INSOLTECH (NZ) LIMITED
XP Series (Xterior Plus®)

Powder Coating Quality Assurance System (PCQAS)

MARCH 2007

INTRODUCTION

These specifications recognise that powder coating on aluminium joinery requires control of the finishing process in order to provide a quality service to the customer and to support the INSOLTECH warranty. Compliance to this INSOLTECH Powder Coating Quality Assurance System (PCQAS) is considered to be the minimum requirements that are to be followed by approved INSOLTECH Applicators.

SCOPE

This document specifies requirements to which powder organic coated aluminium extrusions, sheet and pre-formed sections used in the fabrication of window frames and ancillary products other than hardware must conform.

This document is applicable to residential and light commercial joinery.

REFERENCED DOCUMENTS (standards)

The approved Applicator is expected to adopt and implement the following standards.

AS 3715 Metal Finishing - thermo set powder coatings for architectural applications
Note - Attention is also drawn to the additional Standards referenced in AS3715.

BS 3900 Part C5 Determination of film thickness

Guidelines for the stripping of powder coated extrusion

BS 1746 Specification for domestic pressure cookers

1. DEFINITIONS

1.1 Significant Surfaces And Inspections

A significant surface is defined as that part of the total surface, which is essential to the serviceability, appearance, and long-term performance of the coated articles. If necessary, such surfaces will be specified to the coating applicator by suitably marked drawings or by the provision of samples.

Edges, deep recesses and secondary surfaces are not regarded as significant surfaces.

1.2 Visual Inspection

Visual inspection shall be conducted at the distance of 1 metre.

1.3 Batch or Lot

(a) Applicator associated with Primer Die holder
A batch or lot shall be defined as a quantity of metal covered by a customer order number and of a discrete colour being processed at the same time.

(b) Jobbing Shop (JS) Applicator
A batch will be defined as a job lot or no more than five (5) baskets whereby all jobs or baskets proceed after the previous and are completed within an 8 hour shift

1.4 Substrate

Substrate is defined as aluminium or aluminium alloy product in the form of sheet; preformed or extruded sections.

Powder coatings shall be applied to aluminum alloys that meet relevant National or International Standards.

1.5 Powder Coating and Pretreatment Systems

Powder coatings and pretreatment systems that are compliant with AS3715 and capable of meeting the performance requirements of AS3715 shall be used in the PCQAS. For example, the final rinse water conductivity specification i in AS3715 is 30 micro siemens/cm at 20°C.

2. POWDER COATING STORAGE CONDITIONS

2.1 Storage of Powder

INSOLTECH XP Series (Xterior Plus® Approved Applicators must store powder in dry, cool conditions (less than 30°C) and out of direct sunlight at all times and for a period not normally exceeding the recommendations of INSOLTECH.

2.2 Powder Coating Application Conditions

Powder Coatings can be applied by manual or automatic electrostatic spray equipment. The selection of method will depend on the shape and complexity of the piece to be coated. On automatic lines, gun settings may need to be adjusted for different shape profiles to ensure an adequate coverage on all significant surfaces. Powder overspray can be reclaimed using suitable equipment and recycled through the coating system. Efficiency of recovery will depend on the method used but reclaimed powder should be sieved to remove foreign particles before blending with virgin powder.

Compressed air lines should be equipped with suitable traps and filters to prevent oil, water and other contaminants from reaching the spray guns.

When colour changing, avoid cross-contamination of powder that can result in "specks" within the finished film. A high standard of housekeeping is necessary to reduce the risk of contamination from dust in the atmosphere or equipment.

A high standard of housekeeping includes the use of designated areas for each process and that the environment is kept in a clean and professional manner.

3. PRETREATMENT OF ALUMINIUM (AS 3715)

3.1 General Requirements

The correct surface preparation of a metal substrate is critically important to the application of any coating system.

The Applicator must:

(a) Completely clean the surface

(b) Condition the surface to make it suitable for the application of the coating

(c) Make the application to the surface uniform, irrespective of the condition of the metal.

The pre-treatment required for aluminium for use in the architectural market is detailed in the appropriate local specifications and standards but, in every case, a multi-stage cleaning and conversion process is mandatory. Both cleaning and pre-treatment can be carried out by spraying or dipping.

The actual pre-treatment method to be employed will depend on the source and condition of the aluminium received. The pre-treatment should be applied and tested in accordance with the Supplier's pre-treatment.

Conversion coatings are mandatory prior to application of INSOLTECH powder coatings. The chemical conversion coating should be applied in a solution containing essential chromate ions or chromate and phosphate ions as the active components *(or alternatively sufficiently proven non-chrome systems may be used - see note below)*. The effectiveness of such coatings will depend on achieving a balance between increased coating weight (to give greater corrosion resistance) and a lower coating weight (to improve mechanical properties). The coating weight deposited will depend on the type of conversion coating used and should be as specified by the pre-treatment supplier. The minimum allowable under this standard is a chrome coating weight is 400 mg/square meter.

If the procedures are followed, good adhesion of fully cured powder coating to proprietary chromate conversion coatings on aluminium will result. Any failure will more likely occur at the conversion coating/metal substrate interface.
Therefore, it is essential to follow the recommendation of the Pre-treatment Supplier.

Careful rinsing using de-ionised water in the final rinse stage is essential.
It is a requirement that the conductivity of the final rinse water draining from work pieces does not exceed 80 micro siemens/cm at 20°C**.**
(For further information refer to AS1627.6 section 3.43.)

Regularly check and replenish the purity of cleaning solutions and rinsing water because the conversion coatings are consumed during processing. The pre-treatment supplier will advise how to conduct checking but titration equipment will be necessary to measure the solutions.
It is also recommended that certified pre-treatment colour standards are obtained from the pre-treatment supplier to establish pre-treatment coating weights.

3.2 Sufficiently Proven Non-Chrome

Sufficiently proven refers to a system that is capable of meeting internationally recognised standards and must be run strictly in accordance with the pre-treatment supplier's recommendations.

3.3 Recommended Minimum Pre-treatment System for Aluminium

Cleaning	Degrease in acid or alkaline aqueous solutions, organic solvents or aqueous emulsions (Optional - may be omitted Water rinse (Optional - may be omitted Alkaline or acid clean/etch Cold water rinse (Optional – may be omitted)
Pre-treatment	Approved conversion coating Cold water rinse

Final Conditioning Demineralised water rinse
(Conductivity of the final deionised water rinse draining from work pieces must not exceed 80 micro siemens/cm at 20°C)

Metal must be thoroughly dry prior to the application of powder. The dry off temperature must not exceed the maximum temperature recommended by the pre-treatment chemical supplier

All chemicals in the process must be used and tested in strict accordance with the pre-treatment supplier's instructions and in compliance with the appropriate material safety data sheets (MSDS) supplied.

Refer also AS3715 – 2002 Appendix G.

4. APPLICATOR STANDARDS AND TESTS

INSOLTECH PCQAS Applicators must have access to designated facility with, as a minimum, the following laboratory equipment available:

- Titration Equipment for Pre-treatment evaluation **(Mandatory)**
- Dry film Thickness Gauge **(Mandatory)**
- Gloss Meter **(Recommended)**
- Impact Tester or equivalent **(Mandatory)**
- Cross Hatch Adhesion Scribe **(Mandatory)**
- Pressure Cooker **(Mandatory)**
- Oven Temperature Recorder **(Recommended)**
- Cure Test Solvent **(Mandatory)**
- Conductivity meter **(Mandatory)**

5. RECOATING OR REWORKING OF ANODISED AND POWDER COATED ALUMINIUM

5.1 Stripping Anodising

Anodised pieces must be stripped and pre-treated prior to application of the powder organic coating.
BS 3900 Part C5 standard for the determination of film thickness is recommended.

5.2 Stripping Powder Coating

The original coating and pre-treatment should be completely removed by stripping prior to refinishing. (Refer BS 3900 Part 5 and to the WANZ publication "Stripping of Powder Organic Coatings").

5.3 Recoating

Alternatively, the re-coating or re-working of the powder coated piece is permissible provided:

- Traceability exists and the prime source of the pre-treatment and powder application is known.
- The new finish is fully compatible with the original finish and suitable for this purpose.
- The surface is clean and free of any contamination.
- The adhesion of the original coating of the piece has been tested and shown to comply with Section 8.4 of the BS 3900 standard.
- The adhesion of the second coating to the original coating has been tested and shown to comply with Section 8.4 of the BS 3900s standard.

6. TEST METHODS

INSOLTECH approved Applicators are expected to have a test method expected to accepted industry standards.

6.1 It is mandatory that metal be correctly pre-treated to provide a suitable substrate prior to powder coating. It is generally considered that the quality of the final rinse is paramount in the long-term effectiveness of the coating system.
The maximum acceptable conductivity is 80µS.

6.2 Quality of Pre-treatment (Permeability Test)

Origin Test method as specified in AS3715 – 2002 section 2.5.11.

Scope This test sets out the method for assessing the permeability of the powder coating and the quality of the pre-treatment of the base aluminium.

Safety Ensure the seal is in good condition and the pressure relief valve is regularly calibrated and in good working order. Care should be taken to avoid burns when operating the permeability tester and removing panels.

Equipment It is recommended that the pressure cooker complies with the requirements of the BS1746 standard, with a weighted needle valve.
Powder coated extrusion piece as test sample up to 200 mm (or as required to fit in pressure cooker).

Procedure Add de-ionised water to the pressure cooker to a depth of up to 75 mm. Place the test piece in position so that approximately half of the coated test sample is immersed in the water.

Place the lid in position and heat the pressure cooker until steam is emitted from the valve. Insert a weighted needle value sufficient to give an internal pressure of 100 ± Kpa and continue heating for a period of two (2) hours, measuring the time from the point when steam is first emitted.

Care should be taken to ensure the apparatus does not boil dry. Cool the apparatus and remove the sample and allow cooling to ambient temperature. Examine the powder coating carefully and then promptly perform the test for adhesion. Adhesion should be tested on both the water and vapour phases of the sample.

Results When tested by the method given above, there should be no blistering (other than micro blisters) of the powder coating when examined visually ignoring those blisters which may occur within 3 mm of the edge of the sample.
There should not be any detachment of the coating when tested for adhesion by cross hatch.

7. MAINTENANCE OF INSOLTECH XP Series (Xterior Plus® Approved Applicator STATUS

7.1 Audit

INSOLTECH may undertake a PCQAS audit. The audit will be conducted in accordance with the audit sheets as per Appendix 2.

All compliances (C's) are mandatory and must be complied with.
All recommendations (R's) are optional.

If at any time one mandatory non-conformance is found then the applicator is deemed to have failed the audit. In the event of a failure remedial action must be implemented immediately. The Auditor will set a date by which non-compliances should be rectified. This will be followed up at the next consecutive audit.

7.2 Procedure for removing INSOLTECH XP Series (Xterior Plus® Applicator

(a) In the event of an Applicator operating in such a manner that there is serious concern about their ability (as determined by INSOLTECH or its recognised auditor) the following procedure shall be adopted:

(b) If failure occurs a notice will be faxed and sent in the post on the same day to the Applicator detailing the failure or non-compliance. Samples of work coated the same day of the failure (or preferably the same project) will be requested for retest, or action will be detailed which must be taken to overcome the non-compliance.

(c) If the retests are satisfactory or the non-compliance corrected within the time period indicated by INSOLECH no further action is required.

(d) If the retests are unsatisfactory or the non-compliance not rectified, within the time period indicated by INSOLTECH, WANZ, the Applicator will be faxed immediately, and a letter sent in the post, detailing reported failures or continued non-compliance. Written details of the action (including pre-treatment records) that will be taken to overcome the faults must be sent to INSOLTECH within 48 hours of the date/time of notice.

(e) If the second series of audit checks give the same degree of failure or non-compliance, an urgent meeting will be held with the Applicator to determine necessary action to resolve the problem. Failure to agree a satisfactory course of action, within the time period indicated by INSOLTECH will result in immediate suspension of Approved Applicator Status. The details of the failures or non-compliance will be recorded, faxed and sent in the post to the Applicator, who will be given 7 days to rectify all faults; during which time the Approved Applicator Status will be suspended.

Failure to implement the fault rectification process after 7 days will result in an "Action Discussion". This may result in INSOLTECH removing or further suspending the INSOLTECH XP Series (Xterior Plus®) Approved Applicator status.

(f) Reinstatement shall be at the sole option of INSOLTECH or its recognised auditor.

APPENDIX

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APPLICATION FOR APPROVAL AS AN

INSOLTECH XP Series (Xterior Plus®) Approved Applicator

The following PERSON OR PARTNERSHIP OR COMPANY applies for approval as an INSOLTECH XP Series (Xterior Plus®) Approved Applicator

Applicator:

Business Name of Applicant:
…….

Address
……..……

We agree to abide by the INSOLTECH XP Series (Xterior Plus®) rules and procedures as of the PCQAS documentation dated March 2007 and any subsequent amendments.

We acknowledge that the PCQAS system has been developed based on best industry practice and is offered by INSOLTECH to Approved Applicators in good faith and without warranty stated or implied as to its suitability. We therefore undertake to accept all commercial and other liabilities associated with the operation and promotion of this Quality Assurance System absolving INSOLTECH from any claims howsoever arising.

We also undertake to cease all promotion and dissemination of our INSOLTECH XP Series (Xterior Plus®) Approved Applicator status in the event that we should no longer comply, either permanently or temporarily, with the requirements of the PCQAS registration**.**

Name of person authorised by the above member to make this application:

Name …….

Signature: ……..……

Date: ……

Nominated Auditor: ……

Date of approval by INSOLTECH ……
(having evidence of compliance in accordance with the PCQAS procedures).

INSOLTECH Managing Director: ……