



Standard Specification for Nails for the Application of Gypsum Board¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers requirements for steel wire nails suitable for use in the application of gypsum board.

1.2 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.

1.3 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 The following precautionary caveat pertains only to the test method portion, Sections 7 and 8, 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*:²

E4 Practices for Force Verification of Testing Machines

3. Materials

3.1 *Steel Wire*, used in the manufacture of nails, shall be of hard-drawn low or medium-low-carbon steel, entirely suitable for the purpose intended. Before fabrication it shall be sufficiently ductile to withstand cold-bending, without fracture, through 180° over a radius not greater than the diameter of the wire (see Section 8).

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 C11.02 on Specifications and Test Methods for Accessories and Related Products.

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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.

4. Physical Properties

4.1 *Ductility*—The nail shall be sufficiently ductile to withstand cold bending without fracture when tested according to Section 8.

4.2 *Withdrawal Resistance*—The average withdrawal resistance, both immediate and delayed, shall be at least equal to that provided by 12.5 gauge (0.099 ± 0.003 in.) (2.515 ± 0.08 mm) bright, smooth shank, nails with a medium diamond point, when tested according to 8.2.

5. Dimensions and Permissible Variations

5.1 *Heads*—Shall be not less than 0.2375 in. (6.0 mm) and not more than 0.3875 in. (9.8 mm) in diameter, shall be not more than $\frac{1}{64}$ in. (0.4 mm) thick at the peripheral edge, shall be uniformly tapered to a small fillet around the shank, shall be either flat or concave, and shall be free from protrusions and sharp, irregular edges.

5.2 *Shanks*—Diameter shall not vary more than ± 0.003 in. (0.08 mm) for shank diameters 0.076 in. (1.93 mm) or larger.

5.3 *Points*—The nails shall have medium to long diamond or needle points.

5.4 *Clearance*—Where a deformation process produces other than a smooth shank nail, a clearance area (round and smooth), measured from the top of the head to the deformed section, shall be provided equal to the nominal thickness of the gypsum board for which the nails are specified.

6. Workmanship, Finish, and Appearance

6.1 The nails shall be bright, or chemically treated, or coated with rust inhibiting material provided that such chemical treatment or rust inhibitor does not adversely affect the performance of the nail as specified in Section 4. The nails shall also be compatible with the joint compound and decoration. Nails shall be neatly formed and free from injurious defects or deformations.

7. Number of Tests

7.1 At least five nails from each lot of 100 individual containers shall be examined to determine conformance to the requirements of this specification.

8. Test Methods

8.1 Bend Test:

8.1.1 *Significance and Use*—This test method is performed to determine the ductility of a nail, and used to determine compliance with this specification.

8.1.2 *Procedure*—Hold the test nail in a vise and bend by means of a clamp or similar device attached to the free end of the nail through 90° over a radius not greater than the diameter of the nail.

8.1.3 *Precision and Bias*—Neither the precision nor the bias of the nail bend test have been determined.

8.2 Withdrawal Resistance

8.2.1 *Significance and Use*—This test method determines the resistance to withdrawal from a wood block of the test nail compared to a standard nail. It is used to determine compliance with this specification.

8.2.2 Apparatus:

8.2.2.1 *Testing machine*—The testing machine shall be of any type that is of sufficient capacity and that is capable of applying a tensile load at the strain rate prescribed in 8.2.3.2. The load platform shall be of sufficient size to accept the block of wood described in 8.2.2.5. The testing machine shall be power operated and shall apply the load continuously and without shock.

8.2.2.2 The test apparatus shall be verified according to Practices E4, Sections 16 through 18.

8.2.2.3 *Load Indicating Equipment*, capable of reading to 1 lbf (4.45 N) increments shall be provided for the test apparatus. A means shall be provided to indicate the maximum load attained during the test.

8.2.2.4 A means of securing the blocks of wood to the platform or lower cross head shall be provided so that the nails are aligned with the direction of pull. A device shall be attached to the upper cross head to grasp the nail head securely and hold it during the test for the purpose of pulling the nail from the block of wood.

8.2.2.5 *Wood Nailing Blocks*—Nominal 2 by 6 in. (38 by 140 mm) Douglas Fir, construction grade, containing at least 16 %, but not more than 19 %, free moisture as determined by a suitable moisture meter. Required wood blocks for a test series shall be cut from a single piece of lumber creating blocks free of knots.

8.2.3 Procedure:

8.2.3.1 Alternately use twenty of the standard 12.5 gauge nails and twenty of the nails being tested and hammer drive to a depth of 7/8 in. (22.2 mm) into the longitudinal center line of one edge and one side face of the wood blocks. Space nails 3 in. (76 mm) apart. Determine the comparative performance as follows:

8.2.3.2 *Immediate*—Withdraw alternate samples of each type of nail from each face, ten of each nail, at the rate of 0.06 in. (1.5 mm)/min.

8.2.3.3 *Delayed*—Condition the lumber, into which the nails are driven, at $50 \pm 2\%$ relative humidity and $70 \pm 5^\circ\text{F}$ ($21.1 \pm 3^\circ\text{C}$) to constant weight, after which withdraw the remaining nails.

8.2.4 *Precision and Bias*—Neither the precision nor the bias have been determined for the nail withdrawal test method.

9. Certification

9.1 When specified in the purchase order a producer's or supplier's certification shall be furnished to the purchaser that the material is in compliance with this specification.

10. Packaging and Package Marking

10.1 Unless otherwise specified, nails shall be packaged in substantial commercial containers of the type, size, and kind commonly used for the purpose, so constructed as to preserve the contents in good condition and to ensure acceptance and safe delivery by common or other carriers, at the lowest rate, to the point of delivery. In addition, the containers shall be so made that the contents can be partially removed without destroying the container's ability to serve as a receptacle for the remainder of the contents.

10.2 Unless otherwise specified, individual packages and shipping containers shall be marked with the type and length of nail and the name of the manufacturer or distributor. Individual packages shall also be marked with the name of the manufacturer or distributor and the net mass.

11. Keywords

11.1 gypsum board; nail; points; shanks; wire heads

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