Designation: C754 – 20

Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products[1]

This standard is issued under the fixed designation C754; 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 standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers the minimum requirements for the installation of interior nonstructural steel framing and furring members designed to receive screw-attached gypsum panel products. The steel framing and furring members covered in this specification are limited to those complying with Specification C645.

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

1.3 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.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A641/A641M Specification for Zinc–Coated (Galvanized) Carbon Steel Wire

A653/A653M Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

A1008/A1008M Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

C11 Terminology Relating to Gypsum and Related Building Materials and Systems

C645 Specification for Nonstructural Steel Framing Members

C840 Specification for Application and Finishing of Gypsum Board

C955 Specification for Cold-Formed Steel Structural Framing Members

2.2 *AISI Standards:*[3]

S202 Code of Standard Practice for Cold-Formed Steel Structural Framing

S220 North American Standard for Cold-Formed Steel Framing – Nonstructural Members

S240 North American Standard for Cold-Formed Steel Structural Framing

2.3 *ICC-ES Document:*[4]

ICC-ES AC86 Criteria for Cold-Formed Steel Framing Members—Interior Nonload-bearing Wall Assemblies—Approved May 2012

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this specification, refer to Terminology C11.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *channel, n*—material described in 4.3 to which furring members are attached.

3.2.2 *cross furring, n*—furring member attached perpendicular to main runners or framing members.

3.2.3 *cross furring member, n*—a member installed perpendicularly to the main beams designed to receive screw-attached gypsum panel products.

[1] This specification is under the jurisdiction of ASTM Committee C11 on Gypsum and Related Building Materials and Systems and is the direct responsibility of Subcommittee C11.03 on Specifications for the Application of Gypsum and Other Products in Assemblies.

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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 American Iron and Steel Institute (AISI), 25 Massachusetts Ave., NW, Suite 800, Washington, DC 20001, http://www.steel.org.

[4] Available from International Code Council (ICC), 500 New Jersey Ave., NW, 6th Floor, Washington, DC 20001, http://www.iccsafe.org.

***A Summary of Changes section appears at the end of this standard**

3.2.4 *direct furring, n*—furring members attached directly to the structural members of the building.

3.2.5 *framing member, n*—metal studs, runners (track), and rigid furring channels designed to receive screw-attached gypsum panel products.

3.2.6 *furred ceiling, n*—a ceiling in which the rigid furring channels and studs are attached directly to the structural members of the building.

3.2.7 *furring, v*—preparing a wall or ceiling with framing or furring members to provide a level surface or airspace.

3.2.8 *furring member, n*—metal studs, rigid furring channels, or channels used either as direct furring or as cross furring.

3.2.9 *grid suspension system, n*—a ceiling system composed of modular interlocking steel components designed to receive screw-attached gypsum panel products.

3.2.10 *main beam, n*—the main support member of a grid suspension system that receives cross furring members.

3.2.11 *main runner, n*—the channel or stud that is attached to or suspended from the structural members of the building.

3.2.12 *runner (track), n*—a member designed to receive the ends of metal studs, attached directly to the structural members of the building.

3.2.13 *suspended ceiling, n*—a ceiling in which the main runners and cross furring are suspended below the structural members of the building.

4. Materials and Manufacture

4.1 *Studs, Runners, Rigid Furring Channels, and Grid Suspension Systems*—See Specification C645 or AISI S220.

4.2 *Tie Wire and Hanger Wire*—Zinc-coated (galvanized) soft-annealed steel, or of a material and size having equivalent corrosion resistance and strength. Wire diameters (uncoated) specified herein correspond with United States steel wire gauge numbers as follows:

Diameter[A]		Wire Gauge
in.	mm	(U.S. Steel Wire Gauge)
0.0348	0.88	No. 20
0.0410	1.04	No. 19
0.0475	1.21	No. 18
0.0540	1.37	No. 17
0.0625	1.59	No. 16
0.0800	2.03	No. 14
0.0915	2.32	No. 13
0.1055	2.68	No. 12
0.1205	3.06	No. 11
0.1350	3.43	No. 10
0.1483	3.77	No. 9
0.1620	4.12	No. 8

[A] Allowable variations in diameter shall be in accordance with tolerances as established in Specification A641/A641M.

4.3 *Channels*—Channels shall be cold-formed from steel with a minimum 33 000 psi (228 MPa) yield strength and 0.0538 in. (1.37 mm) minimum bare steel thickness.

4.3.1 *Protective Coating:*

4.3.1.1 Channels for use in interior applications shall have a protective coating conforming to the requirements of Specification C645 or AISI S220.

4.3.1.2 Channels for use in exterior applications shall have a protective coating conforming to the requirements of Specification C955 or AISI S240.

4.3.2 Channels shall have the following minimum weights in lb per 1000 linear ft (kg/m):

Section Designation	Web Depth		Flange Width		Weight	
	in.	(mm)	in.	(mm)	lb/ 1000 ft	(kg/m)
075U050 -54	¾	(19)	½	(13)	277	(0.412)
150U050 -54	1½	(38)	½	(13)	414	(0.616)
200U050 -54	2	(51)	½	(13)	506	(0.753)
250U050 -54	2½	(64)	½	(13)	597	(0.888)

4.4 *Grid Suspension System:*

4.4.1 *Main Beam*—Formed from cold-rolled steel "T" sections, indexed with slots to receive ends of cross furring members, and with stamped couplings at each end for the purpose of splicing.

4.4.2 *Cross Furring Members*—Formed from cold-rolled steel, designed to permit screw attachment of gypsum panel products, and formed with an end configuration that permits mechanical interlock with the indexed slots of the main beam.

4.5 *Rod and Flat Hangers*—Formed from steel conforming to Specification A1008/A1008M. When specified, rod and flat hangers shall be protected with zinc coating or another equally rust-inhibiting coating.

5. Installation of Metal Framing

5.1 *Tolerances:*

5.1.1 Spacing of studs and furring members shall be not more than ±⅛ in. (3 mm) from the spacing shown in Tables 1 and 2. Any cumulative error shall be not more than ±⅛ in.

5.2 *Runner (Track) Installation:*

5.2.1 *General*—Runners shall be aligned accurately at the floor and ceiling and securely anchored approximately 2 in. (50 mm) from the runner ends, not more than 24 in. (610 mm) on center. Runners shall be secured with fasteners at partition corners. One runner shall extend to the end of the corner and the other runner shall butt to it and be gapped to allow clearance for the gypsum panel product thickness. Runners shall not be mitered.

5.2.2 *Runners to Concrete Slabs*—Shall be fastened with concrete stub nails, expansion anchors, shielded screws, or power-driven fasteners not exceeding 24 in. (610 mm) on center.

5.2.3 *Runners to Wood*—Shall be fastened with screws providing not less than 1 in. (25 mm) penetration or nails providing 1½ in. (38 mm) penetration into the wood.

5.2.4 *Runners to Suspended Ceilings*—Shall be fastened with "Molly"-type expandable fasteners, toggle bolts, clamps, or screws into channels, splines, "T" runners, or other members.

5.3 *Stud Installation:*

5.3.1 *Stud Height and Spacing Limitations:*

5.3.1.1 Maximum framing spacing determined by gypsum panel product thickness shall be in accordance with Table 1.

5.3.1.2 Stud heights shall be not greater than those shown in Tables 3-5.

TABLE 1 Maximum Framing Spacing

NOTE 1—Where a conflict exists in spacing between base and face layers, the closer spacing shall govern.

Gypsum Panel Product Thickness		Location	Application[A]	Maximum Spacing, o.c.[B]		
				One Layer Only, in. (mm)	Two Layers	
Base Layer, in. (mm)	Face Layer, in. (mm)				Fasteners Only, in. (mm)	Adhesive Between Layers, in. (mm)
⅜ (9.5)	. . .	ceilings	perpendicular	16 (406)[C]	16 (406)[C]	16 (406)[C]
	⅜ (9.5)	ceilings	perpendicular	[D]	16 (406)	16 (406)
	⅜ (9.5)	ceilings	parallel	[D]	[E]	16 (406)
½ (12.7)	. . .	ceilings	perpendicular	24 (610)[C]	24 (610)[C]	24 (610)[C]
	. . .	ceilings	parallel	16 (406)[C]	16 (406)[C]	16 (406)[C]
	⅜ (9.5)	ceilings	perpendicular	[D]	16 (406)	24 (610)
	⅜ (9.5)	ceilings	parallel	[D]	[E]	24 (610)
	½ (12.7)	ceilings	perpendicular	[D]	24 (610)	24 (610)
	½ (12.7)	ceilings	parallel	[D]	16 (406)	24 (610)
⅝ (15.9)	. . .	ceilings	perpendicular	24 (610)[C]	24 (610)[C]	24 (610)[C]
	. . .	ceilings	parallel	16 (406)[C]	16 (406)[C]	16 (406)[C]
	⅜ (9.5)	ceilings	perpendicular	[D]	16 (406)	24 (406)
	⅜ (9.5)	ceilings	parallel	[D]	[E]	24 (610)
	½ or ⅝ (12.7 or 15.9)	ceilings	perpendicular	[D]	24 (610)	24 (610)
	½ or ⅝ (12.7 or 15.9)	ceilings	parallel	[D]	16 (406)	24 (406)
¼ (6.4)	. . .	walls	parallel	[E]	16 (406)[C]	16 (406)[C]
	⅜ (9.5)	walls	[E]	[E]	[E]	[E]
	½ or ⅝ (12.7 or 15.9)	walls	perpendicular or parallel	[D]	16 (406)	16 (406)
⅜ (9.5)	. . .	walls	perpendicular or parallel	16 (406)[C]	16 (406)[C]	24 (610)[C]
	⅜ or ½ or ⅝ (9.5 or 12.7 or 15.9)	walls	perpendicular or parallel	[D]	16 (406)	24 (610)
½ or ⅝ (12.7 or 15.9)	. . .	walls	perpendicular or parallel	24 (610)[C]	24 (610)[C]	24 (610)[C]
	⅜ or ½ or ⅝ (9.5 or 12.7 or 15.9)	walls	perpendicular or parallel	[D]	24 (610)	24 (610)

[A] In relation to framing members.
[B] On center.
[C] Denotes framing spacing for base layer in two-layer application.
[D] Not applicable.
[E] Not recommended.

TABLE 2 Spans and Spacings of Horizontal Furring Members

Type of Furring	Maximum[A] Spacing c to c,[B] in. (mm)	Maximum Span, ft (mm)
Rigid Furring Channel	24 (610)	4 (1220)
1⅝ in. (41 mm) stud (erected with open side up and against support)	24 (610)	5 (1520)
2½ in. (64 mm) stud (erected with web vertical to support)[C]	24 (610)	6 (1830)
3⅝ in. (92 mm) stud (erected with web vertical to support)[C]	24 (610)	8 (2440)

[A] Consult Table 1 for maximum spacing as determined by gypsum panel product thickness.
[B] c to c—center to center
[C] A in. 6-in. (150 mm) length of same size stud or track shall be nested to form a "box" at each saddle tie.

5.3.1.3 Studs shall engage both the floor and ceiling runners. The gap between the end of a stud and the web of the top and bottom runner shall be not more than ¼ in. (6 mm).

5.3.1.4 Where conditions require that a partition be constructed with compensation for vertical structural movement, the gap between the end of a stud and the adjacent runner shall be designed by an architect or engineer.

5.3.2 *Location:*

5.3.2.1 Studs shall be positioned vertically and shall be spaced not more than the maximum framing spacing allowed for the finish specified. Studs located adjacent to door and window frames, partition intersections, and corners shall be anchored to runner flanges by screws, or by crimping at each stud and runner flange.

5.3.2.2 At the junction of through and abutting partitions, a stud shall be located not more than 2 in. (50 mm) away from the intersection in the abutting partition from the through partition (see Fig. 1), and not more than 2 in. (50 mm) from partition corners and other construction. A stud shall be located adjacent to all door and borrowed light frames. Studs shall be securely anchored to the jamb anchor clips on each door frame or borrowed light frame by bolt or screw attachment. A header shall be formed over metal door and borrowed light frames with a cut-to-length section of runner placed horizontally with the flanges cut and web bent vertically at each end, and securely attached to the adjacent vertical studs. A cut-to-length stud shall be positioned at the location of vertical joints over the header extending to the ceiling runner. Additional cut to length studs required to comply with framing spacing in accordance with Table 1 shall also be added over the header, extending to the ceiling runner.

5.3.2.3 At partition corners, a stud shall be installed so that it forms the outside corner. Following application of a single layer of gypsum panel product to this stud, a second stud shall be installed in the abutting runner and the web shall be screw-attached through the gypsum panel product into the flange of the first stud (see Fig. 2). A three-stud conventional corner shall be permitted (see Fig. 3).