

SPECIFICATION FOR ANODISING OF ALUMINIUM (Z33 FORMAT)

110 ANODISING: This is invoked by reference to other sections. Details of anodising to components are given in clause(s).

130 TENDER INFORMATION

The name and address of the proposed anodiser must be specified on the tender documents. Should the use of this process be likely to cause problems in the design or manufacture of the proposed system, this should be indicated at tender stage. A copy of the proposed anodising guarantee must be supplied to the CA for approval with the tender documentation.

210 WORKING PROCEDURES

Unless specified otherwise, comply with all relevant requirements and recommendations of BS 3987.

220 ANODISER REQUIREMENTS

The CA shall be supplied with a certificate verifying that the finish complies with the specification and is carried out by a company possessing a current BS EN ISO 9001 certificate. This certification and a copy of this certificate must be supplied to the CA **prior** to work being delivered to site. A copy of the anodisers guarantee must be issued to the CA on completion of work as clause 225 (Guarantee). The anodiser must issue a certificate of conformity to the CA on request and before delivery of work to site, confirming that the anodising is in accordance with this specification.

221 FILM THICKNESS

Aluminium extrusions to be etched and anodised **to BS 3987:1991 except that the film thickness should have a local minimum of 25 microns and a maximum of 35 microns.** The film thickness will be measured in accordance with **BS EN ISO 2360** for production control with **BS EN ISO 1463** as the referee method in case of dispute.

222 QUALITY OF SEALING

Sealing of the anodic coating shall be carried out under conditions of acceptable good practice for architectural work. **Impregnated cold sealing processes shall not be used. The sealed anodic films shall meet the requirements of BS3987 in respect of sealing.** For rapid quality control, use of the admittance test **BS3987:Appendix K (BS EN 12373 Part 5)** is acceptable provided the corrected values obtained do not exceed $500/t$, where t is the film thickness in microns.

In cases of dispute the referee test shall be the method described in **BS EN 12373 : Part 7** carried out on at least two samples having the highest admittance values. The loss in mass per unit area shall not exceed $3g/m^2$. The referee test is as the name implies, not a production or site test as it is destructive and can only be carried out in a laboratory.

223 COATING ABRASION RESISTANCE

Anodic oxide films produced in sulphuric acid electrolytes shall have a thickness wear index not greater than 1.40. The thickness wear index shall be the referee quality measured by the method of **BS EN 12373 Part 9**. Acceptance shall be decided from the results of tests made by the method described in **BS 6161 : Part 18**. Films which, when tested by this method, continue to be scratched by glass-coated abrasive paper, do not conform to the specification. In cases of dispute, the referee test must be carried out on test pieces cut from a representative number of components suspected of having low abrasion resistance as a consequence of the results obtained from the abrasive paper test.

225 GUARANTEE

Work shall be carried out by the anodiser in accordance with the standard practices required to conform to the guarantees. All guarantees must be headed with the name of the development and signed by a Director of the finishing company. **A life time guarantee will be required for all anodising used on this project. The Guarantee must not be subject to cleaning**

230 CONTROL SAMPLES

Prior to commencement of any finishing of production components obtain approval from the CA for fabricated samples showing joint assembly, how anodising is affected and how any cut metal edges are protected.

Natural anodising

Five identical pieces cut from a control sample of similar shape and form to the actual production components and at least 300 mm in length to be used for the comparison of texture must be submitted with the tender document for approval by the CA. After approving and suitably annotating the control sample the CA will retain one piece and initiate distribution of the remaining pieces to the main contractor, sub-contractor, processing company and independent inspector.

Coloured anodising

Where colour variation is anticipated the maximum extent of the variation shall be displayed by five identical sets of two (upper and lower) control samples of similar shape and form to the actual production components and at least 300 mm in length, which must be submitted at tender stage for approval by the CA. After approving and suitably annotating the sets of samples the CA will retain one set and initiate distribution of the remaining approved samples to the main contractor, sub-contractor, processing company and independent inspector.

235 INDEPENDENT INSPECTION AT PLANT

The sub-contractor must make provision for the cost of a minimum of three independent acceptance inspections of processed material on each colour and finish used in the sub-contract package. These inspections must be carried out at the finishing plant or on the sub-contractors premises prior to any fabrication.

Inspections must be made in accordance with the requirements of the sampling procedures and plans set out in BS 6001 : part 1 (ISO 2859/1) at general inspection level 2 with an AQL of 1%. These inspections must be carried out by an independent inspection laboratory selected from AASC Technical Information Sheet No. 8a (Appendix A) and approved by the CA. Finished material failing these inspections will require re-processing and re-inspection.

Acceptance inspections are considered an essential contract requirement for the specified components. The CA reserves the right to reject any components fabricated before the acceptance inspections have been carried out and the inspected components passed by the appointed inspector.

241 INDEPENDENT INSPECTION ON SITE

If the CA does not receive the satisfactory independent reports as required he will instruct a laboratory of his own choice and make a financial adjustment to the costs involved at the end of the contract. This retention may exceed the actual costs of the inspections as failure to provide the required reports may be deemed a breach of contract. An independent investigation of all finishes on site fixed units must be carried out by the CA's appointed inspector within the guidelines of BS 6001 : Part 2 (ISO 2859/2), with a limiting quality (LQ) of 5% where the probability of acceptance (Pa) is 10%. For the purpose of this inspection each section in the window curtain wall or other fabrication must be taken as an individual component in estimating the total number of pieces in the batch to allow random sampling to confirm that the finished material complies with the project specification.

Until these reports have been received, the CA is entitled to withhold signature from any document of authority accepting the works.

250 COMPONENT DESIGN

Ensure that components to be anodised comply with relevant recommendations of **Parts 1 and 5 of BS 4479: 1990** and are of suitable size with regard to the physical limitations of plant capacity.

310 PRETREATMENT

All components to be anodised are to be free from corrosion and damage.

320 FINISHING PROCESS

Anodising shall be carried out under conditions of acceptable good practice for architectural applications. The processing conditions shall be held constant for the duration of the period required for completion of the contract. Records of these conditions shall be kept and be available for inspection in the event of a dispute as to the quality.

Bronze or black colouring of the anodic film shall be achieved by use of an electrolytic process utilising cobalt as the colouring metal (Anolok). **For grey anodising the Anolok II blue-grey colouring process is used.**

N.B. CA must specify the colour reference and code number for coloured finishes.

Use of an alternative process will only be considered when samples of the alternative finish proposed are confirmed by independent assessment to satisfy all of the visual, physical and documentary requirements detailed within this specification and provide an equal or superior standard of performance and life expectancy. Written approval is required from the CA.

Only one processing plant shall be used throughout this sub-contract to optimise the uniformity of visual appearance. If for unavoidable technical reasons a concession is required this must be confirmed in writing by the CA and will require a re-evaluation of the independent inspection programme.

410 EXTENT OF ANODISING

Significant surfaces shall be defined as those that can be viewed in service and any area requiring the protection of the finish. The fabricator shall supply suitably annotated drawings with the material to be anodised on which significant surfaces are clearly marked.

440 APPEARANCE

The finish must match the control sample(s) approved by the CA prior to commencement of the contract. Significant surfaces should be free from visible coating or metallurgical defects when viewed from a distance of to be Agreed.

450 ALUMINIUM ALLOY FABRICATIONS / SUBSTRATE MATERIALS

The extrusion shall be in Alloy 6063 T5 or T6 BS 1474:1987 (partially replaced by Parts 1 – 6 of BS EN 755) and J57S (BS EN 485 Parts 1 to 4 /BS EN 515 1993 / BS EN 573 Parts 1 to 4) for sheet requirements. Extrusion shall be of aluminium alloy 6063 T5 or T6 in accordance with the appropriate parts of BS 1474:1987 and parts 1 – 6 of BS EN 755:1996/1997. For sheet requirements J57S or Anodiser approved equivalent should be used, a guarantee covering the uniform appearance of the sheet after anodising will be required from the suppliers.

Fabrications may be from pre-coated lineals or machined lengths at the recommendation of the fabricator. The fabricator is to state which is included in his tender. No visible or exposed areas of uncoated metal will be accepted under any circumstances. In any area where coating is carried out after machining, satisfactory jigging points must be arranged between the fabricator and anodising company. Units may be assembled but must allow satisfactory drainage of process solutions.

451 SEALANTS

Where sealants are used on metal joints, these are to be of a sympathetic colour, agreed with the CA. Written confirmation must be obtained from the sealant manufacturer as to their suitability for the application in which they are being used.

480 FABRICATION DAMAGE REPAIR/REPLACEMENT

Check all components before delivery to site for anodising damage. Report findings and proposed method of repair or replacement to the CA and obtain approval before commencing remedial work.

Repair components with minor damage as soon as possible by cleaning, abrading and coating with matching repair paint system applied in accordance with the AASC remedial painting specification and method statement. Replace components with major damage considered unacceptable for repair.

510 PROTECTION

All anodised surfaces of components vulnerable to damage during handling and installation, or by subsequent site operations, are to be fully protected throughout the course of these works. All exposed surface areas are to be taped before despatch from the fabricator's works. If during fixing of glazing, any tape is removed, this must be refitted or replaced immediately afterwards.

Carry out monthly inspections of protective coverings and promptly repair any deterioration or deficiency. Remove protective coverings only when instructed by the CA.

511 CLEANING DOWN

The sub-contractor will be required to maintain and protect his works until the installation is complete. Thereafter, all protection is to be agreed with the main contractor with liaison on method, sequence and responsibility for cleaning down to ensure that other sub-contractors do not damage the work at any stage of construction.

530 SITE DAMAGE REPAIR/REPLACEMENT

If during fixing or glazing any damage does occur, this must be rectified immediately and not left until the end of the installation. Site rectification of damage shall only be carried out with the approval of the CA and must carry a 15-year guarantee for both colour retention and adhesion. Replace components with major damage considered unacceptable for repair.

540 MAINTENANCE

After removal of protective coverings, clean and maintain all anodised surfaces at regular intervals until Practical Completion. All maintenance is to be in accordance with procedures detailed in the anodiser's technical literature and guarantee. The sub-contractor will be required to supply four copies of a maintenance document covering regular cleaning of the metalwork.

The successful sub-contractor will be required to supply four copies of a maintenance document covering regular cleaning and maintenance of the metal fabrications, together with the cleaning and lubrication of any moving parts affecting the operation of the system. This shall also cover any residual Health & Safety Risks.

580 DOCUMENTATION AND INTERPRETATION

All paperwork submitted to the finishing company by the sub-contractor must clearly state the name of the development. All documents for review should be submitted with annotation written in English.

This specification and any guarantees required should be construed and interpreted in accordance with the English law and be subject to the English Courts only. Where reference is made in this specification or guarantee to any British Standard or Code of Practice, it shall be construed as reference to such publication in the form in which it is in force at the date of the specification.

DOCUMENTS RELATING TO SPECIFICATION OF ANODISING

BS EN 485 Parts 1 to 4 titled "Specification for wrought aluminium and aluminium alloys for general engineering purposes; plate, sheet and strip."

BS EN 515:1993 Aluminium and aluminium alloys: Wrought product temper designations.

BS EN 573 Parts 1 to 4: Aluminium and aluminium alloys: Chemical composition and form of wrought products.

BS EN 755 Parts 1 to 8: Aluminium and aluminium alloys: Extruded bar, rod, tube and profiles. Conditions for delivery, properties and tolerances.

BS 1474 titled "Specification for wrought aluminium and aluminium alloys for general engineering purposes: bars extruded round tubes and sections.(Partially replaced by **Parts 1 to 8 of BS EN 755**."

BS 3987: 1991 incorporating amendment No1 (June 2001), titled "Specification for anodic oxidation coatings on wrought aluminium for external architectural applications.

BS 4479 Part 1: 1990 (1997) titled "General recommendations"

BS 4479 Part 5: 1990 (1997) titled "Recommendations for anodic oxidation coatings"

BS 6001: Part 1(ISO 2859/1: 1999) titled "Specification for sampling plans indexed by acceptable quality limit (AQL) for lot-by-lot inspection."

BS 6001: Part 2: 1993 (ISO 2859-2: 1985) titled "Specification for sampling plans indexed by limiting quality (LQ) for isolated lot inspection."

BS 6161 Part 18: 1991 (1997) titled "Determination of surface abrasion resistance" does not have a direct equivalent in BS EN 12373 and has not been accepted for incorporation into the European Standard although this test is a critical component of BS 3987.

BS EN 12373-5: 1999 titled "Assessment of quality of sealed anodic oxidation coatings by measurement of admittance."

BS EN 12373-7: 1999 titled "Assessment of quality of sealed anodic oxidation coatings by measurement of the loss of mass after immersion in phosphoric acid/chromic acid solution with prior acid treatment."

BS EN 12373-9: 1998 titled "Measurement of wear resistance and wear index of anodic oxidation coatings using an abrasive wheel wear test apparatus."

BS EN ISO 1461: 1995 titled "Metallic and oxide coatings. Measurement of coating thickness. Microscopical method."

BS EN ISO 2360: 1995 titled "Non conductive coatings on non magnetic basis metals. Measurement of coating thickness. Eddy current method."

BS EN ISO 9001: 1994 titled "Quality systems. Model for quality assurance in production, installation and servicing."

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