

Subject :	SPECIFICATION OF ETCHING PRACTICES
Proposal	“Specifications” Working Group
QUALANOD resolution:	Meetings in November 2006 and June 2007
Date of application:	1st January 2008

Amendments to the Specifications:

- Extended paragraph **2.1 Appearance and colour**: division into paragraph 2.1.1 Visible defects (according to EN-12373-1) and 2.1.2 Surface texture
- Extended paragraph 3.1.2 with new title “Surface texture”
- Extended paragraph 3.1.4 Colour
- New paragraph 3.2.8 Etching (after 3.2.7 Rinsing)
- Extended paragraph 3.2.9 Colouring (will become 3.2.10 in the new edition)
- New paragraph 4.1 Testing the etching baths
- Extended paragraph 4.2 Checking the bath temperature (will become 4.3 in the new edition)
- Modified table “Specifications for In-House control in anodizing plants”

2.1. Appearance and colour

2.1.1 Visible defects (according to EN 12373-1)

The anodized parts must be free of visible defects on the significant surface(s) when viewed from a minimum distance of 5m (exterior architectural applications), 3m (interior architectural applications) or 0.5m (decorative applications).

2.1.2 Surface texture

The comparative assessment of appearance should be carried out visually or, for production control purposes, by using an instrumental method if it is possible.

Anodized aluminium has the property of double reflection from the surfaces of the anodic film and the basis metal. Therefore, for a comparative visual assessment, samples or components shall be set in the same plane and viewed as near to normal as is practicable with the direction of working (eg the rolling, extrusion or machining direction) always the same. They shall be viewed from a minimum distance as specified in 2.1.1.

Where the products are going to be used under natural lighting conditions, unless otherwise agreed, samples or components shall be compared in diffuse daylight from a northerly aspect. If the products are to be used in artificial light, this lighting shall be used for the comparison, and a diffuse source of illumination shall be placed above and behind the viewer.

For surface texture, instrumental measurement shall be performed in accordance with the requirements of EN 12373-11, -12, -13 or -14 depending on the finish of the product. It is important to be attentive to any dependence of measuring on sample orientation (working direction), and to set operating procedures accordingly. For example, specular gloss should be measured by placing the sample in contact with the instrument so that the plane of incidence and reflection is parallel to the working direction of the metal.

3.1.2 Surface texture

The appearance of the final products depends on the surface treatment immediately prior to anodizing and that appearance and the surface preparation designation system (EN 12373-1) and the reference standard must be agreed between the customer and the anodizer. The requirements for uniformity of appearance relate to the permissible variations in the alloy including variations caused by the manufacturing process and to variations in the treatment by the anodizer.

The extent of admissible variations in the final appearance and uniformity should be agreed by means of indicative samples that have the required coating thickness and are acceptable to both parties. Also, the method of assessment should be agreed by both parties. It must be noted that it is not possible to specify "upper" and "lower" limits on appearance because a number of different factors contribute. For example, although specular gloss varies on a scale up to 100, it is possible for samples with similar gloss values to look quite different under visual assessment

3.1.4 Colour

The colour of colour-anodized aluminium products must be agreed between the customer and the anodizer. The permissible colour variation should be specified by means of samples that are acceptable to both parties. The samples may represent agreed darkest and lightest limits. Also, the method of assessment should be agreed by both parties.

3.2.8 Etching

The etching process and the aluminium metallurgy are important in producing the appearance required of the anodized product. Consequently, to be able to achieve a high level of consistency and uniformity, it is important to properly control the etching process.

The anodizer should follow closely the instructions from the supplier of the etch chemicals and, where available, the supplier of the semi-fabricated product. In the absence of full instructions, the anodizer should take particular measures indicated below.

In order to achieve a consistent product, it is necessary to control within tight tolerances the concentrations of free sodium hydroxide, aluminium and any sequesterant, and the solution temperature. Solution composition can be effectively controlled by using a crystallizer to continuously regenerate the solution or by using a "long-life" etch where the masses of materials entering and leaving the etch solution are balanced.

Whereas during etching, aluminium loses mass at a constant rate, the gloss falls at a decreasing rate. After a certain time depending on the etching conditions, an approximately constant gloss level is achieved. Anodizers should identify this regime for their particular etch conditions and set the processing time accordingly. This makes the process very much more controllable and reduces product inconsistency that might arise from poor reproducibility of etching time, excessive drainage time after the load has been withdrawn from the etch tank and excessive rinsing at relatively high pH values.

3.2.9 Colouring

When colouring parts, anodizers should use dyes that satisfy the light fastness test (see section 2.5).

The dye supplier's instructions on the temperature and pH value of the dye bath and time of immersion must be followed depending on the dye employed.

Similarly, for electrolytic colouring, anodizers must follow the practices recommended by the supplier.

For external applications the quality label may not be used for black electrolytic colouring using copper salts.

4.1. Testing the etching baths

The etching baths should be analysed in accordance with the instructions of the supplier of the etch chemicals. In the absence of such instructions, the analysis of total sodium hydroxide, aluminium and, if appropriate, the sequestrant should be carried out at least:

- once a day per bath if three shifts are worked per day;
- once every two days per bath if two eight-hour shifts are worked per day;
- once every three days per bath if one eight-hour shift is worked per day;

and the bath adjusted accordingly.

The results of these analyses must be entered in charts or some other records readily accessible to the inspector. The following data must be recorded: the actual values registered and the number of shifts worked.

4.2. Checking the bath temperature

The temperature of each etching, anodizing and sealing bath must be checked at least twice in every work shift at regular intervals.

The temperature of the etching bath must be measured at the beginning of the etching cycle.

The temperature of the anodizing bath must be measured at the end of the anodizing cycle.

The temperature of the sealing bath must be measured 10 minutes after immersion of the load.

The results of these tests must be entered in charts or some other records readily accessible to the inspector.

Specifications for In-House control in Anodizing Plants

Object tested	Minimum frequency	Results
Etching and anodizing baths	<u>Once a day per bath</u> if three shifts are worked per a day <u>once every two days per bath</u> if two eight-hour shifts are worked per day <u>once every three days per bath</u> if one eight-hour shift is worked per day	The results are to be entered in charts or some other records (2).
Temperature of the etching, anodizing and sealing baths	<u>Twice per bath in every shift</u> , at regular intervals to be measured: - at the beginning of the etching cycle (etching bath) - at the end of the anodizing cycle (anodizing bath). - :ten minutes after immersion (sealing bath)	The results are to be entered in charts or some other records (2).
pH of the sealing baths	<u>Twice in every shift</u> , at regular intervals	The results are to be entered in charts or some other records (2).
Sealing	<u>Dye spot test or admittance measurement</u> for natural anodized aluminium: <u>Once per bath in every shift</u> <u>Weight loss:</u> <u>once a day per bath</u> if colour anodized products account for 100% (1) <u>once every two days per bath</u> if colour anodized products account for more than 50% (1) <u>once a week per bath</u> if colour anodized products account for less than 50% (1)	It is compulsory to repeat the weight loss test or reseal the parts if the result of the dye spot test is 2 or if the admittance value reaches the limit of 400/e $\mu\text{S}/\mu\text{m}$. The test results are to be recorded in the production control register.
Film thickness	<u>Once per flight bar on the finished product.</u>	Results to be recorded on the manufacturing tags and in production control register.
Thickness classes 20 or 25	<u>Abrasion test at least once per shift from each anodizing tank</u>	Light powder deposit on the abrasive paper.

1) of the total output in the week

2) readily accessible to the inspector