



Designation: C 901 – 01

Standard Specification for Prefabricated Masonry Panels¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers the structural design and quality control of fabrication for load-bearing and non-load-bearing prefabricated masonry panels. Methods of prefabrication, field erection, and jointing are not covered in this specification.

2. Referenced Documents

2.1 ASTM Standards:

- A 82 Specification for Steel Wire, Plain, for Concrete Reinforcement²
- A 116 Specification for Metallic-Coated Steel Woven Wire Fence Fabric³
- A 153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware³
- A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip⁴
- A 185 Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement²
- A 615/A 615M Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement²
- A 616/A 616M Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement⁵
- A 617/A 617M Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement⁵
- B 227 Specification for Hard-Drawn Copper-Clad Steel Wire⁶
- C 34 Specification for Structural Clay Load-Bearing Wall Tile⁷
- C 55 Specification for Concrete Brick⁷
- C 62 Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)⁷

- C 67 Test Methods for Sampling and Testing Brick and Structural Clay Tile⁷
- C 73 Specification for Calcium Silicate Brick (Sand-Lime Brick)⁷
- C 90 Specification for Loadbearing Concrete Masonry Units⁷
- C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)⁸
- C 126 Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units⁷
- C 140 Test Methods of Sampling and Testing Concrete Masonry Units and Related Units⁷
- C 212 Specification for Structural Clay Facing Tile⁷
- C 216 Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)⁷
- C 270 Specification for Mortar for Unit Masonry⁷
- C 476 Specification for Grout for Masonry⁷
- C 652 Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)⁷
- C 744 Specification for Prefaced Concrete and Calcium Silicate Masonry Units⁷
- C 780 Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry⁷
- C 1019 Test Method of Sampling and Testing Grout⁷
- C 1314 Test Method of Compressive Strength of Masonry Prisms⁷
- C 1357 Test Methods for Evaluating Masonry Bond Strength⁷
- E 72 Methods of Conducting Strength Tests of Panels for Building Construction⁸
- E 447 Test Methods for Compressive Strength of Laboratory Constructed Masonry Prisms⁹
- E 518 Test Methods for Flexural Bond Strength of Masonry⁷

¹ This specification is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.05 on Masonry Assemblies.

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² Annual Book of ASTM Standards, Vol 01.04.

³ Annual Book of ASTM Standards, Vol 01.06.

⁴ Annual Book of ASTM Standards, Vol 01.03.

⁵ Discontinued. See 1998 Annual Book of ASTM Standards, Vol 01.04.

⁶ Annual Book of ASTM Standards, Vol 02.03.

⁷ Annual Book of ASTM Standards, Vol 04.05.

⁸ Annual Book of ASTM Standards, Vol 04.01.

⁹ Discontinued. See 1999 Annual Book of ASTM Standards, Vol 04.05.

3. Materials and Manufacture

3.1 *Masonry Units*—Masonry units shall conform to the following applicable specifications:

3.1.1 *Brick*—Specification C 62 for building brick, Specification C 216 for facing brick, Specification C 126 for ceramic glazed structural clay tile, facing brick, and solid masonry units, and Specification C 652 for hollow brick.

3.1.2 *Concrete Masonry Units*—Specification C 55 for concrete building brick, Specification C 90 for hollow load-bearing concrete masonry units, and Specification C 744 for prefaced concrete masonry units.

3.1.3 *Calcium Silicate Face Brick*—Specification C 73 for calcium silicate face brick.

3.1.4 *Structural Clay Tile*—Specification C 212 for structural clay facing tile, Specification C 34 for structural clay load-bearing wall tile, and Specification C 126 for ceramic glazed structural clay tile, facing brick, and solid masonry units.

3.2 *Mortar and Grout*—Mortar and grout shall conform to the following applicable specifications:

3.2.1 *Mortar*—Specification C 270 for mortar for unit masonry.

3.2.2 *Reinforced Masonry*—Specification C 476 for grout for masonry.

3.2.3 Other mortars may be used, provided properties for such construction are established by tests made in accordance with Test Methods E 72.

3.3 *Metal Ties, Fittings, Anchors, Lifting Inserts, and Other Embedded Metal*—All metal embedded in masonry walls shall comply with the applicable specifications in accordance with 3.4 and, except for structural reinforcement, shall be coated with a corrosion-resistant material, such as copper, zinc, or other material having equivalent or better corrosion-resistant qualities, or shall be made of stainless steel type 304 or 316 (see Specification A 167).¹⁰ Upon request by the purchaser, evidence satisfactory to the purchaser shall be provided that all corrosion-resistant metal is adequate in the atmospheric and material environment in which it is to be used.

3.3.1 Zinc coatings on iron or steel shall conform to Class B-1, B-2, or B-3 of Specification A 153.

3.3.2 Zinc coating on wire shall conform to Class 3 of Specification A 116.

3.3.3 Copper-coated wire shall conform to Grade 30HS of Specification B 227.

3.3.4 Stainless steel shall conform to type 304 or type 316 of Specification A 167.

3.4 *Reinforcement*—Reinforcement shall conform to the following applicable specifications:

3.4.1 Specification A 82 for cold-drawn steel wire for concrete reinforcement.

3.4.2 Specification A 185 for welded steel wire fabric for concrete reinforcement.

3.4.3 Specification A 615 or A 615M for deformed and plain billet-steel bars for concrete reinforcement.

¹⁰ In masonry panels, utilizing modified mortar or mortar admixtures, protection of structural reinforcement may be required, and the manufacturers of such materials should be consulted.

3.4.4 Specification A 616 for rail-steel deformed and plain bars for concrete reinforcement.

3.4.5 Specification A 617/A 617M for axle-steel deformed and plain bars for concrete reinforcement.

4. Structural Design

4.1 *General*—Structural design of panels shall be performed in accordance with the provisions of the applicable local building code and the requirements of this specification. In the absence of a local building code, the requirements of a national model building code shall govern. The applicable code shall be identified on the plans. Structural design of panels shall consider all loading and restraint conditions from initial fabrication to in-service conditions in the completed structure, including storage, transportation, and erection. The design loads shall be of the type and magnitude required by the applicable building code. Panels and connections required to resist wind, seismic, or other dynamic loads shall be designed to resist the required positive and negative forces in all directions. The joints between dissimilar materials within each panel, between panels, and between panels and their structural supports shall be designed to accommodate differential movement and deflections of each material, panel, and adjacent building elements.

4.2 *Lifting Devices*—Lifting devices and their connections to the panels shall have an ultimate capacity of four times the dead weight of the appropriate portion of the panel. Inclination of the lifting forces shall be considered.

5. Dimensions and Permissible Variations

5.1 *Standard Dimensions*—The standard nominal widths and heights of the panels shall be in multiples of nominal individual masonry unit heights and lengths. The nominal thickness of panels shall be the sum of the nominal thicknesses of the masonry units in the panels plus the nominal thickness of cavities, if any. The specified dimensions may be less than the required nominal dimensions by the thickness of one mortar joint but not by more than ½ in. (13 mm).

5.2 *Custom Dimensions*—For custom installations, all dimensions of panels shall be as shown on the drawings or as specified.

5.3 *Thickness of panels*—The actual thickness of the panels shall be as required for adequate strength, fire resistance, or other design criteria for the type of construction and occupancy as required by the applicable building code.

5.4 *Dimensional Tolerances*—Based on actual dimensions, a prefabricated masonry wall panel shall not vary from the specified face dimensions by more than the following:

10 ft (3.05 m) or under—±½ in. (3.2 mm)
 10 to 20 ft (3.5 to 6.1 m)—+⅜ in. (3.2 mm) or -⅜ in. (4.8 mm)
 20 to 30 ft (6.096 to 9.144 m)—+⅜ in. (3.2 mm) or -¼ in. (6.4 mm)
 For each additional 10 ft (3.5 m)—±⅜ in. (1.6 mm)

The maximum permissible variation from the specified thickness of prefabricated masonry panels shall be not greater than -⅜ in. (3.2 mm) or +¼ in. (6.4 mm). Prefabricated masonry panels shall have maximum out-of-square differential dimensions (difference in length of the two diagonal face measurements) not greater than ⅛ in./6 ft (3.2 mm/1.83 m) nor an absolute maximum of greater than ¼ in. (6.4 mm).