



Standard Specification for Medical Screwdriver Bits¹

This standard is issued under the fixed designation F116; 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.

1. Scope

1.1 This specification covers the acceptable dimensions and tolerances for bits of screwdrivers to insert and remove metal screws used as surgical implants.

1.2 This specification is based, in part, upon ISO 8319–1, ISO 8319–2, and ISO 10664.

1.3 The screwdrivers with the bits described in this specification are suitable for use with screws described in Specification F543, ISO 5835, and ISO 9268.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *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

- E18 Test Methods for Rockwell Hardness of Metallic Materials
- F90 Specification for Wrought Cobalt-20Chromium-15Tungsten-10Nickel Alloy for Surgical Implant Applications (UNS R30605)
- F543 Specification and Test Methods for Metallic Medical Bone Screws
- F565 Practice for Care and Handling of Orthopedic Implants and Instruments
- F899 Specification for Wrought Stainless Steels for Surgical Instruments
- F1744 Guide for Care and Handling of Stainless Steel Surgical Instruments

¹ This specification is under the jurisdiction of ASTM Committee F04 on Medical and Surgical Materials and Devices and is the direct responsibility of Subcommittee F04.21 on Osteosynthesis.

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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.

2.2 ISO Standards:³

- ISO 5832–5 Implants for Surgery—Metallic Materials—Part 5: Wrought Cobalt-Chromium-Tungsten-Nickel Alloy
- ISO 5835 Implants for Surgery—Metal Bone Screws with Hexagonal Driver Connection, Spherical Under Surface of Head, Asymmetrical Thread—Dimensions
- ISO 7153–1 Surgical Instruments—Metallic Materials—Part 1: Stainless Steel
- ISO 8319–1 Orthopaedic Instruments—Drive Connections—Part 1: Keys for Use with Screws with Hexagon Socket Heads
- ISO 8319–2 Orthopaedic Instruments—Drive Connections—Part 2: Screwdrivers for Single Slot Head Screws, screws with Cruciate Slot, and Cross-Recessed Head Screws
- ISO 9268 Implants for Surgery—Metal Bone Screws with Conical Under-Surface of Head—Dimensions
- ISO 10664 Hexalobular Internal Driving Feature for Bolts and Screws

3. Classification

3.1 This specification includes the following types of bits for medical screwdrivers:

- 3.1.1 *Type I*—Single-slot bit.
- 3.1.2 *Type II*—Cruciate-slot bit.
- 3.1.3 *Type III*—Cross-slot (Modified Phillips) bit.
- 3.1.4 *Type IV*—Hexagonal bit.
- 3.1.5 *Type V*—Square bit.
- 3.1.6 *Type VI*—Hexalobe bit.

4. Dimensions and Tolerances

4.1 Screwdriver bits conforming to this specification shall be fabricated in accordance with the dimensions and tolerances described below:

4.1.1 *Type I*—Single-slot screwdriver bits shall conform to the dimensions and tolerances provided in Table 1, and shown in Fig. 1.

4.1.2 *Type II*—Cruciate-slot screwdriver bits shall conform to the dimensions and tolerances provided in Table 2, and shown in Fig. 2.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

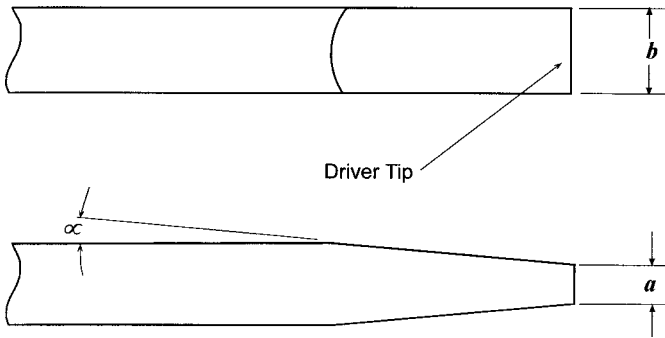


FIG. 1 Dimensions of Single-Slot Screwdriver Bit

TABLE 1 Dimensions and Tolerances of Single-Slot Screwdriver Bit

Slot Thickness, <i>a</i> (mm)	Slot Width, <i>b</i> (mm; maximum)	Slot Angle, α (degrees)
1.10	+0.03	5.0
	−0.07	+30'
1.10	+0.03	−30'
	−0.07	+30'
		−30'

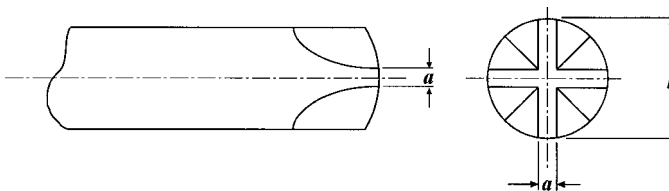


FIG. 2 Dimensions of Cruciate-Slot Screwdriver Bit

TABLE 2 Dimensions and Tolerances of Cruciate-Slot Screwdriver Bit

Slot Thickness, <i>a</i> (mm)	Slot Width, <i>b</i> (mm; maximum)
1.10	+0.03
	−0.07
1.10	+0.03
	−0.07

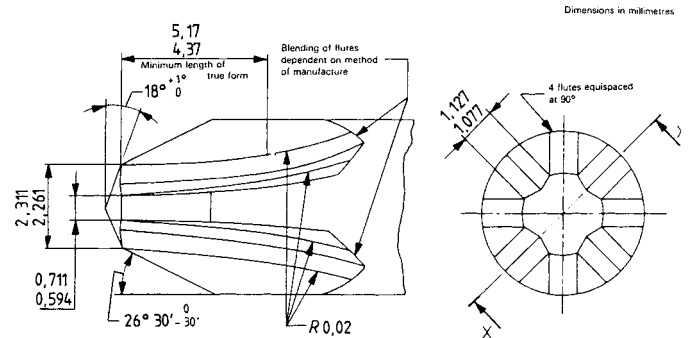


FIG. 3 Dimensions and Tolerances of Cross-Slot (Modified Phillips) Screwdriver Bit

5.1.2 Cold worked Cobalt-Chromium-Tungsten-Nickel alloy (Specification F90 or ISO 5832-5).

5.2 The hardness of the material of the bit and shaft portion shall be 45–55 (stainless steel) or 45–50 (Cobalt-Chromium-Tungsten-Nickel alloy) when measured on the Rockwell C scale according to the procedures described in Test Methods E18.

5.3 The shaft shall be firmly fixed to a handle of appropriate material.

6. Finish and Marking

6.1 The bit portion of the screwdriver shall be free of nicks, dents, and scratches.

6.2 When size permits, the following information should be legibly marked on the shaft or handle of the screwdriver (in order of preference):

- 6.2.1 Manufacturer's name or logo
- 6.2.2 Size (for Type IV through VI screwdriver bits)
- 6.2.3 Catalog number
- 6.2.4 Manufacturing lot number
- 6.2.5 Material (include ASTM designation, as appropriate).

6.3 The marking should be such that the mechanical integrity of the screwdriver is not compromised.

7. Care and Handling

7.1 Screwdrivers should be handled in accordance with Practices F565 and F1744, as appropriate.

8. Keywords

8.1 bone screw; orthopaedic medical devices; screwdriver; surgical instruments

4.1.3 *Type III*—Cross-slot (Modified Phillips) screwdriver bits shall conform to the dimensions and tolerances provided in Fig. 3.

4.1.4 *Type IV*—Hexagonal screwdriver bits shall conform to the dimensions and tolerances provided in Table 3, and shown in Fig. 4.

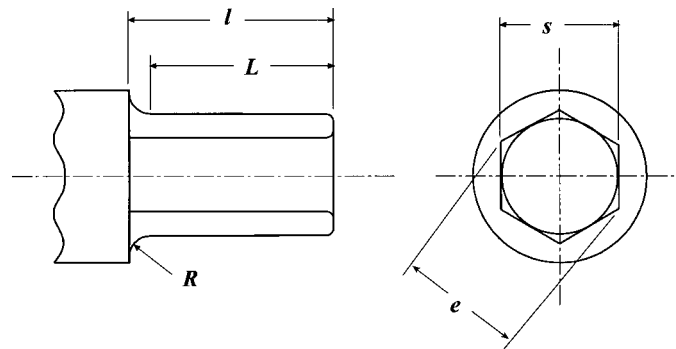
4.1.5 *Type V*—Square screwdriver bits shall conform to the general dimensions provided in Table 4, and shown in Fig. 5.

4.1.6 *Type VI*—Hexalobe screwdriver bits shall conform to the general dimensions provided in Table 5, and shown in Fig. 6.

5. Material Requirements

5.1 The bit and shaft portion of the screwdriver should be fabricated from one of the following materials:

5.1.1 Martensitic stainless steel (Specification F899 or ISO 7153-1).



NOTE 1—The hexagon length (L) may be calculated from the following:
 $L \approx l - R$ (measured with a radius gage).

FIG. 4 Dimensions and Tolerances of Hexagonal Screwdriver Bit

TABLE 3 Dimensions and Tolerances of Hexagonal Screwdriver Bit

Size	Hexagon Width Across Flats, s (mm)	Hexagon Width Across Corners, e (mm)	Hexagon Length, L (mm; minimum)
1.5	1.500 +0.000 -0.025	1.670 +0.020 -0.020	2.0
2.5	2.500 +0.000 -0.030	2.820 +0.025 -0.025	3.0
3.5	3.500 +0.000 -0.030	3.956 +0.025 -0.025	4.0
4.5	4.500 +0.000 -0.030	5.106 +0.025 -0.025	5.0
5/32	3.950 +0.000 -0.050	4.471 +0.025 -0.025	5.0
3/16	4.735 +0.000 -0.050	5.373 +0.025 -0.025	6.0

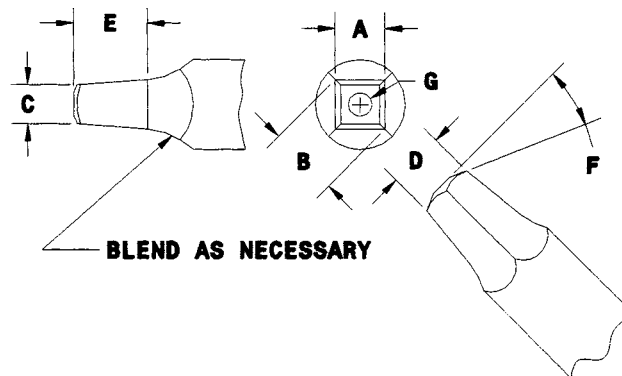


FIG. 5 Dimensions of Square Screwdriver Bits

TABLE 4 Dimensions of Square Screwdriver Bits

Screwdriver Bit Size	Width Across Flats at Radius, A (mm)	Width Across Corners at Radius, B (mm)	Width Across Flats at Chamfer, C (mm)	Width Across Corners at Chamfer, D (mm)	Length, E (mm)	Chamfer Angle, F (°)	Chamfer Diameter, G (mm)
1.0	0.84	1.19	0.67	0.95	1.25	24	0.40
1.5	1.16	1.64	0.96	1.38	1.57	28	0.48
2.0	2.03	2.87	1.20	1.70	2.69	26.5	0.76

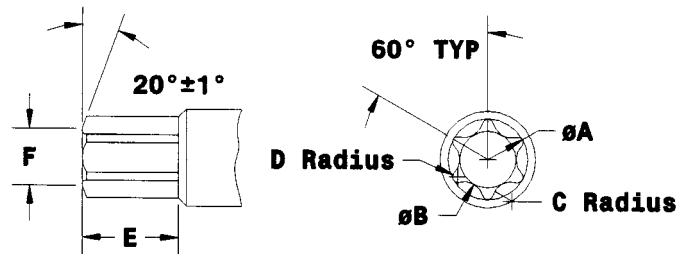


FIG. 6 Dimensions of Hexalobe Screwdriver Bits

TABLE 5 Dimensions of Hexalobe Screwdriver Bits

Screwdriver Bit Size	Major Diameter A (mm)	Minor Diameter B (mm)	Internal Radius C (mm)	External Radius D (mm)	Length E (mm)	Chamfer Diameter F (mm)
4	1.27	0.89	0.31	0.08	1.52	^A
5	1.40	1.00	0.34	0.10	1.52	^A
6	1.68	1.19	0.39	0.12	1.52	^A
8	2.27	1.60	0.55	0.15	1.78	^A
10	2.69	1.91	0.62	0.20	2.03	^A
15	3.23	2.29	0.74	0.24	2.16	^A
20	3.81	2.71	0.87	0.28	2.29	2.96
25	4.36	3.07	0.96	0.34	2.54	3.33
30	5.45	3.86	1.22	0.42	3.18	4.11

^A Chamfer not necessary.

APPENDIX

(Nonmandatory Information)

X1. RATIONALE

X1.1 This specification provides dimensions and tolerances for screwdrivers used to insert and remove medical bone screws. It is intended to provide assurances to the surgical staff that the specified screwdriver will fit and perform acceptably when used with the bone screws specified in Specification F543, ISO 5835, and ISO 9268.

X1.2 During a periodic review of the standard, the Subcommittee established that there are no consensus dimensions for either of these bit types. However, an ISO standard relevant to Hexalobe screwdriver bits was identified and included. Deletion of the information on these bits from the standard was felt to detract from the value of the standard as a whole.

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