

Technical Information 01

Color/texture deviations in anodized aluminum in the architectural sector

Anodized aluminum is a favorite surface element in the architectural sector due to its mechanical robustness and metallic feel.

Anodic oxidation of aluminum in a sulfuric acid bath produces a layer of robust, crystalline aluminum oxide with a thickness of about 20-35 µm. In the alloys commonly used in the architectural world, the layer is transparent and formed by chemical conversion of aluminum, not by a deposition reaction. Therefore, inhomogeneities in the aluminum substrate are incorporated into the layer and may become visible. For example, small differences in the alloy composition or a different distribution and size of the metal phases formed by the alloy constituents may contribute to color variations. Furthermore, the parameters resulting from the anodization process are possibly adding to color differences. Etching and rinsing procedures as well as the thickness of the anodized layer are contributing factors. Thus, it is recommended that all involved parties are made aware at an early stage of possible discrepancies in color, structure and visual impact. The information sheet Al.03 of the Association of Window and Facade Manufacturers in Frankfurt am Main provides the best reference to evaluate permissible color tolerances [6].



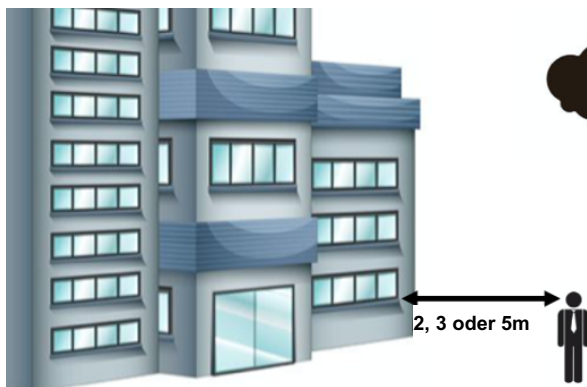
Visible texture - Anodized layer with linear color contrasting pattern resulting from the metallic structure of the base material. Chemical etching cannot neutralize this effect influenced by the substrate. This effect is rated as admissible, as long as the visual impact is not disturbingly compromised [1].



Color fan with the common anodized colors
C0/C31/C32/C33/C34/C35



Agreed color reference charts C32, light and dark, which are used to evaluate color differences.



Rating takes places exclusively through visual observation. Depending on the applicable norm and location of the component the evaluation is performed under diffuse light conditions looking perpendicularly to the surface from a distance of 2, 3 or 5 meters. Non disturbing effects are permitted.

Literature/standards and regulations for anodizing:

- [1] DIN 17611
- [2] BS 3987
- [3] DIN EN ISO 7599
- [4] AAMA 611
- [5] Specifications for the QUALANOD Quality Label for Sulfuric Acid-Based Anodizing of Aluminum
- [6] Merkblatt Al.03 Verband der Fenster- und Fassadenhersteller e.V., Frankfurt am Main