological or chemical properties of the final coating.

4. ADDITIVES

These are substances added to the powder in small quantities to improve certain characteristics of the coating (vapour relief, gloss etc.).

These other components (pigments, extenders or additives) of powder coating can also have some influence on the film properties and characteristics controlled within the QUALICOAT label. Nevertheless, as these constituents can be numerous and varied, it is up to the powder coating manufacturers to control their formulations so that they comply with the QUALICOAT label.

5. APPEARANCE OF THE FINAL COATING

Like all other coatings, powders – after curing – can give the final coating different appearances, for example:

- a smooth appearance
- a structured (grained or textured) appearance

A structured appearance cannot be treated like a smooth appearance. Even if the modification of the formulation is based on special additives, a powder 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 powder.

A4 – Definition of metallic powder coatings

Metallic powder coatings are powder coatings with a metallic or metallized effect. A metallic powder coating is a "normal" powder coating, the difference is the pigmentation. Powder manufacturers achieve this special effect by incorporating metal (for example: leafing or non-leafing aluminium) or other materials (for example: mica) in the formulation of the powder.

We can separate metallic powder coatings into two categories:

- One-coat systems with a metallized appearance (no clear coat is needed for good outdoor durability and resistance). **The current approvals are sufficient.**

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

The powder manufacturers are responsible for advising their customers whether they need to use a two-coat system or not.

A5 – Special specifications for coatings on cast accessories for architectural applications under the QUALICOAT quality label

1. Introduction

Cast accessories may be made of different alloys whose chemical composition is specified in the **EN 1706** standard.

The nature of the alloy and production method determine the final quality of the coated accessory. Some alloys – especially those based on silicone and copper – are the cause of unsatisfactory resistance to corrosion.

The pretreatment cycle must be tailored to the alloy and the quality of the castings. For outdoor architectural applications, it is necessary to use special alloys which have good resistance to corrosion as indicated in EN 1706.

It is the responsibility of the customer to define the alloy.

2. Work Specifications

All the requirements set out in Chapter 3 of the Specifications are applicable to the treatment of accessories, **with the exception of the etching degree** which is not specified for castings (see Specifications, § 3.2.1).

3. Testing

3.1 Inspection of finished products

Certain tests may be carried out on the finished products themselves but the full range of tests must be performed on test panels processed concurrently with a production lot.

The inspector must perform the following tests on the coated accessories:

- Appearance (Specifications § 2.1)
- Polymerisation (Specifications § 2.14)

and if the geometry of the parts permits:

- Coating thickness (Specifications § 2.3)
- Adhesion (Specifications § 2.4)
- Indentation (Specifications § 2.5)

The following tests must be performed on extruded sections only:

- Acetic acid salt spray test (Specifications § 2.10)
- Machu test (Specifications § 2.11)

3.2 Inspection of test panels

The full range of tests must be performed on test panels processed concurrently with a production lot.

- Gloss (Specifications § 2.2)
- Coating thickness (Specifications § 2.3)
- Adhesion (Specifications § 2.4)
- Indentation (Specifications § 2.5)
- Cupping test (Specifications § 2.6)
- Bend test (Specifications § 2.7)
- Impact test (Specifications § 2.8)

Apart from the restrictions above, please refer to the QUALICOAT Specifications.

A6 – Procedure for evaluating alternative pretreatment systems

1. Introduction

QUALICOAT, the association for Quality Control in the Lacquering, Painting and Coating Industry, has established a testing programme to evaluate the characteristics of new pretreatment products which are not covered by DIN 50939 and which represent an alternative to the traditional chromate systems used as a reference in the Specifications.
This programme started in 1992, and many meetings were necessary to define a testing programme acceptable to all participants. The programme has undergone changes in the course of the past series of tests, on the basis of the results and new developments in this field.

2. Testing programme

a) Formal application prior to testing

Chemical suppliers who plan to submit a new alternative pretreatment system for testing **must** inform the national association or QUALICOAT in countries without a national association. Basic documentation, a safety data sheet and detailed instructions on treatment cycles should be submitted not only to the laboratory in charge but also to the national association and QUALICOAT at the same time.

The following minimum technical information must be given

APPLICATION METHOD (1) (2)				
PROCESS CYCLE (2)				
ANALYTICAL METHODS FOR BATH				
FILM WEIGHT (3)				
OTHER ANALYSES				
OTHER RECOMMENDATIONS (EQUIPMENT, HANDLING, STORAGE ETC.) (4)				

(1) Spraying and/or immersion

(2) The supplier is responsible for ensuring that the cycle used by the coater is suitable for obtaining a coated product conforming to the QUALICOAT Specifications. What are the limits for demineralised water before and after conversion coating?

(3) What limits must be observed?

(4) The technical specifications must make it clear which points are compulsory, for instance does "recommended" mean compulsory or not?

b) Panel preparation

Special attention must be paid to the preparation of samples. Indeed, the final results of corrosion and exposure tests depend not only on the treatment but also on the aluminium composition and the reaction between the aluminium surface and chemical products.

The suppliers must indicate the complete pretreatment cycle to be used (degreasing etc.), and the laboratory charged with preparing the samples must strictly follow these instructions. This means that chemical suppliers must send QUALICOAT a complete technical data sheet with all the information necessary for preparing the samples.

The samples may be prepared:

- in the laboratory recognised by QUALICOAT
- or in the chemical supplier's laboratory under the supervision of the person in charge of the laboratory

c) Alloy and powder

The alloys to be used are:

- AA 5005 (for mechanical tests)
- AA 6060 or 6063 (for corrosion tests and outdoor exposure)

The chemical composition of the samples must be known and must be homogenous. The laboratory's final report must indicate the chemical composition.

The powder used shall be TGIC free and approved by QUALICOAT.

d) Dimensions

Sheet: according to the QUALICOAT Specifications.
Section: according to figure 1 (special attention must be paid to the cutting)

e) Tests

- Mechanical tests (according to the QUALICOAT Specifications)
    - Impact
    - Adhesion
    - Bend
    - Cupping
- Corrosion tests (according to the QUALICOAT Specifications)
    - Constant climate condensation water
    - Resistance to humid atmospheres containing sulphur dioxide
    - Acetic acid salt spray resistance
    - Pressure cooker test

f) Exposure site

Genoa

g) Coating to be applied

QUALICOAT has decided to use only one colour, RAL 9010, for TGIC-free powder coating of categories 1 and 3. The system must have a QUALICOAT approval.

h) Number of panels

All the tests will be made in triplicate.

i) Laboratory

All the corrosion tests must be performed in 2 laboratories.

j) Acceptable limits

- **Corrosion tests**

  The limits are the same as those prescribed in the QUALICOAT Specifications. For every test, 6 panels will be evaluated (3 panels in each of the two laboratories involved).
  The final evaluation will be as follows:

  Result of one laboratory

POSITIVE	No or 1 unsatisfactory result
NEGATIVE	2 or more unsatisfactory panels

  Result of two laboratories

  - If the results in both laboratories are positive, the system is satisfactory.
  - If the results in both laboratories are negative, the system is unsatisfactory.
  - If the results are positive in one laboratory and negative in the other, the tests must be repeated in a third laboratory.

- **Exposure test**

  After 2 years of exposure, the final evaluation will be made, applying the following criteria:

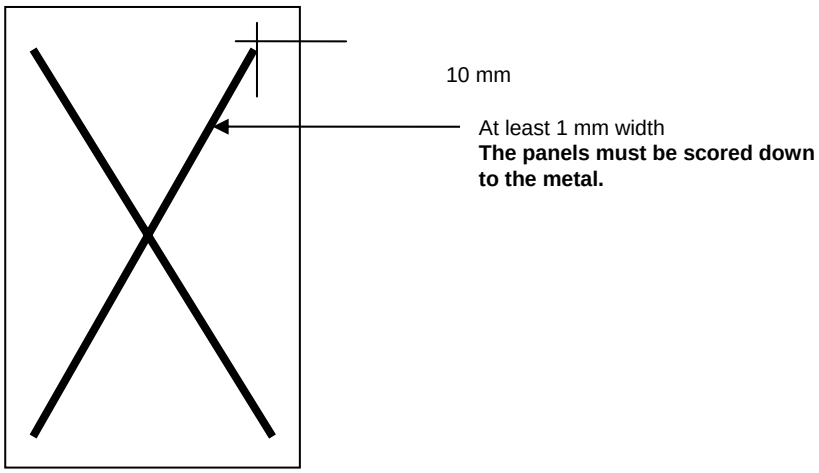
POSITIVE	No or 1 unsatisfactory result
NEGATIVE	2 or more unsatisfactory panels

  Same criteria as to evaluate the acetic acid salt spray resistance test (max. length 4 mm; corroded surface not exceeding 16 mm^2/10 cm scratch length).

  No blistering in excess of 2 (S2) is accepted.

Fig. 1 Scratches for corrosion tests

(Panel dimensions: length 200mm, width 70 – 100mm)



The second laboratory is responsible for making the scratches before carrying out the corrosion tests, while the laboratory in charge makes the scratches for the exposure test.

3. GRANTING OF AN APPROVAL

a) Formal request to QUALICOAT including all technical information (technical data sheet). These documents will serve as the official reference for QUALICOAT. QUALICOAT must be notified of every change;

b) An approved QUALICOAT laboratory organises the testing programme. The corrosion tests must be carried out by 2 laboratories, the laboratory in charge being responsible for organising the testing programme (par. 2) and writing the final report that must be submitted to QUALICOAT;

c) A QUALICOAT working group (Assessment of alternative pretreatment systems WG) evaluates the laboratories' test results and takes a decision, also in writing. In case of doubt a special meeting will be organised. The supplier of the tested system will be invited to a meeting to discuss the results.

d) Preliminary QUALICOAT decision based on WG proposal

e) The WG evaluates the exposure tests.

f) Final decision based on WG proposal.

4. RENEWAL OF SYSTEM APPROVALS

System approvals must be renewed every 5 years with the full test programme including outdoor exposure (see section 2 of this Appendix).

5. RESPONSIBILITY

a) Supplier's responsibility

The supplier is responsible for all cycles used by the coaters. The coater is expected to use these products exactly as instructed by his supplier. The suppliers and customers (coaters) already co-operate closely. For all systems, there are technical data sheets, also giving information about other products with which a system may or may not be used. The system suppliers send QUALICOAT valid technical data sheets, also indicating how the quality of the chromium-free conversion coating can be monitored by the inspectors and during in-house plant control. The methods for assessing the conversion coating may differ from one system to the next since there is not a pertinent standard (such as DIN 50939 for chromate conversion coating). QUALICOAT will send these data sheets to the general licensees (national associations) and recognised testing laboratories.

b) Coater's responsibility

The coater is clearly responsible for the quality of the coated products. Only the user can control all the parameters in his plant. However, the suppliers are prepared to check more frequently whether their customers adhere to the specifications stipulated on the technical data sheets. During their regular visits, they are also willing to verify the values recorded by the licensed plants during their in-house control.

c) Minimum technical information

The supplier must document the specific working conditions for every plant so that all the plant parameters will be available to the inspector.

6. COMPULSORY DECLARATION OF CHANGES IN FORMULATION FOR ALTERNATIVE PRETREATMENTS APPROVED BY QUALICOAT

In principle, if the chemical composition of the conversion coating remains the same, it is not necessary to apply for a new approval. In practice this means accepting all the variations specified on the technical data sheet to adjust the system to a specific application line in order to achieve the specified coating weight. The chemical product can be supplied as two components or just one. The suppliers must guarantee that the chemical composition of the working solution is basically the same as that approved by QUALICOAT.

Any change in formula that can result in significant modifications to the composition of the conversion coating represents a new product and requires a new QUALICOAT approval.

To give a few examples of such changes, we would like to mention some clear-cut cases:

- Any change in the metal content of the coating through substitution, addition, removal etc. of the approved metal system when the products are based on transition metals replacing chrome.
- Any change in the polymer composition and, by extension, in the organic components through substitution, addition, removal etc. when they are present in the approved formula.
- Any change in the typical appearance of the conversion coating, for example from colourless to colour.

A7 – RAL / DELTA E Table

RAL	DELTA E	RAL	DELTA E	RAL	DELTA E	RAL	DELTA E	RAL	DELTA E	RAL	DELTA E	RAL	DELTA E	RAL	DELTA E	RAL	DELTA E
1000	3.0	2000	6.0	3000	6.0	4001	4.0	5000	4.0	6000	5.0	7000	4.0	8000	4.0	9001	2.0
1001	3.0	2001	8.0	3002	6.0	4002	4.0	5001	4.0	6001	5.0	7001	3.0	8001	4.0	9002	2.0
1002	3.0	2002	8.0	3003	4.0	4003	5.0	5002	4.0	6002	5.0	7002	4.0	8003	4.0	9003	2.0
1003	4.0	2003	6.0	3004	4.0	4004	5.0	5003	5.0	6003	5.0	7003	4.0	8004	4.0	9004	5.0
1004	6.0	2004	5.0	3005	4.0	4005	4.0	5004	5.0	6004	5.0	7004	4.0	8007	4.0	9005	5.0
1005	6.0	2008	6.0	3007	4.0	4007	5.0	5005	4.0	6005	3.0	7005	4.0	8008	4.0	9006	2.0
1006	6.0	2009	4.0	3009	4.0	4009	4.0	5007	4.0	6006	4.0	7006	4.0	8011	4.0	9007	2.0
1007	6.0			3011	6.0			5008	5.0	6007	4.0	7008	4.0	8012	4.0	9010	2.0
1011	3.0			3012	8.0			5009	4.0	6008	5.0	7009	4.0	8014	3.0	9011	5.0
1012	3.0			3013	6.0			5010	4.0	6009	4.0	7010	4.0	8015	4.0	9016	2.0
1013	2.0			3014	4.0			5011	5.0	6010	5.0	7011	4.0	8016	4.0	9018	2.0
1014	3.0			3015	3.0			5012	4.0	6011	4.0	7012	4.0	8017	4.0	9022	2.0
1015	2.0			3016	5.0			5013	5.0	6012	4.0	7013	4.0	8019	3.0		
1016	6.0			3017	8.0			5014	4.0	6013	3.0	7015	4.0	8022	5.0		
1017	3.0			3018	5.0			5015	3.0	6014	4.0	7016	3.0	8024	4.0		
1018	6.0			3020	4.0			5017	5.0	6015	4.0	7021	4.0	8025	4.0		
1019	3.0			3022	8.0			5018	5.0	6016	5.0	7022	4.0	8028	3.0		
1020	6.0			3027	6.0			5019	4.0	6017	5.0	7023	3.0	8070	4.0		
1021	6.0							5020	5.0	6018	4.0	7024	4.0				
1023	3.0							5021	4.0	6019	2.0	7026	4.0				
1027	3.0							5022	5.0	6020	2.0	7030	2.0				
1028	8.0							5023	4.0	6021	4.0	7031	4.0				
1032	6.0									6024	3.0	7032	2.0				
1034	4.0									6025	5.0	7033	3.0				
1038	2.0									6026	5.0	7034	3.0				
										6027	2.0	7035	2.0				
										6028	5.0	7036	3.0				
										6029	5.0	7037	3.0				
										6033	2.0	7038	2.0				
										6034	2.0	7039	4.0				
												7040	3.0				
												7043	3.0				
												7044	2.0				
												7047	2.0				

underlined = colours tested as of November 2005

A8 - Specifications for batch treatment

1. Introduction

For batch treatment, the parts to be treated are arranged in organised loads in baskets used for immersion.

2. Specifications

2.1 Material of baskets and separators

The material used must be compatible with the chemistry used as recommended by the chemical supplier.

2.2 Shape and number of separators

The number of separators must be chosen to minimise contacts between the layers of parts.

The shape of the separators must be designed to guarantee a contact width not exceeding:

- 2 mm for stainless steel separators
- 2 mm for aluminium separators

Attention: the maximum contact widths are effective and not nominal.

2.3 Flow of liquid between parts

The parts must be arranged with sufficient space between them to allow the liquid to pass freely through the load.

2.4 Hooping of the parts

The hooping of the parts may be aluminium, stainless steel or any other material that is non-degradable in the treatment baths.

The hooping must not prevent the sections from floating.

The contact widths must not exceed:

aluminium hooping	:	2 mm
stainless steel hooping	:	2 mm
hooping made of other materials	:	2 mm

A9 – List of relevant standards

Nº	YEAR	TITLE	SPECIFICATIONS
ISO 2813	**1994**	Paints and varnishes -- Determination of specular gloss of non-metallic paint films at 20 degrees, 60 degrees and 85 degrees	**Gloss** 2.2, 2.12, 2.13, 6.3.1
EN ISO 2360	**2003**	Non-conductive coatings on non-magnetic electrically conductive basis materials - Measurement of coating thickness - Amplitude-sensitive eddy current method (ISO 2360:2003)	**Coating thickness** 2.3, 6.3.2
EN ISO 2409	**1994**	Paints and varnishes -- Cross-cut test	**Adhesion** 2.4, 6.3.4
EN ISO 2815	**2003**	Paints and varnishes -- Buchholz indentation test	**Indentation** 2.5, 6.3.5
EN ISO 1520	**2001**	Paints and varnishes -- Cupping test	**Cupping test** 2.6, 6.3.7
EN ISO 1519	**2002**	Paints and varnishes -- Bend test (cylindrical mandrel)	**Bend test** 2.7, 6.3.8
EN ISO 6272-1	**2004**	Paints and varnishes -- Rapid-deformation (impact resistance) tests -- Part 1: Falling-weight test, large-area indenter	**Impact test** 2.8
ASTM D 2794	**1999**	Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)	**Impact test** 2.8
EN ISO 3231	**1997**	Paints and varnishes -- Determination of resistance to humid atmospheres containing sulfur dioxide	**Resistance to humid atmospheres containing sulphur dioxid** 2.9
ISO 4628-2	**2003**	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** 2.9 - 2.10 – 2.16
ISO 9227	**1990**	Corrosion tests in artificial atmospheres -- Salt spray tests	**Acetic acid salt spray resistance** 2.10

Nº	YEAR	TITLE	SPECIFICATIONS
EN ISO 11341	**2004**	Paints and varnishes -- Artificial weathering and exposure to artificial radiation -- Exposure to filtered xenon-arc radiation	**Accelerated weathering test** 2.12
ISO 7724/3	**1984**	Paints and varnishes -- Colorimetry -- Part 3: Calculation of colour differences	**Colour variation** 2.12 – 2.13
ISO 2810	**2004**	Paints and varnishes -- Natural weathering of coatings -- Exposure and assessment	**Natural weathering test** 2.13
ASTM D 3260	**2001**	Test Method for Acid and Mortar Resistance of Factory-Applied Clear Coatings on Extruded Aluminum Products	**Resistance to mortar** 2.15
DIN 50017	**1982**	Atmospheres and their technical application; Condensation water test atmospheres	**Constant climate condensation water test** 2.17
DIN 50939	**1998**	Corrosion protection - Chromating of aluminium - Principles and methods of test	**Chromate pretreatment** 3.2.2, 6.2.2
EN 1706	**1998**	Aluminium and aluminium alloys - Castings - Chemical composition and mechanical properties	**Cast accessories** Appendix A5