Designation: F 1667 – 05

Standard Specification for Driven Fasteners: Nails, Spikes, and Staples[1]

This standard is issued under the fixed designation F 1667; 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. The Commercial and Government Entity (Cage) Code for ASTM: 81346.

Scope*

1.1 This specification covers nails, spikes, staples, and other driven fasteners, as listed in Table 1.

NOTE 1—Fastener ductility information is presented in Table 2 and dimensional information in Tables 3-64.

1.2 Fasteners described in this specification are driven by hand tool, power tool, or mechanical device in single or multiple strikes and are positioned by hand, tool, or machine.

1.3 The values stated in inch-pound units are to be regarded as the standard.

1.4 *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.*

Referenced Documents

2.1 *ASTM Standards:* [2]

A 153M Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

B 695M Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel [Metric]

B 641M Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

B 695 Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

F 547 Terminology of Nails for Use with Wood and Wood-Base Materials

F 592 Terminology of Collated and Cohered Fasteners and Their Application Tools

F 680 Test Methods for Nails

F 1575 Test Method for Determining Bending Yield Moment of Nails

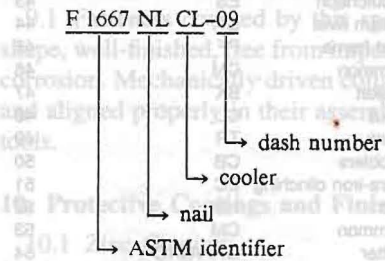
3. Terminology

3.1 *Definitions*—The definitions used in this specification are those of common commercial acceptance and usage and also appear in Terminologies F 547 and F 592.

4. Classification

4.1 The fasteners and their Table 1 classification are identified as follows:

NOTE 2—The identification of fasteners, classified by style and type (alpha indicators) followed by a dash number (numerical code) based on Tables 3-64, identifies dimensions specifically and establishes a PIN (part identifying number) system when preceded by the F 1667 ASTM designator of this specification. For example:



Identifies a cooler nail with a length of 2⅞, a shank diameter of 0.120, and a head diameter of 0.297 (See Table 10).[4]

[4] All dimensions are given in inches.

4.2 The trade designation, *S*, pennyweight, used in commercial practice is referenced in Tables 3-64 wherever it applies.

5. Ordering Information

5.1 Orders for driven fasteners under this specification shall include the following information:

5.1.1 Quantity or weight;

5.1.2 Part identifying number (PIN) or product description (see 4.1 and appropriate table);

This specification is under the jurisdiction of ASTM Committee F16 on Fasteners and is the direct responsibility of Subcommittee F16.05 on Driven and Threaded Fasteners.

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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.**

ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States.

TABLE 1 Classification and Identification Index

Type		Style	Style Identification	Table
I—Nails (NL)	1.	Brads	BR	3
	2.	Barrel	BL	4
	3.	Boat	BTH/BTL	5
	4.	Box A	BXA	6
		Box B	BXB	7
	5.	Broom	BM	8
	6.	Casing	CN	9
	7.	Cooler	CL	10
	8.	Sinker	SK	11
	9.	Corker	CK	12
	10.	Common	CMA	13
		Common	CMC	14
		Common	CMS	15
		Common	CMM	16
	11.	Concrete	CTS/CTM	17
	12.	Double-headed	DH	18
	13.	Fine	FN	19
	14.	Finishing	FH	20
	15.	Flooring	FL	21
	16.	Lath	LHF	22
		Lath	LHH	23
	17.	Masonry	MR/MRH	24
	18.	Pallet	PL	25
	19.	Gypsum wallboard	GWS	26
		Gypsum wallboard	GWM	27
	20.	Roofing	RFA	28
		Roofing	RFS	29
		Roofing	RFC	30
		Roofing	RFL	31
		Roofing	RFR	32
		Roofing	RFD	33
		Roofing	RFNS/RFND	34
	21.	Shingle	SHAD/SHAS	35
		Shingle	SHSS/SHNSB	36
	22.	Siding	SDF/SDC/SDK	37
	23.	Slating	SLA/SLC/SLS	38
	24.	Rubber heel	RH	39
	25.	Underlayment	UL	40
	26.	Square-barbed	SB	41
	27.	Masonry drive	MD	42
	28.	Escutcheon	ES	43
	29.	Glulam rivet	GR	44
	30.	Post frame	PF	45
II—Cut nails (CN)	1.	Common	CM	46
	2.	Basket	BK	47
	3.	Clout	CL	48
	4.	Trunk	TR	49
	5.	Cobblers	CB	50
	6.	Extra-iron clinching	EC	51
	7.	Hob	HB	52
III—Spikes (SP)	1.	Common	CM	53
	2.	Gutter	GRF/GRO	54
	3.	Round	RDC/RDF	55
	4.	Barge and boat	BB	56
IV—Staples (ST)	1.	Fence	FN	57
	2.	Poultry netting	PN	58
	3.	Flat top crown	FC	59
		Flat top crown	FCC	60
	4.	Round or V crown	RC	61
	5.	Preformed	PC	62
	6.	Electrical	RE	63
	7.	Preformed hoop	PH	64

5.1.3 Special material requirements, if specified, including coatings or finishes;

5.1.4 ASTM designation;

5.1.5 Packaging requirements;

5.1.6 A producer's or supplier's certification that the material and the finished fastener are in compliance with this specification, furnished only when specified in the purchase order;

TABLE 2 Bend Angles for Fasteners Using the Test Method F 680 Bend Test

	Fastener Material
1.	Steel wire: (low-carbon, medium-low carbon, medium-carbon) (unhardened)
2.	Stainless steel wire
3.	Hardened steel fasteners
4.	Sheet steel for cut nails, Type II, and cut spikes, Type III
5.	Copper (min 98 %)
6.	Copper clad wire (min 20 %)
7.	Aluminum alloy wire
8.	Brass wire

5.1.7 Supplementary requirements, if any; and

5.1.8 Any additions agreed upon between the purchaser and the supplier.

6. Material Requirements

6.1 Steel wire used in the manufacture of driven fasteners shall be of low carbon, medium-low carbon, or medium-carbon.

6.2 Stainless steel wire used in the manufacture of driven fasteners shall be of Types 302, 304, 305, or 316.

6.3 Carbon steel wire for the manufacture of hardened nails shall be suitable for heat treatment to a minimum hardness of 37 HRC.

6.4 Sheet steel used in the manufacture of cut nails (Type II) and cut spikes (Type III) shall be a medium-carbon steel.

6.5 Copper used in the manufacture of driven fasteners shall contain a minimum of 98 % pure copper.

6.6 Copper-clad steel wire used in the manufacture of driven fasteners shall contain not less than 20 % copper by weight. The average thickness of copper on the steel wire shall be not less than 10 % of the radius of the clad wire. The minimum thickness of copper on the steel wire shall be not less than 8 % of the radius of the clad wire.

6.7 Aluminum alloy wire used in the manufacture of fasteners shall conform to Alloy 2024, 5056, 6061, or 6262, and have a minimum ultimate tensile strength of 60 000 psi.

NOTE 3—Smooth shank nails are sometimes chemically treated to remove grease, oil, and foreign matter and to roughen the surface microscopically. Mechanically deformed nails are sometimes tumbled to remove grease and foreign matter.

6.8 Brass wire used in the manufacture of fasteners shall be of good commercial quality suitable for the purpose.

7. Physical Properties

7.1 *Ductility*—The fasteners shall be sufficiently ductile to withstand cold bending without fracture, as specified in Table 2 for various materials used in the manufacture of fasteners utilizing the conventional bend test described in Test Method F 680. Mandrel diameter used in this test shall not exceed the nail/wire diameter. The cold bend test shall not apply to unhardened nails with deformed shanks.

7.2 *Tensile Strength*—Finished driven fasteners are not normally subject to tension testing. However, the wire material used to manufacture the fastener is tested as required for control in the production process during manufacture.

Dimensions and Tolerances

Nominal dimensions of nails and spikes shall be as in Tables 3-56. The following dimensional designations apply:

= trade designation (reference in penny weight),
= length, in.,
= head diameter or width, in.,
= shank diameter, in.,
= head separation, in. (Table 18), and
= approximate count per pound.

The lengths, *L*, of nails and spikes with flat heads or shoulders under the head shall be measured from under the head or shoulder to the tip of the point. All other nails and spikes shall be measured overall.

The diameter, *D*, of smooth shank nails and spikes shall be measured away from the gripper marks. The diameter, of formed or deformed shanks shall be measured before formation, or, if specified, the thread crest diameter after formation, or both. All diameter dimensions shall be taken prior to the application of or after the removal of any coatings or finish.

Tolerances on Nominal Dimensions for Nails and

Length tolerances shall be ±1⁄32 in. for lengths up to including 1 in.; ±1⁄16 in. for lengths over 1 in., up to and including 2½ in.; ±3⁄32 for lengths over 2½ in., up to and including 7 in.; and ±⅛ in. for all lengths over 7 in.

Shank diameter tolerances shall be ±0.002 in. for diameters smaller than 0.076 in. and ±0.004 in. for diameters 0.076 in. and larger.

Head Diameter Tolerances:

Hand Driven—Tolerances on head diameters of nails shall be +0, −10 % of the nominal head diameter (mean of two readings 90° apart). For other brads, nails, and spikes, the tolerance shall be ±10 % of the nominal head diameter (individual measurement). The difference in diameter across the long axis of a roofing nail shall not exceed that across the short axis by more than 20 %. For other brads, nails, and spikes, the difference in diameter across the long axis shall not exceed that across the short axis by more than 10 %. A fillet shall be provided under the head if not otherwise specified.

Power Driven—Tolerances on head diameters of power-driven nails shall comply with the manufacturer's specifications and shall be suitable for use in the make and model of tool specified.

Nominal dimensions of staples shall be as shown in -64, and the following dimensional designations shall

Hand Tool–Driven Nominal Dimensions:

= leg length, inside, in.,
= round leg diameter, in.,
= crown width, inside, in., and
= approximate count per pound.

Power Tool–Driven Nominal Dimensions:

D = round leg diameter, in.,
L = leg length, outside, in.,
T = leg thickness, in. (see Tables 59 and 60),
W = leg width, in. (see Tables 59 and 60),
C = crown width, outside, in., and
G = steel wire gage.

8.4 *Tolerances on Nominal Dimensions for Staples*:

8.4.1 Leg length, *L*, tolerances shall be +1⁄32 , −1⁄64 in. for both hand tool–driven and power tool–driven staples.

8.4.2 Diameter tolerances for hand tool–driven round staples shall be ±0.002 in. for diameters smaller than 0.076 in. and ±0.004 in. for diameters 0.076 in. and larger.

8.4.3 Thickness and width tolerances on power-driven staples shall comply with the manufacturer's specification and shall be suitable for use in the make and model tool specified (see Tables 59 and 60).

8.4.4 Crown width tolerances are ±1⁄32 in. unless otherwise specified.

8.5 *Nominal Dimensions for Cut Nails, Type II*—Unless otherwise specified, cut nails shall be sheared from medium carbon sheet steel and shall have a wedge-shaped shank with a sheared square point end narrower than the upset head end. The designation *T* in Tables 46-51 refers to sheet thickness in finished product. Other designations shall be the same as those for nails in 8.1.

8.6 When gage is used for a nominal diameter dimension in the application of this specification, it shall be in accordance with the decimal equivalents as shown in Specification A 510M, unless otherwise specified.

9. Workmanship

9.1 Fasteners covered by this specification shall be true to shape, well-finished, free from imperfections, clean, and free of corrosion. Mechanically driven collated items shall be uniform and aligned properly in their assembled form for use in power tools.

10. Protective Coatings and Finishes

10.1 *Zinc Coating*:

10.1.1 Driven fasteners required to be zinc coated shall be cut and formed from hot-dip, hard-wiped, galvanized steel wire, electrogalvanized steel wire, or zinc flake/chromate dispersion-coated steel wire; or they shall be cut from uncoated (bright) steel wire and shall be hot-dip galvanized, electrodeposited zinc coated, mechanically deposited zinc coated, or zinc flake/chromate dispersion coated after forming. Power-driven staples are not normally zinc coated after forming.

10.1.2 Hot-dip galvanized or electrogalvanized steel wire for the manufacture of fasteners shall have a coating weight in accordance with Specification A 641/A 641M, Supplementary Requirements, Class 1.

10.1.3 Hot-dip galvanized steel fasteners coated after forming shall have a coating weight in accordance with Specification A 153/A 153M, Class D, when a heavier coating for exterior use is specified. If not otherwise specified, the coating weight shall be in accordance with Specification A 641/A 641M, Supplementary Requirements, Class 1.

10.1.4 Mechanically deposited zinc coatings applied to fasteners after forming shall have a thickness in accordance with Specification B 695, Class 40, unless otherwise specified.

10.2 *Other Coatings and Finishes (When Specified)*:

10.2.1 Cement coating shall be applied by tumbling, mechanical dispensing device, or immersion in resin or other similar material and shall not be tacky or gummy. Cement coatings on power-driven fasteners shall be uniform and applied before, during, or after the fasteners are cohered into strips, clips, or coils.

NOTE 4—Cement coatings increase the holding strength in withdrawal of a driven fastener, depending on the fastener size, amount of cement coating applied, and method of driving.

10.2.2 Chemical etching shall remove the polish of fabrication and roughen the surface microscopically.

10.2.3 Blued nails shall be heated to form a thin, colored oxide on the surface.

10.2.4 Miscellaneous finishes, such as tin plating, liquor, brass plating, copper plating, phosphate coating, or oil coating shall be applied.

10.3 *Altered Shapes and Deformations*:

10.3.1 Mechanically formed or deformed nail shanks shall have barbs, flutes, threads, or angular serrations formed onto the wire from which the nail is manufactured. Mechanically deformed shanks shall have vertical or helical flutes or screw-type or annular (ring)-type deformations rolled onto the shank. Symmetrical helical shank deformations shall be obtained by twisting square wire. The deformations shall pass entirely around the shank body, resulting in expanded ridges and depressions.

10.3.2 Mechanically formed or deformed [illegible] round or T-headed; or they shall be altered [illegible] use in a given make and model of a power-[illegible] system.

10.3.3 Staples manufactured for intended use [illegible] shall comply with the tool manufacturer's [illegible] IV, Style 3 (Table 59 or Table 60).

11. Certification

11.1 When specified in the purchase order, a [illegible] supplier's certification shall be furnished to the [illegible] indicating that the fasteners are in [illegible] specification and the purchase order.

12. Packaging and Package Marking

12.1 Unless otherwise specified, fasteners [illegible] stantial commercial containers of the type, [illegible] commonly used for the purpose, so constructed as to protect the contents in good condition and to ensure [illegible] safe delivery by common or other carriers to the [illegible] delivery. In addition, the containers shall be so made that contents can be removed partially without destroying the container's ability to serve as a receptacle for the remainder of the contents.

12.2 When specified, individual packages and [illegible] containers shall be marked with the part-identifying [illegible] and type, length, diameter (or gage, as applicable) of the fastener, the name of the manufacturer or distributor, and the quantity or net weight.

13. Keywords

13.1 diameter; driven fasteners; head; length; nails; pins; spikes; staples;