



Standard Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster¹

This standard is issued under the fixed designation C 844; 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.

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

1. Scope

1.1 This specification covers the minimum requirements for, and methods of, application of gypsum veneer base for gypsum veneer plasters.

1.2 Gypsum veneer base shall not be used as a base for direct adhesive application of ceramic, metal, or plastic tile in areas exposed to abnormal moisture or humidity or temperature.

1.3 Details of construction for a specific assembly to achieve the required fire resistance shall be obtained from reports of fire-resistance tests, engineering evaluations, or listings from recognized fire testing laboratories.

1.4 Where a specific degree of sound control is required for veneer plaster assemblies and constructions, details of construction shall be in accordance with official reports of tests conducted in recognized sound testing laboratories in accordance with the applicable sound tests, Test Method C 423, Test Method E 90, or Test Method E 492.

1.5 Where this specification is more stringent (size or thickness of framing; spacing of fasteners) than the fire-rated construction, this specification shall govern; otherwise, the construction described in the fire test report shall govern.

1.6 Unheated spaces above gypsum veneer base ceilings shall be properly ventilated (see Appendix X3).

1.7 The values stated in inch-pound units are to be regarded as the standard. The SI (metric) values given in parentheses are approximate and are provided for information purposes only.

1.8 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

2. Referenced Documents

2.1 ASTM Standards:

C 11 Terminology Relating to Gypsum and Related Build-

ing Materials and Systems²

C 423 Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method³

C 514 Specification for Nails for the Application of Gypsum Board²

C 587 Specification for Gypsum Veneer Plaster²

C 588 Specification for Gypsum Base for Veneer Plasters²

C 754 Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products²

C 954 Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.012 in. (2.84 mm) in Thickness²

C 955 Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases²

C 1002 Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases²

C 1007 Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories²

C 1047 Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base²

E 90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements³

E 492 Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine³

2.2 *American Lumber Softwood Standards:*
PS-20

3. Terminology

3.1 *Definitions*—Definitions shall be in accordance with Terminology C 11.

3.2 *Definitions of Terms Specific to this Standard:*

3.2.1 *base ply*—first ply of gypsum base in multiple ply application.

¹ This specification is under the jurisdiction of ASTM Committee C-11 on Gypsum and Related Building Material and Systems, and is the direct responsibility of Subcommittee C11.03 on Specifications for Application of Gypsum and Other Products in Assemblies.

Current edition approved Oct. 10, 1998. Published April 1999. Originally published as C 844 – 78. Last previous edition C 844 – 98.

² *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 04.06.

3.2.2 *face ply*—outer or visible layer of gypsum base in multiple ply application.

3.2.3 *fastener, n*—nails, screws, or staples used for the application of the gypsum base or backing board.

3.2.4 *framing member, n*—that portion of the framing, furring, blocking, etc., to which the gypsum base is attached. Unless otherwise specified, the surface to which abutting edges or ends are attached shall be not less than 1½ in. (38 mm) wide for wood members, not less than 1¼ in. (32 mm) wide for steel members, and not less than 6 in. (152 mm) wide for gypsum studs. For internal corners or angles, the bearing surface shall be not less than ¾ in. (19 mm).

3.2.5 *parallel application, n*—gypsum base application where the gypsum base edge is applied parallel to the framing members.

3.2.6 *perpendicular application, n*—gypsum base application where the gypsum base edge is applied at right angles to the framing members.

4. Materials

4.1 Materials shall conform to the respective specifications and standards and to the requirements specified herein.

4.2 *Gypsum Base for Veneer Plasters* (hereinafter referred to as “gypsum base”)—Specification C 588.

4.3 *Gypsum Backing Board or Coreboard*—Specification C 442.

4.4 *Special Fire-Retardant Gypsum Base*—Specification C 588, Type X.

4.5 *Foil-Backed Gypsum Base*—Specification C 588.

4.6 *Gypsum Veneer Plaster*—Specification C 587.

4.7 *Nails*—Specification C 514.

4.8 *Screws*:

4.8.1 *Non-load bearing steel*—Specification C 1002.

4.8.2 *Load bearing steel*—Specification C 954.

4.9 *Staples*—No. 16 USS gage 0.063 in. (1.6-mm) flattened galvanized wire with 7/16-in. (11.1-mm) wide-crown minimum outside measure and divergent points. Staples shall be used only for the base ply of two-ply application over wood framing.

4.10 *Steel Framing, Non-load bearing*—Specification C 645 for the specified design criteria.

4.11 *Accessories*—Specification C 1047.

4.12 *Adhesive*:

4.12.1 For application of gypsum base to steel framing, the

adhesive shall be as recommended by the manufacturer of the gypsum base.

4.13 *Steel Framing Load Bearing*—Specification C 955.

4.14 *Wood Framing*—American Lumber Softwood Standard PS-20.

5. Delivery of Materials

5.1 All materials shall be delivered in the original packages, containers, or bundles bearing the brand name and manufacturer (or supplier) identification.

6. Shipping, Handling and Storage

6.1 Gypsum board shall be shipped so as to be kept dry.

6.2 Gypsum board shall be stored so as to be kept dry, preferably inside a building, under a roof. Gypsum board shall be neatly stacked flat with care taken to prevent sagging or damage to edges, ends, and surfaces.

6.3 Where necessary to store gypsum board outside, it shall be stacked flat, off the ground, supported on a level platform and fully protected from weather and direct sunlight exposure.

6.4 Prior to application, the building exterior shall be so enclosed to protect the gypsum base from exposure to weather and direct sunlight.

NOTE 1—The bond of alkaline veneer plaster to gypsum base will be impaired if the base is exposed to direct light or sunlight for extended periods.

7. Environmental Conditions

7.1 *Application of Gypsum Base and Adhesives*—A room temperature of not less than 40°F (4°C) shall be maintained during application of gypsum base except when adhesive is used for the attachment of gypsum base. For the bonding of adhesive, a room temperature of not less than 50°F (10°C) shall be maintained for 48 h prior to application and continuously thereafter until adhesive is completely dry. When a temporary heat source is used, the temperature shall not exceed 95°F (35°C) in any room or area. Adequate ventilation shall be maintained in the working area during the application and adhesive curing process.

8. Application of Gypsum Base

8.1 *General Requirements*:

8.1.1 Installation of steel framing shall be in accordance with applicable Specifications C 754 or C 1007 except where superseded by requirements of Table 1.

TABLE 1 Maximum Framing Spacing

| Single-ply Base (Thickness), in. (mm) | Application to Framing | Maximum On Center Spacing of Framing, in. (mm) |
|---------------------------------------|---------------------------|--|
| Ceilings: | | |
| ½ (12.7) | parallel | 16 (406) |
| ½ (12.7) ^A | perpendicular | 24 (610) |
| ¾ (19.0) ^B | perpendicular | 24 (610) |
| Sidewalls: | | |
| ¾ (9.5) ^C | perpendicular | 16 (406) |
| ½ (12.7) | parallel | 16 (406) |
| ½ (12.7) ^A | perpendicular | 24 (610) |
| ¾ (19.0) ^B | parallel or perpendicular | 24 (610) |

^A ½-in. (12.7-mm) gypsum base applied perpendicular on 24-in. (610-mm) on centers framing shall be considered to be minimum construction.

^B For ¾-in. (19.0-mm) base, perpendicular on ceilings and either perpendicular or parallel on sidewalls at 24-in. (610-mm) on centers spacing, only two-component veneer plaster or special joint reinforcement, as recommended by the gypsum veneer plaster manufacturer, shall be used.

^C ¾-in. (9.5-mm) gypsum base shall be used over wood framing with two-component veneer plaster systems only.

NOTE 2—For general wood framing requirements, see Appendix X2.

8.1.2 Method of Cutting—The gypsum base shall be cut by scoring and breaking or by sawing, working from the face side. When cutting by scoring, the face shall be cut with a knife or other suitable tool and the gypsum base snapped back away from the cut face. The back shall be broken by snapping the gypsum base in the reverse direction, or by cutting with a knife or other suitable tool.

8.1.3 All cut edges and ends of the gypsum base shall be smoothed to obtain neat jointing. Cut-outs for pipes, fixtures, or other small openings on the face and back of the base shall be scribed in outline before removing or cut out with a saw or other suitable tool. The gypsum base shall be scribed where it meets projecting surfaces. Base shall be brought lightly into contact with adjacent panels but not forced into place. Abutting ends and edges shall fit neatly.

8.1.4 When gypsum base is to be applied to both ceiling and walls, the base shall be applied to the ceiling and then to the walls.

8.2 Fastening, Mechanical:

8.2.1 The gypsum base shall be held in firm contact with the underlying support while driving any fastener.

8.2.2 Fastener application shall proceed from the center of the field of the gypsum base to the ends and edges or shall begin along one edge and proceed toward the other edge.

8.2.3 Except where required for fire rating, structural performance, or other special considerations, fastening to top or bottom plates shall not be required.

8.2.4 Fasteners shall be spaced not less than $\frac{3}{8}$ in. (9.5 mm) from the edges and ends of the gypsum base. Fasteners used at edges or at base ends in horizontal application shall not be more than 1 in. from edges or ends.

8.2.5 Nails and screws shall be driven to a point flush with the gypsum base surface without breaking the surface paper or damaging the surrounding gypsum core and without stripping the framing member around the screws.

8.2.6 Staples shall be driven so that both legs penetrate the support member and the crown bears tightly against the backing board, but does not cut into the face paper. The staple shall be driven with the crown parallel to framing members. Staples shall be used only for the first ply in two-ply gypsum base systems.

8.2.7 Penetration of mechanical fasteners into supporting framing members shall be not less than:

| | Nails | Screws | Staples |
|--------|-----------------|-----------------|---------------------------|
| Wood: | 1n& in. (22 mm) | 1n% in. (15 mm) | 1n% in. (15 mm), each leg |
| Steel: | ... | 1n# in. (9 mm) | ... |

8.3 Control Joints

8.3.1 Control joints shall be installed in ceilings more than 2500 ft² (232 m²) in area that are constructed with perimeter relief. The distance between control joints shall be not more than 50 ft (15 m) in either direction.

8.3.2 Ceilings of more than 900 ft² (85 m²) in area constructed without perimeter relief shall have control joints installed with spacing not to exceed 30 ft (9 m) in either direction.

8.3.3 Control joints shall be installed where ceiling framing or furring changes direction or where construction joints occur in the base building construction. In partitions, walls, or wall furring, the distance between control joints shall be not more than 30 ft (9 m).

8.3.4 A ceiling height door frame, installed in accordance with the spacing requirements set forth in 8.3, shall be permitted to be used as a control joint.

9. Application of Single-Ply Gypsum Base

9.1 The maximum spacing of framing members for single-ply gypsum base construction shall be not more than those shown in Table 1.

9.2 In single-ply installation, all ends and edges of gypsum base shall occur over framing members or other solid backing except where treated joints occur at right angles to framing or furring members.

9.3 Joints on opposite sides of a partition shall be arranged to occur on different framing members.

9.4 Fasteners (Single Ply Application):

9.4.1 Nail Spacing—Space nails a maximum of 7 in. (178 mm) on centers on the ceiling and a maximum of 8 in. (203 mm) on centers on the walls.

9.4.2 Double Nailing—Nails shall be spaced as shown in Fig. 1 and applied as follows:

9.4.2.1 Starting at the center of the base, nails shown as solid dots shall be applied by row starting with row 1, then rows 2 and 2A, 3 and 3A, 4 and 4A. Base shall be kept tight against the framing throughout the procedure.

9.4.2.2 Using the procedure in 9.4.2.1, second nails shown by circles shall be applied.

9.4.2.3 As an alternative procedure, second nails shall be

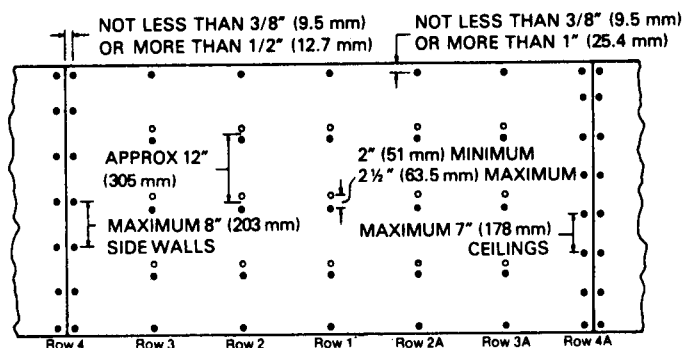


FIG. 1 Double Nailing

permitted to be applied immediately after all first nails in each individual row have been driven in accordance with 9.4.2.1.

9.4.2.4 Single nails shall be used on the perimeter of the base.

NOTE 3—It may be necessary to reset the first nails in each row after the second nails have been set.

9.4.3 Nails for single-ply application over wood members shall be as follows:

| Gypsum Base Thickness, in. (mm) | Nails, in. (mm) |
|---------------------------------|-----------------|
| 3/8 (9.5) | 1 1/4 (32) |
| 1/2 (12.7) | 1 3/8 (35) |
| 5/8 (15.9) | 1 1/2 (38) |

9.4.4 Where a specific degree of fire resistance is required for gypsum board assemblies and constructions, nails of same or larger length, shank diameter, and head bearing area, as those described in the applicable fire test report shall be used.

9.4.5 Screw Spacing—Screws shall be spaced not more than 12 in. (305 mm) on center along framing members for wall or ceiling application.

9.5 Floating Interior Angles—To help minimize the possibility of cracking in areas adjacent to a wall and ceiling intersection, the floating angle method of application shall be permitted to be used. This method is applicable where single nailing, double nailing, or screw attachment is used. When using this method the base shall be applied to ceilings first.

9.5.1 Ceilings—Fasteners shall be spaced in accordance with 9.4 except that for single nailing the nail adjacent to the ceiling/wall intersection shall be located 7 in. (178 mm) away from the wall, or 11 to 12 in. (279 mm to 305 mm) away for double nailing or screw application.

9.5.2 Walls—The gypsum base shall be fastened to walls to provide a firm support for the floated edges of the ceiling gypsum base. The top attachment shall be located into each stud 8 in. (203 mm) down from the ceiling intersection for single nailing (Fig. 2), and 11 to 12 in. (279 to 305 mm) for double nailing (Fig. 1) or screw application (see Fig. 3 and Fig. 4). At sidewall vertical angles (Fig. 5), the overlapping base shall be applied so as to bring the back of the underlying board into firm contact with the face of the framing member behind it.

10. Adhesive-Mechanical Fastener Application

10.1 Except as modified herein, application shall be in accordance with Section 9.

10.2 Surfaces of gypsum base and framing to receive adhesive shall be free of dust, dirt, grease or any other foreign matter that could impair the bond.

10.3 A bead of adhesive 3/8 in. (9.5 mm) in diameter shall be applied to the face of all wood framing members, except plates, that support the gypsum base. As pressure is applied to the base the adhesive shall spread to an average width of 3/4 in. (19 mm)

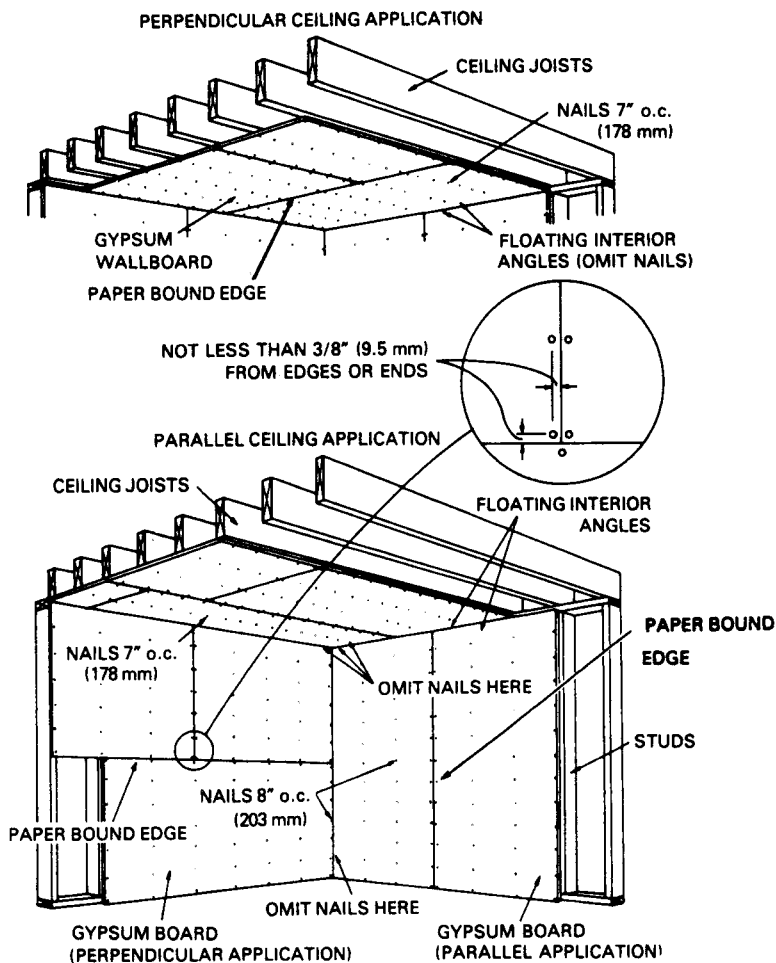


FIG. 2 Single Nailing

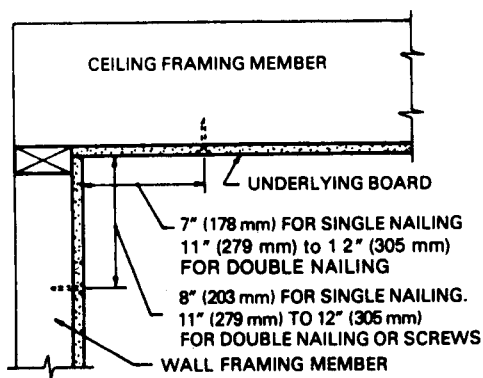


FIG. 3 Vertical Section, Ceiling Framing Perpendicular To Wall

approximately $\frac{1}{8}$ in. (3.2 mm) thick. Application patterns shall be shown as in Fig. 6.

10.3.1 Where two adjacent pieces of gypsum base abut (ends or edges) on a framing member, two parallel beads of adhesive shall be applied to the framing member. Application patterns shall be as shown in Fig. 6.

10.4 Adhesive shall be applied to no greater area than can be covered with gypsum base within the "open time" of the adhesive.

10.5 Fastener Spacing:

10.5.1 Where the properties of the adhesive ensure bridging between the gypsum base and the wood framing, no fastening shall be required in the field of the base for walls. In such cases, perimeter fastening, 16 in. (406 mm) on center, shall be required.

10.5.2 Where the properties of the adhesive achieve no positive bridging between the board and the wood framing, either temporary field nailing or temporary bracing shall be required to ensure contact between the base, the adhesive, and the stud face until the adhesive develops adequate bond strength. Fasteners shall be spaced in accordance with Table 2.

11. Application over Existing Surfaces

11.1 Gypsum base installed over uneven or broken surfaces, on the interior of all exterior masonry or concrete walls or columns, or over reasonably smooth, solid interior surfaces such as concrete or unit masonry shall be applied over furring strips or furring channels in accordance with Section 9 of this specification.

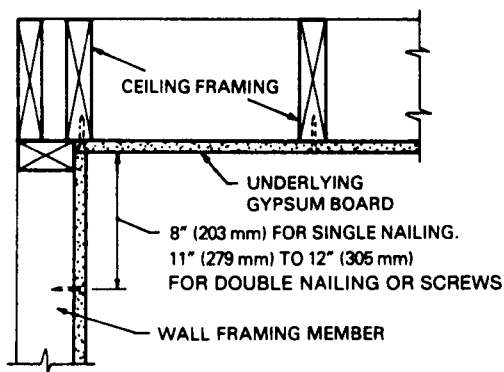


FIG. 4 Vertical Section, Ceiling Framing Parallel to Wall

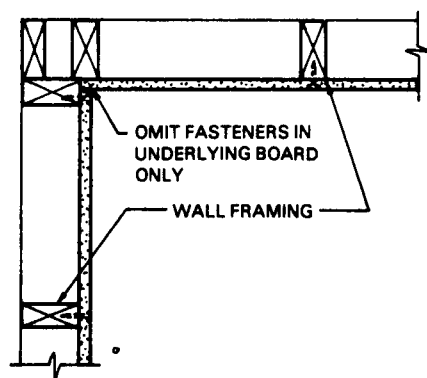


FIG. 5 Horizontal Section Through Interior Vertical Angle

11.2 Over reasonably smooth, sound, existing surfaces, such as gypsum wallboard or plaster in good condition, the gypsum base shall be applied by using fasteners of sufficient length to penetrate into the underlying framing members in accordance with 8.2.7. Fasteners shall be spaced in accordance with Sections 8 and 9 of this specification.

11.3 Fastener and adhesive attachment of gypsum base to existing surfaces shall be in accordance with Section 10 of this specification.

12. Foil-Backed Gypsum Base

12.1 The application of foil-backed gypsum base shall conform to all of the specifications for the application of gypsum base except that it shall not be used as follows:

12.1.1 The face ply on a two-ply laminating system.

12.1.2 Laminated directly to masonry.

12.1.3 Directly over plaster or other existing surfaces.

12.2 The reflective surface of the foil-backed gypsum base shall be placed against the face of the framing members.

13. Application of Two-Ply Gypsum Base to Framing Members

NOTE 4—The base ply in two-ply construction may be gypsum board other than gypsum veneer base (see Section 4).

13.1 Spacing of framing members and the application direction for both plies of two-ply gypsum base construction with no adhesive between plies shall comply with Table 1.

13.2 Spacing of framing members for two-ply gypsum base construction with adhesive between plies shall comply with Table 3.

13.3 The first ply of gypsum base shall be applied using nails, screws, or staples, spaced in accordance with Table 4.

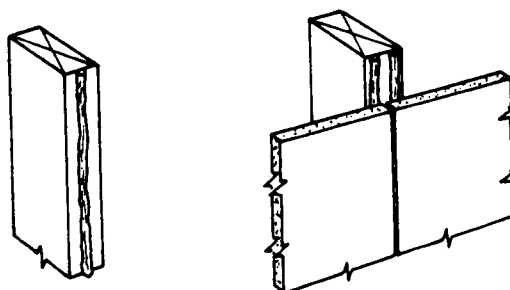


FIG. 6 Adhesive Application Patterns

TABLE 2 Fastener Spacing with Adhesive or Mastic Application and Supplemental Fastening, in. (mm) On Center

| Framing Member Spacing | Ceilings | | Partitions Load Bearing | | Partitions Nonload-Bearing | |
|---------------------------|----------|----------|-------------------------|----------|----------------------------|----------|
| | Nail | Screw | Nail | Screw | Nail | Screw |
| 16 (406) | 16 (406) | 16 (406) | 16 (406) | 24 (610) | 24 (610) | 24 (610) |
| 24 (610) | 12 (305) | 16 (406) | 12 (305) | 16 (406) | 16 (406) | 24 (610) |

13.4 Where no adhesive is used between plies, the two plies of gypsum base shall be applied either parallel or perpendicular to each other. The face ply shall be applied with the number of nails or screws required for normal single-ply application. Face ply joints that are parallel to framing shall fall over framing members and be offset from the base ply joints when two plies of gypsum base are installed parallel to each other.

13.5 Where a laminating adhesive is used between plies, joints in the face ply shall not be required to occur over framing members. Parallel joints of the two plies shall be staggered (offset) at least 8 in. (203 mm).

13.6 Where gypsum base is adhesively installed, the face ply shall be held firmly in place with temporary fasteners or shoring (supports, props, headers, etc.) in sufficient quantity to ensure pressure for bonding. When sufficient bond has developed, supports shall be removed and temporary fasteners removed or driven flush with the surface.

14. Solid Gypsum Base Partitions

14.1 *Face Ply*—shall be ½ in. (12.7 mm), ⅝ in. (15.9 mm), or multiple laminations of gypsum base of 4-ft (1200-mm) width.

14.2 *Core*—shall be 1-in. thick gypsum panel products, either single or multiple layer in 2-ft (610 mm) or 4-ft (1220 mm) width.

14.3 *Runners*—shall be metal not less than 0.0179 in. (0.046 mm) in thickness or construction grade wood.

14.4 Floor and ceiling runners shall be not less than 24 in. (610 mm) on center. Vertical runners shall be installed at required locations, such as exterior walls, exterior corners, and door frames. Partitions shall be secured at the floor and ceiling in accordance with the gypsum base manufacturer's details or as otherwise required.

14.5 Pressure shall be applied to gypsum base laminated to the backing board to ensure a secure, firm bond. Joints between the gypsum base and the backing board shall be staggered. Fasteners shall be used to ensure a continuous bond between the gypsum base and the backing board.

14.6 Veneer plaster shall not be applied until the adhesive is fully set and the gypsum base is firmly bonded.

15. Adhesive Application of Gypsum Base to Interior Masonry or Concrete Walls

15.1 Direct adhesive application shall be permitted only on interior masonry or concrete walls above grade, or the inside of exterior masonry cavity walls with a cavity not less than 1-in. (25.4-mm) in width between the inside and outside masonry for the full height of the above grade surface to receive gypsum base.

15.2 Foil-backed gypsum base shall not be used for direct adhesive application.

15.3 All surfaces to be adhered shall be free of any foreign matter that could impair the bond. Projections or elevations in the masonry shall be removed by chipping or wire brushing. Large hollows or depressions shall be face-plastered with portland cement and allowed to dry.

15.4 For application to monolithic concrete, porous brick, or concrete block, adhesive shall be applied to the back of the gypsum base or on the wall in continuous parallel beads spaced not more than 12 in. (305 mm) on center or daubs spaced not more than 12 in. on center each way.

15.4.1 Beads shall be not less than ⅜ in. (9.5 mm) in diameter to provide a continuous bond between the gypsum base and the wall surface.

15.4.2 Daubs shall be 2 to 3 in. (51 mm to 76 mm) in diameter.

NOTE 5—Caution: Be sure that the adhesive will bond to monolithic concrete. Form release compounds may cause bond failure.

15.5 *Gypsum Base Installation*—Gypsum base shall be positioned to provide a tight fit at abutting edges. The base shall not be slid into place. Moderate pressure shall be used to develop a full adhesive bond.

15.5.1 Veneer plaster shall not be applied until the adhesive is fully set and the gypsum base is firmly bonded.

15.6 *Gypsum Base Application over Rigid Plastic Foam*—

TABLE 3 Maximum Framing Spacing with Adhesive Between Plies

| Gypsum Base Thickness, in. (mm) | | Application Direction | | Maximum On Center Spacing of Framing, in. (mm) |
|---------------------------------|---------------------------|---------------------------|---------------------------|--|
| Ceilings | | | | |
| Base | Face | Base | Face | |
| 3⁄8 (9.5) | 1⁄2 (12.7) | perpendicular | perpendicular or parallel | 16 (406) |
| 1⁄2 (12.7) | 1⁄2 (12.7) | parallel | perpendicular or parallel | 16 (406) |
| | | perpendicular | perpendicular or parallel | 24 (610) |
| 5⁄8 (15.9) | 1⁄2 (12.7) | perpendicular or parallel | perpendicular or parallel | 24 (610) |
| 3⁄4 (15.9) | 5⁄8 (15.9) | perpendicular | perpendicular or parallel | 24 (610) |
| Sidewalls | | | | |
| 3⁄8 (9.5) | 1⁄2 (12.7) | perpendicular or parallel | perpendicular or parallel | 16 (406) |
| 1⁄2 (12.7) | 1⁄2 (12.7) | perpendicular or parallel | perpendicular or parallel | 24 (610) |
| 5⁄8 (15.9) | 1⁄2 or 3⁄4 (12.7 or 15.9) | perpendicular or parallel | perpendicular or parallel | 24 (610) |

TABLE 4 Attachment Spacing for Base Ply over Wood or Steel Framing

| Fastener | Nails | Screws | Staples |
|---------------------------|----------------------------|----------------------------|----------------------------|
| Framing | wood | wood or metal | wood |
| No adhesive between plies | 24 in. (610 mm) on centers | 24 in. (610 mm) on centers | 16 in. (406 mm) on centers |
| Adhesive between plies | Section 7.2.1 | Section 7.2.2 | 7 in. (178 mm) |

Gypsum base shall be permitted to be applied over rigid plastic foam insulation panels that have been applied to masonry or concrete walls.

15.6.1 Foam insulation shall be applied to the masonry or concrete in accordance with the foam manufacturer's specifications.

15.6.2 Furring strips or special metal furring members shall be attached using mechanical means to the masonry or concrete wall surface. This shall be done either before or after application of insulation, depending on the system used.

15.6.2.1 Furring members shall be installed in accordance with Table 1 of this specification and at the floor-wall angle, wall-ceiling angle (or at the termination of the gypsum base above suspended ceilings), around door, window, and other openings, and where required for cabinet or fixture attachment.

15.6.3 Gypsum base shall be applied to the furring as described in Section 9 of this specification. Mechanical fasteners shall be of such length that they shall not penetrate completely to the masonry or concrete.

16. Gypsum Base Application over Steel Framing and Furring

16.1 *Screw Application*—shall be as specified in Section 9 of this specification.

16.2 *Framing Spacing*—Spacing of steel framing and furring for screw application shall be in accordance with Table 1 for single-ply gypsum base and as specified in Table 3 for two-ply gypsum base.

16.3 Screw Spacing:

16.3.1 Screw spacing for single-ply gypsum base and face ply of two-ply gypsum base with no adhesive shall be as specified in 9.4.5 of this specification.

16.3.2 Screw spacing for parallel applied first-ply of two-ply gypsum base over steel framing on side walls with no adhesive between the plies shall be 12 in. (305 mm) on center along the edges of the gypsum base and at third points into each stud or furring channel in the field of the gypsum base.

16.3.3 Screw spacing for a perpendicular applied first-ply of two-ply gypsum base over steel framing on side walls with no adhesive between the plies shall be one screw at each edge at each stud or furring channel intersection and one screw midway between edges at each stud or furring channel.

16.3.4 Screw spacing for perpendicular or parallel applied first-ply of two-ply gypsum base over steel framing with adhesive between plies shall be as specified for single-ply gypsum base in 9.4.5 of this specification.

16.3.5 Screw spacing for the first ply of two-ply gypsum base over steel framing with adhesive between plies on ceilings shall be the same as specified for the face-ply of two-ply gypsum base in 13.4 of this specification. Only a sufficient number of screws to hold the gypsum base in place until the adhesive develops a bond shall be used.

17. Application to Arches

17.1 Gypsum base applied to the soffit of arches (see Table 5) shall be carefully bent into place. If necessary, the base shall first be either dampened or scored approximately 1 in. (25 mm) on center on the back side. In the latter case, after the core has been broken at each cut, the gypsum base shall be applied to the framing member and fastened in place. If the base is dampened, it shall be allowed to dry before plastering.

17.2 To apply the base, a stop shall be placed at one end of the curve and the base shall be gently and gradually pushed on the other end, forcing the center against the framing until the curve is complete.

NOTE 6—By moistening the face and back paper thoroughly and allowing the water to soak well into the core, the base may be bent to still shorter radii. When it dries thoroughly, the base will regain its original hardness.

18. Keywords

18.1 electric heat cable; gypsum; gypsum base; veneer plastic

TABLE 5 Bending Radii for Application to Arches

| Gypsum Base Thickness, in. (mm) | Bent Lengthwise, ft (m) | Bent Widthwise, ft (m) |
|---------------------------------|-------------------------|------------------------|
| ½ (12.7) | 10 (3.05) ^A | — |
| ¾ (9.5) | 7½ (2.29) | 25 (7.62) |

^A Bending two ¼-in. (6.4-mm) pieces successively permits radii shown for ¼ in.

APPENDIXES

(Nonmandatory Information)

These Appendixes provide general information and also suggestions for inclusions to be made elsewhere by the specifier, and are not a part of this specification.

X1. GENERAL INFORMATION

X1.1 Scaffolding shall be constructed and maintained in strict conformity with applicable laws and ordinances and shall

not interfere with or obstruct the work of others. The work shall be properly coordinated with the work of other trades.

X2. WOOD FRAMING REQUIREMENTS

X2.1 Requirements covering framing, furring, spacing, etc., are essential to provide a proper surface to receive the gypsum base. The following requirements should be included in the project specifications for framing and furring:

X2.1.1 All framing members to which gypsum base will be fastened shall be straight and true and spaced not more than the maximum spacings shown in Table 1. Wood framing, bridging, and furring members shall be the proper grade for the intended use and members 2 by 4 in. nominal size or larger shall bear the grade mark of a recognized inspection agency. Framing, bridging, and furring shall be adequate to carry the design or code loading, or both. In place of an applicable local code, the framing shall meet the minimum requirements of FHA for single or multifamily dwellings. The deflection of members supporting gypsum base shall be not more than $L/360$ of the span at full design load. Headers shall be provided as necessary for the support of fixtures.

X2.1.2 When the gypsum base is nailed to wood cross furring on ceilings, these members shall have a cross section of not less than $1\frac{1}{2}$ by $1\frac{1}{2}$ in. (38 by 38 mm) and shall be spaced in accordance with the requirements of Table 1. Where screw application is used, the furring member shall have a size of not less than $\frac{3}{4}$ by $2\frac{1}{2}$ in. (19 by 64 mm) actual size. Lumber shall conform to American Softwood Lumber Standard PS-20.

X2.1.3 All vertical solid surfaces that are furred to receive gypsum base shall be furred with wood framing members not less than $\frac{3}{4}$ in. (19 mm) thick and $1\frac{1}{2}$ in. (38 mm) wide. (Fastener penetration into the framing member shall be in accordance with 8.2.7 of this specification.)

X2.1.4 Insulating blankets or flanges of blankets shall not be applied over framing members that are to receive gypsum base. Foil-backed gypsum base may be used as a vapor retarder where required.

X3. VENTILATING ABOVE GYPSUM BASE CEILINGS

X3.1 Adequate ventilation of attics or similar unheated spaces above gypsum plaster systems is essential to the performance of these systems and shall be designed and

provided by others per ASHRAE Fundamentals Handbook or applicable building code.

X4. CABLE ELECTRIC RADIANT HEATING SYSTEMS FOR CEILINGS

X4.1 The application of gypsum base under this specification shall be performed in accordance with the requirements of this specification except as follows:

X4.1.1 The gypsum base shall have a thickness of $\frac{1}{2}$ in. (12.7 mm). The gypsum base shall be applied perpendicular to framing members by using attachment methods as required in Section 9 of this specification.

X4.1.2 Electric heating cables shall be securely attached to the gypsum base in accordance with the recommendations of the cable manufacturer or supplier.

X4.1.3 Cables shall run at right angles to the gypsum base paperbound edges. Cables shall not be positioned directly over joints that run parallel to the direction of cable run.

X4.1.4 Cables shall be positioned not less than 6 in. (152 mm) from all wall-ceiling intersections and openings.

X4.1.5 All inspections and testing of the heating system shall be completed before application of the veneer plaster.

X4.1.6 Under no conditions shall the heating cable have an operating temperature greater than 125°F (52°C).