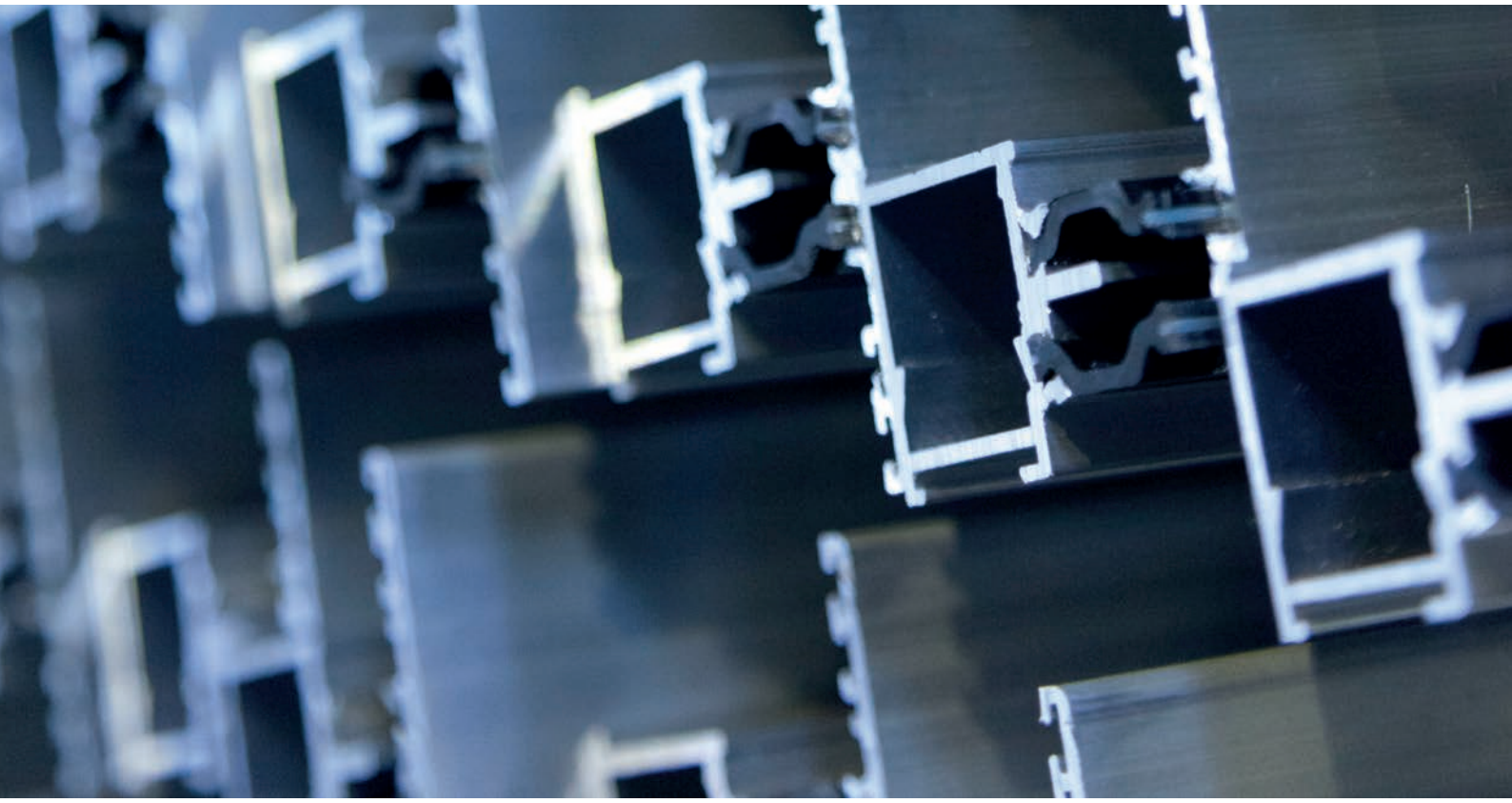
recommendations for **aluminium alloys**



a technical research paper

recommendations

the global standard for architectural aluminium finishin

recommendations for aluminium alloys in combination with QUALICOAT

After extensive research and testing, QUALICOAT have recognised that the aluminium alloy composition does have a long term effect on the powder coated finish. The better the tolerance of the base material, in both trace elements and age hardening, a even longer life expectancy can be achieved.

This, and other developments being worked on by QUALICOAT member committees, offers a real commitment to the QUALICOAT architectural finishing standard, which is available from the associations' website.

recommendations

Technical Information Sheet 3

May 2023 Edition

Best chemical composition and temper of EN AW 6060 and EN AW 6063 aluminium alloy semi-finished extrusions for p otective performance.

It may seem that coatability automatically means best performance. All aluminium alloys can be coated, provided that the surface is prepared to provide good adhesion, but the corrosion performance achieved with different alloys varies. There is a great deal of data evidencing this scale of performance.

Architects and specifiers generally require the best long-term performance, but considering the previous statement, the question is how to achieve it?

To consider this requirement, we need to start with the aluminium alloy.

Surface preparation creates a link between the organic coating and the metal substrate. The organic coating is required to have intrinsic adhesion and to ensure protection against corrosion.

QUALICOAT Specifications give clear requirements for the coating process and define the performance of the organic coating. The following recommendations for aluminium alloys in combination with the QUALICOAT Specifications assure the best long-term performance.

Aluminium Properties

This recommendation mainly concerns the producers of aluminium extrusions, but we believe that other stakeholders in the aluminium sector, i.e. distributors, dealers, designers, fabricators (window makers), etc., should be made aware of its content.

Corrosion behaviour depends on the following factors:

a. Chemical composition of the alloy

b. Heat treatments

c. Insufficient surface preparation

a. The chemical composition given in Table 1, showing different limits and narrower ranges for the various alloying elements than usual for EN AW 6060 and EN AW 6063 alloys, is likely to achieve the best long-term performance.

   In the case of EN AW 6060 and EN AW 6063 recycled alloys, the values of the relative weights of the alloying elements Cu and Zn may be increased, if they are properly balanced, and if the extrusion conditions are adequate.

Elements	Minimum	Maximum
Si	0.30	0.55
Fe	0.10	0.30
Cu		0.03
Mn		0.10
Mg	0.35	0.60
Cr		0.05
Zn		0.03
Ti		0.10
Other impurities	Each Maximum 0.05 Total Maximum 0.15	

Table 1 - Acceptable limits recommended by QUALICOAT for the chemical composition of EN AW 6060 and EN AW 6063 aluminium alloys.

b. Even thermal treatments can affect corrosion resistance. Inappropriate thermal treatments to achieve T5 and T6 tempers can cause the formation of structures more susceptible to corrosion. A simple method to assess the achievement of T5 and T6 tempers is hardness measurement.

Table 2 shows the acceptable hardness range that provides the best long-term performance.

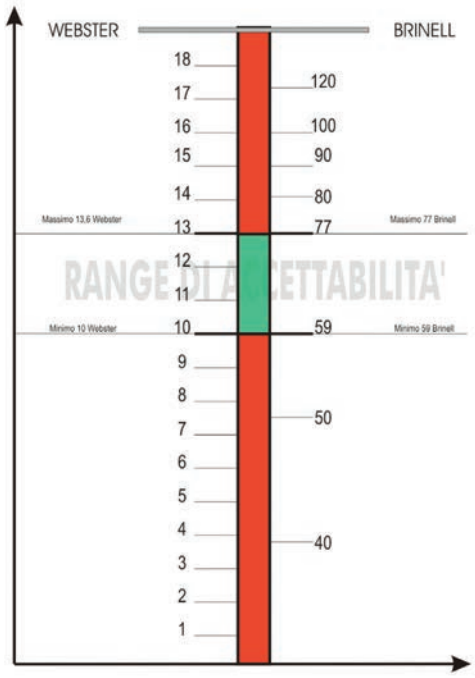


Table 2 – Best Webster and Brinell hardness values (green colour) of EN AW 6060 and EN AW 6063 aluminium alloys for maximum resistance to corrosion.

c. Surface preparation: the aluminium surface needs to be prepared before conversion coating treatment (see Chapter 3 of the QUALICOAT Specifications). For QCT 3.0 applications, SEASIDE endorsement and an etching degree of 2 g/m^2 is mandatory.

References:

Aluminium Centrum, Einsteinbaan 1, NL 3439 NJ Houten

AITAL TECHNICAL Data sheet 40/12: "Properties of semi-finished extrusions in EN AW 6060 Aluminium alloy for highly-aesthetic, highly-protective applications"

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