

Windows Specification

for

Toilet upgrades and associated works at 3 Further Education & Training Centre locations:

(1) Tipperary FET College Roscrea, Old Dublin Road, Roscrea, Co. Tipperary. E53 P797

(2) Tipperary FET College Cappawhite, Cappawhite, Co. Tipperary. E34 A320

(3) Tipperary FET College Clonmel, The Mall, Clonmel, Co. Tipperary. E91K2E2

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1.0 GENERAL

1.1 Scope of Work

Extruded aluminium alloy double glazed thermally broken window system conforming generally to BS 4873:2016, purpose made from standard section frames; sashes; transoms; mullions; coupling bars; cills. To layout and configuration as shown.

1.2 Window Types

This specification to be read in conjunction with all relevant drawings.

1.3 Drawing Reference

This specification to be read in conjunction with all relevant drawings.

1.4 Shop Drawings

1. Submit to Architect for review Shop Drawings and Product Data. Full size details of head, transom and cill construction, and window drainage, to be submitted with tender.
2. Until submittal is reviewed, work involving relevant product may not proceed.
3. Submit one print and one reproducible sepia copy for review. If corrections are required, one marked up print will be returned until the drawing is approved or approved as noted. The last submission (one print and one sepia) shall incorporate all the required changes.
4. Shop drawings to be forwarded to: Spentide Ltd, 80 Main Street, Midleton, Co. Cork and by email to john@spentide.ie

1.5 Maintenance Instructions

Written maintenance instructions on windows to be given to client.

1.6 Samples

Submit duplicate samples of finished aluminium to Architect. Submit samples of corner joints glazing sections and other details as directed. Construct shop sample for viewing by Architect prior to delivery of windows to site. Set up sample on building for approval prior to final erection. Contractor to allow for testing of sample window by Forbairt (Institute of Industrial Research & Standards).

1.7 Codes and Standards Reference

Window Sets, finishes, coatings, flashings, cills components, hardware & fittings shall be provided in compliance with latest building regulations and the follow non exhaustive list of standards, where later versions of the standards referred to exist, the manufacturer / supplier / installer shall meet the latest version of the standard.

BS EN 1999-1-4:2007+A1:2011	Eurocode 9. Design of aluminium structures Cold-formed structural sheeting
BS EN 1999-1-1:2007	Eurocode 9: Design Of Aluminium Structures - Part 1-1: General S structural Rules

BS EN 1999-1-3:2007	Eurocode 9: Design Of Aluminium Structures - Part 1-3: Structures Susceptible To Fatigue
I.S. EN 16034:2014	Pedestrian Doorsets, Industrial, Commercial, Garage Doors And Openable Windows - Product Standard, Performance Characteristics - Fire Resisting And/Or Smoke Control Characteristics
I.S. EN ISO 10077-2:2017	Thermal Performance Of Windows, Doors And Shutters - Calculation Of Thermal Transmittance - Part 2: Numerical Method For Frames (Iso 10077-2:2017)
I.S. EN 12210:2016	Windows And Doors - Resistance To Wind Load – Classification
I.S. EN ISO 10077-2:2017	Thermal Performance Of Windows, Doors And Shutters - Calculation Of Thermal Transmittance - Part 2: Numerical Method For Frames (Iso 10077-2:2017)
I.S. EN 1026:2016	Windows And Doors - Air Permeability - Test Method
BS 5606:2022	Accuracy and tolerance in design and construction. Guide
BS EN 485-1:2016	Aluminium and aluminium alloys. Sheet, strip and plate Technical conditions for inspection and delivery
BS EN 1706:2020+A1:2021	Aluminium and aluminium alloys. Castings. Chemical composition and mechanical properties
BS 3900	Methods of test for paints
I.S. EN ISO 2813:2014	Paints And Varnishes - Determination Of Gloss Value At 20 Degrees, 60 Degrees And 85 Degrees
BS 3987:1991	Specification for anodic oxidation coatings on wrought aluminium for external architectural applications
BS EN ISO 11600:2003	Building construction - Jointing products - Classification and requirements for sealants (+A1:2011) (incorporating corrigendum July 2006)
BS 4842: 1984	Specification For Liquid Organic Coatings For Application To Aluminium Alloy Extrusions, Sheet And Preformed Sections For External Architectural Purposes, And For The Finish On Aluminium Alloy Extrusions, Sheet And Preformed Sections Coated With Liquid Organic Coatings
BS 4255-1:1986	Rubber used in preformed gaskets for weather exclusion from buildings. Specification for non-cellular gaskets
BS EN 1090-2:2018	Execution of steel structures and aluminium structures Technical requirements for steel structures
BS 6262-7:2017	Glazing for buildings- Part 7: Code of practice for the provision of information
BS 6262-6:2005	Glazing For Buildings - Part 6: Code Of Practice For Special Applications
BS 6262-2:2005	Glazing For Buildings - Part 2: Code Of Practice For Energy, Light And Sound
BS 6262-3:2005	Glazing For Buildings - Part 3: Code Of Practice For Fire, Security And Wind Loading
BS 6262:1982	Code Of Practice For Glazing For Buildings
BS 6375-1:2015+A1 2016	Performance of windows and doors. Classification for weathertightness and guidance on selection and specification
BS 6375-2:2009	Performance Of Windows And Doors - Part 2: Classification For Operation And Strength Characteristics And Guidance On Selection And Specification

BS 6375-3:2009+A1:2013	Performance of windows and doors Classification for additional performance characteristics and guidance on selection and specification
IS EN 13830:2015	Curtain walling - product standard (+A1:2020)
BS 4873:2016	Aluminium alloy windows and doorsets Specification.
BS EN 14351-2:2018	Windows and doors. Product standard, performance characteristics. Internal pedestrian doorsets.
BS EN 14351-1:2006+A2:2016	Windows and doors. Product standard, performance characteristics. Windows and external pedestrian doorsets.
BS EN 12207:2016	Windows and doors. Air permeability. Classification
BS EN 12208:2000	Windows And Doors - Watertightness - Classification
I.S. EN 12211:2016	Windows And Doors - Resistance To Wind Load - Test Method
BS 8200	Design of non-loadbearing external vertical enclosures of buildings.
BS EN 1125:2008	Building hardware. Panic exit devices operated by a horizontal bar, for use on escape routes. Requirements and test methods
BS EN 13637:2015	Building hardware. Electrically controlled exit systems for use on escape routes. Requirements and test methods
I.S. EN 12206-1:2021	Paints and varnishes - Coating of aluminium and aluminium alloys for architectural purposes - Part 1: Coatings prepared from thermosetting coating powder
BS EN ISO 2081:2008:	Metallic And Other Inorganic Coatings - Electroplated Coatings Of Zinc With Supplementary Treatments On Iron Or Steel
BS EN ISO 2082:2017	Metallic and other inorganic coatings. Electroplated coatings of cadmium with supplementary treatments on iron or steel
BS EN ISO 1461:2022	Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods
BS EN ISO 2063-1:2019	Thermal spraying. Zinc, aluminium and their alloys. Design considerations and quality requirements for corrosion protection systems
BS EN ISO 2063-2:2017	Thermal spraying. Zinc, aluminium and their alloys Execution of corrosion protection systems.
DIN EN ISO 105-B01:2014-12	Textiles - Tests For Colour Fastness - Part B01: Colour Fastness To Light: Daylight (Iso 105-B01:2014)
DIN EN 20105-A02:1994-10	Textiles - Tests For Colour Fastness - Part A02: Grey Scale For Assessing Change In Colour
I.S. EN 12487:2007	Corrosion Protection of Metals - Rinsed And Non-Rinsed Chromate Conversion Coatings On Aluminium And Aluminium Alloys.

The operation and strength characteristics of opening lights shall be in accordance with BS 6375-2:2009.

All specific manufacturer's written instructions, directions and recommendation shall be adhered to.

NOTE:

Where later editions of the Publications listed above are published, latest editions should be used.

1.8 Guarantees

Window manufacturer shall be responsible for ensuring that his/her work will not only meet the requirements of this specification of Material and Performance but that the entire completed installation will be structurally stable, thermally broken, entirely watertight and will meet air

infiltration requirements. Provide a written guarantee against leakage and malfunction under normal usage for a period of 30 years from the date of Final Certificate of Completion.

2.0 MATERIALS

2.1 Aluminium

- (a) Extruded aluminium profiles shall be fabricated from designated treated alloy 6060 or 6063 in tempers T4, T5 or T6 conforming to BS EN 755-9:2008.
- (b) When ancillary components such as sills, couplings etc. are formed from sheet materials they shall be fabricated from designated alloys 1200, 3103, 5005 or 5251 conforming to BS EN 485-2:2013 in temper suitable for the particular type of application and degree of forming to be adopted.
- (c) The aluminium profiles used in the construction of the frames excluding glazing beads, nibs, inte locks and similar features shall be, at minimum tolerance, not less than 1.2 mm thick.

Thermally improved frames

- (a) Where window frames are thermally improved by the inclusion of an insulating barrier or clad- ding, the insulating material should be stable under the conditions of service, e.g. under wind and dead loads and within the likely surface temperature range of the frames. The thermal barrier or cladding system should be sufficiently robust to withstand tests carried out in accordance with BS 6375-1:2015 and BS 6375-2: 2009.
- (b) NOTE 1: BS 6375 specifies performance requirements for the strength of windows based on a se- ries of mechanical tests that check the integrity of the frame.
- (c) NOTE 2: Requirements for thermal barriers are specified in prEN 140243.

2.2 Finish Polyester Powder Coating

Polyester Powder coating Interpon D or Syntapulvin (Not a mixture of both) applied by Qualicoat approved applicator using a Standard RAL colour in matt finish to comply with I.S. EN 12206-1:2021. Prior to the application of the polyester power coating the aluminium profiles are to be pre-treated using an 8-stage process of acid etching, Chrome or Chrome Free process to Qualicoat approval and water rinsing. A guarantee of 25 years must be applied for in advance of starting the project on site. It is noted that this period of time is subject to the location or proximity of the school to marine envi- ronment. Therefore 'Architectural powder coating to Qualicoat 'Seaside' standard from approved supplier' is required.

Polyester powder coated finishes shall be electrostatically applied in factory to a film thickness of 100 microns, gloss standard 70+10 (60o ASTM B523) ECCA Test T2; hardness 4-7H (KOH-1-NOR) ECCA Test T4; adhesion No. to ECCA test T6.

The following batch testing must be carried out by the Powder Manufacturer:

1. Salt spray test to ASTM B. 117
2. Scratch test to B.S. 3900/Part E/2
3. Gloss test to I.S. EN ISO 2813:2014
4. Zenon test to DIN EN ISO 105-B01:2014-12
5. Weather resistance test to DIN EN 20105-A02:1994-10.

The supplier of the polyester powder coating is to be approved by the Engineer. The Trade Coater shall be a licensed applicator of the process.

All materials to be coated must undergo a pre-treatment 6/7 stage chromate conversion process to I.S. EN 12487:2007 comprising:-

- a) Cleaning
- b) De-oxidising
- c) De-smutting
- d) Etching and chromating with adequate cleaning swill between each process stage.

Following this pre-treatment process, no materials shall be touched by hand. If this is unavoidable, cotton gloves should be worn.

Application of the powdered coating shall be made by electrostatic means with a negative polarity, to give a cured coating thickness of 60/80 microns. Applied powder to be cured at a metal temperature of 200°C for a period of 10 minutes.

Quality/Production Testing is to be carried out every four production hours, comprising five tests as follows:-

- 1) Cross Hatch to I.S. EN ISO 2409:2020
- 2) Conical Mandrel ASTM.522
- 3) Impact Test 0.23m/kg minimum
- 4) Drilling and Milling

Five test panels 80mm X 200mm X 0.752mm are to be coated at each test period for use as follows:

- 1) Two to be used to carry out the Quality/production test
- 2) Two are to be despatched to both Fabricator and Powder Supplier (one to each) together with copies of Test Report
- 3) One to be retained by Coater with Test Report.

Records to be maintained by the Coater to comprise of a weekly analysis of all pre-treated processes; also a record to be maintained of all coating carried out and indexed to the appropriate test panels and test reports.

On completion, the coating to comply fully to B.S. 4842 including all painting amendments.

Colour sample to be approved by the Architect before final order.

2.3 Window System

1. Type: XT66 Performance Plus or Equivalent Thermally broken aluminium window system.
2. Manufacturer: Architectural & Metal Systems, Wallington, Little Island, Co.Cork.

2.4 Double Glazing - (All Window Types)

Refer to Glazing Specification

2.5 Integrated Doors

To be as recommended by window system manufacturers and shall be co-ordinated with aluminium door specification to approved detail.

2.6 Weather Stripping

(a) Weatherstripping shall be one of the following:

- (i) Ethylene propylene diene monomer (epdm); or
- (ii) Plasticized PVC (PVC-P); or
- (iii) Polychloroprene (CR); or
- (iv) Polypropylene pile; or
- (v) Sheathed cellular elastomeric polymer; or
- (vi) Silicone (Si); or
- (vii) Thermoplastic elastomer (TPE).

(b) NOTE 1: Non-cellular forms of materials i), ii) and iii) are specified in BS 4255-1:1986.

(c) NOTE 2: Guidance on weatherstripping products is given in BPF WG 345/1 [1].

2.7 Frame Joint Sealing Materials

(a) When the completed window is tested in accordance with BS 6375-1:2015 and BS 6375-2:2009, there shall be no degradation of the sealing or the operational function of the window due to failure of the sealing materials.

(b) NOTE: Materials should be able to withstand stresses during assembly, transportation, installation and operation of the window.

2.8 External Perimeter Sealing Materials

To be as recommended by the window system manufacturer and shall be 2 part polysulphide to BS 4254 to selected colour with polyethylene backing strip.

2.9 Bedding Compound

To be as recommended by window system manufacturer and shall be Butyl based.

2.10 Hinges, stays and pivots

(a) Friction hinges, variable geometry stays and friction pivots are expected to maintain friction without adjustment or, when adjustment devices are provided, with adjustment. Corrosion test reports to be submitted.

2.11 Opening Light Operative Devices

To be as recommended by the window system manufacturer and shall be of suitable materials, resistant to atmospheric corrosion and operating forces. If such materials are used that react adversely with aluminium or its finishes they shall be separated from the aluminium by materials that do not react adversely with it.

Types as follows:

- Hand operated levers with concealed restrictor stays.

2.12 Bearing Devices and Hardware

(a) Metallic materials used for bearing devices and hardware shall have at least the equivalent corrosion resistance to BS EN 1670:2007, class 3 when subjected to a neutral salt spray test as specified in BS EN 1670:2007.

(b) NOTE 1: For environments in highly contaminated localities such as those subject to combinations of industrial and coastal pollution, BS EN 1670:2007, class 4 should be used.

(c) NOTE 2: Requirements for hardware materials are specified in BS EN 13126-5:2011+A1:2014). These requirements apply to both metallic and non-metallic materials.

2.13 Fastenings

To be as recommended by the window system manufacturer and shall be of stainless steel or aluminium with the exception of those which are protected when the window is closed. Alternatively these may be made of steel which has been finished by one of the following methods:

- (a) Zinc plated and passivated according to BS EN ISO 2081:2008
- (b) Hot-dip galvanised according to the requirements of BS EN ISO 1461:2022.
- (c) Sheradized according to the requirements of BS EN ISO 1461:2022.
- (d) Sprayed with metal coating according to BS EN ISO 2063-1:2019.

Where non-metallic components are incorporated, the material and specification for these should be selected according to the required function.

2.14 Fixings

(a) All straps, clips, brackets, lugs, screws, nuts, bolts, rivets, metal washers, shims and other fixings shall be manufactured from one of the following: stainless steel grade A2, A4 or F1 conforming to BS EN ISO 3506-1:2009 or BS EN ISO 3506-2:2009; steel which has been finished by one of the following methods: zinc plating in accordance with BS EN ISO 2081:2008, code Fe/Zn 12 or Fe/Zn 25, and chromate passivation in accordance with BS 6338:1982, ISO 4520-1981, class 2Cor 2D; hot dip galvanizing in accordance with BS EN ISO 1461:2009 to a minimum coating mass of 460 g/m²; spraying with a zinc coating in accordance with BS EN ISO 2063:2005, symbol Zn4; any other protective treatment of equivalent performance to those specified in 4.1 Aluminium (a) to (c), of an alloy having mechanical strength properties at least equal to that of the frame.

(b) NOTE: Spacer shims used at fixings, which serve only as packing and do not influence the structural integrity of the fixing, may be of extruded or moulded plastics material.

(c) Fixing devices should be capable of withstanding the design wind load (see BS EN 1991-1-4:2005+A1:2010) and any operating forces of the windows. Provision should also be made to prevent water penetrating any holes provided for the fixings.

2.15 Glazing Gaskets and Strips

(a) To minimise gaps in joints and shrinkage internal gaskets are to be serrated to allow for the gasket to be continuous and not requiring mitre jointing at corners. The internal gaskets are to have one joint only which is to be sealed and located at a low critical area.

(b) Glazing gaskets shall be one of the following:

- (i) Chloroprene rubber, solid (cellular); or
- (ii) Chloroprene rubber, solid (non-cellular) conforming to BS 4255-1:1986; or
- (iii) Cured ethylene propylene diene monomer (epdm); or
- (iv) Plasticized PVC; or
- (v) NOTE: Plasticized PVC gaskets should not be used with polycarbonate glazing materials.
- (vi) PVC nitrile; or
- (vii) Thermoplastic elastomer (TPE); or
- (viii) Uncured ethylene propylene diene monomer (epdm).

(c) Glazing compounds shall be non-setting compounds, preformed mastic tapes, gun grade solvent release type sealants, one-part or two-part curing sealants or two part rubberizing compounds. Gun grade sealants shall conform to BS EN ISO 11600:2003+A1:2011.

3.0 WORKMANSHIP

3.1 Design

Table 2 – Submittal / Design Statements

Reference	DOES Requirements
EN 12207:2000 Air Permeability	Class 3 at 600Pa. or better.
BS EN 12208:2000 Water tightness	Test Class 9A at 600Pa. or better.
IS EN 12211: 2000 Wind Resistance	P1= 1600Pa., P2 = 800Pa., P3 = 2400Pa.
BS 8200 Design of non-loadbearing external vertical enclosures of buildings	All windows and doors to comply with requirements of this standard.
BS EN ISO 140 Acoustic Performance	The R_w sound reduction index for the Glazing should not be less than 27db.
Thermal Transmittance ISO/NP 10077-1 and ISO 10077-2:2011	Table F.4 — Thermal transmittances for vertical windows with fraction of the frame area 20 % of the whole window area, glazing spacer bars with improved thermal performance $1.6W/m^2K$. Design size: 1.2wide x 1.5m high top hung opening sash full size. Manufacturer to provide documentary evidence that the above sized window has a thermal performance of $1.6W/m^2K$ or better.
Glazing to BS 6262-1:2005	Glazing to conform to the guidelines set out in this standard. Thermal transmittance for standard glazing shall be no greater than $1.15W/m^2K$ = Centre pane U value. All units to be 28mm minimum overall thickness. Typical centre pane make up: 4mm glazing – 20mm argon filled cavity (90%) – 4mm soft coat thermal glazing with glass having an emissivity value of 0.01. Where safety glazing is required the supplier shall submit calculations to show an overall U-value of $1.15 W/m^2K$. The spacer used to separate the glazing should be a warm edge spacer bar and the space between the panes filled with Argon gas. A minimum requirement for the U-value of the glazing for a window Design size: 1.2wide x 1.5m high top hung opening sash full size shall be $1.6W/m^2K$
EN12206-1 2004	Polyester Powder coating Interpon D or Syntapulvin applied by Qualicoat approved applicator using a standard RAL colour in matt finish.
BS EN 1670:2007 Building Hardware. Corrosion resistance. Requirement and test method	All Ironmongery to comply with the requirements this standard. Multipoint single lever locking system is to be incorporated in all opening sashes.

Note: All thermally modified window frames are to be fully tested in accordance with Table 2 in order to be considered for use in school buildings.

3.1.1 Loadings

(a) Dead loads shall be calculated in accordance with BS EN 1991-1-1:2002 Eurocode 1

- (b) Imposed loads shall be calculated in accordance with BS EN 1991-1-1:2002 Eurocode 1
- (c) Subject to paragraph (e) wind loads shall be calculated in accordance with BS EN 1991-1-4:2005+A1:2010 & BS EN 1991-1-4 : 2005
- (d) Where any actual imposed load will exceed or is likely to exceed the load calculated in accordance with paragraph (2) (b), that actual load shall be substituted for the load so calculated.
- (e) In calculating wind loads in accordance with paragraph (2) (c) of this specification:-
 - (i) the basic wind speed V shall be taken to be the value appropriate to the location of the building obtained by interpolation between isopleths shown on the map in Schedule 3, evaluated to the nearest integral metre per second;
 - (ii) where a building falls outside the range of those for which the Code gives force and pressure coefficients, values shall be used which are appropriate in relation to that building, having regard to its construction, size, proportions, shape, profile and surface characteristics.
- (f) Structural Engineers calculations for wind speed and dynamic pressure, are available in the project Documents:- Aluminium windows to be designed to withstand.
- (g) Interpretation "dead load" means the force due to the static mass of all walls, partitions, floors, roofs and finishes including all other permanent construction and services equipment affixed to the building; "imposed load" means the load assumed to be produced by the intended occupancy or use of the building including distributed, concentrated, impact, inertia and snow loads but excluding wind loads; and "wind loads" means all loads due to the effect of wind pressure or suction.

Windows must be designed to accommodate expansion and contraction when subjected to the minimum and maximum surface temperature that will be experienced by the building as located.

The design by Window System Manufacturer shall include a fully drained system for all components of the window assembly.

The system shall incorporate a tubular structural member, pressure plate and face cap.

Class A to be used with the pressure coefficients applicable to the particular area in which the glazing occurs.

3.1.2 Weather-tightness

- (a) The following weather-tightness requirements apply to all types of window.
 - (i) The completed window shall meet the weather-tightness requirements for the appropriate classification specified in BS 6375-1:2015+A1 2016, when tested in accordance with BS 6375-1:2015+A1 2016 and, for double windows, with the appropriate additional procedure given below.
 - (ii) For air permeability, double windows shall be tested with both windows closed, the length of opening joint being that which is visible on the inner surface of the inner window only.
 - (iii) For water-tightness, double windows shall be tested with both windows closed and the performance class shall be that obtained by the outer windows.

(iv) For wind resistance, double windows shall be tested with the inner window open and the outer window closed. The test shall then be repeated with the inner window closed and, if the outer window contains opening light(s), this (they) shall be opened.

3.1.3 Frame joints

(a) Joints in frames shall be made either by welding or by mechanical means (e.g. cleating and screwing) and shall have flush, stepped or lapped surfaces. For flush joints formed by mechanical means, any deviation from the same plane shall be within the limits set by the use of extrusion tolerances given in BS EN 755-9:2016.

(b) Welded joints shall be cleaned off smooth on surfaces that are exposed when the window is in the closed position and where the joints would otherwise project into the glazing space.

(c) Sealing of joints

(i) Any frame joints, including those of the thermal barrier or cladding, which would otherwise cause loss of watertightness and/or increase of air permeability, should be sealed with sealant or by other means to achieve the performance required.

(d) Deviations in the plane of flush joints

(i) No allowance is given for assembly and machining tolerances. Therefore, to achieve the requirements specified it can be necessary to use extrusions with closer tolerances than those given in BS EN 755-9:2016. In practice, to avoid sharp exposed edges etc., manufacturers might need to agree tolerances with the extrusion supplier. It can be necessary to fit "L" shaping backing plates (chevrons) to flanges of mitred cornered frames to correct misalignment due to angular tolerances.

3.2 Construction

1. Construction units to give a flush external surface of extruded aluminium sections and flush internal surface of profile and face dimensions to suit to configurations as shown on drawings. Similar vertical and horizontal members to have equal dimensions max. depth of section to be 150mm.
2. Construct units with extended leg sections or extruded profile cills as cills where shown and where necessary.
3. Joints in frames to be made either by mechanical means (i.e. cleating and screwing) or by welding. If welded, joints shall be cleared off smooth on the surfaces which are exposed and where they come into contact with glazing. If mechanical, joints to be mechanically assembled with concealed angle blocks and mitre alignment plates clamped, crimped and sealed.
4. Carry out on site glazing to procedures as laid down in BS 6262 (glazing and fixing for Glass of Buildings). Windows to be such that glazing or reglazing on site is possible without the need to remove the outer frame from the structure of the buildings.
5. Construct units making provision for suitable fixing devices. The fixings to be capable of withstanding the design wind load and any operating forces on the windows. The manufacturer to select the provision for fixing appropriate to the window design.

6. Extruded weatherstripping to be continuous about the entire perimeter of the opening sections being mitre cut and chemically welded at corners.
7. Construct windows so that no opening light shall be operable or removable from the outside when it is fastened in a closed position.
8. Construct windows so that all hinges are concealed.
9. Construct windows so that they are capable of achieving different colours and finishes on the external/internal facade and within the same element.

3.3 Installation

1. Manufacturers Reference

The window shall be assembled by the manufacturer or by his / her duly authorised representative. If by the latter the manufacturer shall provide instructions as to the manner of assembly of the windows and shall be responsible for the work.

2. Operatives

Installation by mechanics skilled in this work.

3.4 Inspection of Work

As each stage of work is completed, it will be inspected by the manufacturer who will certify work completed at that time.

3.5 Unloading, Handling, Storage and Protection

- (a) Do not deliver to site any components which cannot be immediately unloaded into suitable conditions of storage.
- (b) Unload, handle and store components in accordance with manufacturers recommendations.
- (c) Avoid distortion of components during transit handling and storage.
- (d) Prevent pre-finished surfaces from rubbing together.
- (e) Prevent contact with mud, ashes, plaster and cement.
- (f) Retain protective coverings in position. Keep paper and cardboard wrappings on aluminium components dry.

3.6 Protection of Coatings

- (a) Surface areas liable to damage during handling, fixing or by other building trades such as plasterers are to be protected by tape. The recommended tape is Sellotape Black Vinyl No. 1415 to be removed as soon as practicable after completion of all work in the area of installation. Panel constructions to be protected by polythene sheeting.
- (b) Install hardware in accordance with templates and manufacturers instructions.
- (c) Fix units securely to building to leave plumb, straight true and free from scratches, dents or other defects.
- (d) Conceal fixings except where approved by Architect.
- (e) Take care to assemble units with adjacent finish surfaces and colours matching.
- (f) Make provisions for thermal movement and still maintain full weatherproof installation.

- (g) Where aluminium is to be placed in contact with concrete masonry or mortar, back paint aluminium with one coat of fine chromate or bituminous paint.
- (h) Avoid displacement of d.p.c.s. and ensure that they are positioned correctly in relation to frame.
- (i) Prepare and point sealant joints in accordance with sealant manufacturer's recommendations. Insert backing strips in all joints to be pointed with sealant. Tool sealant to form a smooth flat bead.
- (j) Adjust operable parts for correct function.