



Designation: ~~C 954-04~~ Designation: C 954 - 07

## Standard 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 0.112 in. (2.84 mm) in Thickness<sup>1</sup>

This standard is issued under the fixed designation C 954; 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 ( $\epsilon$ ) 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 minimum requirements for steel drill screws for use in fastening gypsum panel products or metal plaster bases to steel members from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in thickness.

1.2 This specification also covers physical properties and test methods for determining performance requirements.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 The following safety hazards caveat pertains only to the test methods described in 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:*<sup>2</sup>

A 510 [Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel](#)

C 11 [Terminology Relating to Gypsum and Related Building Materials and Systems](#)

~~C 36 Specification for Gypsum Wallboard~~ 1396/C 1396M [Specification for Gypsum Board](#)

C 1513 [Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections](#)

### 3. Terminology

3.1 *Definitions:*

3.1.1 For definitions relating to gypsum and related building materials and systems, see Terminology C 11.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *steel drill screw*—self-drilling tapping screw with the ability to drill its own hole, form or cut mating threads without deforming its own threads or breaking during assembly.

### 4. Materials

4.1 Screws shall be manufactured from Grade 1018 to 1022 steel wire manufactured in accordance with Specification A 510.

### 5. Physical Properties

5.1 *Metallurgical Requirements :*

5.1.1 The surface of the screw shall be carbonitrided to a depth of 0.004 to 0.008 in. (0.10 to 0.20 mm).

5.1.2 The core hardness shall be 32 to 40 HRB after being drawn at a minimum temperature of 625 °F (330 °C).

5.1.3 The screw shall have no band of free ferrite between the case and core nor shall the case contain appreciable amounts of retained austenite or other soft constituents.

5.1.4 Surface hardness shall be determined by a micro hardness instrument at “the root of the thread profile,” as exposed by removal of enough material to form a flat surface along the length of the screw.

5.1.5 *Ductility*—Screws shall have sufficient ductility to be able to withstand a 5° bend without visible signs of fracture when

<sup>1</sup> 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 C11.02 on Specifications and Test Methods for Accessories and Related Products.

Current edition approved Oct. 1, 2004/2007. Published October 2004/August 2007. Originally approved in 1981. Last previous edition approved in 2000/2004 as C 954 - 004.

<sup>2</sup> 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.

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

tested as specified in paragraph 8.2.1 of Specification C 1513.

#### 5.2 *Dimensions and Permissible Variations:*

##### 5.2.1 *General:*

5.2.1.1 *Head Diameter*— The head of the screw shall not be out of round more than 0.021 in. (0.51 mm) and have the following shape and dimensions:

5.2.1.2 *Screw Diameter*— Screws shall have a major diameter not less than 0.136 in. (3.45 mm).

5.2.1.3 *Points*, shall provide for self-drilling into steel studs from 0.333 in. (0.84 mm) to 0.112 in. (2.84 mm) in thickness and meet the performance tests in Section 6.

5.2.1.4 *Driving Recess*, shall be a No. 2 “Phillips” design with a minimum depth of 0.104 in. (2.64 mm) as determined with a “Phillips” penetration depth gage or a recess of equal performance.

5.2.1.5 *Length*—Nominal lengths shall be minimum length.

##### 5.2.2 *Screws for Fastening Gypsum Board:*

5.2.2.1 Screw-head minimum diameter shall be 0.3145 in. (8.00 mm).

5.2.2.2 The top of the head shall be flat. The outer flange thickness shall be  $0.025 \pm 0.005$  in. ( $0.64 \pm 0.13$  mm). The contour beneath the flange head shall be such that the screw head shall be able to be driven so that the head of the screw rests immediately below the surface of the gypsum panel products.

5.2.2.3 The threads shall extend to the lower edge of the head contour.

##### 5.2.3 *Screws for Fastening Metal Plaster Bases:*

5.2.3.1 Screw head minimum diameter shall be 0.437 in. (11.1 mm).

5.2.3.2 The top of the head shall be flat or contoured. The underside of the head shall be flat.

5.2.3.3 The threads shall extend to the underside of the head.

## 6. Performance Requirements

### 6.1 ~~Spin-Out~~ Spin-Out:

6.1.1 Screws shall self-drill and drive into a stud 0.0598 in. (1.5 mm) thick with an approximate hardness of 65 HRB without spin-out.

6.1.2 Screws shall self drill and drive into a stud 0.105 in. (2.7 mm) thick, with a hardness of 80 HRB without spin-out.

### 6.2 *Performance:*

6.2.1 When tested in accordance with Section 10, screws shall meet the requirements as follows:

6.2.1.1 *Gypsum Panel Products*—Screw threads shall be adequate to pull the head of the screw below the surface of the gypsum panel through four layers of kraft paper placed over the gypsum panel products and a steel stud 0.033 in. (0.84 mm) thick when tested in accordance with 10.5.1.

6.2.1.2 *Metal Plaster Bases*—Screw threads shall be adequate to pull metal lath tight against the flange of a steel stud 0.033 in. (0.84 mm) thick so that when subjected to a steady pull, the lath will tear and not slip out from under the screw head when tested in accordance with 10.5.1.

## 7. Finish and Appearance

7.1 Screws shall be corrosion-resistant treated with a material which will not inhibit adhesion to joint compounds or plaster and will not bleed through decorative finishes.

7.2 Screws shall be straight, clean, smooth, neatly formed, and free of defects such as burrs and deformations.

## 8. Sampling

8.1 Obtain not less than 90 screws from not less than five containers.

## 9. Number of Tests and Retests

9.1 Test a minimum of five screws for each test. If any of the first lot fails, test 25 more screws.

9.2 If two or more of the second lot fail the second test, then the represented lot fails to meet the specified requirements.

## 10. Test Method

### 10.1 *Summary of Test Method:*

10.1.1 This test method utilizes steel screws designed for use to hold gypsum panel products and metal plaster base materials applied with power-driven screw guns of 2500 r/min maximum to steel studs.

### 10.2 *Significance and Use:*

10.2.1 This test method evaluates the ability of steel drill screws used to secure gypsum panel products and metal plaster bases to certain steel framing members.

10.2.2 The test shall be conducted in a laboratory or on-site.

### 10.3 *Apparatus:*

10.3.1 *Power-Driven Drill Screw Gun*, having the capacity of turning 2500 r/min maximum (free spindle speed).

10.3.2 A *Vice*, or similar device to support the stud during the test.