

## **Part 1            General**

### **1.1                REFERENCES**

- .1    CSA International
  - .1    CAN/CSA-A165 SERIES-04(R2009), CSA Standards on Concrete Masonry Units covers: A165.1, A165.2, A165.3.
  - .2    CAN/CSA-A179-04(R2009), Mortar and Grout for Unit Masonry.
  - .3    CAN/CSA-A370-04(R2009), Connectors for Masonry.
  - .4    CAN/CSA A371-04(R2009), Masonry Construction for Buildings.
  - .5    CSA S304.1-[04(R2009)], Design of Masonry Structures.
- .2    Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1    Material Safety Data Sheets (MSDS).

### **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 masonry products and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2    Submit copies of WHMIS MSDS in accordance with Section 01 35 43 - Environmental Procedures.
    - .1    Indicate VOC's in g/L for epoxy coatings and galvanized protective coatings and touch-up products to be applied within building envelope.
- .3    Shop Drawings:
  - .1    Submit drawings stamped and signed by professional engineer registered or licensed in Province of Saskatchewan, Canada.
  - .2    Shop drawings consist of bar bending details, lists and placing drawings.
  - .3    Placing drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

### **1.3                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 masonry products from nicks, scratches, and blemishes.

- .3 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.

## **Part 2 Products**

### **2.1 MASONRY UNITS**

- .1 Standard concrete block units: to CAN/CSA-A165 Series (CAN/CSA-A165.1).
  - .1 Classification: H/ 15/ C/ M.
  - .2 Size: modular.

### **2.2 REINFORCEMENT AND CONNECTORS**

- .1 Bar reinforcement: to CAN/CSA-A371, Grade 400.
- .2 Wire reinforcement: to CAN/CSA-A371, truss type.
- .3 Connectors shall be corrosion resistant: to CAN/CSA-A370.

### **2.3 MORTAR AND GROUT**

- .1 Mortar: to CAN/CSA-A179.
  - .1 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
  - .2 Mortar Type: S based on property specifications,
  - .3 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M based on property specifications.
  - .4 Following applies regardless of mortar types and uses specified above:
    - .1 Mortar for grouted reinforced masonry: type S based on property specifications.
  - .5 Grout: to CAN/CSA-A179, Table 3.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 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 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.
  - .1 Bond: running stretcher bond with vertical joints in perpendicular alignment and centred on adjacent stretchers above and below.
  - .2 Coursing height: 200 mm for one block and one joint.
  - .3 Jointing: tool where exposed or where paint or other finish coating is specified to provide smooth compressed concave surface.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

### 3.3 CONSTRUCTION

- .1 Exposed masonry:
  - .1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units.
  - .2 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects. Make cuts straight, clean, and free from uneven edges.
- .2 Building-in:
  - .1 Install masonry connectors and reinforcement where indicated on drawings.
  - .2 Build in items required to be built into masonry.
  - .3 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
  - .4 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
  - .5 Install loose steel lintels over openings where indicated.
- .3 Support of loads:
  - .1 Use 20 MPa concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units.
  - .2 Use grout to CAN/CSA-A179 where grout is used in lieu of solid units.
  - .3 Install building paper below voids to be filled with concrete; keep paper 25 mm back from faces of units.
- .4 Provision for movement:
  - .1 Leave 3 mm space below shelf angles.
  - .2 Leave 6 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
  - .3 Built masonry to tie in with stabilizers, with provision for vertical movement.
- .5 Interface with other work:
  - .1 Cut openings in existing work as indicated.
  - .2 Openings in walls: approved Departmental Representative.
  - .3 Make good existing work. Use materials to match existing.

### **3.4 REINFORCING AND CONNECTING**

- .1 Install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371 and CSA S304.1 unless indicated otherwise.
- .2 Prior to placing concrete or grout, obtain Departmental Representative's approval of placement of reinforcement and connectors.

### **3.5 GROUTING**

- .1 Grout masonry in accordance with CAN/CSA-A179, CAN/CSA-A371 and CSA S304.1 and as required to match existing.

### **3.6 SITE TOLERANCES**

- .1 Tolerances of CAN/CSA-A371 apply.

### **3.7 FIELD QUALITY CONTROL**

- .1 Inspection and testing will be carried out by Testing Laboratory designated by Departmental Representative.

### **3.8 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 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.

### **3.9 PROTECTION**

- .1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.
- .2 Repair damage to adjacent materials caused by masonry products installation.

**END OF SECTION**

**Part 1            General**

**1.1                REFERENCES**

- .1    ASTM International
  - .1        ASTM A123/A123M-2012, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .2        ASTM A153/A153M-09, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- .2    CSA Group
  - .1        CAN/CSA-A179-04(R2009), Mortar and Grout for Unit Masonry.

**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 glass unit masonry and include product characteristics, performance criteria, physical size, finish and limitations.

**1.3                QUALITY ASSURANCE**

- .1    Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2    Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3    Mock-ups:
  - .1        Construct mock-ups in accordance with Section 01 45 00 - Quality Control and requirements of Section 04 05 00 - Common Work Results for Masonry.
    - .1            Construct mock-up panel of exterior glass wall construction: two full rows of blocks.

**1.4                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        Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2        Store and protect glass unit masonry from nicks, scratches, and blemishes.

- .3 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.

## **1.5 SITE CONDITIONS**

- .1 Ambient Conditions: assemble and erect components when temperature is above 4 degrees C.
- .2 Field Measurements:
  - .1 Make field measurements necessary to ensure proper fit of all members.

## **Part 2 Products**

### **2.1 SYSTEM DESCRIPTION**

- .1 Glass block panels not to be designed to support structural loads.
- .2 Provide for expansion and movement at jambs and heads of panels. Do not bridge expansion spaces with mortar.
- .3 Design and install glass block projects by whole units since cutting glass block is not recommended.

### **2.2 MANUFACTURED UNITS**

- .1 Hollow glass block: thick-faced, with joint key for mortar bond.
  - .1 Pattern and design: transparent.
  - .2 Outer surfaces: smooth.
  - .3 Inner surfaces: multi-directional wavy.
  - .4 Colour: clear glass.
  - .5 Edge coating colour: manufacturer's standard translucent polyvinyl-butylal edge coating.
  - .6 Nominal sizes:
    - .1 Square units: 200 mm square x 100 mm thick.
  - .7 Inserts: white fibrous glass.
  - .8 Partial vacuum unit cores.
  - .9 Insulation value: Thermal Conductance value of 2.9 W/m<sup>2</sup> degrees C.
  - .10 Visible light transmittance: minimum 72%.
  - .11 Shading coefficient: .41.
  - .12 Compressive strength: 2.8 kPa to 7.4 kPa.
  - .13 Sound Transmission Class: 37 STC.

### **2.3 ACCESSORIES**

- .1 Mortar: as specified in Section 04 05 12 - Masonry Mortar and Grout.

- .2 Expansion strips: 100 mm wide x 10 mm thick, continuous semi-rigid glass fibre, in accordance with recommendations of glass unit manufacturer.
- .3 Panel reinforcing: two parallel 3.8 mm thick wire 40 mm on centre, with electrically butt welded cross-wired spaced at regular intervals, and hot-dip galvanized after fabrication to ASTM A123/A123M.
- .4 Sealant: non-staining, waterproof mastic, silicone, apply sealant 24 hours after glass unit masonry installation.
- .5 Sealant backing: polyethylene foam or equal as approved by sealant manufacturer.
- .6 Bond breaker: Polyethylene bond breaker tape which will not bond to sealant..
- .7 Sealant primer: non-staining type recommended by sealant manufacturer.
- .8 Fasteners: steel, 6 mm minimum diameter, galvanized to ASTM A153/A153M, and as follows:
  - .1 To metal: self-drilling, self-tapping screws.
  - .2 To concrete and masonry: self-drilling, compression type insert, or self-tapping type screws for pre-drilled holes.
  - .3 To wood: wood screws.
- .9 Spacers: plastic, concealed type, allowing pointing mortar and placing reinforcing and panel anchors without obstruction, of size to provide horizontal and vertical joint width indicated, capable of supporting glass units until mortar set, incorporated into structural design of glass unit masonry.
- .10 Galvanized Steel Angles: to Section 05 50 00 – Metal Fabrications.

## **2.4 SOURCE QUALITY CONTROL**

- .1 Ensure glass block, components and materials are from single manufacturer.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for glass unit masonry installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Examine openings to receive glass unit masonry. Verify correct size, location, squared and plumb and readiness to receive work of this Section.
    - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
    - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from Departmental Representative.
    - .3 Beginning of installation means acceptance of conditions.

### 3.2 PREPARATION

- .1 Ensure structure or substrate is adequate to support glass block.
- .2 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00 - Examination and Preparation.
- .3 Clean glass units of foreign substances.
- .4 Establish and protect lines, levels, and coursing.
- .5 Protect elements surrounding work of this Section from damage and disfiguration.

### 3.3 INSTALLATION

- .1 Erect glass units and accessories in accordance with manufacturer's instructions.
- .2 Install perimeter metal channels.
- .3 Install glass unit spacers to manufacturer's recommendations.
- .4 Set glass units with full bond mortar joints. Furrowing not permitted. Remove excess mortar.
- .5 Do not install glass unit when ambient temperature is below 4 degrees C. Maintain ambient temperature above 4 degrees C for 48 hours after installation.
- .6 Place units to maintain uniform joint width of 6 mm.
- .7 Install unit masonry to avoid contact of glass units with metal accessories or frames.
- .8 Isolate panel from adjacent construction on sides and top with expansion strips concealed within perimeter trim. Keep expansion joint voids clear of mortar.
- .9 Shore assembly until mortar will maintain panel in position without movement.
- .10 Joint reinforcement:
  - .1 Install reinforcement in accordance with NBC and Section 04 05 19 - Masonry Anchorage and Reinforcing, and as follows.
  - .2 Install horizontal reinforcement:
    - .1 Above first course.
    - .2 Below top course.
    - .3 To glass unit manufacturer's recommendations but not less than 406 mm centres.
    - .4 Lap joints 150 mm.
  - .3 Provide horizontal joint reinforcement at first course above and below openings within glass unit panel.
  - .4 Install reinforcement continuously from end to end of panels without bridging expansion joints. Lap minimum 150 mm.
  - .5 Embed reinforcement between two layer application of mortar bed.

### 3.4 CONSTRUCTION

- .1 Mortar Placement:

- .1 Place pointing mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout.
- .2 Set glass with full bond mortar joints. Furrowing not permitted. Remove excess mortar.
- .3 Place units to maintain uniform joint width of 6 mm.
- .2 Jointing:
  - .1 Tool joints to concave profile, exposing shoulders of glass units.
  - .2 Rake out mortar joints to depth equal to joint width and not less than 13 mm, to receive pointing mortar.
  - .3 Rake out mortar joints to half of joint width but not less than 5 mm depth, to receive joint sealant.
- .3 Application of pointing mortar.
  - .1 Neatly tool surface to a concave profile. Expose shoulders of glass units.
  - .2 Remove excess mortar while it is still plastic using a clean, wet sponge or a scrub brush with stiff bristles.
  - .3 Vacuum clean mortar joints.
- .4 Application of Sealant:
  - .1 Install sealant in accordance with Section 07 92 00 - Joint Sealants.
  - .2 Apply sealant 24 hours after glass unit masonry installation.
  - .3 Form surfaces of sealant smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Tool surface to a slight concave profile. Edges of joints to expose shoulders of glass units.
  - .4 Remove excess sealant.

### **3.5 TOLERANCES**

- .1 Tolerance for glass block unit construction in accordance with Section 04 05 00 - Common Work Results for Masonry, supplemented as follows.
  - .1 Variation from specified joint width: plus 2 mm and minimum 0 mm.
  - .2 Maximum variation from plane of unit to adjacent unit: 1 mm.
  - .3 Maximum variation from flat plane: 3 mm in 3 m, non-cumulative.

### **3.6 FIELD QUALITY CONTROL**

- .1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results.

### **3.7 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 mortar particles using clean wet sponge or cloth. Rinse sponge or cloth frequently in clean water to remove abrasive particles that could scratch glass surfaces. Allow any remaining film on block to dry to a powder.

- .3 Remove excess caulking materials with commercial solvents such as xylene and follow with normal wash and rinse. Do not damage caulking by overgenerous application of strong solvents. Comply with solvent manufacturers' printed data for toxicity and flammability warnings.
- .4 When glass block panels are completely installed and are not exposed to direct sunlight, final cleaning may be carried out. Start at top of panel and wash with generous amounts of clean water. Dry all water from glass block surface. Change cloth frequently to eliminate dried mortar particles that could scratch glass surface. Use clean, dry, soft cloth to remove the dry powder from glass surfaces.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 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.

### **3.8 PROTECTION**

- .1 Brace and protect glass block unit construction in accordance with Section 04 05 00 - Common Work Results for Masonry.
- .2 Make good damage to adjacent materials caused by glass block installation.

**END OF SECTION**