Designation: C946 – 10

Standard Practice for Construction of Dry-Stacked, Surface-Bonded Walls[1]

This standard is issued under the fixed designation C946; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers material, workmanship, and construction procedures for applying surface bonded mortar to both sides of dry stacked concrete masonry units. It does not include grout, reinforcing, anchorage, or control joints since their use is essentially the same as conventional concrete masonry construction, unless specifically mentioned in this practice.

NOTE 1—Design and construction procedures for conventional concrete masonry construction are found in Building Code Requirements for Masonry Structures (TMS 402-08/ACI 530-08/ASCE 5-08) and Specification for Masonry Structures (TMS 602-08/ACI 530.1-08/ASCE 6-08).

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C55 Specification for Concrete Building Brick

C90 Specification for Loadbearing Concrete Masonry Units

C129 Specification for Nonloadbearing Concrete Masonry Units

C270 Specification for Mortar for Unit Masonry

C887 Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar

2.2 *Other Documents:*

TMS 402-08/ACI 530-08/ASCE 5-08 The Masonry Society, Building Code Requirements for Masonry Structures[3]

TMS 602-08/ACI 530.1-08/ASCE 6-08 The Masonry Society, Specification for Masonry Structures [3]

TEK 10-2A National Concrete Masonry Association, Control Joints for Concrete Masonry Walls[4]

Standard Practice for Bracing Masonry Walls Under Construction, Masonry Contractors Association of America[5]

3. Storage

3.1 Deliver and store surface bonding mortar in original containers off the ground to prevent contact with water. Protect from rain with suitable covering.

3.2 Store concrete masonry units off the ground to prevent contamination by mud, dust, and materials likely to cause staining or other defects, and protect from rain.

4. Materials and Manufacture

4.1 Concrete masonry units shall be clean and shall meet the requirements of either Specifications C55, C90, or C129. The surface to receive surface bonding mortar shall be free of paint, oil, efflorescence, or foreign materials that interfere with bonding.

4.2 Surface bonding mortar shall meet the requirements of Specification C887. If the dry mix contains hard lumps, it shall not be used.

4.3 Leveling course shall be bedded with a mortar meeting either Specification C270 or Specification C887.

4.4 Shims shall be corrosion-resistant metal or plastic with a minimum compressive strength of 2000 psi (13.8 MPa), or steel protected from corrosion by a coating of zinc at least 0.8 oz/ft^2 (2.4 gm/mm^2), or by a coating of cadmium or zinc of equivalent corrosion resistance.

[1] This practice is under the jurisdiction of ASTM Committee C12 on Mortars and Grouts for Unit Masonry and is the direct responsibility of Subcommittee C12.06 on Surface Bonding.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from The Masonry Society, www.masonrysociety.org; American Concrete Institute, www.aci-int.org; and American Society of Civil Engineers, www.asce.org.

[4] Available from the National Concrete Masonry Assn. (NCMA), P.O. Box 781, Herndon, VA 22070, http://www.ncma.org.

[5] Available from Masonry Contractors Association of America (MCAA), 33 South Roselle Rd., Schaumberg, IL 60193, http://www.masoncontractors.org.

5. Leveling Courses

5.1 Leveling courses, when needed, are to provide a smooth surface level within ¼ in. (6.35 mm) in 20 ft (6.1 m), for dry stacking concrete masonry units. Leveling courses shall be located whenever a vertical difference greater than ½ in. (12.7 mm) in 10 ft (3.0 m) occurs within one course. Leveling courses are usually located on the first course above the foundation, because footings are not normally placed in a level condition, and at each floor level.

5.2 When Specification C270 mortar or surface bonding mortar is used a leveling course, concrete masonry units shall be set in a full bed of mortar, laid to a line with the top surface level, as defined in 5.1, and butted together with no mortar in the head joints. Bed joints shall be struck flush. If the cores are to be grouted, no mortar shall be placed in the space to receive grout.

5.3 Allow the levelling mortar to set sufficiently so no movement breaks the bond while dry stacking units in subsequent courses.

6. Dry-Stacking Concrete Masonry Units

6.1 Courses of concrete masonry units between the leveling courses shall be placed without mortar on the bed or head joints. Place units in running bond. Remove burrs and butt blocks tightly.

6.2 Use shims, mortar, or surface bonding mortar to plumb and level individual units when necessary.

6.3 Check the wall every fourth course to be certain it is plumb and level. If any course is out of level by more than ½ in. (12.7 mm) in 10 ft (3.0 m), another leveling course shall be built.

6.4 Cut masonry units to fit openings. Minimum length of cut piece used in the wall shall be 1¼ in. (31.8 mm).

6.5 Precut units for inserts indicated on drawings.

6.6 Anchors, reinforcing, flashing, lintels, and other items to be built in shall be installed as the stacking progresses. Cut or notch masonry units as required.

NOTE 2—Special consideration must be given to the placement of built-in items. Surface bonding mortar requires approximately 1¼ in. (31.8 mm) from the edge of a unit to develop tensile strength across the joint. Layout of the first course with respect to built in items is extremely important, it determines the size of the cut pieces for closure.

NOTE 3—Utilities such as electrical lines and plumbing located in the cores of the units are best placed prior to the application of surface bonding mortar while the concrete masonry units are visible.

6.7 Cores to be filled with grout shall be aligned to provide a continuous, unobstructed opening.

6.8 Where a horizontal change in wall thickness occurs, the thicker portion shall end with a solid surface. Use a leveling course for the first course in the upper portion.

7. Mixing Surface Bonding Mortar

7.1 Use clean mixing equipment and water free of deleterious amounts of acid, alkali, and organic materials.

7.2 Surface bonding mortar shall be mixed according to the manufacturer's instructions and used within the time recommended by the manufacturer.

7.3 Mix only full bag multiples of material to overcome any segregation of ingredients while in the package.

7.4 Mixing time shall be kept to a minimum, as over-mixing may cause damage to fibers in Specification C887 mortar.

7.5 *Hand Mixing:*

7.5.1 Place water in the mixing container.

7.5.2 Slowly add the dry surface bonding material.

7.5.3 Mix thoroughly.

7.6 *Machine Mixing:*

7.6.1 Place water in mixer.

7.6.2 Add the surface bonding material to the operating mixer.

7.6.3 Mix thoroughly, 1 to 3 min after all materials have been added.

7.7 The mixture should be creamy, nonlumpy, and easy to apply.

7.8 Admixtures may be permitted within the limits set by Specification C887 and the manufacturer of the surface bonding mortar. If desired, admixtures must be specified in the contract documents.

8. Application of Surface Bonding Mortar

8.1 Wet the wall uniformly with water immediately before applying surface bonding mortar to prevent excessive suction of water from the surface bonding mortar. If the wall dries prior to application, rewet it. Avoid saturating the units.

8.2 Trowel- or spray-apply surface bonding mortar to both sides of the dry-stacked concrete masonry units.

8.3 Completely cover the wall surface with a minimum thickness of ⅛ in. (3.2 mm) of surface bonding mortar by trowel or spray.

8.4 When a second coat of surface bonding mortar is to be applied, the first coat shall have taken its initial set but not be completely hardened or dried out. If the first coat has completely hardened or dried out, consult the manufacturer's recommendations for application of a second coat, since a bonding agent may be required.

8.5 Finish to the texture specified.

8.6 If application of surface bonding mortar is discontinued for more than 1 h, the *horizontal* joint between the two applications, other than at wall tops, must occur at least 1¼ in. (31.8 mm) from the horizontal edge of the concrete masonry unit.

9. Curing and Protection

9.1 At ambient temperatures below 40°F (4.4°C) or above 90°F (32.2°C), follow the Specification for Masonry Structures (TMS 602-08/ACI 530.1-08/ASCE 6-08).

9.2 Dampen the wall with a water mist after 8 h, but within 24 h of application of the surface bonding mortar.

9.3 Fog spray twice within the first 24 h from application of the surface bonding mortar. With pigmented mortar, the time may be extended to 48 h. With maximum temperature in excess of 90°F (32.2°C), wind speed greater than 20 mph (32.2 km/h), or mean relative humidity less than 50 % relative humidity, more frequent application of fog spray shall be necessary.

9.4 The top of the walls shall be covered with a nonstaining, waterproof covering, extending at least 2 ft (0.6 m) on each side of the wall to prevent moisture from entering the wall until the top is permanently protected.

10. Other Requirements

10.1 Requirements concerning grout, reinforcement, anchors, ties, corrosion resistance, dimensional tolerances, wall bracing after coating, and miscellaneous items unless specified by the manufacturer of the surface bonding mortar shall be outlined in the following:

10.1.1 TMS 402-08/ACI 530-08/ASCE 5-08, Building Code Requirements for Masonry Structures.

10.1.2 TMS 602-08/ACI 530.1-08/ASCE 6-08, Specification for Masonry Structures.

10.1.3 Standard Practice for Bracing Masonry Walls Under Construction.

10.2 *Control Joints:*

10.2.1 Location, spacing, and type of control joints shall meet the requirements of TEK 10-2A, Control Joints for Concrete Masonry Walls.

10.2.2 Control joints shall be uniform in width, through the wall, and continuous from top to bottom of the wall.

10.2.3 Remove surface bonding mortar from the control joint.

11. Keywords

11.1 dry stacked; fiber reinforced; mortar; packaged; surface bonding