

## **Part 1        General**

### **1.1            REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A653/A653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
  - .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Steel Door Manufacturers' Association (CSDMA)
  - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
  - .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.
- .5 National Fire Protection Association (NFPA)
  - .1 NFPA 80-2010, Standard for Fire Doors and Fire Windows.
- .6 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
  - .2 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.

### **1.2            SYSTEM DESCRIPTION**

- .1 Design Requirements:
  - .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35 degrees C to 35 degrees C.
  - .2 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 for ratings specified or indicated.
  - .3 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104 and listed by nationally recognized agency having factory inspection services.

### **1.3            ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.

- .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, arrangement of hardware, fire rating and finishes.
  - .2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, reinforcing, fire rating and finishes.
  - .3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **Part 2 Products**

#### **2.1 MATERIALS**

- .1 Hot dipped galvanized steel sheet: to ASTM A653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A653M, ZF75.

#### **2.2 DOOR CORE MATERIALS**

- .1 Honeycomb construction:
  - .1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m<sup>3</sup> minimum sanded to required thickness.
- .2 Stiffened: face sheets laminated, insulated core.
  - .1 Fibreglass (acoustical doors): to CAN/ULC-S702, semi-rigid Type 1, density 24 kg/m<sup>3</sup>.
  - .2 Polyurethane (exterior doors): to CAN/ULC-S704 rigid, modified poly/isocyanurate, closed cell board. Density 32 kg/m<sup>3</sup>.

#### **2.3 ADHESIVES**

- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
- .2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

## **2.4 PRIMER**

- .1 Touch-up prime CAN/CGSB-1.181.

## **2.5 PAINT**

- .1 Field paint steel doors and frames in accordance with Sections 09 91 23 - Interior Painting, 09 91 13 - Exterior Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

## **2.6 ACCESSORIES**

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Exterior top and bottom caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Interior top and bottom caps: steel.
- .4 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .5 Door bottom seal: as per Section 08 71 00 - Door Hardware - General.
- .6 Metallic paste filler: to manufacturer's standard.
- .7 Fire labels: metal riveted.
- .8 Sealant: as per Section 07 92 00 - Joint Sealants.
- .9 Glazing: Section 08 80 50 - Glazing.
- .10 Make provisions for glazing as indicated and provide necessary glazing stops.
  - .1 Provide removable stainless steel glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws.
  - .2 Design exterior glazing stops to be tamperproof.
- .11 Acoustical door frame insulation: to Section 07 21 00 – Blanket Insulation.
- .12 Exterior door frame insulation: to Section 07 21 29 03 – Sprayed Insulation – Polyurethane Foam.

## **2.7 FRAMES FABRICATION GENERAL**

- .1 Fabricate frames in accordance with CSDMA specifications.
- .2 Fabricate frames to profiles and maximum face sizes as indicated.
- .3 Exterior frames: 1.6 mm welded thermally broken type construction.
- .4 Interior frames: 1.6 mm welded type construction.
- .5 Blank, reinforce, drill and tap frames for mortised, templated hardware, electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.
- .6 Protect mortised cutouts with steel guard boxes.
- .7 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

- .8 Manufacturer's nameplates on frames and screens are not permitted.
- .9 Conceal fastenings except where exposed fastenings are indicated.
- .10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.
- .11 Insulate exterior frame components with polyurethane insulation.

## **2.8 FRAME ANCHORAGE**

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.
- .4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

## **2.9 FRAMES: WELDED TYPE**

- .1 Welding in accordance with CSA W59.
- .2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.
- .3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.
- .4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.
- .5 Securely attach floor anchors to inside of each jamb profile.
- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

## **2.10 DOOR FABRICATION GENERAL**

- .1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.
- .2 Exterior doors: hollow steel construction. Interior doors: honeycomb and hollow steel construction.
- .3 Fabricate doors with longitudinal edges welded. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
- .4 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.
- .5 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.
- .6 Reinforce doors where required, for surface mounted hardware. Provide flush PVC top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

- .7 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .8 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN4-S104 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
- .9 Manufacturer's nameplates on doors are not permitted.

## **2.11 DOORS: HONEYCOMB CORE CONSTRUCTION**

- .1 Form face sheets for interior doors from 1.6 mm sheet steel with honeycomb core laminated under pressure to face sheets.

## **2.12 HOLLOW STEEL CONSTRUCTION**

- .1 Form face sheets for exterior doors from 1.6 mm sheet steel.
- .2 Form face sheets for interior acoustical doors from 1.6 sheet steel.
- .3 Reinforce doors with vertical stiffeners, securely welded to face sheets at 150 mm on centre maximum.
- .4 Fill voids between stiffeners of exterior doors with polyurethane core.
- .5 Fill voids between stiffeners of interior acoustical doors with fibreglass core.

## **2.13 THERMALLY BROKEN DOORS AND FRAMES**

- .1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.
- .2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Fabricate thermally broken frames separating exterior parts from interior parts with continuous interlocking thermal break.
- .4 Apply insulation.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 INSTALLATION GENERAL**

- .1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.
- .2 Install doors and frames to CSDMA Installation Guide.

### **3.3 FRAME INSTALLATION**

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.
- .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .5 Caulk perimeter of frames between frame and adjacent material.
- .6 Maintain continuity of air/vapour barrier.
- .7 Where acoustical doors required, fill acoustical door frames with acoustical door frame insulation.

### **3.4 DOOR INSTALLATION**

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
  - .1 Hinge side: 1.0 mm.
  - .2 Latchside and head: 1.5 mm.
  - .3 Finished floor and thresholds: 13 mm.
- .3 Adjust operable parts for correct function.
- .4 Install louvres.

### **3.5 FINISH REPAIRS**

- .1 Touch up with primer finishes damaged during installation.
- .2 Fill exposed frame anchors surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

### **3.6 GLAZING**

- .1 Install glazing for doors frames in accordance with Section 08 80 50 - Glazing.

**END OF SECTION**

## **Part 1            General**

### **1.1                REFERENCES**

- .1 Aluminum Association (AA)
  - .1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.
- .2 American Architectural Manufacturers Association (AAMA)
  - .1 AAMA CW-10-04, Care and Handling of Architectural Aluminum From Shop to Site.
  - .2 AAMA T1R-A1-04, Sound Control for Fenestration Products.
  - .3 AAMA 501-05, Methods of Test for Exterior Walls.
  - .4 AAMA 611-98, Voluntary Specifications for Anodized Finishes Architectural Aluminum.
- .3 ASTM International
  - .1 ASTM A123/A123M-09, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .2 ASTM A653/A653M-09a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .3 ASTM B221-08, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - .4 ASTM E283-04, Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB 1.108-M89, Bituminous Solvent Type Paint.
  - .2 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.
- .5 CSA International
  - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA W59.2-M1991(R2008), Welded Aluminum Construction.
- .6 Society for Protective Coatings (SSPC)
  - .1 SSPC - Paint 20-02(R2004), Zinc Rich Coating, Type I - Inorganic and Type II - Organic.

### **1.2                ADMINISTRATIVE REQUIREMENTS**

- .1 Co-ordination: co-ordinate work of this Section with installation of air/vapour barrier placement, flashing placement, components or materials.
- .2 Pre-Installation Meetings:

- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's written installation instructions and warranty requirements.
- .3 Hold project meetings every two weeks.
- .4 Ensure key personnel attend.
- .5 Departmental Representative will submit written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for curtain wall components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.
- .3 Shop Drawings:
  - .1 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.
- .4 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Samples will be returned for inclusion into work.
  - .3 Submit 2 samples 300 x 300 mm in size illustrating prefinished aluminum surface, finish, colour, texture, specified glass units, glazing materials illustrating edge and corner.
- .5 Delegated Design Submittals:
  - .1 Include framing member structural and physical characteristics, calculations, dimensional limitations, special installation requirements.
- .6 Test Reports:
  - .1 Submit substantiating engineering data, test results of previous tests which purport to meet performance criteria, and supportive data.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

- .2 Operation and Maintenance Data: submit operation and maintenance data for glazed aluminum curtain wall for incorporation into manual.

## **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- .1 Extra Stock Materials:
  - .1 Supply extra stock materials of glass units in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Supply 1 extra sealed glass unit of each size required.
  - .3 Supply protected and packaged in wood crates suitable for storage. Clearly identify each crate.
  - .4 Deliver to Departmental Representative, upon completion of work of this Section.
  - .5 Store where directed by Departmental Representative.

## **1.6 QUALITY ASSURANCE**

- .1 Regulatory Requirements:
  - .1 Conform to applicable code for acoustic attenuation, sound transmission, requirements.
- .2 Mock-ups:
  - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
  - .2 Supply full size mock-up including vision glass light.
    - .1 Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
  - .3 Locate mock-up where directed by Departmental Representative.
  - .4 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with work.
  - .5 When accepted, mock-up will demonstrate minimum standard of quality and materials for work of this Section.
  - .6 Mock-up may remain as part of finished work.

## **1.7 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Handle work of this Section in accordance with AAMA CW-10.
  - .2 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .3 Store and protect aluminum glazed curtain wall components from nicks, scratches, and blemishes.

- .4 Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
- .5 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.8 AMBIENT CONDITIONS**

- .1 Install sealants when ambient and surface temperature is above 5 degrees C minimum.
- .2 Maintain this minimum temperature during and for 48 hours minimum after installation of sealants.

## **Part 2 Products**

### **2.1 SYSTEMS**

- .1 Description:
  - .1 Vertical glazed aluminum curtain wall system includes thermally broken tubular aluminum sections with self-supporting framing, shop fabricated, factory prefinished, vision glass, related flashings, anchorage and attachment devices.
  - .2 Assembled system to permit re-glazing of individual glass units from exterior without requiring removal of structural mullion sections.
- .2 Performance Requirements:
  - .1 Design and size components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with NBC.
  - .2 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable codes.
  - .3 Limit mullion deflection to flexure limit of glass with full recovery of glazing materials.
  - .4 Size glass units and glass dimensions to limits established in CAN/CGSB-12.20.
  - .5 Ensure system is designed to accommodate the following without damage to components or deterioration of seals:
    - .1 Movement within system.
    - .2 Movement between system and perimeter framing components.
    - .3 Dynamic loading and release of loads.
    - .4 Deflection of structural support framing.
  - .6 Thermal Resistance of:
    - .1 System RSI (excluding vision areas): .44 minimum.
    - .2 Vision glass areas RSI: .59 minimum.
  - .7 Sound attenuation through wall system exterior to interior: STC 45, measured to AAMA T1R - A1.

- .8 Limit air infiltration through assembly to  $0.0003 \text{ m}^3/\text{s}/\text{m}^2$  of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with AAMA 501 or ASTM E283.
- .9 Vapour seal with interior atmospheric pressure of 25 mm sp, 22 degrees C, 40% RH: no failure.
- .10 Water leakage: none, when measured to AAMA 501.
- .11 Ensure system allows for expansion and contraction within system components when temperature range is 95 degrees C over 12 hour period without causing detrimental affect to system components.
- .12 Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to exterior by weep drainage network.
- .13 Maintain continuous air barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
  - .1 Position thermal insulation on exterior surface of air barrier and vapour retarder.
- .14 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.
- .15 Reinforce curtain wall system to accommodate window washing guide rails.
  - .1 Supply sufficiently rigid anchors to resist loads caused by equipment platform, without damage to wall system.

## 2.2 MATERIALS

- .1 Extruded aluminum: to ASTM B221.
- .2 Sheet steel: to ASTM A653/A653M; galvanized.
- .3 Steel sections: to CSA G40.20/G40.21; shaped to suit mullion sections.
- .4 Anchors: 3-way adjustable hot-dip galvanized cast iron.
- .5 Fasteners: stainless steel, finish to match curtain wall.
- .6 Bituminous paint: CAN/CGSB 1.108.
- .7 Vertical glass units:
  - .1 Glass in exterior lights: Type H1 as specified in Section 08 80 50 - Glazing.
- .8 Sealant:
  - .1 Perimeter sealant: Type 1 as specified in Section 07 92 00 - Sealants.
  - .2 Sealant used within system (not used for Glazing): as recommended by manufacturer.
- .9 Transition membrane: self-adhesive bitumen laminated to high-density polyethylene film, nominal total thickness of 1 mm.

## 2.3 COMPONENTS

- .1 Mullion profile:

- .1 Vertical members: 50.8 x 153.9 mm nominal dimension unless indicated otherwise.
  - .2 Horizontal members: 50.8 x 153.9 mm nominal dimension unless indicated otherwise.
  - .3 Thermally broken with interior tubular section insulated from exterior pressure plate.
  - .4 Matching stops and pressure plate of sufficient size and strength to ensure adequate bite on glass.
  - .5 Drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.
  - .6 Internal mullion baffles to eliminate "stack effect" air movement within internal spaces.
- .2 Flashings: 0.7 mm thick galvanized steel, finish to match curtain wall mullion sections where exposed, secured with concealed fastening method.
  - .3 Vapour retarder: sprayed polyurethane foam insulation as specified in Section 07 21 29.03.
  - .4 Air barrier: specified in Section 07 46 13 - Preformed Metal Siding.

## **2.4 FABRICATION**

- .1 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- .2 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- .3 Prepare components to receive anchor devices. Install anchors.
- .4 Arrange fasteners and attachments to ensure concealment from view.
- .5 Reinforce framing members for external imposed loads.
- .6 Visible manufacturer's identification labels not permitted.
- .7 Finishes:
  - .1 Finish coatings: conform to AAMA 611.
  - .2 Exterior exposed aluminum surfaces: to A44, colour to match existing.
  - .3 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.
  - .4 Concealed steel items: galvanized in accordance with ASTM A123.
  - .5 Apply 1 coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

## **2.5 SOURCE QUALITY CONTROL**

- .1 Perform work in accordance with AAMA GSM-1.
- .2 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.

- .3 Installer qualifications: company specializing in performing the work of this section with minimum 3 years of experience and approved by manufacturer.
- .4 Perform welding Work in accordance with CSA W59.2.

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for aluminum curtain wall installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Verify dimensions, tolerances, and method of attachment with other work.
  - .3 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this Section.
  - .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

#### **3.2 INSTALLATION**

- .1 Install curtain wall system in accordance with manufacturer's instructions.
- .2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- .3 Use alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.
- .4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.
- .5 Use thermal isolation where components penetrate or disrupt building insulation.
- .6 Install sill flashings.
- .7 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.
- .8 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- .9 Install glass in accordance with Section 08 80 50 - Glazing, to glazing method required to achieve performance criteria. Cover caps to conceal screws and ensure continuous sightline.
- .10 Install perimeter sealant to method required to achieve performance criteria. Type 1, backing materials, and installation criteria in accordance with Section 07 92 00 - Joint Sealants.
- .11 Install transition membranes as indicated and as per manufacturer's instructions.

### **3.3 SITE TOLERANCES**

- .1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 mm/30 m, whichever is less.
- .2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.
- .3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

### **3.4 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Remove protective material from prefinished aluminum surfaces.
  - .3 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
  - .4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.
  - .5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.5 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by glazed aluminum curtain wall installation.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1    American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
  - .1        ANSI/BHMA A156.9-2003, Cabinet Hardware.
  - .2        ANSI/BHMA A156.11- 2004, Cabinet Locks.

**1.2                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Product Data:
  - .1        Submit manufacturer's instructions, printed product literature and data sheets for cabinet hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .3    Hardware List:
  - .1        Submit contract hardware list.
  - .2        Indicate specified hardware, including make, model, material, function, finish and other pertinent information.
- .4    Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .5    Manufacturer's Instructions: submit manufacturer's installation instructions.

**1.3                CLOSEOUT SUBMITTALS**

- .1    Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2    Operation and Maintenance Data: submit operation and maintenance data for cabinet hardware for incorporation into manual.

**1.4                QUALITY ASSURANCE**

- .1    Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

**1.5                DELIVERY, STORAGE AND HANDLING**

- .1    Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2    Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3    Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .4    Storage and Handling Requirements:

- .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect cabinet hardware from nicks, scratches, and blemishes.
- .3 Protect prefinished surfaces with wrapping.
- .4 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of [pallets,] crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **Part 2 Products**

### **2.1 HARDWARE ITEMS**

- .1 Use one manufacturer's product for all similar items.

### **2.2 CABINET HARDWARE**

- .1 Cabinet hardware: to ANSI/BHMA A156.9, as listed below:
  - .1 Hinges: concealed, screw mounted, 110° opening.
  - .2 Pulls: 100 mm, brushed chrome 'D' pulls.
  - .3 Drawer slides: side mounted, full extension, 400 mm long, 45 kg capacity per pair.
  - .4 Shelf Supports: recessed chrome full height standards c/w chrome clips.
- .2 Cabinet locks: to ANSI/BHMA A156.11, as listed below:
  - .1 Locks (to all doors and drawers): cam locks, counter clockwise unlocking, 180°, 2 key pulls to be provided, 19 mm diameter.

### **2.3 FASTENINGS**

- .1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .2 Exposed fastening devices to match finish of hardware.
- .3 Use fasteners compatible with material through which they pass.

### **2.4 KEYING**

- .1 Padlocks and cabinet locks to be master keyed as directed. Submit keying schedule for approval.
- .2 Provide keys in duplicate for every lock in this Contract.
- .3 Provide three masterkeys for each MK or GMK group.
- .4 Stamp keying code numbers on keys and cylinders.

### **Part 3 Execution**

#### **3.1 INSTALLATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Install hardware to standard hardware location dimensions in accordance with manufacturer's recommendations and to project design requirements.
- .3 Install key control cabinet and establish key control set-up.

#### **3.2 ADJUSTING**

- .1 Adjust cabinet hardware for optimum, smooth operating condition.
- .2 Lubricate hardware and other moving parts.
- .3 Adjust cabinet door hardware to ensure tight fit at contact points with frames.

#### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
  - .3 Remove protective material from hardware items where present.
  - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

#### **3.4 DEMONSTRATION**

- .1 Keying System Setup and Cabinet:
  - .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
  - .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
  - .3 Lock key cabinet and turn over key to Departmental Representative.
- .2 Maintenance Staff Briefing:
  - .1 Brief maintenance staff regarding:
    - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
    - .2 Description, use, handling, and storage of keys.

- .3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

**3.5 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by cabinet and miscellaneous hardware installation.

**END OF SECTION**

## **Part 1           General**

### **1.1               REFERENCES**

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
  - .1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
  - .2 ANSI/BHMA A156.4-2000, Door Controls - Closers.
  - .3 ANSI/BHMA A156.6-2005, Architectural Door Trim.
  - .4 ANSI/BHMA A156.13-2002, Mortise Locks and Latches Series 1000.
  - .5 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
  - .6 ANSI/BHMA A156.18-2006, Materials and Finishes.
- .2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
  - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

### **1.2               ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Samples will be returned for inclusion into work.
  - .3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
  - .4 After approval samples will be returned for incorporation in Work.
- .4 Hardware List:
  - .1 Submit contract hardware list.
  - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .6 Manufacturer's Instructions: submit manufacturer's installation instructions.

### **1.3               CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

#### **1.4 MAINTENANCE MATERIALS SUBMITTALS**

- .1 Extra Stock Materials:
  - .1 Supply maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
  - .2 Tools:
    - .1 Supply 2 sets of wrenches for door closers, locksets and fire exit hardware.

#### **1.5 QUALITY ASSURANCE**

- .1 Regulatory Requirements:
  - .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
  - .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
- .4 Storage and Handling Requirements:
  - .1 Store materials off ground, indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect door hardware from nicks, scratches, and blemishes.
  - .3 Protect prefinished surfaces with wrapping.
  - .4 Replace defective or damaged materials with new.
- .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **Part 2 Products**

#### **2.1 HARDWARE ITEMS**

- .1 Use one manufacturer's products only for similar items.

#### **2.2 DOOR HARDWARE**

- .1 Locks and latches:

- .1 Mortise locks and latches: to ANSI/BHMA A156.13, series 1000 mortise lock, grade 1, designed for function as stated in Hardware Schedule.
  - .2 Lever handles: plain design.
  - .3 Escutcheons: round.
  - .4 Normal strikes: box type, lip projection not beyond jamb.
  - .5 Cylinders: key into keying system as directed.
  - .6 Finish as indicated.
- .2 Butts and hinges:
    - .1 Butts and hinges: to ANSI/BHMA A156.1, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.
- .3 Door Closers and Accessories:
    - .1 Door controls (closers): to ANSI/BHMA A156.4, designated by letter C and numeral identifiers listed in Hardware Schedule, size in accordance with ANSI/BHMA A156.4, table A1, finish as indicated.
- .4 Architectural door trim: to ANSI/BHMA A156.6, designated by letter J and numeral identifiers listed in Hardware Schedule, finish as indicated.
- .5 Auxiliary hardware: to ANSI/BHMA A156.16, designated by letter L and numeral identifiers listed in Hardware Schedule, finish as indicated.
    - .1 Door viewers:
      - .1 Acceptable products:
        - .1 Loxem 190:
          - .1 Manufactured by: VSI Hardware Industries, 12930 Bradley Avenue, P.O. Box 4445 Symlar, California 91342
          - .2 Available in Canada from: Taymour Industries, 1170 William Street, Vancouver, B.C.
        - .2 Madison No. 20 R35:
          - .1 Manufactured by Madison Products Company Limited, 550 Sheppard Avenue, Unit 25, Agincourt, Ontario.
          - .2 Available in Canada from:
            - .1 Madison Products Company Limited, 804-90th Avenue, LaSalle, Quebec.
            - .2 Madison Products Company Limited, 3840 Jacombs Road, Unit 21, Richmond, B.C..
        - .3 Ives No. 698B3:
          - .1 Manufactured by: Leigh Metal Products Ltd., 101 Brookside Street, London, Ontario N6A 4Y3.
          - .2 Available from most hardware stores in Canada.
        - .4 ASD metallic industrial DS238:
          - .1 Manufactured by: Advanced Safety Devices, 9140 Jordan Avenue, Chatsworth, California 91311, Telephone: 1-818-701-9200.

.2 Available from most Home Depot stores in Canada.

- .6 Door bottom seal: heavy duty door seal of extruded aluminum frame and solid closed cell neoprene weather seal, recessed in door bottom, closed ends, adjustable automatic retract mechanism when door is open, finish as indicated.
- .7 Thresholds: 125 mm wide x full width of door opening, extruded aluminum. Finish as indicated, serrated surface.
- .8 Weatherstripping:
  - .1 Head and jamb seal:
    - .1 Extruded aluminum frame and closed cell neoprene insert, finish as indicated.
  - .2 Door bottom seal:
    - .1 Extruded aluminum frame and nylon brush sweep, finish as indicated.

### **2.3 FASTENINGS**

- .1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.
- .2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.
- .3 Exposed fastening devices to match finish of hardware.
- .4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.
- .5 Use fasteners compatible with material through which they pass.

### **2.4 KEYING**

- .1 Doors, padlocks and cabinet locks to be keyed alike in groups, master keyed, grand master keyed, as directed. Prepare detailed keying schedule in conjunction with Departmental Representative.
- .2 Supply keys in duplicate for every lock in this Contract.
- .3 Supply 3 master keys for each master key or grand master key group.
- .4 Stamp keying code numbers on keys and cylinders.
- .5 Supply construction cores.
- .6 Hand over permanent cores and keys to Departmental Representative.

## **Part 3 Execution**

### **3.1 INSTALLATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

- .2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Supply manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
- .5 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .6 Install key control cabinet.
- .7 Use only manufacturer's supplied fasteners.
  - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .8 Remove construction cores when directed by Departmental Representative.
  - .1 Install permanent cores and ensure locks operate correctly.

### **3.2 ADJUSTING**

- .1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.
- .2 Lubricate hardware, operating equipment and other moving parts.
- .3 Adjust door hardware to ensure tight fit at contact points with frames.

### **3.3 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
  - .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
  - .3 Remove protective material from hardware items where present.
  - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.4 DEMONSTRATION**

- .1 Keying System Setup and Cabinet:
  - .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
  - .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
  - .3 Lock key cabinet and turn over key to Departmental Representative.
- .2 Maintenance Staff Briefing:

- .1 Brief maintenance staff regarding:
  - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
  - .2 Description, use, handling, and storage of keys.
  - .3 Use, application and storage of wrenches for door closers, locksets and fire exit hardware.
- .3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

### **3.5 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by door hardware installation.

### **3.6 SCHEDULE**

- .1 See Appendix 2 for Hardware Schedule.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1    ASTM International
  - .1    ASTM D2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
  - .2    ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .2    Canadian General Standards Board (CGSB)
  - .1    CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
  - .2    CAN/CGSB-12.8-97, Insulating Glass Units.
  - .3    CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.
- .3    Glass Association of North American (GANA)
  - .1    GANA Glazing Manual - 2008.

**1.2                ADMINISTRATIVE REQUIREMENTS**

- .1    Pre-Installation Meetings:
  - .1    Convene pre-installation meeting 1 week prior to beginning work of this Section, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
    - .1    Verify project requirements.
    - .2    Review installation and substrate conditions.
    - .3    Co-ordination with other building subtrades.
    - .4    Review manufacturer's written installation instructions and warranty requirements.
  - .2    Hold project meetings every two weeks.
  - .3    Ensure key personnel attend.
  - .4    Departmental Representative will submit written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Product Data:
  - .1    Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .3    Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Saskatchewan, Canada.
- .4 Samples:
  - .1 Submit for review and acceptance of each unit.
- .5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

#### **1.4 CLOSEOUT SUBMITTALS**

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

#### **1.5 QUALITY ASSURANCE**

- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Mock-ups:
  - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
  - .2 Construct mock-up to include glazing, and perimeter air barrier and vapour retarder seal.
  - .3 Mock-up will be used:
    - .1 To judge quality of work, substrate preparation, operation of equipment and material application.
  - .4 Locate where directed.
  - .5 Allow 24 hours for inspection of mock-up before proceeding with work.
  - .6 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect glazing and frames from nicks, scratches, and blemishes.
  - .3 Protect prefinished aluminum surfaces with wrapping
  - .4 Replace defective or damaged materials with new.

- .4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

## **1.7 AMBIENT CONDITIONS**

- .1 Ambient Requirements:
  - .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
  - .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Design Criteria:
  - .1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
    - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
    - .2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass, to ASTM E330.
    - .3 Limit glass deflection to flexural limit of glass with full recovery of glazing materials.
  - .2 Flat Glass:
    - .1 Safety glass (T1): to CAN/CGSB-12.1, transparent, 6 mm thick.
      - .1 Type 2-tempered.
      - .2 Class B-float.
      - .3 Category 11.
      - .4 Edge treatment.
  - .3 Wired glass (G1): to CAN/CGSB-12.11, 6 mm thick.
    - .1 Type 1-polished both sides (transparent).
    - .2 Wire mesh styles 3-square 4-rectangular.
  - .4 Insulating Glass Units:
    - .1 Insulating glass units (SU1): to CAN/CGSB-12.8, double unit, 25 mm overall thickness.
      - .1 Outer Glass Pane: to CAN/CGSB-12.11.
      - .2 Inner Glass Pane: to CAN/CGSB-12.1.
      - .3 Glass thickness: 6 mm each light.
      - .4 Inter-cavity space thickness: 13mm with low conductivity spacers.
      - .5 Glass coating: surface number 3, low "E", soft-sputtered.

- .6 Inert gas fill: argon.
- .2 Insulating glass units (SU2): to CAN/CGSB-12.8, double unit, 25 mm overall thickness.
  - .1 Glass: to CAN/CGSB-12.1.
  - .2 Glass thickness: 6 mm each light.
  - .3 Inter-cavity space thickness: 13mm with low conductivity spacers.
  - .4 Glass coating: surface number 3, low "E", soft-sputtered.
  - .5 Inert gas fill: argon.
- .3
- .5 Plastic Film: in accordance with Section 08 87 53 - Security Films.
- .6 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

## **2.2 ACCESSORIES**

- .1 Setting blocks: neoprene, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.
- .2 Glazing tape:
  - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.
- .3 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
  - .1 Verify that openings for glazing are correctly sized and within tolerance.
  - .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
  - .3 Visually inspect substrate in presence of Departmental Representative.
  - .4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

### **3.2 PREPARATION**

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

- .3 Prime surfaces scheduled to receive sealant.

### **3.3 INSTALLATION: EXTERIOR - DRY METHOD (PREFORMED GLAZING)**

- .1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Perform work in accordance with GANA Glazing Manual for glazing installation methods.
- .3 Cut glazing spline to length; install on glazing light. Seal corners by butting spline and sealing junctions with sealant.
- .4 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .5 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- .6 Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

### **3.4 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)**

- .1 Perform work in accordance with GANA Glazing Manual for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.
- .3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
- .4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.
- .5 Place glazing tape on free perimeter of glazing in same manner described.
- .6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- .7 Knife trim protruding tape.

### **3.5 INSTALLATION: PLASTIC FILM**

- .1 Install plastic film with adhesive, applied in accordance with film manufacturer's instructions.
- .2 Place without air bubbles, creases or visible distortion.
- .3 Fit tight to glass perimeter with razor cut edge.

### **3.6 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
    - .1 Remove traces of primer, caulking.
    - .2 Remove glazing materials from finish surfaces.
    - .3 Remove labels.

- .4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

### **3.7**

#### **PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 After installation, mark each light with an "X" by using removable plastic tape or paste.
  - .1 Do not mark heat absorbing or reflective glass units.
- .3 Repair damage to adjacent materials caused by glazing installation.

**END OF SECTION**

**Part 1            General**

**1.1                SUMMARY**

- .1    Section Includes:
  - .1    Security and safety film placed on glass surfaces for increased security protection, to improve resistance to glass breakage.

**1.2                REFERENCES**

- .1    American National Standards Institute (ANSI)
  - .1    ANSI Z97.1-1984(R1994), Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.
- .2    International Window Film Association (IWFA)
  - .1    IWFA Visual Quality Standard for Applied Window Film 1999.
- .3    Consumer Product Safety Commission Publications (CPSC)/Code of Federal Regulations (CFR)
  - .1    CPSC, 16 CFR 1201 CAT II.
- .4    General Services Administration (GSA)
  - .1    GSA-TS01-2003, Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.
- .5    Government of Canada
  - .1    Canada Labour Code, WHMIS datasheets.

**1.3                DEFINITIONS**

- .1    Safety: reduction of risk of injury, loss or death of persons due to accidental, natural or unintentional causes.
- .2    Security: reduction of risk of injury, loss or death of persons due to intentional actions of others.
- .3    Security and Safety Film Types:
  - .1    Type 1 Safety: areas of concern related to common residential or light commercial accidents.
  - .2    Type 2 Safety / Security / Seismic: areas of concern related to seismographic upgrade, low end smash and grab break and entry and over pressure due to violent weather.
  - .3    Type 3 Security / Blast: areas of concern related to bomb blasts.

**1.4                ACTION AND INFORMATIONAL SUBMITTALS**

- .1    Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2    Product Data: submit WHMIS MSDS - Material Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.

- .3 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit one 500 x 500 mm sample of film installed on 6 mm thick clear plate glass.
- .5 Submit test reports in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Submit test reports from approved independent testing laboratory, certifying film's compliance with specified requirements.
- .6 Submit Closeout Submittals in accordance with Section 01 78 00 - Closeout Submittals.
  - .1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
  - .2 Follow manufacturers written instructions for care and maintenance of security and safety film.
  - .3 Use only cleaning solution recommended by manufacturer for regularly scheduled cleaning of security film.

## **1.5 QUALITY ASSURANCE**

- .1 Health and Safety:
  - .1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Canada Labour Code.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with section 01 61 00 - Common Product Requirements.
- .2 Provide and maintain dry, off-ground weatherproof storage.
- .3 Store rolls of film flat on cross supports. Do not stand rolls of film on end.
- .4 Remove from storage, in quantities required for same day use.
- .5 Store materials in accordance with manufacturers written instructions.
- .6 Waste Management and Disposal:
  - .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal, and with Waste Reduction Workplan.
  - .2 Place materials defined as hazardous or toxic waste in designated containers.
  - .3 Ensure emptied containers are sealed and stored safely.

## **1.7 WARRANTY**

- .1 Work of this Section 08 87 53 - Security Films 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to 10 years.
- .2 Ensure warranty includes items as follows:

- .1 Maintaining adhesion properties without blistering, bubbling or delaminating from glass surface.
- .2 Maintaining appearance without discolouration.
- .3 Removing, replace and reapply defective materials.
- .4 In event of product failure under warranty terms, remove and re-apply film without glass replacement at no cost to Departmental Representative.

## **1.8 MAINTENANCE DATA**

- .1 Provide operation and maintenance data for window film for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Security Film - General: optically clear polyester film, abrasion resistant coating and release liner.
  - .1 Type 3 Security/Blast Film:
    - .1 Testing in accordance with GSA-TS01, ANSI Z97.1, and CPSC 16 CFR 1201 CAT II.
    - .2 Thickness: 0.15 mm.

### **2.2 FABRICATION**

- .1 Shop installation of security film to glass panels:
  - .1 Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.
  - .2 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems.
  - .3 View glass from 2.0 m minimum. Report findings to Departmental Representative.
  - .4 Proceed with Work only after receipt of written approval from Departmental Representative.
    - .1 Install security film to glass panels ensuring no blisters, bubbles, scratches, edge defects or distortions.
    - .2 Cut film edges straight and square to within 3 mm of edge of panel.
    - .3 Deliver glass panels complete with security film installed and labels intact and legible to site in accordance with section 01 61 00 - Common Product Requirements.

**Part 3            Execution**

**3.1                INSTALLER'S INSPECTION**

- .1        Visual Inspection: in accordance with IWFA - Visual Quality Standard for Applied Window Film.
- .2        Remove and replace window unit that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2.0 m minimum after 30 day period.

**3.2                FINAL CLEANING**

- .1        Wash interior and exterior of each window and film using cleaning solution recommended by film manufacturer.

**3.3                SCHEDULE**

- .1        Install security film on all new main floor exterior windows.

**END OF SECTION**