



Guidance Note - No.5

UK & Ireland

The Conversion Coating Processes

May 2023

Scope

The International recognised quality label QUALICOAT is continually working towards higher industry standards, including but not limited to, the performance of the various conversion coatings used prior to organic coatings for external use.

Due to concerns over the environment and REACH implications in the use of chromium trioxide containing coatings and their acidic mixtures, most QUALICOAT licensed applicators have changed to alternative conversion coating processes that are completely free of chromium trioxide.

Purpose

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

General

QUALICOAT demands that all alternative conversion coating processes are thoroughly tested to the latest revision of the specification adopting methods that follow international standards listed in Appendix A9 of this specification. Fully approved conversion processes have been proven in quality and cost competitiveness and regularly checked through inspections undertaken in line with the general licensee. Statistical analysis, provided by QUALICOAT own working group, confirms that there is no significant difference in corrosion performance between the alternatives.

An issue for many QUALICOAT applicators using these alternative conversion coating processes is the impact of potential loss of business under a restricted tender process following the rise of inclusion of BS EN 12206-1:2021 in the tender documentation.

The major concerns raised by applicators responding to tender enquiries are:

- Tender documentation often does not recognise the important contribution of QUALICOAT in safe-guarding quality of external painted aluminium surfaces.
- National standard BSEN 12206-1:2021 is often specified in tender documentation based on the perception that it is a higher performance level than QUALICOAT and that fully approved alternative conversion processes endorsed by QUALICOAT do not meet the requirements of Annex B Outdoor Weathering.
- Tender process is increasingly influenced by stakeholder(s) directing continued use chromium trioxide or pre-anodising (PREOX, Flash Anodising) as the only acceptable and allowed pre-treatment for external painted aluminium surfaces.

In an increasingly competitive market the interests of all our members is of primary importance and we remain committed to update all stakeholders within the supply chain in the use alternative conversion coating processes and we would like to summarise the following in response to the concerns raised.

QUALICOAT current specification (as of the date of this Guidance Note) allows for the following chemical conversion coating processes:

- Chromate Conversion Coating
- Alternative Conversion Coating
- Anodic pretreatment, also known as pre-anodising

A comparison of the test method and performance is summarised in Table 1 overleaf.



Comparison Performance Requirements and Test Methods			
	EN12206-1 (2021)	Qualicoat Current Edition	Comment
Renewal Frequency	No Requirement	Every 3 years	
Etching Degree	Min. 1 g/m ²	Min. 1-2 g/m ²	Depending on endorsement, applies to all conversion coatings
Resistance to AASS	ISO 9227 (1000 hours)	ISO 9227 (1000-2000 hours)	2000 hours requirement for QUALICOAT seaside endorsement
Resistance to Sulphur Dioxide	ISO 3231 (24 cycles)	ISO 3231 (24 cycles)	
Resistance to Humidity	ISO 6270 (1000 hours)	ISO 6270 (1000 hours)	
Resistance to Filliform**	No Requirement	ISO 4623-2 (1000 hours)	
Pressure Cooker	2 hours	2 hours	No difference
Outdoor Weathering	ISO 8565 (3-5 years industrial and coastal)*	Genoa (2 years)***	Anodic oxidation requires outdoor weathering testing under EN12206-1(2004)
Outdoor Weathering	ISO 2810 (12 months Florida)	ISO 2810 (12 months Florida)	
* Revised 2011 replacing ISO 8565 (1995) corrosion of metal and alloys ** Critical test of the pre-treatment and painted profile for external use *** Validated by external testing institute, anodic oxidation is exempt from testing			

Table 1 - A comparison of the test method and performance

QUALICOAT specification exceeds a higher performance than BS EN 12206-1:2021, in addition for coastal environments a seaside endorsement provides a higher corrosion classification and can be specified.

As summarised in table (1) specifiers should avoid use of BS EN 12206-1:2021 without the inclusion of a QUALICOAT endorsement as it can be shown that the national standard alone may not be sufficient to safe-guard quality and can be summarised as follows:

- BS EN 12206-1:2021 does not require regular testing for alternative conversion coating processes.
- BS EN 12206-1:2021 does not set a minimum etching degree for aluminium surfaces.
- BS EN 12206-1:2021 does not include the use of higher durability coatings in testing alternative conversion coatings processes.
- BS EN 12206-1:2021 has no performance level for resistance against filliform corrosion.

There is a requirement under BS EN 12206-1:2021 that conversion coating processes be tested to ISO 8565 (2011) for a duration up to 5years industrial and coastal outdoor weathering.

While it is accepted that outdoor weathering is useful in determining corrosion behaviour, particularly in areas of specific corrosion interest, there are multiple and complex

environmental factors influencing these tests. Field testing therefore alone cannot exactly predict service performance (Crewdson, 2009) and unless a specific site location for outdoor weathering testing is fixed, it is not possible to make a ranking correlation within and between standards.

Florida conditions generally produce faster deterioration of the painted profile compared to the weathering in more northern locations and QUALICOAT uses both accelerated laboratory testing together with outdoor weathering for higher correlation.

QUALICOAT includes within the matrix of tests the Genoa weathering location for up to 2years duration repeated every 3years for all alternative conversion coating processes. Selecting a specific weathering climate ensures a higher correlation between the outdoor weathering test and the accelerated laboratory tests used in routine license inspection.

The 2-year test duration allows for the influence of seasonal variation of the atmospheric conditions during testing. Characterisation of the dominating weathering factors are moderated by the testing institute these include but are not limited to the factors shown in Table 2 overleaf.



Mandatory ISO 8565 (2011)		
Air Temperature	°C	Continuous or at least four times per day with 6 hours difference
Relative Humidity	%	Continuous or at least four times per day with 6 hours difference
Precipitation	mm	Monthly
Concentration of SO ₂ or SO ₂ deposition rate	µg/m ³ mg/(m ² -d)	Continuous – monthly
Chloride deposition rate (marine atmospheres)	mg/(m ² -d)	Continuous – monthly

Table 2 - Mandatory ISO 8565 (2011)

To comply with BS EN 12206-1:2021 standard the applicator simply must provide data that their selected alternative conversion coating processes has been tested. For most fully approved alternative conversion coatings this data can be provided by their chemical supplier with a representative copy of the testing institute report – this report should include the test duration, location and the atmospheric conditions listed in table (2).

The use of Hexavalent Chromium

UK REACH aims to ensure that substances of very high concern (SVHCs) are progressively replaced by less dangerous substances or technologies where feasible alternatives exist. As chrome based pretreatment systems or conversion coatings have alternative less dangerous systems available, in the architectural powder coating industry the use of chrome based systems will currently be subject to a 'sunset date' in September 2024.

References

Specification for a quality label for liquid and powder organic coatings on aluminium for architectural applications QUALICOAT Current Edition

Paints and varnishes coating of aluminium and aluminium alloys for architectural purposes EN12206-1 (2021)
Metals and alloys - atmospheric corrosion testing - general requirements ISO 8565 (2011)

Crewdson, M. (2008), 'Outdoor Weathering Must Verify Accelerated Testing', The Waterborne Symposium, New Orleans, Louisiana)

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.

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

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