

## SECTION 04 2300 - GLASS UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes glass block set in mortar and glass block set in glass-block grid systems for Exterior and Interior locations.
  - 1. Solid glass block.
- B. Related Sections include the following:
  - 1. Division 05 5000 Section "Metal Fabrications" for steel channel frames and loose steel lintels at glass unit masonry assemblies.
  - 2. Division 07 9200 Section "Joint Sealants" for sealants installed in glass unit masonry assemblies.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide glass-block grid systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Wind Load: Uniform pressure of 30 psf, acting inward or outward.
  - 2. Floor Live Load: 100 psf.
  - 3. Roof Live Load: 30 psf.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include glass block, glass-block grid systems, cementitious materials, waterproofing admixtures for mortar, and accessories.
- B. Shop Drawings: Show fabrication and installation details for glass unit masonry, including vertical and horizontal coursing, anchors, reinforcement, and expansion strips, glass-block grid systems.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Verification: Full-size glass-block units with glass-block grid and mortar and sealant joints.
  - 1. Provide Samples for each form, pattern, and color of glass block and color of joint material and glass-block grid material indicated or selected by Architect.

## 1.5 QUALITY ASSURANCE

- A. Source Limitations for Glass Block: Obtain each type and pattern of glass block through one source from a single manufacturer.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store glass block and accessories in unopened cartons on elevated platforms, under cover, and in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation of glass unit masonry assemblies only when ambient and material temperatures are 40 deg F (5 deg C) or higher.
  - 1. Maintain temperature in installation areas at 40 deg F (5 deg C) or above for 48 hours after installing.

## 1.8 SEQUENCING AND SCHEDULING

- A. Sequence and coordinate completion of glass unit masonry assemblies so sealants can be installed immediately after mortar has attained final set.

## PART 2 - PRODUCTS

### 2.1 GLASS BLOCK

- A. Manufacturers: Provide standard and special sizes, corner units, end, and other units for a complete water-tight system.
  - 1. Manufacturers: Subject to compliance with requirements, provide the Basis of Design products by one of the manufacturers listed:
    - a. Fidenza Vetraria SpA.
    - b. Pittsburgh Corning Corp.
    - c. Mulia.
    - d. Nippon Electric Glass Co., Ltd.
    - e. Oberland Glas AG, Bauglas Division; Solaris Glasstein.
    - f. J. Weck GmbH.
    - g. Smith, L. E. Glass Company.

B. Solid Glass Block: Colorless, transparent, solid glass block faces and manufacturer's standard edge coating. The Project's glass block is based on the following:

1. Basis-of-Design – Manufacturer's Product:

- a. Manufacturer: Pittsburgh Corning Corporation.
- b. Glass Block Series: Solid VistaBrik 8" x 8" x 3"
- c. Glass Unit Sizes: Provide glass block units in sizes indicated on the Drawings and manufacturer's standard and special corners, ends, and shapes for a complete water-tight system.
- d. Glass Block Color: Clear

## 2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, natural color, white, or a blend to produce mortar color indicated.

1. Where joints are indicated to be raked out and pointed, gray cement may be used for setting mortar.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

D. Masonry Cement: ASTM C 91.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Capital Materials Corporation.
- b. Essroc.
- c. Lafarge North America Inc.
- d. Lehigh Cement Company.
- e. National Cement Company, Inc.
- f. Holcim (US) Inc.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Bayer Corporation, Industrial Chemicals Division.
- b. Davis Colors.
- c. Solomon Grind-Chem Services, Inc.

F. Aggregate: ASTM C 144, with 100 percent passing No. 8 (2.36-mm) sieve.

1. For pointing mortar and joints narrower than 1/4 inch (6 mm), use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
2. White Aggregates: Natural white sand or crushed white stone.

3. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- G. Water-Repellent Admixture: Manufacturer's standard dry mixture of stearates, water-reducing agents, and fine aggregates intended to reduce capillarity in mortar.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Sonneborn, Div. of ChemRex, Inc.; Hydrocide Powder.
    - b. Other manufacturer's product approved by the Architect.
- H. Water-Repellent Admixture: Liquid polymeric water-repellent mortar admixture that does not reduce flexural bond strength of mortar.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture, Mortar Titej.
    - b. Laticrete International, Inc.; Laticrete 8510 Bonding Admix.
    - c. Master Builders, Inc.; Color Cure Mortar Admix or Rheomix Rheopel.
- I. Water: Potable.

## 2.3 GLASS UNIT MASONRY ACCESSORIES

- A. Panel Reinforcement: Ladder-type units, butt welded, not lapped and welded; complying with ASTM A 951 in straight lengths of not less than **10 feet (3 m)**, and as follows:
  1. Interior Walls: Hot-dip galvanized, carbon-steel wire.
  2. Exterior Walls: Stainless-steel wire.
  3. Wire Size: W1.7 or **0.148-inch (3.8-mm)** diameter.
  4. Width: **2 inches (50 mm)** minimum or as required.
  5. Spacing of Cross Rods: Not more than **16 inches (407 mm)** apart.
- B. Panel Anchors: Glass-block manufacturer's standard perforated steel strips, **0.0359 inch (0.9 mm)** by **1-3/4 inches (44 mm)** wide by **24 inches (600 mm)** long, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
- C. Fasteners, General: Unless otherwise indicated, provide Type 304 or Type 316 stainless-steel fasteners at exterior walls and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at interior walls. Select fasteners for type, grade, and class required.
- D. Carbon-Steel Bolts: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)** with hex nuts, **ASTM A 563 (ASTM A 563M)**, if applicable.
- E. Stainless-Steel Bolts: **ASTM F 593 (ASTM F 738M)**, Alloy Group **1 or 2 (A1 or A4)** with hex nuts, **ASTM F 594 (ASTM F 836M)**, if applicable.
- F. Postinstalled Anchors: Provide metal expansion sleeve anchors or metal impact expansion anchors of type and size necessary for installation indicated, as recommended by manufacturer, unless otherwise indicated.

- G. Asphalt Emulsion: Cold-applied asphalt emulsion complying with ASTM D 1187 or ASTM D 1227.
- H. Mineral-Fiber Expansion Strips: Mineral-fiber strips, complying with requirements of fire-rated assembly listing and glass-block manufacturer.
  - 1. Use for fire-rated assemblies.
- I. Plastic-Foam Expansion Strips: Polyethylene foam complying with requirements of glass-block manufacturer; **3/8 inch (9 mm)** thick by **3-1/2 inches (89 mm)** wide, unless otherwise indicated.
  - 1. Use plastic-foam expansion strips for fire-rated and non-fire-rated assemblies.
- J. Sealants: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants."
  - 1. Single-component, neutral-curing or acid-curing silicone sealant.
  - 2. Single-component, nonsag urethane sealant.
  - 3. Multicomponent, nonsag polysulfide sealant.
  - 4. Provide interior sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- K. Sealant Accessories: Provide sealant accessories, including primers, bond-breaker tape, and cylindrical sealant backing, that comply with applicable requirements in Division 07 Section "Joint Sealants."

## 2.4 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, or antifreeze compounds, unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar.
  - 2. For mortar in exterior panels, use water-repellent admixture according to admixture manufacturer's written instructions.
  - 3. For pointing mortar in exterior panels, use water-repellent admixture according to admixture manufacturer's written instructions.
  - 4. Limit cementitious materials in mortar to Portland cement and lime.
- B. Mortar for Glass Unit Masonry Assemblies: Provide mortar, mixed according to glass-block manufacturer's listing with testing and inspecting agency, for fire-resistance rating indicated.
- C. Mortar for Glass Unit Masonry Assemblies: Comply with ASTM C 270, Proportion Specification for Type S mortar.
  - 1. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Mix mortar to produce a stiff but workable consistency that is drier than mortar for brick or concrete masonry. Discard mortar when it has reached initial set.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed ten (10) percent of Portland cement by weight.
  2. Pigments shall not exceed five (5) percent of masonry cement by weight.
  3. Mix to match Architect's sample.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
1. Mix to match Architect's sample.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine sills, jambs, and heads surrounding glass unit masonry assemblies for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLING GLASS BLOCK WITH MORTAR

- A. Apply a heavy coat of asphalt emulsion to sill and adhere expansion strips to jambs and heads with asphalt emulsion. Allow asphalt emulsion to dry before placing mortar. Trim expansion strips to width required to fit glass block and to full lengths of heads and jambs.
- B. Set glass block with completely filled bed and head joints, with no furrowing, accurately spaced and coordinated with other construction. Maintain **3/8-inch (10-mm)**, exposed joint widths, unless otherwise indicated.
- C. Install panel reinforcement in horizontal joints at spacing indicated and continuously from end to end of panels; comply with the following requirements:
1. Vertical Spacing of Panel Reinforcement for Exterior Panels: Every other course but not more than **16 inches (407 mm)** o.c., starting with first course above sill.
  2. Vertical Spacing of Panel Reinforcement for Interior Panels: Not more than **16 inches (407 mm)** o.c.
  3. Do not bridge expansion joints with panel reinforcement.
  4. Place panel reinforcement in joints immediately above and below all openings within glass unit masonry assemblies.
  5. Lap panel reinforcement not less than **6 inches (150 mm)** if more than 1 length is necessary.
  6. Embed panel reinforcement in mortar bed by placing lower half of mortar bed first, pressing panel reinforcement into place and covering with upper half of mortar bed.
- D. Install panel anchors at locations indicated and in same horizontal joints where panel reinforcement occurs. Extend panel anchors at least **12 inches (300 mm)** into joints, and bend within expansion joints at edges of panels and across the head. Attach panel anchors as follows:
1. For in-place unit masonry assemblies and concrete, attach panel anchors with **1/4-inch- (6-mm-)** diameter bolt-size, post-installed anchors, 2 per panel anchor.

2. For new unit masonry assemblies, embed other ends of panel anchors, after bending portions crossing expansion joint, in horizontal mortar joints closest in elevation to joints in glass unit masonry assemblies containing panel anchors.
  3. For steel members, attach panel anchors with **1/4-inch- (6-mm-)** diameter through bolts and nuts or bolts in tapped holes in steel members.
- E. Use rubber mallet to tap units into position. Do not use steel tools, and do not allow units to come into contact with metal accessories and frames.
- F. Use plastic spacers or temporary wedges in mortar joints to produce uniform joint widths and to prevent mortar from being squeezed out of joints.
1. If temporary wedges are used, remove them after mortar has set and fill voids with mortar.
- G. Keep expansion joints free of mortar.
- H. Rake out joints indicated to be pointed to a uniform depth sufficient to accommodate pointing material, but not less than joint width.
1. If temporary wedges are used, remove them before raking out and pointing joints.
  2. Point joints at **both faces** of exterior panels with mortar.
  3. Point joints at **both faces** of exterior panels with sealant.
  4. Point joints at both faces of exterior and interior panels with sealant.
- I. Point joints with mortar by filling raked joints and voids. Place and compact pointing mortar in layers not more than **3/8 inch (10 mm)** thick. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
1. Tool exposed joints slightly concave when pointing mortar is thumbprint hard. Use a smooth plastic jointer larger than joint width.
- J. Clean glass unit masonry assemblies as work progresses. Remove mortar fins and smears immediately, using a clean, wet sponge or a scrub brush with stiff fiber bristles. Do not use harsh cleaners, acids, abrasives, steel wool, or wire brushes when removing mortar or cleaning glass unit masonry assemblies.
- K. Install sealant at jambs, heads, mullions and other locations indicated. Prepare joints, including installation of primer and bond-breaker tape or cylindrical sealant backing, and apply elastomeric sealants to comply with requirements in Division 07 Section "Joint Sealants."
- L. Construction Tolerances: Set glass block to comply with the following tolerances:
1. Variation from Plumb: For lines and surfaces of vertical elements and arris, do not exceed **1/4 inch in 10 feet (6 mm in 3 m)**, **3/8 inch in 20 feet (9 mm in 6 m)**, or **1/2 inch in 40 feet (12 mm in 12 m)** or more.
  2. Variation from Level: For bed joints, and other conspicuous lines, do not exceed **1/4 inch in 20 feet (6 mm in 6 m)** or **1/2 inch in 40 feet (12 mm in 12 m)** or more.
  3. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed **1/2 inch in 20 feet (12 mm in 6 m)** or **3/4 inch in 40 feet (19 mm in 12 m)** or more.
  4. Variation in Mortar-Joint Thickness: Do not vary from joint thickness indicated by more than plus or minus **1/16 inch (1.5 mm)**.

### 3.3 CLEANING

- A. On surfaces adjacent to glass unit masonry assemblies, remove mortar, sealants, and other residue resulting from glass-block installation, in a manner approved by manufacturers of materials involved.
- B. Remove excess sealants with commercial solvents of type recommended by sealant manufacturer. Exercise care not to damage sealant in joints.
- C. Perform final cleaning of glass unit masonry assemblies when surface is not exposed to direct sunlight. Remove with clean, dry, soft cloths; change cloths frequently to eliminate dried mortar particles and aggregate.

END OF SECTION 04 2300