Guidance Note - No.7

Powder Coating External Failure Causes

June 2023

Scope

These recommendations cover specification guidance of painted aluminium extrusions and curtain wall panels. The guide is intended for specifying powder coated, architectural and aluminium extrusions such as window frames, door frames, railings and trim as well as curtain wall panels, column covers, spandrels, mullions, louvres, vertical trim, etc.

Purpose

These recommendations are intended to assist architects, contractors, owners and building managers who are concerned with the specification of painted, architectural aluminium.

General

There are various reason why architectural powder coating will fail in use. One of the main reasons is poor quality application of the aluminium pretreatment and powder coating processes. There are many powder coaters across the UK who who offer powder coating on all types of goods and machinery, but few who posses the financial investment of a quality pretreatment process which is vital if powder coating is the be constantly exposed to the weather. In the UK & Ireland the majority of architectural powder coaters are licensed members of QUALICOAT.

Given that the powder coating is completed to a high quality there are further issues which can effect the sustainability of the finish, all of which are preventable. This Guidance Note explains the main issues and how to aid them.

Mechanically damaged powder coatings

This may seem obvious, but a damaged coating exposes the base aluminium which could, if left exposed, cause corrosion over time. During routine cleaning and inspection any damage can be noted and a decision made to repair. There are specialist companies that can touch up and repair coatings, seek advice from the powder coater of the project or contact any member of the Association for advice.

Galvanic Corrosion caused through contact with other material

The salts in the atmosphere coupled with rain can encourage galvanic corrosion to begin. These often occur between different materials on the Galvanic Table which are exposed to the weather. To avoid galvanic corrosion, fixings to dissimilar materials which are known to have an incompatibility require to be electrically insulated.

Stray electrical currents

A facade or window assembly is naturally earthed to the materials they are fixed too. In practice this works very well ensuring the finish maintains an excellent sustainable life expectancy. The facade or window should never be considered an ‘earth’ for any electrical supplies or used as part of a circuit irrespective of current load. Stray electrical currents can cause premature powder coating failure. The issue is particularly relevant where the use of photovoltaic panels are used where the wiring needs to be double insulated from the aluminium.

Dirt and soil load accumulations with corners

Debris from the weathering of a window or facade can leave deposits on, or in the aluminium components. Initially these pose no issue, but over time dirt deposits can gather and concentrate salts and acids from the atmosphere that over time will begin to breakdown the powder coat finish. To avoid these failures, ensure that product designs offer as few internal corners as possible and where they do occur try to ensure that there is adequate run off of rain to keep the surface free of debris. Avoid designs where areas of ponding could occur. Together with good design, infrequent cleaning should also ensure that the powder coated surface remains

free of any build up of any soiling.

Sharp corners with radii s 0.5mm

Sharp corners will not allow a powder coat build up to the correct thickness which reduces life expectancy and leaves the edge vulnerable to damage and as a result exposing the aluminium substrate. All systems companies provide profile extrusions that have a minimum of 0.5mm radii, but cut edges that are powder coated on profiles and pressings are vulnerable. All exposed cuts or machining that is being powder coated should be linished to offer a minimum of 0.5mm radii.

Burrs

As with sharp corners, powder coating will not fully coat over burrs however slight. Again simple linishing of these areas prior to powder coating will remove burns and ensure a good level of coating is achieved.

Poor ventilation and drainage

As mentioned earlier in soil accumulations, ponding of water is to be avoided in any design. Most window systems are designed to be drained and ventilated, especially to ensure double glazing secondary seals are kept free from moisture as a result of weathering, to ensure long life expectancy. Given that all cavities are drained and ventilated will ensure that any moisture will evaporate over time.

No water tight connections

When joining cut aluminium profiles that has previously been powder coated, these joints need to be sealed to avoid water from weathering draining through these connections. There are various methods used to offer sealing, from two part epoxy adhesives to small joint sealants. System companies product manuals normally clearly state what sealants are to be used and if in doubt ask the question of the systems supplier.

No sealing of machined faces

Drainage routes through aluminium profiles often consist of small machined or punched openings these should be treated to seal the exposed aluminium surfaces back to the powder coating. This clear touch up liquid is normally an acrylic based formulation that adheres the the cut aluminium but does not damage the powder coating. Systems companies literature should be consulted to ensure that the correct touch up formulations are used.

References

QUALICOAT Specifications
Specifications for a quality label for liquid and powder coatings on aluminium for architectural applications.

Disclaimer

The information provided in this document is for guidance only and is not intended to replace any manufacturers recommended procedures. Qualicoat UK & Ireland strongly recommend that a qualified member of the association is contacted and underwrites any procedures which apply to powder coated finishes.

More Information

Current approved powder coaters can be found at:
www.qualicoatuki.org

Current Qualicoat standards and updates from the European website are at:
www.qualicoat.net

QUALICOAT UK & Ireland
Suite 9, Alcora Building
Halesowen
West Midlands
B62 8DG

+44 (0) 330 236 2800
www.qualicoatuki.org