Designation: C 645 – 00

Standard Specification for Nonstructural Steel Framing Members[1]

This standard is issued under the fixed designation C 645; 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 Department of Defense.

1. Scope *

1.1 This specification covers nonstructural steel framing members in interior construction assemblies.

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

1.3 The following safety hazards caveat pertains only to the test methods portion, Sections 9 and 10, of this specification: *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:*

A 653/A 653M Specification for Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dipped Process[2]

C 11 Terminology Relating to Gypsum and Related Building Materials and Systems[3]

C 1002 Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases[3]

2.2 *AISI Standard:*

Specification for the Design of Cold-Formed Steel Structural Members[4]

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 *members, n*—in screw application of gypsum board, studs, runners (track), hat furring channels, main beams and cross furring members of grid suspension systems or other items manufactured in accordance with this specification.

3.2.2 *nonstructural wall stud, n*—a member in a steel framed wall system which is limited to a lateral (transverse) load of not more than 10 lb/ft^2(480 Pa), a superimposed vertical load, exclusive of sheathing materials, of not more than 100 lbf/ft (1460 N/m), or a superimposed vertical load of not more than 200 lbs (890 N).

4. Materials and Manufacture

4.1 Members shall be manufactured from steel that meets the mechanical requirements of the AISI Specification for the Design of Cold-Formed Steel Structural Members (1996 Edition).

4.2 Members shall have a protective coating conforming to Specification A 653/A 653M – G 40 minimum or shall have a protective coating with an equivalent corrosion resistance.

4.3 Members shall be manufactured from steel having a minimum thickness, individual measurement of 0.0179 in. (0.455 mm) before application of protective coating.

5. Dimensions and Permissible Variations

5.1 Studs and rigid furring channels shall have a configuration and steel thickness such that the system in which they are used will carry the design transverse loads without exceeding either the allowable stress of the steel or the allowable design deflection. Main beams and cross furring of grid suspension systems shall be limited to a deflection of L/240. The manufacturer shall supply sufficient data for calculating design performance.

NOTE 1—Allowable deflection varies depending on the cladding used and architectural requirements. Detailed requirements shall be specified in application specifications.

5.1.1 Members, except main beams of grid suspension systems, shall be sufficiently rigid to permit penetration of the screw.

5.1.2 Minimum width of face to which gypsum board is screw-attached shall be not less than 1¼ in. (32 mm).

5.1.3 Minimum lip dimension shall be 3⁄16 in. (5 mm). See Appendix X1, Fig. X1.1.

5.2 Members shall be manufactured within the limits as shown in Table 1 and Fig. 1.

[1] This specification is under the jurisdiction of ASTM Committee C-11 on Gypsum and Related Building Materials and Systems and is the direct responsibility of Subcommittee C11.02 on Specifications and Test Methods for Accessories and Related Products.

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[2] *Annual Book of ASTM Standards*, Vol 01.06.

[3] *Annual Book of ASTM Standards*, Vol 04.01.

[4] Available from the American Iron and Steel Institute, 1000 16th St. N.W., Washington, DC 20036.

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

TABLE 1 Manufacturing Tolerances

Dimension[A]	Item Checked	Drywall Studs, in. (mm)	Drywall Track, in. (mm)
A	length	+ ⅛ (3.18) − ¼ (6.35)	+ 1 (25.40) − ¼ (6.35)
B[B]	web width	+ 1/32 (0.79) − 1/32 (0.79)	+ ⅛ (3.18) − 0 (0)
C	flare overbend	+ 1/16 (1.59) − 1/16 (1.59)	+ 0 (0) − 3/16 (4.76)
D	hole center width	+ ⅛ (3.18) − ⅛ (3.18)	NA
E	hole center length	+ ¼ (6.35) − ¼ (6.35)	NA
F	crown	+ ⅛ (3.18) − ⅛ (3.18)	+ ⅛ (3.18) − ⅛ (3.18)
G	camber	1/32 per ft (0.79) ½ max (12.7)	1/32per ft (0.79) ½ max (12.7)
H	bow	1/32per ft (0.79) ½ max (12.7)	1/32per ft (0.79) ½ max (12.7)
I	twist	1/32 per ft (0.79) ½ max (12.7)	1/32per ft (0.79) ½ max (12.7)

[A] All measurements shall be taken not less than 1 ft (305 mm) from the end.
[B] Outside dimension for stud; inside for track.

5.3 *Rigid Furring Channels*—Minimum depth shall be ⅞ in. (22 mm). Minimum width of furring attachment flanges (see Fig. 2) shall be ½ in. (12.7 mm).

5.4 Grid suspension systems include main beams and cross furring members which mechanically interlock to form a modular supporting network. Length tolerance for grid suspension members shall be ±1/16 in. (1.59 mm).

5.5 Runners (track) shall be formed in a U-shaped configuration, having web depth compatible with those of the studs of the same nominal size. The runners (track) shall be designed such that when the studs are placed in both the top and bottom runners (track), they are held by friction. Minimum height of flanges shall be 1 in. (25 mm).

6. Edges

6.1 Members shall be manufactured in such a fashion as to minimize burrs and sharp edges.

7. Cutouts

7.1 Cutouts shall not reduce the performance of the members in the gypsum board construction assembly below the specified performance requirements.

8. Sectional Properties

8.1 The sectional properties of members shall be computed in accordance with AISI Specifications for the Design of Cold-Formed Steel Structural Members (See Table 2 and Appendix X1).

9. Performance Requirements

9.1 *Penetration*—When tested in accordance with Section 10, members shall be capable of pulling the head of the screw below the surface of the gypsum board in less than 2 s without spin out.

10. Penetration Test

10.1 *Significance and Use*—This test method provides a procedure for evaluating the member's ability to pull the head of a screw below the surface of gypsum board. It shall be used to determine compliance with this specification. The degree of performance of this test method with service performance has not been determined.

10.2 *Apparatus shall satisfy the following*:

10.2.1 *Electric Drill*, capable of 2500 r/min (free spindle speed), supplied with a screw driving bit to fit the screw used in the test.

10.2.2 *Stop Watch*, capable of being read to the nearest 0.1 s.

10.3 *Materials shall satisfy the following*:

10.3.1 *Wallboard*—Specification C 36, Type X, ⅝ in. (16 mm) thick.

10.3.2 *Screws*—Specification C 1002, Type S, 1 in. (25.4 mm) long.

10.3.3 *Kraft Paper*—0.010 in. (0.254 mm) thick.

10.4 *Sampling*—One member shall be selected from each bundle or package but not more than ten from any one shipment for testing.

10.5 *Specimen Preparation*:

10.5.1 Each member to be tested shall be cut into test specimens not less than 18 in. (460 mm) long.

10.5.2 For each test, one piece of wallboard, 6 in. (12.7 mm) square, shall be cut from not less than 12 in. (305 mm) from the edge or end of the wallboard.

10.5.3 For each test, four pieces of kraft paper, 2 in. (51 mm) square shall be cut.

10.6 *Procedure*—Assemble the member, gypsum board and kraft paper on a rigid, flat surface. (See Fig. 3 for studs, Fig. 2 for furring channels.) Drive the screw, using the electric drill while applying a force (dead weight and applied force) of 25 lbf (112.2 N). Drive the screw to slightly below the surface of the gypsum board. Note if the screw has spun out and the length of time it takes to pull the head of the screw below the surface.

10.7 *Number of Tests and Retests*:

10.7.1 Five specimens of members shall be tested.

10.7.2 If more than one test specimen fails to meet the requirements, two more test specimens shall be chosen for retesting.

10.8 *Report*—Report shall indicate all specimens meeting the requirements of this specification if the time read from the stop watch is less than the time specified in Section 9, and the screw did not spin out; or shall indicate all failing if the time read is equal to or longer than the time specified in Section 9, or the screw spun out.

10.9 *Precision and Bias*—No statement is made about either the precision or bias of this test method since the result merely states whether or not there is conformance to the criteria for success specified in the procedure.

11. Inspection

11.1 Inspection of the members shall be agreed upon between the purchaser and the producer or supplier as part of the purchase agreement.

12. Rejection

12.1 When specified in the purchase agreement, members that fail to conform to the requirements of the specification shall be rejected. Rejection shall be reported to the producer or

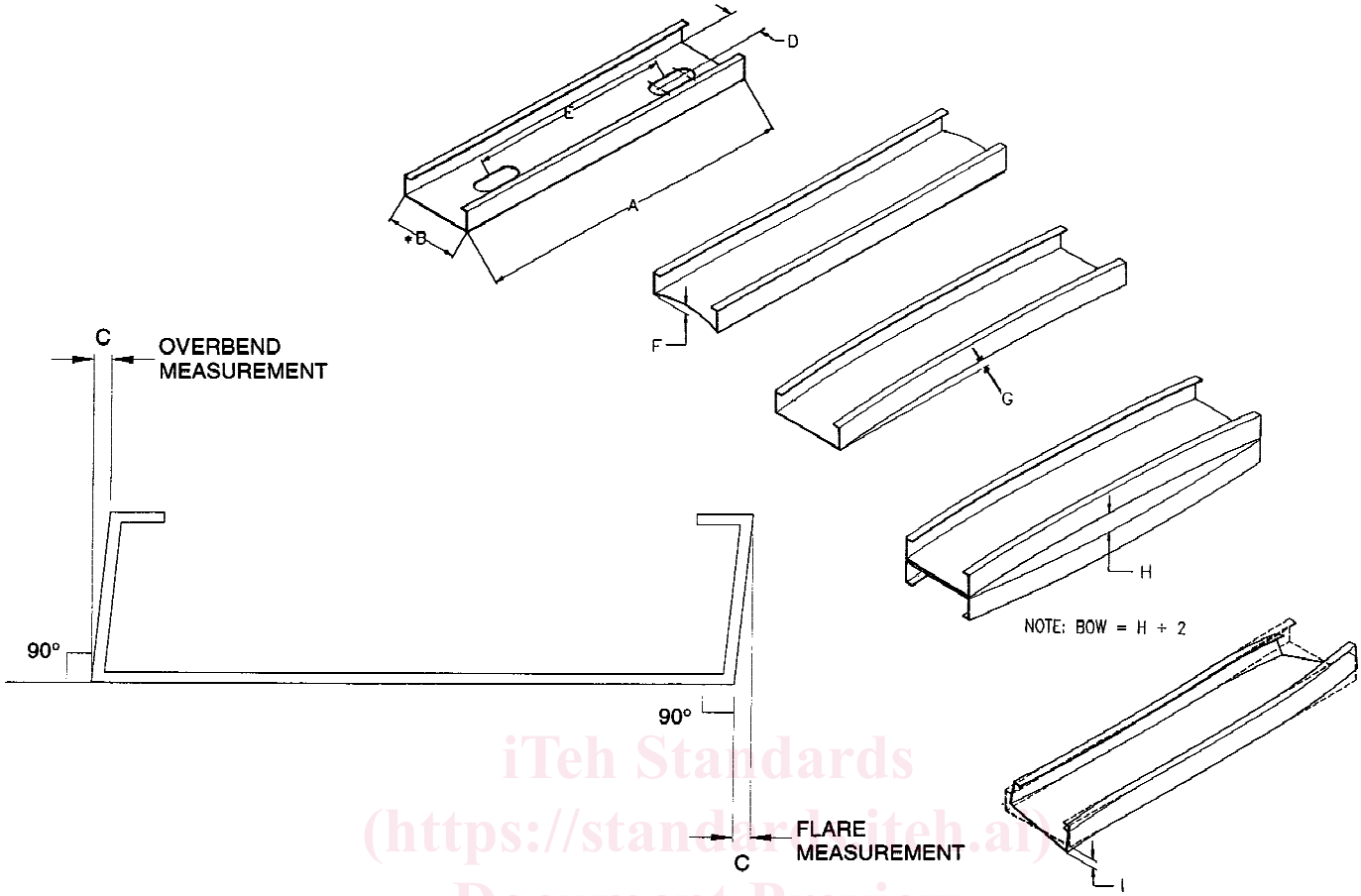
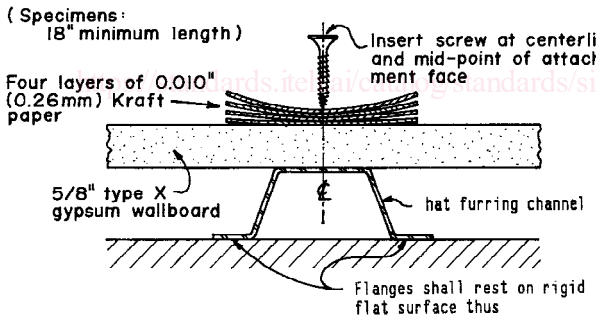


FIG. 1 Manufacturing Tolerances



NOTE 1—Wallboard specimens shall be taken a minimum of 12 in. (305 mm) from either edge and either end of wallboard panel.

FIG. 2 Hat Furring Channels

supplier promptly and in writing. The notice of rejection shall contain a statement documenting how the member has failed to conform to the requirements of this specification and the purchase agreement.

13. Certification

13.1 When specified in the purchase agreement, a producer's or supplier's report shall be furnished at the time of shipment certifying that the product is in compliance with this specification.

14. Marking and Identification

14.1 Groups of like members shall be marked with a label, or a tag attached thereto. Marking shall include length, quantity and rollformer's member designator including member depth, flange size, and minimum steel thickness in mils or inches, exclusive of protective coating.

14.2 In addition to the marking referenced in 14.1, individual members shall have a legible label, stencil, or embossment, at a maximum distance of 48 in. (1220 mm) on center, on the web of the member, with the following minimum information:

14.2.1 The rollformer's identification (that is, name, logo or initials).

14.2.2 The minimum steel thickness, in mils or inches, exclusive of protective coating.

14.2.3 The minimum yield strength in ksi (MPa) if other than 33 ksi (230 MPa).

14.2.4 The minimum protective coating weight, G-XX, if other than as specified in Section 4.

15. Keywords

15.1 furring channels; grid suspension systems; gypsum board; runners; screws; section properties; spinout; studs