

SECTION 02

MASONRY

PART 1- GENERAL

1.01 DESCRIPTION:

This section covers concrete unit Masonry where indicated on the drawings and specified herein.

The Contractor shall provide labor, materials, equipment and services, and perform operations required for installation of masonry walls, mortar and related work as indicated on the drawings and specified herein.

1.02 APPLICABLE CODES AND STANDARDS:

The standards and codes applicable to only a portion of the work specified in this section are referenced in the relevant parts or clauses. Standards and codes which are generally applicable to the work of this section are listed hereinafter:

A. ASTM - American Society for Testing and Materials:

B. UL - Underwriters' Laboratories, Inc.

Standard 618 Concrete Masonry Units - Fire Resistance Index

1.03 SUBMITTALS

The following submittals are required:

- A. Detail Drawings and/or Shop Drawings
- B. Quality Assurances
- C. Samples
- D. Certificates of Compliance with these specifications for approval. Obtain approval prior to shipment of materials.
- E. Test Reports
- F. Product Data: Submit copies of manufacturer's latest published literature for materials specified herein for approval, and obtain approval before materials are delivered to the site.

1.04 TRANSPORTATION HANDLING, STORAGE AND PROTECTION

- A. Delivery: Delivery masonry materials, other than bulk materials to project site in manufacturers unopened containers, bundles, pallets or other standard packaging devices; fully identified with name, type, grade, color and size.

Deliver mortar materials specified herein in manufacturer's unopened containers, with manufacturer's name and point of origin on each container.

Deliver mortar materials and handle as to prevent the inclusion of foreign materials and the damage of materials by water.

- B. Storage: Store on platforms and protect from weather, soiling and damage.

1.05 QUALITY CONTROL

- A. Samples and Testing: Samples from stock on the site shall be taken by the Contractor in the presence of the Government Representative.

1. Cement: Sampled cement shall be tested by the testing laboratory at no additional cost to the Government. Certified copies of laboratory test reports shall be furnished for each lot of cement and shall include all test data, results and certification that the sampling and testing procedures are in conformance with Contract Documents. No cement shall be used until test results are satisfactory. Cement found unsatisfactory under test shall be immediately removed from the construction site.
2. Aggregates: Aggregate sampling shall conform to ASTM D75.
3. Water: Water analysis shall be performed in accordance with ASTM D596.
4. Admixtures: Sampling and testing of all admixtures used in mortar and grout shall be in accordance with the standard procedure recommended by the testing laboratory and at no additional cost to the Government.
5. Unit Masonry: Sampling and testing shall be in accordance with ASTM C426. Test to determine the linear drying-shrinkage of units shall be performed not more than 3 months and not less than 2 weeks before delivery of units to the construction site. Sample units shall prove under test to be free from cracks or other structural defects. Air-dry condition test of masonry units shall be performed when so requested by the Government Representative, at no additional cost to the Government.
6. Mortar and Grout: At start of masonry work, at least one sample of mortar and of grout shall be taken on three successive working days and continuously stored in moist air until tested.

Materials shall conform to the latest edition of reference specifications specified herein and to applicable codes and requirements of local authorities having jurisdiction.

- British Standards (BS).

- American Society for Testing Materials (ASTM).

Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

Mortar and grout shall have the following minimum compressive strengths in Megapascals.

	Size	Strength After 7 days	Strength After 28 days
Mortar Cylinders	50 mm x 100 mm (2 in. x 4 in.)	8.6 MPa (1,250 psi)	17.2 MPa (2,500 psi)
Grout Specimens	76 mm x 76 mm x 152 mm (3 in. x 3 in. x 6 in.)	6.9 MPa (1,000 psi)	13.8 MPa (2,000 psi)

PART 2-PRODUCTS

2.01 MATERIALS

- A. Concrete Masonry Units: Hollow units shall conform to ASTM C90 or solid units, where required, shall conform to ASTM C145. All units shall be Type I, Grade N-1, normal weight, sizes as shown and vertical cells so as to provide specified clear spaces for grouting. Provide half units, bond beam units, open end units, corners, lintel, jamb, sash, header, and other shapes necessary to properly complete the work. Provide square edge blocks unless otherwise shown.
 1. Fire Rated Units: Provide units for fire-rated masonry construction complying with UL 618, or units which have been tested in accordance with ASTM E119 and are listed in the UL "Fire Resistance Tndox" .
- B. Anchors and Ties: Hot-dip galvanized steel complying with ASTM A153, or Eraydo Zinc alloy of acceptable design, complying with the following requirements:
 1. Dovetail Slots: 0.76 mm (22 gages), felt or fiber filled.
 2. Anchors for Dovetail Slots: 1.58 mm (16 gage), corrugated, of length required.
 3. Wire Ties: 3.42 mm (10 gage), looped at both ends.
 4. Wire Mesh Ties: 1.58 mm (16 gage), 12.5 mm (1/2 in.) mesh, 75 mm (3 in.) wide.
 5. Anchor Straps 32 mm (1-1/4 in.) x 3 mm (1/8 in.) by length required, with ends turned up 50 mm (2 in.).
- C. Horizontal Wire Joint Reinforcing ICBO approved truss type units prefabricated of cold-drawn wire, ASTM A82, in - straight lengths not less than 3 m (10 ft.) long, with matching corner and intersection units, continuous deformed longitudinal side rods, 3.8 mm (9 gage) or larger plain cross rods electrically butt welded to side rods, unit widths 38 to 50 mm (1-1/2 to 2 in.) less than wall thickness, rod sizes as

shown, units hot-dip galvanized after fabrication in accordance with ASTM A153, Class B2.

- D. Reinforcing Bars: ASTM A615, Grade 60 except where otherwise shown.
- E. Control Joint Filler: Extruded rubber, ASTM D2000, Type R. Shore A, Durometer 80 when tested in accordance with ASTM D2240, size and shape as shown.
- F. Concrete Inserts: Ferrule loop insert, 19 mm (3/4 in.) diameter, ASTM A501, capable of supporting working loads of 4.88 kN m (3600 lb.ft.) tension and 7.72 kN m (5700 lb. ft.) shear as specified.
- G. Mortar Materials

Portland cement shall be complying with the following:

ASTM C150, Type I or B.S. 12. Provide natural color, non-staining, without air-entertainment.

Nonstaining Cement: Not more than .03 percent soluble alkali - Fed. Spec. SS-C-181e.

Mortar plasticizer.

Aggregates: Natural, clean, washed, hard sand particles of mineral origin conforming to the following:

Aggregates for Mortar: ASTM C 144 or B.S. 1200.

Aggregates for Grout: ASTM C104.

Use white sand (natural or ground white stone) when non-staining is used and required.

Water: Potable and free of salts and deleterious substances.

Masonry Cements: The use of masonry cements is prohibited.

PART 3- EXECUTION

3.01 INSTALLATION

- A. Layout: Layout walls in advance for accurate spacing of exposed bond patterns with uniform joint widths, and to properly locate openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half size units at corners, jambs, and wherever possible, at other locations. Coordinate with and cooperate with installation of reinforcing, dowels, anchors, and other work built into concrete for proper location of such work into masonry.
- B. Alignment and Tolerances: Lay up walls plumb and true with courses level, accurately spaced and coordinated with other work. Comply with following tolerances:

1. Variation from Plumb: For lines and surfaces of columns, walls and arises do not exceed 6 mm in 3 m (1/4 in. in 10 ft.), or 10 mm (3/8 in.) in a story height or 6 m (20 ft.) maximum, nor 13 mm in 12 m (1/2 in. in 40 ft.) or more. Except for external corners, expansion joints and other conspicuous lines do not exceed 6 mm (1/4 in.) in any story or 6 m (20 ft.) maximum, nor 13 mm in 12 m (1/2 in. in 40 ft.) or more.
 2. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 6 mm (1/4 in.) in any bay or 6 m (20 ft.) maximum, nor 19 mm in 12 m (3/4 in. in 40 ft.) or more.
 3. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 13 mm (1/2 in.) in any bay or 6 m (20 ft.) maximum, nor 19 mm in 12 m (3/4 in. in 40 ft.) or more.
 4. Variation in cross-sectional Dimensions: For thickness of walls, from dimensions shown, do not exceed minus 6 mm (1/4 in.) nor plus 13 mm (1/2 in.)
- C. Joints: Tool exposed joints slightly concave, unless otherwise shown. Cut joints flush for masonry which will be Concealed or covered by other materials, except paint and similar coatings. Rake out mortar wherever joints are to receive walking or sealants.
- D. Adjustment: Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove masonry units, clean off mortar, and reset in fresh mortar.

3.02 **LAYING, REINFORCING AND GROUTING**

- A. Laying: Lay units with full head and bed mortar joints. Walls and crosswebs of cells shall be full-bedded in mortar. Maintain head and bed joint widths shown, or if not shown, provide 10 mm (3/8 in.) joints. Bond each course at corners and intersections and bond into or anchor to adjacent construction with metal anchors spaced not over 800 mm (32 in.) o.c. in both directions. Do not wet concrete masonry before lying. Lay wall units in 1/2 running bond with vertical joints in each course centered on units in courses above and below, unless otherwise shown. Use special-shaped units where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams and other special conditions.
1. Vertical Continuity: Maintain vertical continuity of core or cell cavities, which are to be grouted to provide minimum clear dimensions shown and to provide minimum clearance and grout coverage for vertical reinforcing bars. In any case, maintain a clear, unobstructed continuous vertical cell measuring not less than 50 mm by 75 mm (2 in. x 3 in.).
 2. Cutting Masonry Units: Use motor driven Carborundum saw designed to cut masonry units with clean sharp corners. Cut units as required to provide

pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible. Avoid the use of less than half-size units at corners, jambs and at other locations.

3. Metal Frames: Set units tightly against metal frames and fill voids completely with grout. Build frames anchors into joints. Cut units accurately to fit around pipes, ducts, and openings; and fill voids full with grout. Fill jambs and head of hollow metal frames solid with mortar.
4. Partitions: Built partitions of thickness shown. Give sufficient opportunity to the various trades to install built-in-work before proceeding with the partitions, leaving openings where required for testing; such openings to be closed up later. Construct masonry partitions full height and terminate against underside of structure above unless otherwise shown.
5. Joint Reinforcement: Place joint reinforcement in horizontal mortar joints on 400 mm (16 in.) centers unless otherwise shown. Make reinforcement continuous except at control joints and expansion joints. Lap reinforcement 150 mm (6 in.) at ends and use prefabricated "T" and "L" sections at corners and intersections to provide continuity. Provide reinforcement in first and second bed joints above lintels and below sills extending 600 mm (2 ft.) beyond jamb openings.

3.03 BUILT-IN-WORK

- A. General: Build in frames, struts, hangers, miscellaneous metal, and other items of work furnished under other sections. Prepare for, build in, and protect flashings, regrets, anchors, and other similar items occurring in connection with work of this section.
- B. Access Doors Frames and Panels: Install access doors, frames and access panels occurring in masonry construction where shown and required for access to mechanical and electrical installations and equipment.

3.04 CURING:

Maintain masonry continuously in a damp condition during installation and until at least 48 hours after pointing

****END OF SECTION****