

**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 ASTM B29-[03], Standard Specification for Refined Lead.
  - .3 ASTM B749-[03], Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
- .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-[99], Standard for Fire Doors and Fire Windows.
  - .2 NFPA 252-[03], Standard Methods of Fire Tests of Door Assemblies.
- .6 South Coast Air Quality Management District (SCAQMD), California State
  - .1 SCAQMD Rule 1113-[04], Architectural Coatings.
  - .2 SCAQMD Rule 1168-[05], Adhesives and Sealants Applications.
- .7 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-[01], Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - .2 CAN/ULC-S702-[97], Standard for Thermal Insulation, Mineral Fibre, for Buildings.
  - .3 CAN/ULC-S704-[03], Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
  - .4 CAN4-S104-[M80], Standard Method for Fire Tests of Door Assemblies.
  - .5 CAN4-S105-[M85], Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

**1.2 SYSTEM DESCRIPTION**

- .1 Design door assembly to withstand minimum 1,000,000 swing cycles in accordance with ANSI A151.1, with no failure of any design features of the door.

- .2 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to 35°C.
- .3 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.
- .4 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 and NFPA 252 for ratings specified or indicated.
- .5 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with CAN4-S104 and NFPA 252 and listed by nationally recognized agency having factory inspection services and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

### **1.3 SUBMITTALS**

- .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, louvred, arrangement of hardware and fire rating and finishes.
- .2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing firerating and finishes.
- .3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
- .4 Submit one 300 x 300 mm top corner sample of each type door.

### **1.4 QUALITY ASSURANCE**

- .1 Conform to requirements of CSDFMA SDI-100 and ANSI A117.1.
- .2 Company specializing in manufacturing products specified with a minimum of five (5) years documented experience.

### **1.5 PROJECT CONDITIONS**

- .1 Coordinate the Work with frame opening construction, door, and hardware installation. Contractor to Site verify all rough openings prior to fabrication.
- .2 Sequence installation to ensure wire connections are achieved in an orderly and expeditious manner.

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

- .1 Deliver, store, handle and protect doors and frames in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver, handle and store doors and frames at the job Site in such a manner as to prevent damage.
- .3 Store doors and frames under cover with doors stored in a vertical position on blocking, clear of floor and with blocking between doors to permit air circulation.

**1.7 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaning and Waste Management.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away for public.
- .4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.
- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.

**1.8 WARRANTY**

- .1 Provide a written warranty for Work of this section from manufacturer for failure due to defective materials and from Contractor for failure due to defective installation Workmanship, for one (1) year respectively.

**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.
- .3 Cast or rolled pure sheet lead: to ASTM B29.
- .4 Composites: balance of core materials used in conjunction with lead: in accordance with manufacturers' proprietary design.

**2.2 DOOR CORE MATERIALS**

- .1 Stiffened: face sheets welded insulated core.
  - .1 Expanded polystyrene: CAN/ULC-S701, density 16 to 32 kg/m<sup>3</sup>.
  - .2 Polyurethane: to CAN/ULC-S704 rigid, modified polyisocyanurate, closed cell board. Density 32 kg/m<sup>3</sup>.
- .2 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250°C at 60 minutes. Core to be tested as part of a complete door assembly, in accordance with CAN4-S104, ASTM E152 or NFPA 252, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having factory inspection service.
- .3 Thermal Insulation material must:
  - .1 Not require being labelled as poisonous, corrosive, flammable or explosive under the Consumer Chemical and Container Regulations of the Hazardous Products Act.
  - .2 Be manufactured using a process that uses chemical compounds with the minimum zone depletion potential (ODP) available.

## **2.3 ADHESIVES**

- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
  - .1 Adhesive: maximum VOC content to SCAQMD Rule 1168.
- .2 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.
- .3 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

## **2.4 PRIMER**

- .1 Touch-up prime CAN/CGSB-1.181.
  - .1 Maximum VOC limit to SCAQMD Rule 1168.

## **2.5 PAINT**

- .1 Field paint steel doors and frames in accordance with Sections 09 91 13 - Exterior Painting and 09 91 23 - Interior Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.
  - .1 Maximum VOC emission level to SCAQMD Rule 1168.

## **2.6 ACCESSORIES**

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Exterior top and bottom caps steel.
- .3 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.
- .4 Door bottom seal: Refer to Hardware Schedule in Drawings.
- .5 Metallic paste filler: to manufacturer's standard.
- .6 Fire labels: metal riveted.
- .7 Sealant: Section 07 92 00 – Joint Sealants.
- .8 Provide low expanding, single component polyurethane foam sealant installed at head and jamb perimeter of door frame for sealing to building air barrier, vapour retarder and door frame. Foam sealant width to be adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder foam interior. Refer to Section 07 21 20 – Low Expanding Foam Sealant.
- .9 Make provisions for glazing as indicated and provide necessary glazing stops.
  - .1 Provide removable stainless steel glazing beads for dry glazing of snap-on type.
  - .2 Design exterior glazing stops to be tamperproof.
- .10 Finish Painting: to Section 09 91 13 – Exterior Painting and Section 09 91 23 – Interior Painting.

## **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 Minimum 14 gauge pressed metal, thermally broken, welded construction.
- .4 Interior Frames:
  - .1 Minimum 14 gauge pressed metal, welded construction.
- .5 Blank, reinforce, drill and tap frames for mortised, templated hardware, and 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. Fabricate frames as welded unit. Welding in accordance with CSA W59.
- .12 Mullions for Double Doors: Fixed type, of same profiles as jambs.
- .13 Transom Bars for Glazed Lights: Fixed type, of same profiles as jamb and head.
- .14 Reinforce frames wider than 1200 mm inches with roll formed steel channels fitted tightly into frame head, flush with top.
- .15 Prepare frames for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.
- .16 Attach fire rated label to each fire rated door unit.
- .17 Attach channel spreaders at bottom of frames for shipping.

## **2.8 FRAME ANCHORAGE**

- .1 Shim and anchor new doors in accordance with CAN/CSA A440.4.
- .2 Provide appropriate anchorage to floor and wall construction.
- .3 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .4 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.

- .5 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm o.c. 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 All metal doors to be minimum 16 gauge with welded seams.
- .2 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.
- .3 Exterior doors: insulated, hollow steel construction. Interior doors: honeycomb hollow steel construction.
- .4 Fabricate doors with longitudinal edges locked seam. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
- .5 Doors: manufacturers' proprietary construction, tested and/or engineered as part of a fully operable assembly, including door, frame, gasketing and hardware in accordance with ASTM E330.
- .6 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.
- .7 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on Site, at time of hardware installation.
- .8 Reinforce doors where required, for surface mounted hardware. Provide flush steel top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.
- .9 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .10 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in strict conformance with CAN4-S104 ASTM E152 NFPA 252 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.

- .11 Manufacturer's nameplates on doors are not permitted.

## **2.11 DOORS TYPES**

- .1 Refer to Door and Door Frame Schedule in drawings for further information.

## **2.12 HOLLOW STEEL CONSTRUCTION**

- .1 Form each face sheet for exterior doors from 16 gauge sheet steel.
- .2 Form each face sheet for interior doors from 16 gauge steel.
- .3 Reinforce doors with vertical stiffeners, securely welded to each face sheet at 150 mm on centre maximum.
- .4 Fill voids between stiffeners of exterior doors with polystyrene core.
- .5 Fill voids between stiffeners of interior doors with honeycomb 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 polyvinyl chloride 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 barrier and vapour retarder.

### **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 as follows.
  - .1 Hinge side: 1.0 mm.
  - .2 Latch side and head: 1.5 mm.
  - .3 Finished floor: 13 mm.
- .3 Adjust door for smooth and balanced door movement.
- .4 Install louvres.

### **3.5 FINISH REPAIRS**

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

### **3.6 GLAZING**

- .1 Install glazing for doors and frames in accordance with Section 08 80 00 - Glazing.

### **3.3 ERECTION TOLERANCES**

- .1 Maximum Diagonal Distortion: 1.5 nun inch measured with straight edges, crossed corner to corner.
- .2 Clearance on steel doors at head and jambs shall be 3mm maximum, and 3mm maximum between pairs of doors.

### **3.7 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**



**Part 1            General**

**1.1                REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .2 ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
  - .3 ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
  - .4 ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- .2 American National Standards Institute (ANSI)
  - .1 ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.
- .3 The Association of Electrical Equipment and Medical Imaging Manufacturers (NEMA)
  - .1 NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
  - .2 NEMA MG 1 - Motors and Generators.

**1.2                DESIGN / PERFORMANCE REQUIREMENTS**

- .1 Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
- .2 Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

**1.3                SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Manufacturer's data sheets on each product to be used, including:
  - .1 Preparation instructions and recommendations.
  - .2 Storage and handling requirements and recommendations.
  - .3 Installation methods.
- .3 Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- .4 Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- .5 Operation and Maintenance Data.

#### **1.4 QUALITY ASSURANCE**

- .1 Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- .2 Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- .3 Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Store products in manufacturer's unopened packaging until ready for installation.
- .2 Protect materials from exposure to moisture. Do not deliver until after wet Work is complete and dry.
- .3 Store materials in a dry, warm, ventilated weathertight location.

#### **1.6 PROJECT CONDITIONS**

- .1 Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this Work with related and adjacent Work.

#### **1.7 COORDINATION**

Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

#### **1.8 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaning and Waste Management.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away for public.
- .4 Use chemical hardeners that are non-toxic, biodegradable and have zero or low VOC's.
- .5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.

#### **1.9 WARRANTY**

- .1 Warranty: Manufacturer's limited door and operators System warranty for 10 year against delamination of polyurethane foam from steel face and all other components for 3 years or 20,000 cycles, whichever comes first.

**Part 2 Products**

**2.1 ACCEPTABLE MANUFACTURERS**

- .1 C.H.I. Overhead Doors, 1496 Sunrise Drive, Arthur, Illinois, 61911, (Tel) 1-800-677-2650. (or approved equal in accordance with B7).

**2.2 SECTIONAL OVERHEAD DOORS**

- .1 Steel Sectional Overhead Doors: Model 3250 Ribbed Steel Commercial Door (or approved equal in accordance with B7). Units shall have the following characteristics:
  - .1 Door Sections:
    - .1 Panels: 24 inches (610 mm) high by width of door.
    - .2 Panel Material:
      - .1 25-gauge hot-dip galvanized steel.
      - .2 Exterior: White polyester primer and topcoat.
      - .3 Interior: Gray polyester primer and topcoat.
    - .3 Section Thickness: 2 inches (51 mm).
    - .4 Panel Profile: Horizontal ribs with alternating 'v' grooves.
    - .5 End Stiles: Wrap-around box style, 18 gauge galvanized steel, full height of section, riveted to inside rails and face of door.
    - .6 Centre Stiles: Box style, 18 gauge galvanized steel, full height of section, riveted to inside rails and face of door.
  - .2 Tracks:
    - .1 2 inch (51 mm), 14 gauge galvanized steel.
    - .2 Tracks to be mounted with track brackets, clip mount angle or continuous jamb angle.
    - .3 Lower tracks to be adjustable for weather tightness.
    - .4 Horizontal tracks to be reinforce with min 13 gauge angle to suit door size and weight.
  - .3 Hardware:
    - .1 Graduated galvanized steel heavy duty min 14 gauge hinges, min 12 gauge fixtures, and min 13 gauge bottom fixtures. Ball bearing rollers with case-hardened steel tire on solid steel shaft.
  - .4 Spring Counterbalance: Oil tempered torsion springs mounted on a cross-header shaft supported by galvanized steel ball bearing end plates and centre bracket(s). Spring to be designed for exact door size, weight, and trajectory in accordance to ANSI 102 to a minimum of 10,000 cycles. Counterbalance is transferred through galvanized aircraft quality cables secured to bottom of door.
  - .5 Trussing: Galvanized trussing to suit door design.
  - .6 Weather Seal:
    - .1 Double contact heavy duty vinyl floor seal full width of door.
    - .2 Heavy duty head seal full width of door.
    - .3 Heavy duty jamb seals full height of door.
  - .7 Locking:
    - .1 Exterior centre lock with double lock bar lock.
    - .2 Provide interlock to electric operator.
  - .8 Powered Operation:
    - .1 Liftmaster Model MT-50 Medium Duty Trolley Operator (or approved equal in accordance with B7).

## **2.3 SUBSTITUTIONS**

- .1 Refer to Section B7 – Substitutes of Bid Opportunity 668-2017.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Do not begin installation until openings have been properly prepared.
- .2 Verify opening sizes, tolerances and conditions are acceptable.
- .3 Examine conditions of substrates, supports, and other conditions under which this Work is to be performed.
- .4 If substrate preparation is the responsibility of another installer, notify Contract Administrator of unsatisfactory preparation before proceeding.

### **3.2 PREPARATION**

- .1 Clean surfaces thoroughly prior to installation.
- .2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions

### **3.3 INSTALLATION**

- .1 Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- .2 Coordinate installation with adjacent Work to ensure proper clearances and allow for maintenance.
- .3 Anchor assembly to wall construction and building framing without distortion or stress.
- .4 Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- .5 Fit and align door assembly including hardware.
- .6 Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

### **3.4 CLEANING AND ADJUSTING**

- .1 Adjust door assembly to smooth operation and in full contact with weatherstripping.
- .2 Clean doors, frames and glass.
- .3 Remove temporary labels and visible markings.

### **3.5 PROTECTION**

- .1 Do not permit construction traffic through overhead door openings after adjustment and cleaning.

- .2 Protect installed products until completion of project.
- .3 Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 Aluminum Association (AA), Designation System for Aluminum Finishes (2000)
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.40-[97], Anticorrosive Structural Steel Alkyd Primer.
  - .2 CAN/CGSB-79.1-[M91], Insect Screens.
- .3 Canadian Standards Association (CSA) International
  - .1 CSA-A440-[00]/A440.1-[00], A440-[00], Windows / Special Publication A440.1-[00], User Selection Guide to CSA Standard A440-[00], Windows.
  - .2 CAN/CSA-G164-[M92(R1998)], Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CAN/CSA-Z91-[M90(R2000)], Safety Code for Window Cleaning Operations.

**1.2 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim, junction between combination units elevations of unit, anchorage details, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.

**1.3 SAMPLES**

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit one representative model of each type window.
- .3 Include frame, sash, sill, glazing and weatherproofing method, insect screens, surface finish and hardware. Show location of manufacturer's nameplates.
- .4 Include 150 mm long samples of head, jamb, sill, meeting rail, mullions to indicate profile.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaning and Waste Management.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material for recycling in accordance with Waste Management Plan.
- .4 Unused or damaged glazing materials are not recyclable and must not be diverted to municipal recycling programs.
- .5 Divert unused or damaged wood materials from landfill to recycling facility approved by Contract Administrator.

- .6 Divert unused metal materials from landfill to metal recycling facility approved by Contract Administrator.
- .7 Divert unused caulking material from landfill to official hazardous material collections site approved by Contract Administrator.
- .8 Plastic caulking tubes are not recyclable and must not be diverted for recycling with other plastic materials.

## **1.5 TEST REPORTS**

- .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications, for:
  - .1 Windows classifications
  - .2 Air tightness
  - .3 Water tightness
  - .4 Wind load resistance
  - .5 Condensation resistance
  - .6 Forced entry resistance
  - .7 Insect screens
  - .8 Glazing
  - .9 Safety drop - vertical sliding windows only
  - .10 Ease of operation - windows with operable lights
  - .11 Sash pull-off - fiberglass windows

## **1.6 WARRANTY**

- .1 Provide a written warranty for work under this Section from Manufacturer for failure due to defective materials and from Contractor for failure due to defective installation, workmanship for ten (10) years respectively.

## **1.7 CLOSEOUT SUBMITTALS**

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

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Materials: to CSA-A440/A440.1 supplemented as follows:
- .2 All fiberglass windows by same manufacturer.
- .3 Sash: Pultruded, fibreglass, nominal wall thickness 2.3 mm, thermally broken.
- .4 Main frame: pultruded, fibreglass, nominal wall thickness 2.3 mm.
- .5 Glass: in accordance with Section 08 80 00 - Glazing.

## **2.2 WINDOW TYPES AND CLASSIFICATION**

- .1 Windows:
  - .1 Fixed sash fibreglass windows: with insulating glass
  - .2 To: A440-05.
- .2 Classification Rating: to CSA-A440/A440.1.
  - .1 Air Leakage: A3
  - .2 Water Leakage: B6
  - .3 Wind Load Resistance: C3
  - .4 Condensation Resistance: Temperature index I55
  - .5 Forced Entry: F
  - .6 Glazing: G
- .3 Energy ratings: windows to be Energy Star certified to Canadian Standards Association for Manitoba.
- .4 Windows schedule: refer to drawings for window schedule information.

## **2.3 FABRICATION**

- .1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
- .2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3.0 mm for units with a diagonal measurement over 1800 mm.
- .3 Face dimensions detailed are maximum permissible sizes.
- .4 Brace frames to maintain squareness and rigidity during shipment and installation.

## **2.4 FIBERGLASS FINISHES**

- .1 Fibreglass finish: durable isocyanate-free two part polymer enamel with minimum dry film thickness of 0.038 mm and medium gloss of 25-40, conforming to AAMA 613, Organic Coatings.

## **2.5 GLAZING**

- .1 Glaze windows in accordance with CSA-A440/A440.1 and Section 08 80 00 - Glazing.

## **2.6 AIR BARRIER AND VAPOUR RETARDER**

- .1 Equip window frames with factory / site installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
  - .1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
  - .2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.



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**Part 3 Execution**

**3.1 WINDOW INSTALLATION**

- .1 Install in accordance with CSA-A440/A440.1.
- .2 Arrange components to prevent abrupt variation in colour.
- .3 Install shims between windows and building frame at each installation screw location. Shim and fasten windows in accordance with manufacturer's recommendations and CAN/CSA A440.4.

**3.2 CAULKING**

- .1 Seal joints between windows and building with sealant. Apply sealant in accordance with Section 07 92 10 - Joint Sealing. Conceal sealant within window units except where exposed use is permitted by Contract Administrator.
- .2 Apply sealant in accordance with Section 07 92 00 - Joint Sealing. Conceal sealant within window units except where exposed use is permitted by Contract Administrator.

**3.3 CLEANING**

- .1 Leave work area free of all surplus materials, packing, and debris.

**END OF SECTION**

**Part 1 General**

**1.1 REFERENCES**

- .1 AN ANSI/ASTM E330- 02, Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- .2 American National Standards Institute (ANSI).
  - .1 ANSI/ASTM E330-[02], Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .3 American Society for Testing and Materials International, (ASTM).
  - .1 ASTM C542-[94(1999)], Specification for Lock-Strip Gaskets.
  - .2 ASTM D790-[02], Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - .3 ASTM D1003-[00], Test Method for Haze and Luminous Transmittance of Plastics.
  - .4 ASTM D1929-[96(R2001)e1], Test Method for Determining Ignition Temperature of Plastics.
  - .5 ASTM D2240-[02b], Test Method for Rubber Property - Durometer Hardness.
  - .6 ASTM E84-[01], Test Method for Surface Burning Characteristics of Building Materials.
  - .7 ASTM F1233-[98], Test Method for Security Glazing Materials and Systems.
- .4 Canadian General Standards Board (CGSB).
  - .1 CAN/CGSB-12.1-[M90], Tempered or Laminated Safety Glass.
  - .2 CAN/CGSB-12.2-[M91], Flat, Clear Sheet Glass.
  - .3 CAN/CGSB-12.3-[M91], Flat, Clear Float Glass.
  - .4 CAN/CGSB-12.4-[M91], Heat Absorbing Glass.
  - .5 CAN/CGSB-12.5-[M86], Mirrors, Silvered.
  - .6 CAN/CGSB-12.6-[M91], Transparent (One-Way) Mirrors.
  - .7 CAN/CGSB-12.8-[97], Insulating Glass Units.
  - .8 CAN/CGSB-12.9-[M91], Spandrel Glass.
  - .9 CAN/CGSB-12.10-[M76], Glass, Light and Heat Reflecting.
  - .10 CAN/CGSB-12.11-[M90], Wired Safety Glass.
  - .11 CAN/CGSB-12.12-[M90], Plastic Safety Glazing.
  - .12 CAN/CGSB-12.13-[M91], Patterned Glass.
- .5 Canadian Standards Association (CSA International).
  - .1 CSA A440.2-[98], Energy Performance Evaluation of Windows and Sliding Glass Doors.
  - .2 CSA Certification Program for Windows and Doors [2000].
- .6 Environmental Choice Program (ECP).
  - .1 CCD-045-[95], Sealants and Caulking.
- .7 Flat Glass Manufacturers Association (FGMA).

- .1 FGMA Glazing Manual - [1997].
- .8 Laminators Safety Glass Association (LSGA).
  - .1 LSGA Laminated Glass Design Guide [2000].

## **1.2 SYSTEM DESCRIPTION**

- .1 Performance Requirements: Provide 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 in accordance with ASTM E 300-97el..
  - .3 Limit glass deflection to 1/200 with full recovery of glazing materials.

## **1.3 SUBMITTALS**

- .1 Product Data: Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings: Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Manufacturer's Instructions: Submit manufacturer's installation instructions.
- .4 Closeout Submittals: Provide maintenance data including cleaning instructions for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

## **1.4 QUALITY ASSURANCE**

- .1 Perform work in accordance with FGMA Glazing Manual IGMAC and Laminators Safety Glass Association – Standards Manual for glazing installation methods. Provide shop inspection and testing for glass.
- .3 Provide certificate of quality compliance from manufacturer.

## **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 00 – Cleaning and Waste Management.

## **1.6 WARRANTY**

- .1 Provide ten (10) year warranty for glazing units.

## **1.7 ENVIRONMENTAL REQUIREMENTS**

- .1 Install glazing when ambient temperature is 10°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.

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**Part 2 Products**

**2.1 GLASS MATERIALS**

- .1 Float Glass: to CAN/CGSB-12.3, Glazing quality, 6mm thick
- .2 Exterior Insulating Sealed Glass Units (EGU): to CAN/CGSB-12.8.
- .3 Spandrel glass: to Section 08 81 00 – Spandrel Glazing.
- .4 Safety glass: to CAN/CGSB-12.5, Type 1, 2 layers of 6 mm thick glass, laminated (12 mm total thickness) and Type 2, 6mm thick tempered.
- .5 Wired Glass: to CAN/CGSB-12.11, Type 1, wired mesh style 3, 6mm thick
- .6 Mirrors: to CAN/CGSB-12.5, silvered, Type A, 6mm thick, unframed, ground and polished edges, of sizes as indicated.
- .7 Glass for cabinet and millwork: to CAN/CGSB-12.5, transparent, minimum 4.0 mm thick, unless otherwise indicated. Type 2 - Tempered.

**2.2 SEALED INSULATING GLASS**

- .1 Exterior Units:
  - .1 Single-glazed Window Glazing:
    - .1 Center-glazing board: 13mm Type 1 safety glass (2 layers of 6mm – laminated)
    - .2 Light transmittance: minimum 0.70
  - .2 Double-glazed Window Glazing:
    - .1 Outer board: 13 mm Type 1 safety glass (2 layers of 6mm - laminated)
    - .2 Inter-cavity space thickness: 13 mm.
    - .3 Inner Board: 6 mm float glazing
    - .4 Light transmittance: minimum 0.70.

**2.3 SEALANT MATERIALS**

- .1 Sealant: one component compound, to CAN/CGSB-19.13, Class 2-40, neutral cure silicone gun grade, colour to match adjacent surfaces.

**2.4 ACCESSORIES**

- .1 Setting blocks: Neoprene, 80-90 Shore A durometer hardness to ASTM D2240, length of 25 mm for each square meter of glazing, minimum 100 mm x width of glazing rabbet space minus 1.5 mm x height, to suit glazing method, glass light weight and area.
- .2 Spacer shims: Neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.
- .3 Glazing tape:
  - .1 Preformed butyl compound 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; size to suit application; black colour.

- .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.
- .4 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, colour as selected.
- .5 Glazing clips: manufacturer's standard type.
- .6 Lock-strip gaskets: to ASTM C542.
- .7 Polyester Glazing film:
  - .1 Acceptable Manufacturer: 3M
  - .2 Acceptable Product: 3M Fasara Glass Finishes – Milky White
  - .3 Locations: Refer to window schedule for locations.
- .8 Mirror attachment accessories:
  - .1 Stainless steel clips.
  - .2 Plastic rosettes.
  - .3 Mirror adhesive, chemically compatible with mirror coating and wall substrate.
  - .4 Mirror frame

### **Part 3 Execution**

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

- .1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

#### **3.2 EXAMINATION**

- .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.

#### **3.3 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.
- .4 Install Sealant according to Manufacturer's instructions.

#### **3.4 INSTALLATION TEMPERED GLASS**

- .1 Install tempered glass with horizontal tempering, that is, with tempered distortion parallel with floor.

**3.5 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)**

- .1 Perform work in accordance with FGMA Glazing Manual, IGMAC and Laminators Safety Glass Association - Standards Manual for glazing installation methods.
- .2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.
- .3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.
- .4 Place setting blocks at  $\frac{1}{4}$  points, with edge block maximum 150 mm from corners.
- .5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.
- .6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line. Place glazing tape on glazing light or unit with tape flush with 16 mm below sight line.
- .7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.
- .8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

**3.6 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)**

- .1 Perform work in accordance with FGMA Glazing Manual, IGMAC, and Laminators Safety Glass Association - Standards 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  $\frac{1}{4}$  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.

**3.7 INSTALLATION: MIRRORS**

- .1 Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.
- .2 Set mirrors with clips. Anchor rigidly to wall construction.
- .3 Set in frame.

- .4 Place plumb and level.

**3.8 INSTALLATION: GLAZING 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.

**3.9 CLEANING**

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt. Remove traces of primer, caulking.
- .2 Remove glazing materials from finish surfaces.
- .3 Remove labels after work is complete.
- .4 Clean glass using approved non-abrasive cleaner in accordance with manufacture's instructions.
- .5 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**3.10 PROTECTION OF FINISHED WORK**

- .1 After installation, mark light with an "X" by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

**END OF SECTION**