TB 101 — Shade Variation in Anodised Aluminium

TECHNICAL
BULLETIN

AAF

ARCHITECTURAL ANODISED FINISHES

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SHADE VARIATION IN ANODISED ALUMINIUM PRODUCT

At times, for a range of reasons, the appearance of anodised product can be seen to vary to a degree when comparing one product with one another.

Understanding that anodising itself is a translucent finish, any inconsistencies with the supplied aluminium (including metallurgy, surface texture or grain structure) can become evident or accentuated after anodising. This is reflected in parts of the Australian Standard AS1231-2000 for Anodising;

"Additionally, anodic treatments may reveal lack of homogeneity, if present, in the aluminium."). (AS1231-2000; Appendix B - Guidance on the Choice of Aluminium Grade)

"Anodic treatment may accentuate any lack of homogeneity or differences in the metallurgical condition of the aluminium. As a result, some non-uniformity of appearance may be encountered on different areas of a component and/or between different batches of material of the same specification, or where certain welding processes have been used." (AS1231-2000; Appendix G - Guidance Visual Inspection after Anodising)

Shade variation caused by inconsistencies in the supplied aluminium is outside the anodiser's (or AAF's) ability to control.

FREQUENCY

These phenomena, though not occurring regularly, have been seen to occur from time to time with both smaller and larger job lots. Alloy grade alone does not guarantee uniform appearance. Confirm anodising suitability with AAF before purchasing sheet. Understandably, the probability of such increases with the greater number of items processed in a particular job.

PERCEPTIBILITY

Importantly, not all degrees of shade variation may be identified when viewing singularly or yet, a set of panels. The perceptibility of the above significantly increases when viewed at various angles as a large plane surface of abutted panels.

To lessen perceived shade variation, designers and builders may arrange similarly shaded panels together, introduce visual breaks with wider dark-coloured joints, or use perforated panels.

Notwithstanding, the above potential still exists. This information is provided as a matter of importance; we suggest that you please review the risk of such in relation to the installation/use of these products on this or any other project. Our AAF specialists are here to advise and assist.

WHAT CAN BE DONE TO REDUCE RISK?

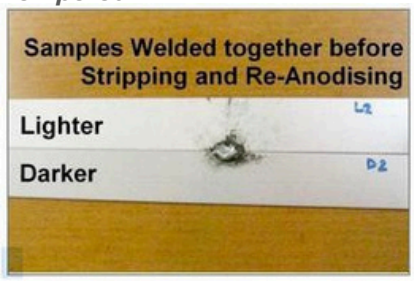
AAF offers Evershield® AQ Sheet guidance and pre-purchase assessment to help customers select sheet suitable for anodising. The following suggestions are listed to help minimise the risks of the above occurring;

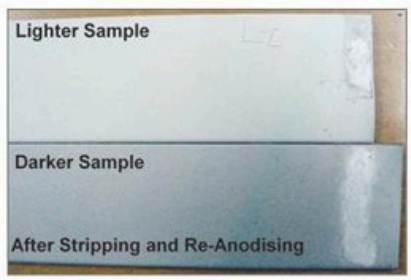
- ***Notify your aluminium product supplier of requirements to reduce variation as much as possible; including metallurgy (Si & Fe…etc.), surface texture and grain structure.***
- ***Source product from a single quality manufacturer rather than multiple suppliers***
- ***As much as is possible, obtain consecutive product rather than a mix of older and newer batches***
- ***Factor in the risk of such in your project and include measures to identify and manage such risks***
- ***Contact AAF for current Evershield® AQ Sheet options and batch assessment.***

Example 1 – Variances in alloy across aluminium parts

We are able to confirm these phenomena by way of re-processing the different appearing product off-cuts obtained from the one source and one batch. The Lighter and Darker off-cut extrusions (LHS) & Sheet product (RHS) were welded together before stripping and re-anodising. As can be seen in the photos below, the same off-cut appears darker and the other remains the lighter.

In each of these instances, it has been established that shade variation has arisen from an inconsistency with the supplied aluminium. Aside from the obvious metallurgical properties, it has been demonstrated that inconsistencies with the panels' surface texture or grain structure may also result in shade variances. These may be the result of the manner by which the metal has been originally manufactured, rolled or tempered.





Example 2 – Incorrect weld alloy used

Mismatch of weld colour after anodising is most likely caused by the improper selection of filler wire.
If the welded assembly will be anodised, 5356 alloy filler wire should be used because the weld colour is a closer match to alloy base material (assuming 6061 alloy extrusion). A weld with 4043 that is anodised will stick out since it will anodise a dark grey". "Its one limitation is that 5356 is not suitable for service temperatures exceeding 65^{0}C". Refer to your welding supplier for more information.

Example 3 – Anodise Grade Sheet not used

"Zebra" or "tiger" striping can become visible after anodising where the supplied sheet is inconsistent. AAF can help assess sheet suitability before purchase through its Evershield® AQ Sheet service. Contact AAF on (07) 3637 5600 for current sheet options and assessment.

The patterned appearance on these sheets arises from inconsistencies within the supplied sheet itself. As detailed in AS1231-2000; Appendix B - Guidance on the Choice of Aluminium Grade. "Anodic treatment may accentuate any lack of homogeneity or differences in the metallurgical condition of the aluminium".

Sheet casting method can affect uniformity after anodising. Direct Chill (DC) and Continuous Casting (CC) are different production methods. Ask your sheet supplier to confirm the casting method and anodising suitability, and consult AAF before purchasing material.

The message from this is if you are purchasing sheet with the intention of having it anodised and want to reduce the risk of Zebra Stripes occurring. Be sure to purchase from your supplier sheet that is "True Anodise Grade" and have them ensure that the sheet has been rolled from strips that were cast via the Direct Chill (DC) process.
AAF is available to test sheet prior to production and we strongly recommend customers work with our AAF staff where sheet/facade style applications are applicable and consistency of shading is important

…"Additional manufacturing problems can occur if the surface of the final product is chemically treated, etched or anodized." … "For all product applications where surface is critical, Continuous Cast products are to be avoided." - The Tech Spot: Vol. 3, Issue 3, March 2009, www.ipg.novelis.com

Example 4 – Sheet suitability for bright anodising

The photo below illustrates why sheet suitability matters for bright anodising. Select anodising-quality sheet and confirm its suitability with AAF before purchase. AAF can advise on current Evershield® AQ Sheet options and assess samples or batches before production. Contact AAF on (07) 3637 5600.

REFERENCE

Further information is available from the following Australian Standards. AS 1231-2000, "Aluminium and Aluminium alloys - Anodic Oxidation Coatings"

NOTE

***Details contained herewith do not constitute specific advice, merely they are provided as a matter of courtesy and as general information only. You should seek your specialist's advice,
to ensure that any information or suggestions meet your specific requirements. Reference should be made to the respective standards for the finish concerned as well as Architectural Anodised Finishes Pty Ltd (AAF) Terms and Conditions of Sale. Latest releases of Australian Standards are available for purchase via the following website; www.standards.org.au
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