3 DOORS AND WINDOWS

3.1 DOORS AND WINDOWS

3.1.1 Scope of Work

1 This Part provides specification for supply and installation of steel Poly vinyl chloride (PVC), Unplasticized poly vinyl chloride (PVC-U), and aluminium doors and windows.

2 Windows and doors are collectively referred to as “units” in this Section.

3 Related Sections and Parts are as follows:

This Section
Part 1..... General
Part 2..... Materials Classification
Part 6..... Workmanship

Section 1	General
Section 16	Structural Metalwork
Section 18	Carpentry, Joinery and Ironmongery
Section 25	Glazing

3.1.2 References

1 Adopted standards and/or referred to in this Part are as follows:

ASTM B209/B209M ...Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

ASTM C1381/C1381M Standard Specification for Molded Glass Fiber Reinforced Gypsum Parts

ASTM C1349.....Standard Specification for Architectural Flat Glass Clad Polycarbonate

ASTM D4726.....Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Exterior-Profile Extrusions Used for Assembled Windows and Doors

BS 476.....Fire tests on building materials and structures

BS 644.....Timber windows and doorsets. Fully finished factory-assembled windows and doorsets of various types. Specification

BS 729.....Specification for hot dip galvanized coatings on iron and steel articles (ISO 1461 Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods)

BS 990.....Metal casement windows and casement doors for domestic buildings.

BS 1245 .....Metal door frames (steel)

BS 1282 .....Pedestrian doorsets and door frames made from steel sheet. Specification.

BS 1449 .....Steel plate, sheet and strip.

BS 1474 .....Specification for wrought aluminium and aluminium alloys for general engineering purposes - bars, extruded round tube and sections; (EN 515 Aluminium and aluminium alloys - Wrought products - Temper designations; EN 573 Aluminium and aluminium alloys - Chemical composition and form of wrought products; EN 755 Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles; EN 12020 Aluminium and aluminium alloys - Extruded precision profiles in alloys EN AW-6060 and EN AW-6063)

BS 3987 .....Specification for anodic oxidation coatings on wrought aluminium for external architectural applications

BS 4254 .....Specification for two-part polysulphide-based sealants; (ISO 11600 Building construction — Jointing products — Classification and requirements for sealants)

BS 4255 .....Rubber used in preformed gaskets for weather exclusion from buildings

BS 4873 .....Aluminium alloy windows and doorsets. Specification

BS 5368 .....Method of testing windows; (EN 1026 Windows and doors - Air permeability - Test method; EN 1027 Windows and doors - Water tightness - Test method; EN 12211 Windows and doors - Resistance to wind load - Test method).

BS 5707 .....Specification for preparations of wood preservatives in organic solvents.

BS 6213 .....Selection of construction sealants. Guide

BS 6375-1 .....Performance of windows and doors - Classification for weathertightness and guidance on selection and specification

BS 6375-2 .....Performance of windows and doors - Classification for operation and strength characteristics and guidance on selection and specification

BS 6375-3 .....Performance of windows and doors - Classification for additional performance characteristics and guidance on selection and specification

BS 6496 .....Specification for powder organic coatings for application and stoving 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 powder organic coatings (AMD 7182); (EN 12206-1 Paints and varnishes - Coating of aluminium and aluminium alloys for architectural purposes - Part 1: Coatings prepared from thermosetting coating powder; ISO 18768-1 Organic coatings on aluminium and its alloys — Methods for specifying decorative and protective organic coatings on aluminium — Part 1: Powder coatings)

BS 6510 .....Steel-framed windows and glazed doors. Specification

BS 7036 .....Power operated pedestrian doorsets. Safety in use - Code of practice for risk assessment and risk reduction

BS 7412 .....Specification for windows and doorsets made from unplasticized polyvinyl chloride (PVC-U) extruded hollow profiles

BS 7722 .....Surface covered PVC-U profiles for windows and doorsets. Specification.

BS 8214 .....Code of practice for fire door assemblies.

BS 8529 .....Composite doorsets. Domestic external doorsets. Specification

EN 477 .....Plastics - Poly(vinyl chloride) (PVC) based profiles - Determination of the resistance to impact of profiles by falling mass.

EN 478 .....Plastics. Poly(vinyl chloride) (PVC) based profiles. Determination of the appearance after exposure at 150˚C.

EN 479 .....Plastics - Poly(vinyl chloride) (PVC) based profiles - Determination of heat reversion.

EN 485 .....Aluminium and aluminium alloys - Sheet, strip and plate

EN 513 .....Plastics - Poly(vinyl chloride) (PVC) based profiles - Determination of the resistance to artificial weathering.

EN 514 .....Plastics - Poly(vinyl chloride) (PVC) based profiles - Determination of the strength of welded corners and T-joints.

EN 10142 .....Continuously hot-dip zinc coated low carbon steels strip and sheet for cold forming - Technical delivery conditions; (EN 10346 Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions).

EN 12608-1 .....Unplasticized poly(vinyl chloride) (PVC-U) profiles for the fabrication of windows and doors - Classification, requirements and test methods - Part 1: Non-coated PVC-U profiles with light coloured surfaces

NFPA 80.....Standard for Fire Doors and Other Opening Protectives.

3.1.3 Detailed Specification

1 Alternative alloys may be used where integral colour anodising is required provided the physical properties of the alloy meet relevant BS Standards for the specific material.

2 All screws, nuts bolts, reverts, washers and other fastenings are to be aluminium or stainless steel (Type 316 S16).

3 The units are to be fabricated at the manufacturer's works as far as possible and delivered complete and ready for installation. Aluminium windows shall be to BS 4873, BS 1474, BS 3987, BS 6496, and EN 485.

4 The overall sizes of assembled units are to be maintained within a tolerance of ± 1.5 mm. Frame assemblies to be square with a maximum difference in the diagonals of 4 m.

5 The finished units to be free from all sharp edges, burrs and the like.

6 Joints in frames are to be made by screw spleen, shear block or other approved system capable of accommodating the thermal movement of the unit and providing tightly fitting and inconspicuous joints.

7 The main web of the aluminium outer frame should not be less than 1.2 mm thick. Frames to be self-draining and no holes for fastenings are to be located in the external channel at sill level.

8 All opening units are to be fully weather stripped using siliconized woven polypropylene, wool pile or neoprene retained in dovetailed or undercut grooves formed in the aluminium extrusions. The weather-stripping should be capable of being removed without disturbing the glazing system and without removing the outer frame from the structure.

9 The design of the units should permit re-glazing without the need to remove the outer frame from the structure.

10 All hardware is to be supplied and fixed by the unit manufacturer, and should match the finish of the surfaces of the units and be replaceable without removing the outer frame from the structure. Fasteners are to be designated so that they cannot be released from the outside by the insertion of a thin blade or other simple tool.

11 Windows are to meet the performance requirements of severe exposure to wind. Horizontal sliding units are to be supported on rustproof and dustproof bearing devices that may easily be repaired or replaced and that prevent contact between the unit and the track. Horizontal and vertical sliding units to be separated and not slide upon each other.

12 The mechanism for vertical sliding windows is to be accessible for adjustment, repair or replacement after the windows have been installed.

13 No window is to be openable or removable from the outside when it is fastened in a closed position except by the use of special tools or by breaking part of the window or door.

14 All opening windows are to be fitted with flyscreens.

15 All unit surfaces which will be visible in the finished work are to be protected after manufacture by low tack tape or other suitable means capable of being removed after exposure to the high temperatures prevalent in Qatar to leave clean, undamaged surfaces.

16 Sill frames to slope outward (level frames are not allowed).

17 Weepholes where required are to be as detailed in the shop drawings

3.2 FLYSCREENS

1 Flyscreens are to be fabricated in accordance with Clause 3.1.3.

2 The frames to be fabricated from substantial, rigid sections and be easily removable from the window to permit maintenance, cleaning and repair. The frames are to allow the replacement of the mesh and be finished (anodised, powder coated, etc.) to match the windows in which they will be fitted.

3 The frames are to be infilled only with 0.4 mm aluminium wire woven to a 1.5 mm mesh, stretched tightly and evenly, and be free from visible joints.

3.3 AUTOMATIC BI-PARTING DOOR OPERATORS

3.3.1 General Requirements

1 Automatic bi-parting door operators are to be approved 240 V/50 Hz fully electric operators, fully housed in extruded aluminium or stainless steel housing.

3.3.2 Safety Control Logic

1 The equipment is to incorporate the following safety control logic:

(a) automatic reversing if obstructed during the closing sequence (fully adjustable sensitivity).

(b) auto retry (three times) at safety “creep” speed (1/3 speed) to detect obstruction.

(c) auto revert to normal mode after successful retry.

(d) fully adjustable speed control with independent settings for Opening, Closing, Final Opening, Final Closing.

(e) auto stop if obstructed during opening sequence (fully adjustable sensitivity).

3.3.3 Drive System

1 The equipment is to incorporate the following drive system:

(a) squirrel cage motor with output shaft and gearbox drive shaft shall use constant rated 7 kg torque capacitor for start and run. No intermediate belts, pulleys and couplings which are subject to failure, breakage, shearing or loss of tension shall be used

(b) thermal protection: the motor must be able to be held in the stalled position indefinitely under full electric current without resultant damage to the windings

(c) chain drive with minimum tensile strength of 1,950 kg and 12.5 mm pitch, directly connected to door leaf carriage assemblies. Chains or belts of lesser tensile strength will not be permitted

(d) auto re-close circuitry to ensure doors close if partially opened (i.e. high wind condition)

(e) self lubricating planetary gearbox with spiral bevel drive.

3.3.4 Track

1 The track is to be replaceable, made of extruded aluminium, hard coat anodise, carrying adjustable hanger bars supported by fully sealed raced fibber glass reinforced track wheels (min 50 mm diameter) for smoother wear and increased life.

3.3.5 Fail Safe

1 Depending on the location of doors the following systems shall be used:

(a) bi-parting doors to exterior: doors drive fully open automatically on power failure/fire alarm. Fail-safe shall consist of a 12v DC/110 vac inverter also incorporating battery alarm/monitory to alert user if power is low. Doors automatically return to original function mode when power is returned or fire signals are de-activated

(b) bi-parting doors within building which serve to Section off or divide fire zones:

(i) doors to close under power failure/smoke alarm

(ii) continuous operations under power failure (min. 50 operations required)

(iii) to be operable manually.

3.4 FIXING ALUMINIUM WINDOWS AND DOORS

3.4.1 General Requirements

1 Windows are to be fixed with sufficient fastenings to comply with Clause 3.1.3, and in no case will the number be less than the minimum specified in BS 6510 for the nearest applicable co-ordinating size.

2 All units are to be fixed square, level and plumb without distortion.

3 Where the method of fixing is be screw fastenings direct to concrete or blockwork surrounds, the screws are to extend a minimum of 25mm into the reveal and the plugs be of proprietary manufacture sized to suit the screw. Wooden plugs will not be permitted. Holes in the frames are be predrilled and the screws countersunk so as to avoid scratching, gouging or locally distorting the frame.

4 Frames are to be protected from alkaline materials in accordance with Clause 2.2.1 or by approved isolating tape.

5 Timber sub-frames to be treated in accordance with BS 1282 and to meet specified requirements of BS 5707. Treatment certificates to be submitted to the Engineer.

6 Timber sub-frames to be primed or sealed before the installation of the units.

7 Joints between the frames of external units and the surrounding construction are to be sealed in accordance with BS 6213 BS 4254 and Clause 2.2.1 in such a way as to form a complete weatherproof seal between the frame and the surround. The sills of sliding doors are to be bedded in mastic. Rubber used in pre-formed gaskets for weather exclusion to the building shall be to BS 4255.

8 After installation all opening units to be eased and adjusted to provide free operation and all moving parts are to be lubricated.

3.5 STEEL DOORS AND WINDOWS

3.5.1 General Requirements

1 Steel doors and frames shall comply with the provisions of BS 1245 and steel windows and frames shall comply with the provisions of BS 990.

3.5.2 Steel Doors and Frames

1 The specification for proprietary steel doors shall be as follows unless otherwise specified in the Project Documentation.

2 All steel doors shall be manufactured in properly equipped workshops by tradesmen proficient in such work. All machinery employed shall be capable of accurately preparing, producing and finishing doors

3 The door shall be finished, 45 mm or 55 mm thick of double skinned, insulated sheet steel construction and shall be fabricated from two zink coated steel sheets not less than 1.6 mm thick with lock seam joints at sides. The door faces shall be free of seams or joints. Top and bottom of the doors shall be either welded flush or closed with recessed spot-channel closures. The doors shall be provided with continuous welded “U” shaped reinforcing channels to head and foot. Door construction shall be one of the following:

(a) not less than 1mm steel interlocking vertical channels of “Z” shaped members spaced not more than 300 mm apart or horizontal channels not more than 350 m apart

(b) not less than 1 mm steel horizontal “U” shaped sections spaced in parallel rows not over 220 mm on centre welded in alternating sequence to the inside face of each outer sheet so that horizontal stiffening occurs approx

(c) a continuous truss-formed inner core of not less than 1 mm sheet metal spot-welded to the face sheet every 70 mm horizontally and vertically over the entire surface of both sides.

4 The doors shall be insulated with mineral wool or pressure injected polyurethane foam for sound and thermal insulation.

5 Doors clearance shall not exceed the following:

(a) 3mm at jamb and heads

(b) 3 mm at meeting stile of pair doors with round or bevelled edges and 6 mm for doors with square edges

(c) 3mm at bottom measured from finished floor line.

6 Doors shall be provided with a sound deadening material to eliminate sound incident to the normal operation of the door as necessary or required by the Engineer.

7 The finished work shall be rigid, neat in appearance and free from defects, warp, or buckle. Moulded members shall be sharp in detail, straight, and true. Corner joints shall be coped or mitered, well-formed, in true alignment, welded and cleaned off.

8 Spot welding shall be used where practicable. Construction joints shall be welded along their full length. Exposed welded joints shall be cleaned off and dressed smooth.

9 The doors shall be suitably reinforced, morticed and tapped to receive all ironmongery.

10 Steel doors shall be finished as detailed in the Project Documentation. They shall be cleaned, filed, ground smooth and either painted with one coat of redhead primer prior to the finished painting or stove enamelled to a colour chosen by the Engineer.

11 Door frames are to be formed of not less than 1.2 mm nominal thickness mild steel hot dip galvanized after manufacture or, alternatively, may be made from hot dip galvanized steel sheet complying with EN 10142.

12 Door frames shall be given primer coat and finish as specified for the matching steel doors.

13 Where frames support door leaves in excess of 60 kg require one-hour fire resisting door assemblies, the minimum steel thickness is to be increased to 1.6 mm.

3.5.3 Steel Windows

1 Steel windows shall be constructed and assembled in accordance with the specification for proprietary steel windows shall be as detailed in the Project Documentation. In addition, steel windows shall comply with the provisions of BS 5368 and BS 6375 for testing and performance.

2 Steel windows and frames shall be manufactured in properly equipped workshops by tradesmen proficient in such work. All machinery employed shall be capable of accurately preparing, producing and finishing window frames.

3 Steel windows and frames made of hot dip galvanised steel shall additionally conform to BS 729.

4 Steel windows shall be finished as shown in the Project Documentation. They shall be cleaned, filed, ground smooth and either painted with one coat of redhead primer prior to the finished painting or stove enamelled to a colour chosen by the Engineer

3.6 INSTALLATION OF STEEL DOOR FRAMES

3.6.1 General Requirements

1 Frames will be fixed plumb, level and securely to prevent deflection or movement.

2 Frames built-in as the surrounding structure is constructed are to be fixed with cramps at maximum 600 mm centres. One cramp is to be located 200 mm from the bottom of the frame and 200 mm from the top or at the nearest adjacent bed joint. Voids in the backs of frames are to be filled in solid with grout as the work proceeds.

3 Frames which are to be built-in are to be braced with temporary struts to prevent distortion. Base ties to be removed after the blockwork has set and before the floor finish is laid.

4 Frames to previously prepared openings are to be fixed with screw fastenings extending into the structural reveal at least 40 mm and at maximum 450 mm centres. One fastening to be located 200 mm from the bottom of the frame and one 200 mm from the top.

3.7 ROLLER SHUTTER FIRE DOORS

3.7.1 General

1 Operation of rolling shutter fire doors shall be manual (push up, chain hoist or waist high crank hoist) or motor operated as stated in the Project Documentation.

2 Mounting of door shall be either interior face mounted on a prepared opening or interior mounted between jambs and under a lintel in a prepared opening.

3 Fire rating of doors to be 3 hours rated sized in accordance with BS 476, the Project Documentation and tested and approved by the Civil Defence Department.

4 Automatic Closing. To be fitted with an automatic closing device, triggered by a closing mechanism by melting of a fusible link at 71 ºC unit to be in operative during normal operations. The release mechanism to be easily reset. Smoke detection is also to be fitted to the release device.

5 Quality Assurance

(a) furnish each overhead roller shutter door as a complete unit produced by one manufacturer, including hardware, accessories, mounting and installation of components.

(b) inserts and anchorages: Furnish inserts and anchoring devices to be set in concrete or built into masonry to install units. Provide setting out drawings, templates, instructions, and directions to install the anchorage devices.

3.7.2 Components

1 The shutter door panel or curtain shall include at minimum the elements as follows:

(a) slats, formed in continuous lengths of stainless steel to BS 1449 or galvanized steel

(b) each end of the slats to be fitted with malleable iron end locks, continuous, to act as wearing surface in the guides to maintain slat alignment and to prevent flame passage

(c) the curtain shall be reinforced with a stainless steel or galvanized steel bottom bar of two (2) angles. Lift handles to be provided on both sides of the door.

2 The spring counter balance shall comply with the following:

(a) the counter balance shall be housed in a steel pipe of diameter and wall thickness to restrict maximum defection to 2.5 mm/m of door width

(b) springs shall be the helical torsion type designed to include an over load factor of 25 % and for optimum ease of operation. Springs to be grease packed and mounted on a cold rolled steel inner shaft

(c) spring tension shall be adjustable from outside of end bracket plate

(d) ball bearings shall be sealed to minimise wear of pipe rotation around inner shaft

3 Bracket plates shall comply with the following:

(a) plates are to be made of stainless or galvanized steel thickness 6.35 mm carrying a pipe counter balancing shaft to house ends of door coil

(b) the drive end bracket plate shall be fitted with a sealed ball bearing

(c) the door shall be equipped with an oscillating governor as required to control the speed of descent.

4 Guides/wall angles shall be stainless or galvanized steel angles of 4.76 mm minimum thickness.

5 Hoods to house the coil are to be fabricated of stainless or galvanized steel.

6 Locking shall one of the following as stated in the Project Documentation:

(a) slide bolts - on bottom bar or manual push up, suitable for pad locks

(b) hand chain lock - locking bracket to be provided on guide angle

(c) locking disc - to be provided on crank box of crank hoist

(d) integral gearing - on motor to provide locking of door.

7 The finish on galvanized surfaces shall be as follows:

(a) baked on coat of epoxy modified polyester on slabs and hood

(b) shop coat of rust inhibiting metallic primer on all remaining ungalvanized surfaces, except bearings.

3.7.3 Electrically Operated Doors

1 Electric door operators shall conform to BS 7036

2 Unless otherwise indicated as having manual operation, provide electric operators for doors. Provide an electric door operator assembly of size and capacity recommended and provided by the door manufacturer, complete with electric motor and factory-prewired motor controls, gear-reduction unit, solenoid-operated brake, remote control stations, control panels conduit and wiring from controls to motor and central stations, and accessories required for proper operations

3 Disconnect mechanism - provide a hand operated disconnect or a mechanism for automatically engaging a sprocket-and-chain operated and releasing brake for emergency manual operation. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged

4 Door operator type - provide a wall or bracket-mounted door operator units consisting of electric motor, worm gear drive from motor to reduction gear box, chain or worm gear drive from a reduction box to a gear wheel mounted on a counterbalanced shaft, and a disconnect release for manual operation. Provide a motor and drive assembly of horsepower and design as determined by the door manufacturer to the size of door required. The operator shall be designed so that motor may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operator

5 Electric motors - provide high-starting torque, reversible, Class A insulated electric motors with overload protection. Size the motor to move the door in either direction, from any position, at not less than 0.2 m nor than 0.3 m per second. The wiring requirement and current characteristics of the motors shall be co-ordinated with the building electrical system. Supply totally enclosed, fan-cooled type motors, fitted with a plugged drain.

6 Remote control station - provide a momentary contact, three button control station with push-button controls labelled “Open”, “Close”, and “Stop”. Supply a keyed lockout feature with a key cylinder masterkeyed to the building system. Provide interior units with a fully guarded, surface-mounted, heavy-duty, general purpose NEMA type 1 enclosure

7 Automatic reversing control - supply each door with an automatic safety switch, extending the full width of the door bottom, and located within neoprene or rubber astragal mounted to bottom of the door rail. Contact with switch before closing will immediately stop downward travel and reverse direction to a fully opened position. Connect to control circuit through retracting safety cord and reel, or self-coiling cable. Provide electrically actuated automatic bottom bar. Ungalvanized or non stainless steel surfaces to be coated with rust inhibiting metallic primer on exposed ferrous surfaces, except bearings

8 Fail safe - depending on the location of doors the below systems shall be used for circumstances as follows:

(a) bi-parting doors to exterior: doors drive fully open automatically on power failure/fire alarm. Fail-safe shall consist of a 12 V DC/110 V AC inverter also incorporating battery alarm/monitory to alert user if power is low. Doors automatically return to original function mode when power is returned or fire signals are de-activated

(b) bi-parting doors within building which serve to section off or divide fire zones:

(i) doors to close under power failure/smoke alarm

(ii) continuous operations under power failure (min. 50 operations required)

(iii) to be operable manually

3.8 INSTALLATION

3.8.1 General Requirements

1 Installation of units shall be undertaken by the manufacturer's authorised representative and in accordance with manufacturer's standards and instruction.

2 Installation shall comply with the latest NFPA 80.

3 After installation, doors are to be tested with multiple closing/opening and witnessed for normal operation.

3.9 SUBMITTALS

3.9.1 General Requirements

1 Provide product data, roughing-in diagrams, and installation instruction for each type and size of overhead coiling door

2 Provide operating instruction and maintenance information

3 Provide information describing fire release system including electrical rough-in instruction.

4 Provide shop drawings for special components and installation that are not dimensioned or detailed in manufacturer's data sheet.

END OF PART