ASME B107.600-2008

(Incorporation of ASME B107.15, B107.26, B107.30, and B107.31)

Screwdrivers

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME SETTING THE STANDARD

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Date of Issuance: November 26, 2008

This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda issued to this edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this document. Interpretations are published on the ASME Web site under the Committee Pages at http://cstools.asme.org as they are issued.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

CONTENTS

FOREWORD

The American National Standards Committee B107 on Screwdrivers was originally under the sponsorship of The American Society of Mechanical Engineers (ASME). It was subsequently reorganized as an ASME Standards Committee, and its title was changed to Hand Tools and Accessories. In 1996, the Committee's scope was expanded to include safety considerations.

The purpose of B107.600 is to define essential performance and safety requirements specifically applicable to the various screwdrivers covered herein. It specifies test methods to evaluate performance related to the defined requirements and safety and indicates limitations of safe use.

This Standard includes the following:

(a) B107.15-2008, Flat Tip Screwdrivers, approved by the American National Standards Institute on September 25, 2008

(b) B107.26-2007, Screwdriver Bits, Hand Driven, approved by the American National Standards Institute on December 20, 2007

(c) B107.30-2008, Cross Tip Screwdrivers, approved by the American National Standards Institute on May 21, 2008

(d) B107.31-1997, Screwdrivers, Cross Tip Gaging, approved by the American National Standards Institute on September 30, 1997

In addition to the consolidation of the individual screwdriver standards into this Standard, principal changes are the uniform inclusion of performance requirements and test methods that evaluate both performance and safety, as well as uniform format for sections on definitions, references, performance requirements, tests, and safety requirements and limitations of use.

Members of the Hand Tools Institute Screwdriver Committee through their knowledge and hard work have been major contributors to the development of the B107 Standards. Their active efforts in the promotion of these standards are acknowledged and appreciated.

The format of this Standard is in accordance with The ASME Codes & Standards Writing Guide 2000. Requests for interpretations of the technical requirements of this Standard should be expressed in writing to the Secretary, B107 Committee, at the address below.

Suggestions for the improvement of this Standard are welcome. They should be addressed to The American Society of Mechanical Engineers, Secretary, B107 Standards Committee, Three Park Avenue, New York, NY 10016-5990.

ASME B107 COMMITTEE
Hand Tools and Accessories

(The following is the roster of the Committee at the time of approval of this Standard.)

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SUBCOMMITTEE 6 — SCREWDRIVERS

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CORRESPONDENCE WITH THE B107 COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B107 Standards Committee
The American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Interpretations. Upon request, the B107 Standards Committee will render an interpretation of any requirement of the Code. Interpretations can only be rendered in response to a written request sent to the Secretary of the B107 Standards Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Code for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The B107 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B107 Standards Committee.

ASME B107.15

FLAT TIP SCREWDRIVERS

1 SCOPE

This Standard covers straight handle-type screwdrivers of flat tip design intended for manual operation in driving or removing screws with slotted recesses. The screwdrivers are of the types normally used by cabinetmakers, carpenters, sheet metal workers, production workers, mechanics, etc. The intention is to specify performance rather than design detail.

Inclusion of dimensional data in the Standard is not intended to imply that all of the products described herein are stock production sizes. Consumers are requested to consult with manufacturers concerning lists of stock production sizes.

Using a screwdriver as a pry bar or striking it with a hammer are clearly misuses of the tool, and nothing in this Standard shall be interpreted as condoning any tool misuse. Further information about proper use of screwdrivers is contained in the Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care.

2 CLASSIFICATION

Flat tip screwdrivers are classified in the following two types:

(a) Type I — cabinet, straight sides

(b) Type II — general purpose, flared sides

3 DEFINITIONS

assembly: the blade plus the handle.

blade: the shank plus the tip.

bolster: a change in the geometry of the shank at the junction of the handle.

handle: that portion of the screwdriver that is gripped with the hand.

shank: the portion of the blade between the tip and the handle.

tip: the portion of the blade that engages the screw recess.

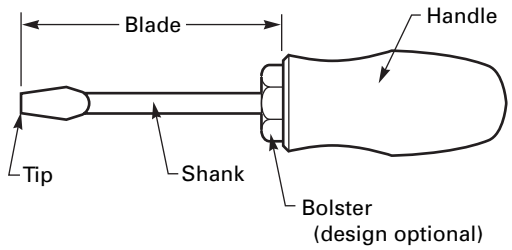
See Fig. 1 for more information.

4 REFERENCES

The following is a list of publications referenced in this Standard.

ASTM D 2240, Standard Test Method for Rubber Property — Durometer Hardness

Fig. 1 Screwdriver Nomenclature



ASTM E 18, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959

Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care

Publisher: Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591

SAE J1703, Motor Vehicle Brake Fluid

Publisher: Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001

5 REQUIREMENTS

The illustrations herein are descriptive, not restrictive, and shall not preclude designs otherwise in accordance with the requirements of this Standard.

5.1 Design

Screwdrivers shall pass applicable tests in section 6. Conformance with marking and other requirements not determined by a test shall be verified by visual examination. Screwdrivers shall conform to the dimensional and performance characteristics specified in Tables 1 and 2. Screwdrivers may be supplied with a bolster.

5.1.1 Type I. Flat tip, straight-sided cabinet screwdrivers are for driving and removing slotted screws (see Fig. 2). The entire length of the blade, excluding the bolster if one is present, shall be capable of entering a round hole no larger than the maximum allowable tip width dimension plus 0.031 in.

Table 1 Dimensional Characteristics of Flat Tip Screwdriver Blade

Nominal Dimensions at Tip, in. (Ref.)		Tip Thickness, *T*, at t_1, in.	Tip Width, *W*, at t_1 ±0.020, in.	t_1, in.
Thickness	Width			
0.011	0.058	0.012 ± 0.001	0.069	0.006
0.015	3/32	0.016 ± 0.002	0.105	0.008
0.020	1/8	0.022 ± 0.003	0.136	0.012
0.020	9/64	0.022 ± 0.003	0.155	0.012
0.025	5/32	0.027 ± 0.004	0.167	0.016
0.030	3/16	0.033 ± 0.004	0.198	0.020
0.032	7/32	0.035 ± 0.004	0.230	0.020
0.037	1/4	0.040 ± 0.004	0.261	0.024
0.042	5/16	0.046 ± 0.004	0.323	0.028
0.046	5/16	0.050 ± 0.004	0.323	0.031
0.050	3/8	0.055 ± 0.004	0.386	0.034
0.060	3/8	0.066 ± 0.004	0.386	0.039
0.070	7/16	0.077 ± 0.004	0.448	0.047
0.091	1/2	0.099 ± 0.004	0.511	0.059

5.1.2 Type II. Flat tip, flared-sided general purpose screwdrivers are for driving and removing slotted screws (see Fig. 2).

5.2 Materials

The materials used in the manufacture of a screwdriver shall be such as to produce products conforming to the requirements of this Standard.

5.3 Markings

Screwdrivers shall be marked in a plain and permanent manner with the manufacturer's name or with a trademark of such known character that the manufacturer shall be readily determined. Marking shall be as permanent as the normal life expectancy of the screwdriver to which it is applied (providing the marked surface has not been subjected to a fretting or abrading action) and be capable of withstanding the cleaning procedures normally experienced during its intended use.

5.4 Blade

5.4.1 General Requirements. The blade shall be held securely in the handle and essentially free from scale, seams, laps, and cracks, which may adversely affect durability or serviceability of the tool.

5.4.2 Finish. The blade shall be treated in a manner to resist rust or corrosion. There shall be no evidence of peeling or chipping of any coating where applicable.

5.4.3 Hardness. The tip portion of the screwdrivers or the entire blade shall be hardened to not less than 48 HRC (see para. 6.2).

5.4.4 Symmetry. The tip width shall be perpendicular to the shank axis within 2 deg. The tip thickness shall be perpendicular to the shank axis within 6 deg. Taper at the tip shall be centered within 5 deg of the shank axis (see Fig. 3).

5.5 Handle

5.5.1 General Requirements. The handle shall be capable of withstanding the applicable tests specified herein. It shall be suitably finished to provide a comfortable grip and free from rough edges, sharp corners, or tool marks that affect comfort while using the tool.

5.5.2 Cushion Grip. When furnished with a cushion grip, the screwdriver will typically resemble that shown in Fig. 4. The grip material shall be capable of meeting the tests of paras. 6.6 and 6.7 (see section 7 regarding limitations of use). The durometer hardness shall be a maximum of Shore A 75 (see para. 6.2). There shall be no detectable slippage between the handle and cushion grip under normal usage.

6 TESTS

WARNING: Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be used in conducting such tests.

6.1 Hardness Test

The Rockwell hardness test shall be conducted in accordance with ASTM E 18. The Shore durometer test shall be conducted in accordance with ASTM D 2240.

6.2 Tip Torsional Test

The tip of each sample under test shall be fixtured in a test block of applicable dimensions shown in Table 2 and Fig. 5. The test block shall have a hardness of not less than 60 HRC.

Table 2 Performance Characteristics of Flat Tip Screwdrivers

Nominal Dimensions at Tip, in. (Ref.)		Test Block Slot (see Fig. 5)		Torsional Test		Minimum Bending Moment, lbf-in.
Thickness	Width	Width ±0.0005, in.	Depth ±0.0028, in.	Minimum Assembly, lbf-in.	Minimum Blade Tip, lbf-in.	
0.011	0.058	0.0140	0.0284	1.2	1.2	None
0.015	3/32	0.0190	0.0304	2.6	3.5	None
0.020 [Note (1)]	1/8	0.0260	0.0344	6	9	None
0.020 [Note (1)]	9/64	0.0260	0.0344	8	10	40
0.025	5/32	0.0320	0.0384	13	17	60
0.030	3/16	0.0380	0.0424	25	30	100
0.032	7/32	0.0400	0.0424	30	39	175
0.037	1/4	0.0450	0.0464	40	58	350
0.042	5/16 [Note (1)]	0.0510	0.0504	60	96	700
0.046	5/16 [Note (1)]	0.0550	0.0534	80	113	700
0.050	3/8 [Note (1)]	0.0600	0.0564	140	165	1,000
0.060	3/8 [Note (1)]	0.0710	0.0614	170	237	1,000
0.070	7/16	0.0820	0.0694	200	376	1,000
0.091	1/2	0.1040	0.0814	225	711	1,000

GENERAL NOTES:

(a) Formula for calculating torsional test loads for blade tips:

$$L = 145{,}000 \times WT^2$$, where L = torsional test load (lbf-in.), and W and T are dimensions in inches at t_1 (see Fig. 3 and Table 1)

(b) See Table 1 for W, T, and t_1 (definitions).

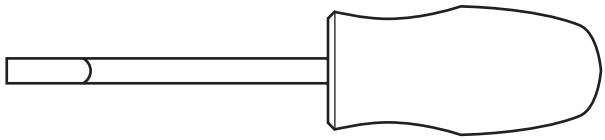
(c) Formula for calculating test block slot dimensions (see Fig. 5):

$$\text{Width} = (\text{maximum tip thickness at } t_1 + 0.0010) \pm 0.0005, \text{ depth} = (t_1 + 0.0224) \pm 0.0028$$

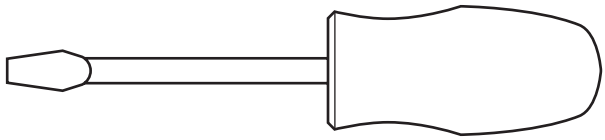
NOTE:

(1) When tip thickness and width are not both specified, and more than one row applies, the row with the more restrictive requirements shall apply.

Fig. 2 Typical Appearances

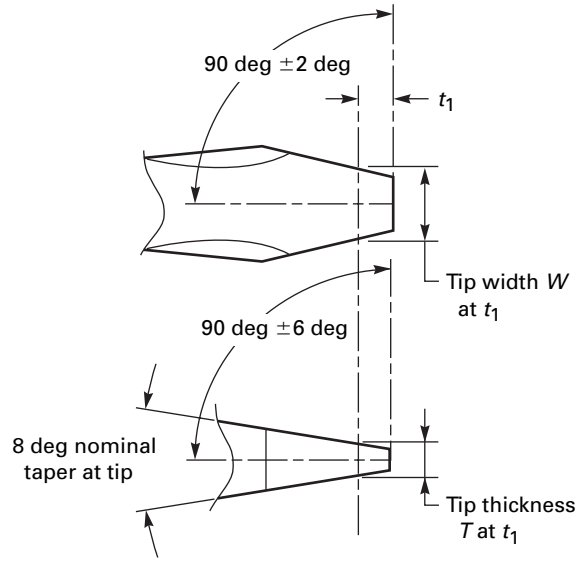


Type I Cabinet



Type II General Purpose

Fig. 3 Flat Tip Screwdriver Nomenclature at T_1



GENERAL NOTE: For tip dimensions at t_1, see Table 1.

Fig. 4 Typical Appearance of a Type II Screwdriver With a Cushion Grip

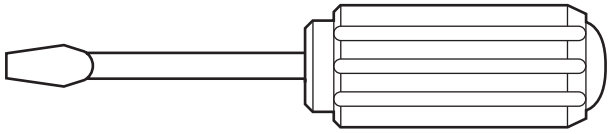
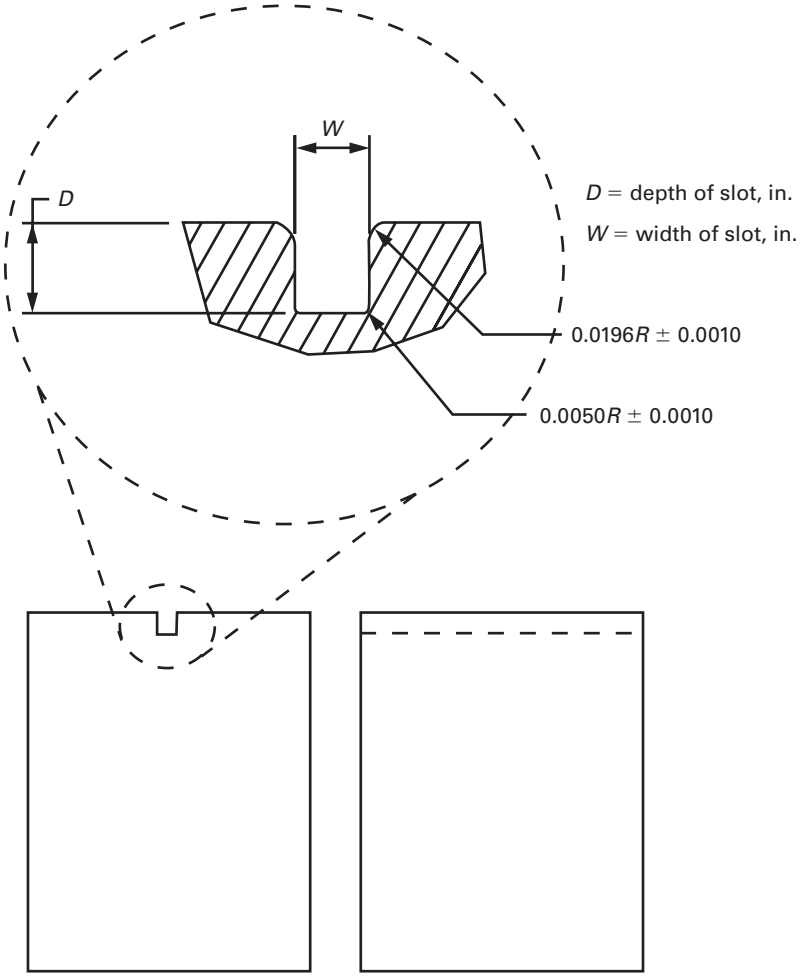


Fig. 5 Typical Torsional Test Block



When tested to the minimum tip torque value specified in Table 2, neither the shank nor the tip shall show visible permanent deformation. The torque shall be applied by forces acting perpendicular to the long axis of the blade with the tip held securely in the test block. It is permissible to support the blade in a suitable position for test. The blade shall be restricted from endwise movement during testing.

6.3 Assembly Torsional Test

The test shall be conducted after preheating the entire tool to a uniform temperature of 125°F ± 5°F. The torque shall be applied within 1 min after removing the tool from the heating medium. The torque shall be applied by forces acting at or near the middle of the natural grip of the handle perpendicular to the long axis of the grip with the tip held securely in the test block. It is permissible to support the shank at or near the junction of the shank and handle in a suitable position for test. The screwdriver shall be restricted from endwise movement during testing. When tested to the minimum assembly torque value specified in Table 2, the assembly shall not show a permanent slippage between the shank and handle.

6.4 Tip Toughness Test

The tip shall be tested as in the torsion test described in para. 6.2 except that the torque shall be increased until failure. If a fracture occurs, the pieces shall be refitted, and the tip shall show that permanent deformation had occurred prior to fracture. If the tip fails without exhibiting such deformation, it shall be considered to have failed the tip toughness test.

6.5 Bending Moment Test

The bending moment test for flat tip screwdrivers shall be conducted in a manner similar to that shown in Fig. 6. In this test, the force shall be applied near the middle of the handle, the force acting at right angles to the axis of the screwdriver to lift weight w (see Fig. 6). A load-measuring device may be used in lieu of a deadweight in applying the bending load. When tested to the minimum bending moment specified in Table 2, the assembly shall not fracture, the blade shall not show any visible permanent deformation, and the handle shall not loosen from the shank.

6.6 Solvent Resistance Test

Screwdrivers shall be capable of undergoing the following test without specified damage. Handles are to be fully immersed in motor vehicle brake fluid (SAE J1703), gasoline, ethylene glycol, and ethyl alcohol for 15 min at room temperature, removed, and allowed to stand for 24 hr. A new assembly shall be used for each of the four test liquids. There shall be no permanent swelling, surface attack (except for manufacturer's identification or paint removal), or failure to comply with paras. 6.3 and 6.7. After testing, the hardness of the cushion grip, if furnished, shall not be greater than durometer Shore A 80.

6.7 Handle Impact Test

This test shall be performed at room temperature. The blade of the screwdriver shall be mounted vertically in a fixture affixed to the base of a suitable falling weight impact device. The blade shall rest on a solid surface to ensure that the blade does not move vertically in the fixture. The weight shall be 15 lb and dropped unrestricted with some means to ensure that the full force of the falling weight will be acting normal to the striking surface. In conducting this test, care shall be taken that the impact energy will not be expended in flexing of the blade or in driving the screwdriver tip into the surface on which it rests. The blade may be shortened or blunted, if necessary, to ensure a proper test. An equivalent test may be used if the impact energy requirement in Table 3 is met.

The blade shall not penetrate into the handle more than specified in Table 3 when the weight has been dropped ten times from the applicable height shown in Table 3. The first drop ensures that the blade is seated in the handle. The difference in length after the first and then after the tenth drop is the blade penetration.

The screwdriver handle shall neither break, crack, nor significantly distort as a result of the above test. "Significantly distort" (for the purpose of this test) means an increase of at least 5% in the handle diameter, either as a uniform or irregular bulge.

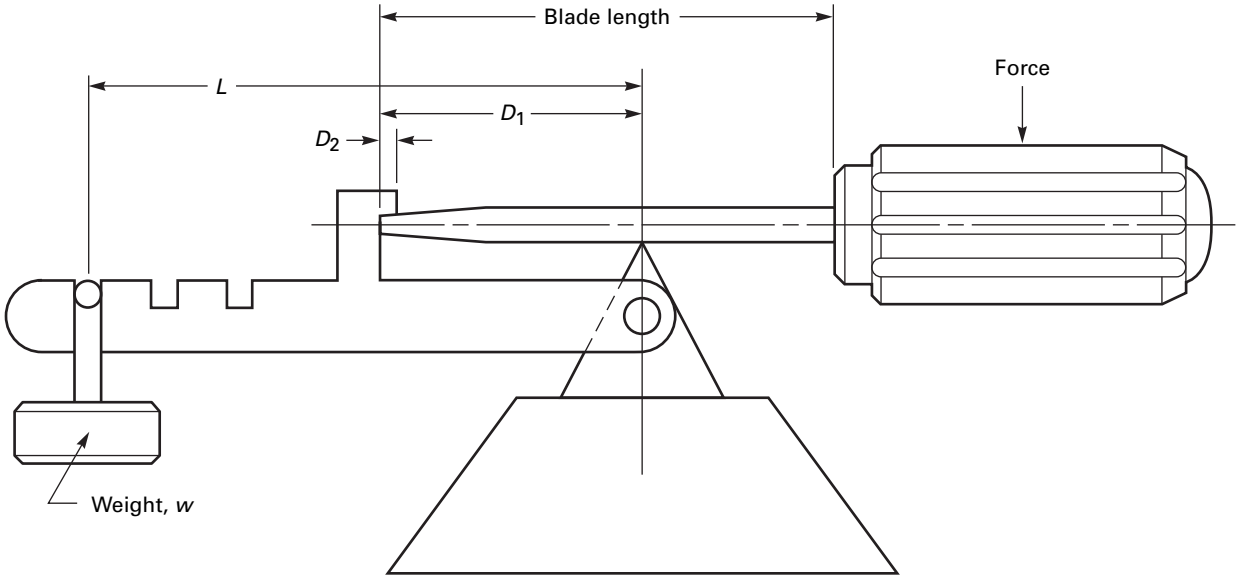
7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

Instructors and employers shall stress proper use and safety in the use of screwdrivers, information about which can be found in the HTI publication, Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care.

WARNING: Comfort or cushion grips on handles are not intended to give any degree of protection against electric shock and shall not be used on or near live electric circuits.[1]

[1] Refer to ASTM F 1505 and IEC 60900 for information regarding insulated screwdrivers.

Fig. 6 Bending Moment Test, Typical Setup



GENERAL NOTES: Method for Bending Moment Test [see Note (1)]:

(a) Bending moment = L_w, in.-lbf (N•m), dimensions are in inches (meters); weight, w, is in pounds (newtons).

(b) A stop for the screwdriver tip is located at a distance, D_1, which is equal to one-half of the blade length from the bending fulcrum.

(c) $D_2 = 4 \times$ tip thickness, T (see Fig. 3 and Table 1).

NOTE:

(1) The above method is not intended to restrict the manner in which the required test shall be made.

Table 3 Impact Test Data

Blade Diameter (Nominal Stock Size), in.	Height of Drop of 15-lb Weight for Impact Tests, in.	Maximum Blade Penetration, in.	Impact Energy, ft-lb
0.12	1.5	0.75	1.88
0.16	4.0	0.75	5.00
0.19	6.0	0.75	7.50
0.22	8.0	0.62	10.00
0.25	10.0	0.62	12.50
0.28	12.0	0.62	15.00
0.31	15.0	0.62	18.75
0.34	17.0	0.62	21.25
0.37 and over	20.0	0.62	25.00

ASME B107.26

SCREWDRIVER BITS, HAND DRIVEN

1 SCOPE

This Standard provides performance and safety requirements for hexagonal shank flat tip and Phillips (PH)[1] and Pozidriv (PZ) design screwdriver bits intended for manual (nonpower) operation in driving or removing screws with slotted heads and screws with Phillips or Pozidriv recesses. The screwdriver bits are of the types normally used by cabinetmakers, carpenters, sheet metal workers, production workers, mechanics, etc.

Inclusion of dimensional data in this Standard is not intended to imply that all of the products described herein are stock production sizes. Consumers are requested to consult with manufacturers concerning the list of stock production sizes.

2 CLASSIFICATION

Screwdriver bits, hand driven, hexagonal shank are classified in the following three types:

(a) Type I — flat tip (see Fig. 1)
(b) Type II — cross tip (PH) (see Fig. 2)
(c) Type III — cross tip (PZ) (see Fig. 3)

3 REFERENCES

The following is a list of publications referenced in this Standard.

ASME B107.31, Screwdrivers, Cross Tip Gaging

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2300, Fairfield, NJ 07007-2300

ASTM E 18, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959

Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care

Publisher: Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591

[1] Phillips and Pozidriv are registered trademarks of the Phillips Screw Co.

4 PERFORMANCE REQUIREMENTS

The illustrations herein are descriptive, not restrictive, and shall not preclude designs (such as double-ended bits) otherwise in accordance with the requirements of the Standard.

4.1 Design

Screwdriver bits shall pass applicable tests in section 5. Conformance with marking and other requirements not determined by a test shall be verified by visual examination.

4.1.1 Type I. Dimensions for bits shall conform to Table 1 (see Figs. 1 and 4).

4.1.2 Type II. Bits shall be designed for driving or removing screws with PH recesses. They shall conform to the dimensional and performance characteristics specified in Figs. 2 and 4 and Tables 2 and 3. Tip dimensions shall be gaged in accordance with ASME B107.31M.

4.1.3 Type III. Bits shall be designed for driving or removing screws with PZ recesses. They shall conform to the dimensional and performance characteristics specified in Figs. 3 and 4 and Tables 4 and 5. Tip dimensions shall be gaged in accordance with ASME B107.31.

4.1.4 Retention Grooves. Retention grooves are optional. The locations and configurations of retention grooves are shown in Fig. 4.

4.2 Materials

The materials used in the manufacture of screwdriver bits shall be such as to produce bits conforming to this Standard.

4.3 Marking

Each bit shall be marked in a plain and permanent manner with the manufacturer's name or a trademark of such known character that the manufacturer shall be readily determined. The marking shall be as permanent as the normal life expectancy of the bit to which it is applied (providing the marked surface has not been subjected to a fretting or abrading action) and be capable of withstanding the cleaning procedures normally experienced during its intended use.

4.4 Finish

The bit shall be treated in a manner to resist rust or corrosion. There shall be no evidence of peeling or

Fig. 1 Type I Screwdriver Bit Geometry

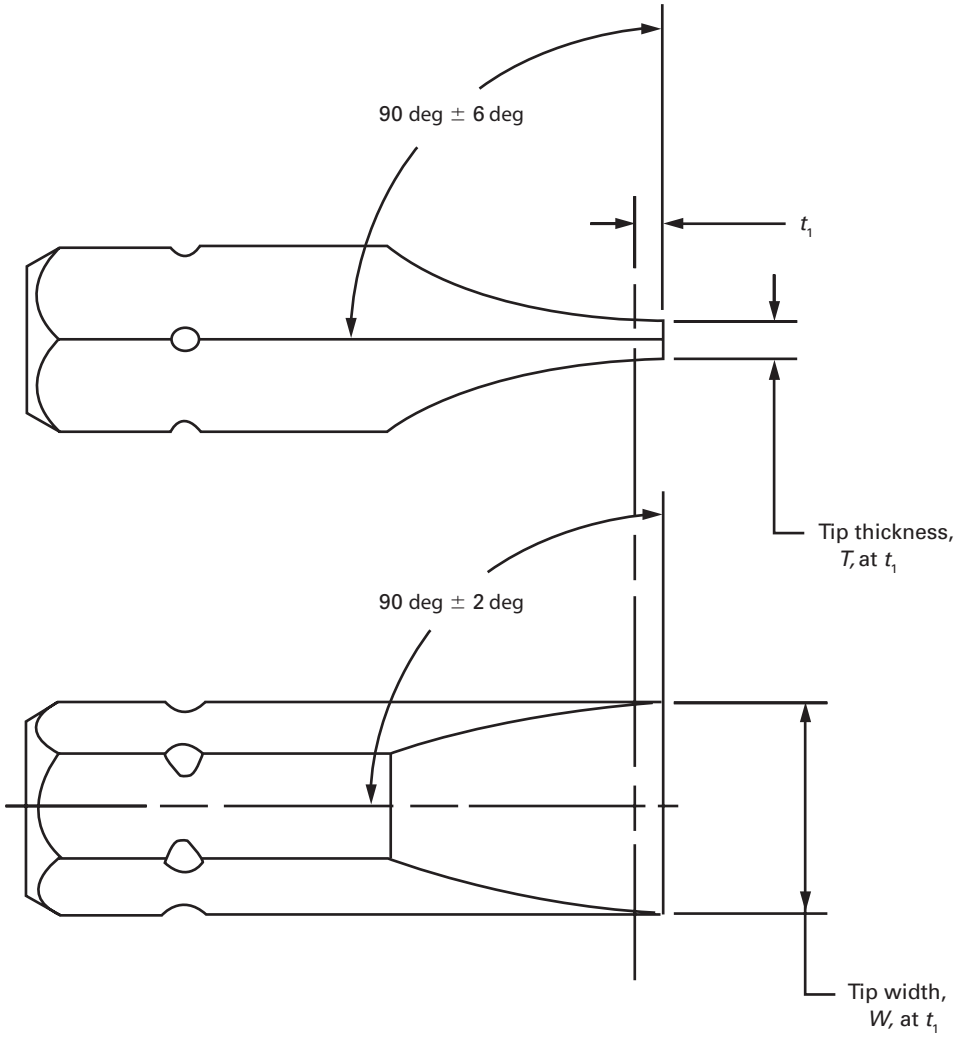


Fig. 2 Type II PH Cross Tip Screwdriver Bits

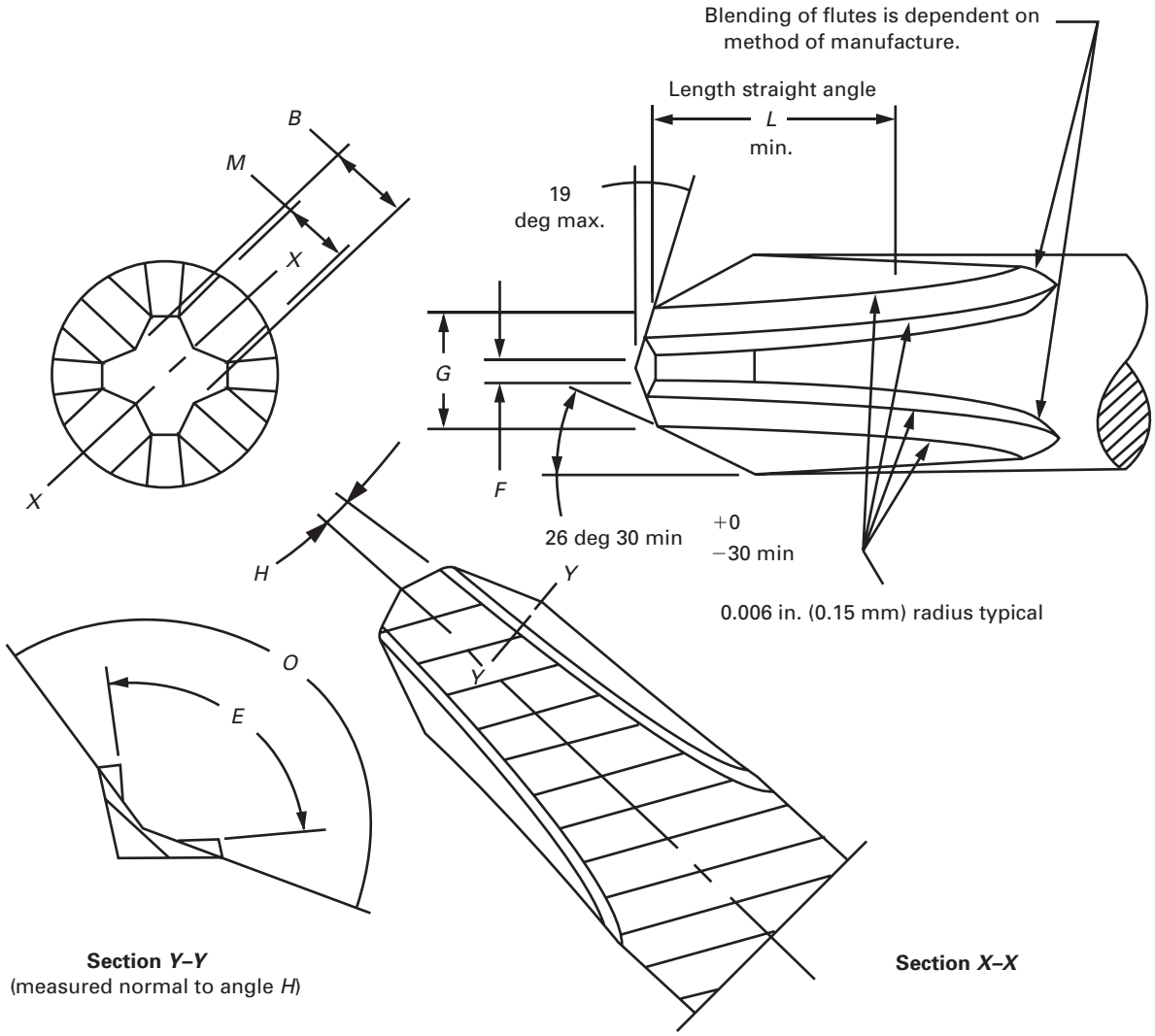
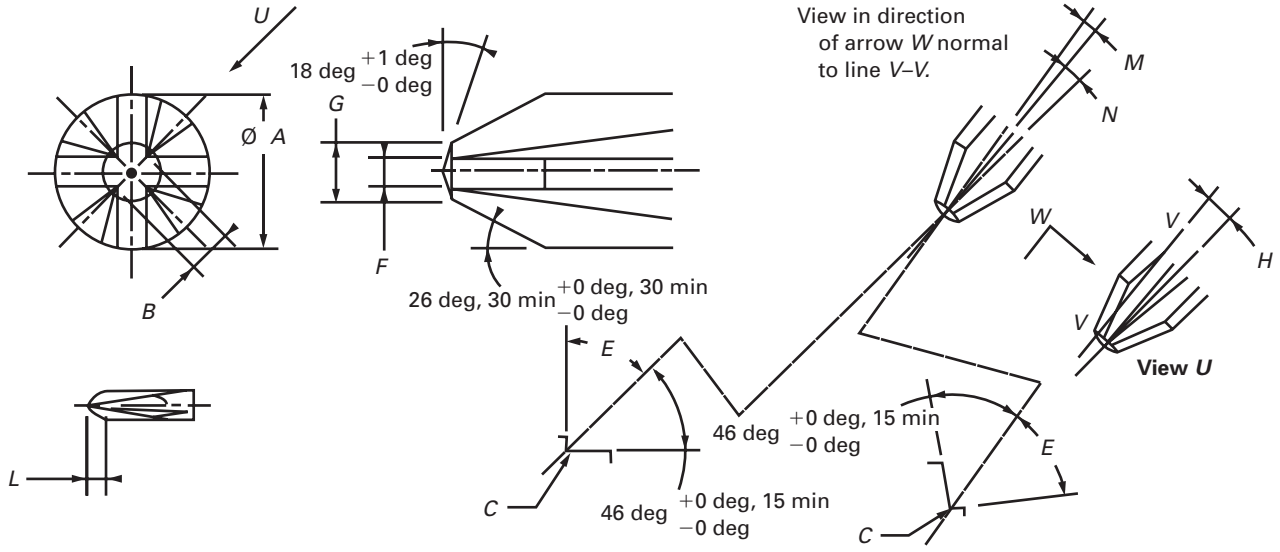


Fig. 3 Type III PZ Cross Tip Screwdriver Bits



chipping of any plating where applicable. Screwdriver bits shall be free from conditions that may adversely affect performance or safety.

4.5 Hardness

The entire bit shall be hardened to not less than 50 HRC.

4.6 Symmetry

The end of the tip of Type I bits shall be perpendicular to the bit axis along its width to within 2 deg and perpendicular to the bit axis along its thickness within 6 deg (see Fig. 1).

5 TESTS

Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be used in conducting such tests.

5.1 Hardness

The Rockwell hardness test shall be conducted in accordance with ASTM E 18.

5.2 Torsional Test

The tip of each sample under test shall be located in a test block (see Fig. 5 or 6). When tested to the minimum tip torque value specified in Table 1, 2, or 3, the tip shall not show visible permanent deformation. The torque shall be applied by forces acting perpendicular to the axis with the tip held securely in the test block. It is permissible to support the bit in a suitable position for test. The bit shall be restricted from endwise movement during testing.

5.3 Tip Toughness Test

The bit shall be torsionally tested as described in para. 5.2 except that the torque shall be increased until failure. If a fracture occurs, the pieces shall be refitted, and the tip shall show that permanent deformation had occurred prior to fracture. If the tip fails without exhibiting such permanent deformation, it shall be considered to have failed the tip toughness test.

6 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

Using a screwdriver bit for anything other than tightening or loosening fasteners is clearly a misuse of the tool. A hand-driven screwdriver bit shall not be used in a power tool.

Instructors and employers shall stress proper use and safety in the use of screwdrivers and screwdriver bits, information about which can be found in the HTI publication, Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care.

Table 1 Type I Dimensional and Test Requirements

Nominal Size	Nominal Tip Thickness and Width at Tip (Ref.), in.	Tip Thickness, T, at t_1 ±0.002, in.	Tip Width, W, at t_1 ±0.010, in.	t_1, in.	Width Across Flats P, in.	Width Across Corners, Y, in.	Groove to End, J, in.	Test Block Slot		Minimum Test Torque, lbf-in.
								Width, S, ±0.0005, in.	Depth, D, ±0.0028, in.	
0	0.011 × 0.090	0.013	0.090	0.030	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0160	0.0524	2.2
2	0.018 × 0.138	0.020	0.138	0.045	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0230	0.0674	8.0
4	0.026 × 0.185	0.028	0.185	0.059	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0310	0.0814	21.0
4–5	0.031 × 0.182	0.033	0.182	0.063	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0360	0.0854	28.7
6	0.034 × 0.232	0.036	0.232	0.074	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0390	0.0964	43.6
6–8	0.037 × 0.245	0.039	0.245	0.081	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0420	0.1034	54.0
(8–10)	0.039 × 0.281	0.041	0.281	0.095	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0440	0.1174	68.5
8	0.040 × 0.279	0.042	0.279	0.088	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0450	0.1104	71.4
10–12	0.043 × 0.281	0.045	0.281	0.110	0.247–0.250	0.2785–0.2845	0.302–0.322	0.0480	0.1324	82.5
10	0.045 × 0.327	0.047	0.327	0.103	0.309–0.312	0.3480–0.3560	0.370–0.390	0.0500	0.1254	104.7
12	0.051 × 0.374	0.053	0.374	0.117	0.309–0.312	0.3480–0.3560	0.370–0.390	0.0560	0.1394	152.3

GENERAL NOTES:

(a) Tip thickness at tip shall be less than or equal to tip thickness at t_1.

(b) Nonpreferred sizes are in parentheses.

(c) Formula for calculating torsional test loads for blade tips:

$$L = 145{,}000 \times WT^2$$

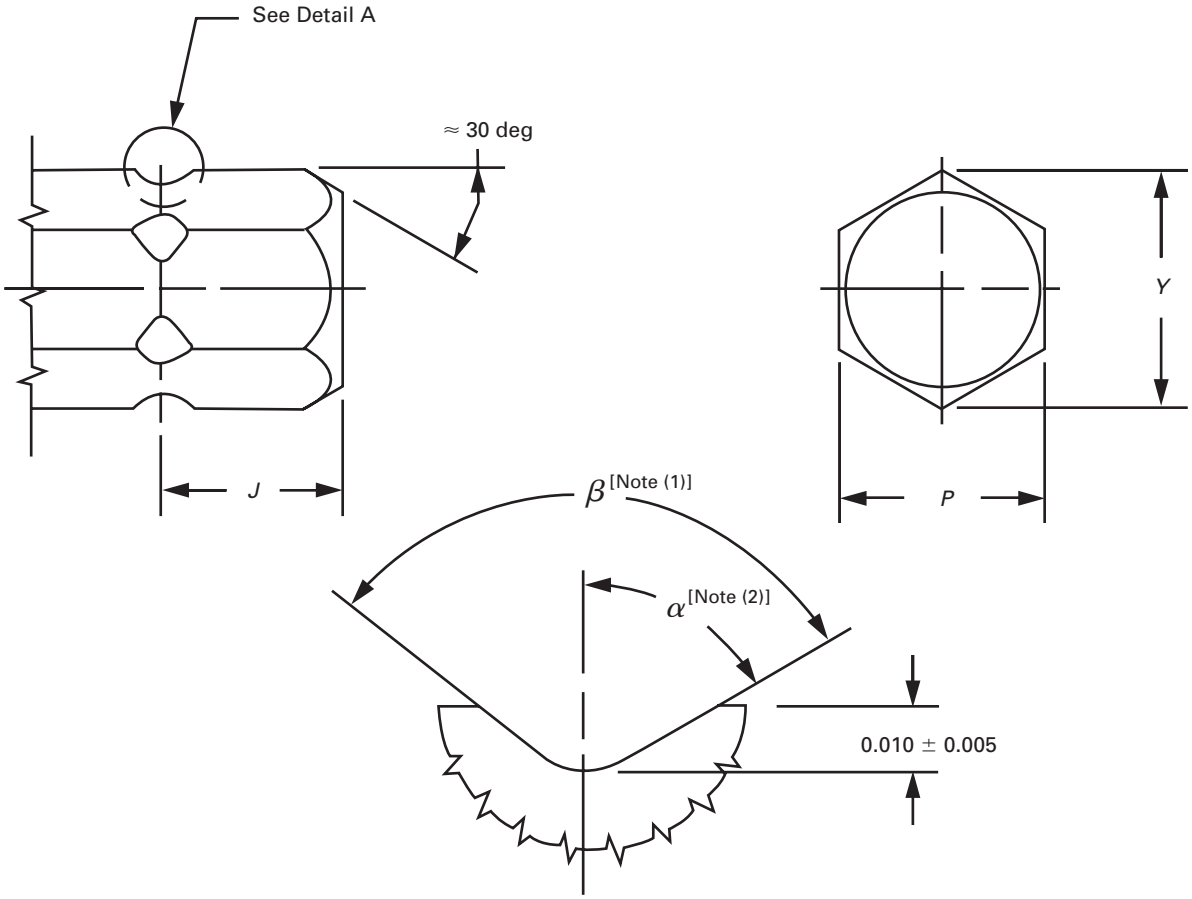
where
L = torsional test load, in.-lb
W = tip width at t_1, in.
T = tip width at t_1, in.

(d) Formula for calculating test block slot dimensions:

width (S) = (maximum tip thickness at t_1 + 0.0010) ± 0.0005, depth (D) = (t_1 + 0.0224) ± 0.0028

(e) Conversion factors:
1 lbf-in. = 0.1125 N·m
1 in. = 25.4 mm

Fig. 4 Hex and Optional Groove Configurations



NOTES:
(1) 60 deg ≤ β ≤ 120 deg
(2) 40 deg ≤ α ≤ 80 deg

Table 2 Type II (PH) Screwdriver Bits

Point Size	Hex Size, in.		Test Block		Minimum Torsional Test Load, lbf-in.	Groove to End, *J*
	Width Across Flats, *P*	Width Across Corners, *Y*	Major Wing Spread, *S* ±0.002	Minor Wing Spread, *T* ±0.002		
0	0.247–0.250	0.2785–0.2845	0.090	0.032	8.9	0.302–0.322
1	0.247–0.250	0.2785–0.2845	0.142	0.050	31	0.302–0.322
2	0.247–0.250	0.2785–0.2845	0.233	0.090	100	0.302–0.322
2	0.309–0.313	0.3480–0.3560	0.233	0.090	100	0.370–0.390
3	0.247–0.250	0.2785–0.2845	0.386	0.150	220	0.302–0.322
3	0.309–0.313	0.3480–0.3560	0.386	0.150	220	0.370–0.390
4	0.309–0.313	0.3480–0.3560	0.486	0.200	340	0.370–0.390

Table 3 Type II (PH) Tip Dimensions

Point Size	*B*, in. ±0.001	*O*, deg +30/−0 min	*G*, in. ±0.001	*H*, deg +0/−30 min	*F*, in.		*E*, deg +30/−0 min	*M*, in. ±0.001	Minimum *L*, in.
					Max.	Min.			
0	0.023	Note (1)	0.032	7	0.012	0.010	92	0.0151–0.0114	0.12
1	0.039	138	0.050	7	0.020	0.016	92	0.0202	0.12
2	0.061	140	0.090	5 deg, 45 min	0.028	0.023	92	0.0434	0.19
3	0.098	146	0.150	5 deg, 45 min	0.033	0.027	92	0.0826	0.28
4	0.141	153	0.200	7	0.045	0.040	92	0.1078	0.34

NOTE:
(1) For size 0, dimension *O* is a radius rather than an angle. *O* = 0.0109-in. maximum to 0.0082-in. minimum radius.

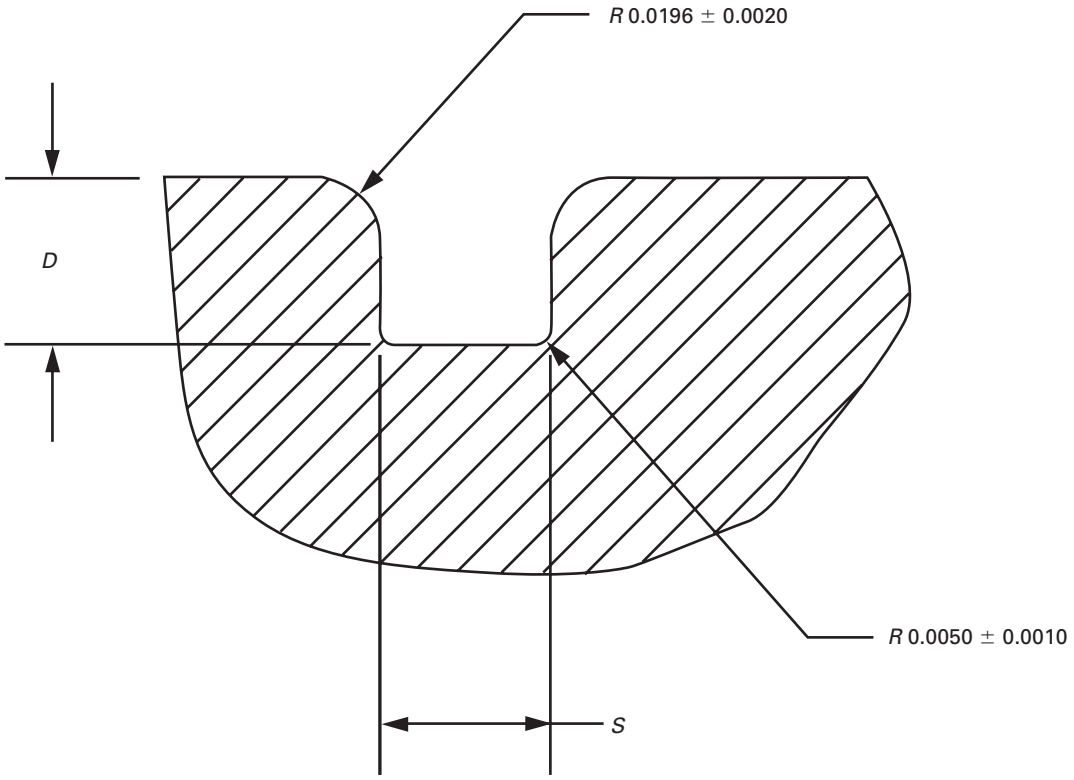
Table 4 Type III (PZ) Screwdriver Bits

Point Size	Hex Size, in.		Test Block		Minimum Torsional Test Load, lbf-in.	Groove to End, *J*
	Width Across Flats, *P*	Width Across Corners, *Y*	Major Wing Spread, *S* ±0.002	Minor Wing Spread, *T*, in. ±0.002		
0	0.247–0.250	0.2785–0.2845	0.090	0.0355	8.9	0.302–0.322
1	0.247–0.250	0.2785–0.2845	0.142	0.0545	35	0.302–0.322
2	0.247–0.250	0.2785–0.2845	0.233	0.095	100	0.302–0.322
2	0.309–0.313	0.3480–0.3560	0.233	0.095	100	0.370–0.390
3	0.247–0.250	0.2785–0.2845	0.386	0.155	350	0.302–0.322
3	0.309–0.313	0.3480–0.3560	0.386	0.155	350	0.370–0.390
4	0.309–0.313	0.3480–0.3560	0.486	0.203	550	0.370–0.390

Table 5 Type III (PZ) Tip Dimensions

Point Size	*A*, in. ±0.010	*B*, in.		*C*, in.		*E*, deg +7/−0 min	*F*, in.		*G*, in.		*H*, deg +0/−30 min	*L*, in. Min.	*M*, deg +30/−0 min	*N*, deg +30/−0 min
		Max.	Min.	Max.	Min.		Max.	Min.	Max.	Min.				
0	0.125	0.2800	0.0265	0.004	0.003	46	0.0175	0.0165	0.0360	0.0350	7	0.0829	4 deg, 23 min	7 deg, 45 min
1	0.188	0.0438	0.0423	0.005	0.004	46	0.0275	0.0265	0.0550	0.0540	7	0.1075	4 deg, 23 min	7 deg, 45 min
2	0.250	0.0670	0.0655	0.012	0.006	46	0.0390	0.0370	0.0960	0.0940	5 deg, 45 min	0.1538	3 deg	6 deg, 20 min
3	0.313	0.1020	0.1005	0.014	0.008	56 deg, 15 min	0.0540	0.0530	0.1560	0.1540	5 deg, 45 min	0.1852	3 deg	6 deg, 20 min
4	0.375	0.1520	0.1505	0.020	0.014	56 deg, 15 min	0.0820	0.0800	0.2040	0.2020	7	0.2573	4 deg, 23 min	7 deg, 45 min

Fig. 5 Cross Section of Slot for Type I Torsional Test Block



GENERAL NOTES:

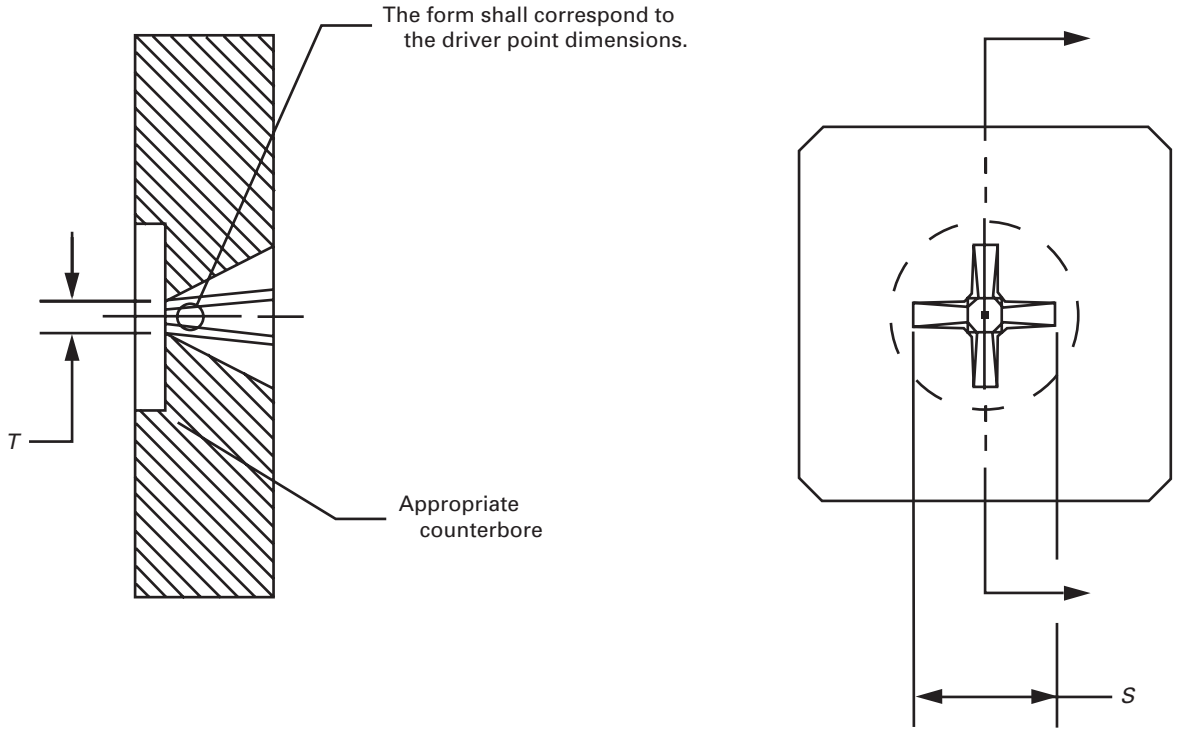
(a) D = depth of slot; S = width of slot.

(b) The test block shall have a hardness of not less than 60 HRC or equivalent. The hardness shall be tested using procedures as outlined in ASTM E 18.

(c) See Table 1 for D and S test block slot dimensions and performance characteristics.

(d) For nominal tip thickness smaller than 0.025 in., use 0.004 R in. maximum at the bottom of the groove.

Fig. 6 Types II and III Test Block Wing Spread



ASME B107.30

CROSS TIP SCREWDRIVERS

1 SCOPE

This Standard provides performance and safety requirements for screwdrivers of Phillips[1] and Pozidriv[2] design intended for manual operation in driving or removing screws with Phillips or Pozidriv recesses. The screwdrivers are of the types normally used by cabinetmakers, carpenters, sheet metal workers, production workers, mechanics, etc.

Inclusion of dimensional data in this Standard is not intended to imply that all of the products described herein are stock production sizes. Consumers are requested to consult with manufacturers concerning lists of stock production sizes.

2 CLASSIFICATION

Cross tip screwdrivers are classified in the following two types:

(a) Type I — Phillips (PH)

(b) Type II — Pozidriv (PZ)

3 DEFINITIONS

assembly: the blade plus the handle.

blade: the shank plus the tip.

bolster: a change in the geometry of the shank at the junction of the handle.

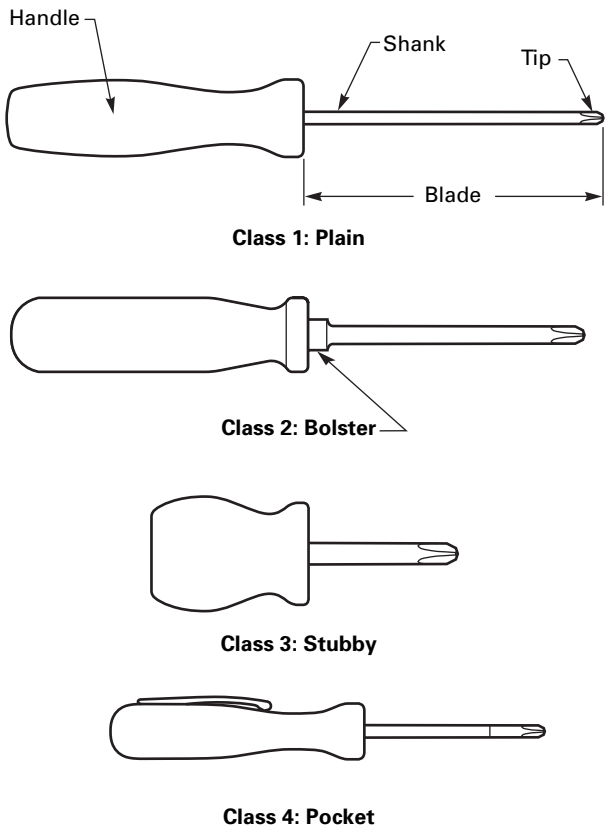
handle: that portion of the screwdriver that is gripped with the hand.

shank: the portion of the blade between the tip and the handle.

tip: the portion of the blade that engages the screw recess.

See Fig. 1 for more information.

Fig. 1 Type I (PH) and Type II (PZ) Screwdriver Assemblies



4 REFERENCES

The following is a list of publications referenced in this Standard.

ASME B107.31, Screwdrivers, Cross Tip Gaging

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2300, Fairfield, NJ 07007-2300

ASTM E 18, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

ASTM F 1505, Standard Specification for Insulated and Insulating Hand Tools

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959

Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care

Publisher: Hand Tools Institute (HTI), 25 North Broadway, Tarrytown, NY 10591

[1] Phillips and Pozidriv PZ1, PZ2, and PZ3 are registered trademarks of the Phillips Screw Co.

[2] Refer to ASTM F 1505 and IEC 60900 for information regarding insulated screwdrivers.

Table 1 Dimensional and Performance Characteristics of Type I (PH) Screwdrivers

Blade		Performance			
		Test Block [Note (1)]		Torsional Test	
Point Size	Nominal Diameter, in.	Major Wing Spread, *A* (See Fig. 3) ±0.002 in.	Minor Wing Spread, *B* (See Fig. 3) ±0.002 in.	Minimum Assembly, lbf-in.	Minimum Tip, lbf-in.
0	0.12	0.090	0.032	6	8.9
1	0.19	0.142	0.050	25	31
2	0.25	0.233	0.090	60	100
3	0.31	0.386	0.150	150	220
4	0.37	0.486	0.200	200	340

NOTE:
(1) Test block hardness shall be no less than 60 HRC.

IEC 60900, Live Working — Hand Tools for Use Up to 1000 V a.c. and 1500 V d.c.

Publisher: International Electrotechnical Commission (IEC), 3, rue de Varembé, Case Postale 131, CH-1211, Genève 20, Switzerland/Suisse

SAE J1703, Motor Vehicle Brake Fluid

Publisher: Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001

5 REQUIREMENTS

The illustrations herein are descriptive, not restrictive, and shall not preclude designs otherwise in accordance with the requirements of this Standard.

5.1 Design

Screwdrivers shall pass applicable tests in section 6. Conformance to marking and other requirements not determined by test shall be verified by visual examination. Screwdrivers shall conform to the dimensional and performance characteristics specified in applicable tables. Screwdrivers may be supplied with a bolster. Screwdrivers may be supplied with a pocket clip.

5.1.1 Type I (PH). These screwdrivers are for driving or removing screws with Phillips recesses. The screwdrivers shall conform to the dimensional and performance characteristics specified in Tables 1 through 3 and Fig. 2. Tip dimensions shall be gaged in accordance with ASME B107.31M.

5.1.2 Type II (PZ). These screwdrivers are for driving or removing screws with Pozidriv recesses. The screwdrivers shall conform to the dimensional and performance characteristics specified in Tables 2, 4, and 5 and Fig. 3. Tip dimensions shall be gaged in accordance with ASME B107.31.

5.2 Materials

The materials used in the manufacture of a screwdriver shall be such as to produce products conforming to the performance requirements specified herein.

5.3 Markings

Screwdrivers shall be marked in a plain and permanent manner with the manufacturer's name or a trademark of such known character that the manufacturer shall be readily determined. Marking shall be as permanent as the normal life expectancy of the screwdriver to which it is applied (providing the marked surface has not been subjected to a fretting or abrading action) and be capable of withstanding the cleaning procedures normally experienced during its intended use.

5.4 Blade

5.4.1 General Requirements. The blade shall be held securely in the handle. The blade shall be essentially free from scale, seams, laps, and cracks, which may adversely affect durability or serviceability of the tool.

5.4.2 Finish. The blade shall be treated in a manner to resist rust or corrosion. There shall be no evidence of peeling or chipping of any coating where applicable.

5.4.3 Hardness. The tip portion of the screwdriver or the entire blade shall be hardened to not less than 48 HRC (see para. 6.1).

5.5 Handle

5.5.1 General Requirements. The handle shall be of a material capable of withstanding the applicable tests specified herein. The handle shall be suitably finished to provide a comfortable grip. The handle shall be free from rough edges, sharp corners, or tool marks that affect comfort while using the tool.

Table 2 Impact Test Data

Blade Diameter (Nominal Stock Size), in.	Height of Drop of 15-lb Weight for Impact Tests at Room Temperature, in.	Maximum Blade Penetration, in.	Impact Energy, lbf-ft
0.12	1.5	0.75	1.9
0.16	4	0.75	5.0
0.19	6	0.75	7.5
0.22	8	0.62	10.0
0.25	10	0.62	12.5
0.28	12	0.62	15.0
0.31	15	0.62	18.8
0.34	17	0.62	21.3
0.37 and over	20	0.62	25.0

Table 3 Type I (PH) Tip Dimensions

Point Size	*B*, in. ±0.001	*O*, deg +30/−0 min	*G*, in. ±0.001	*H*, deg +0/−30 min	*F* [Note (1)], in.		*E*, deg +30/−0 min	*M*, in. ±0.001	*L*, in. Min.
					Max.	Min.			
0	0.0230	Note (2)	0.032	7	0.012	0.010	92	Note (3)	0.12
1	0.0394	138	0.050	7	0.020	0.016	92	0.0202	0.12
2	0.0606	140	0.090	5 deg, 45 min	0.028	0.023	92	0.0434	0.19
3	0.0983	146	0.150	5 deg, 45 min	0.033	0.027	92	0.0826	0.28
4	0.1407	153	0.200	7	0.045	0.040	92	0.1078	0.34

GENERAL NOTE: See Fig. 4.

NOTES:

(1) Resultant dimension.

(2) For point size 0, dimension is a radius rather than an angle. $O = 0.0082$-in. to 0.0109-in. radius.

(3) For point size 0, M is in the range of 0.0114 in. to 0.0151 in.

Fig. 2 Type I (PH) Cross Tip Screwdriver

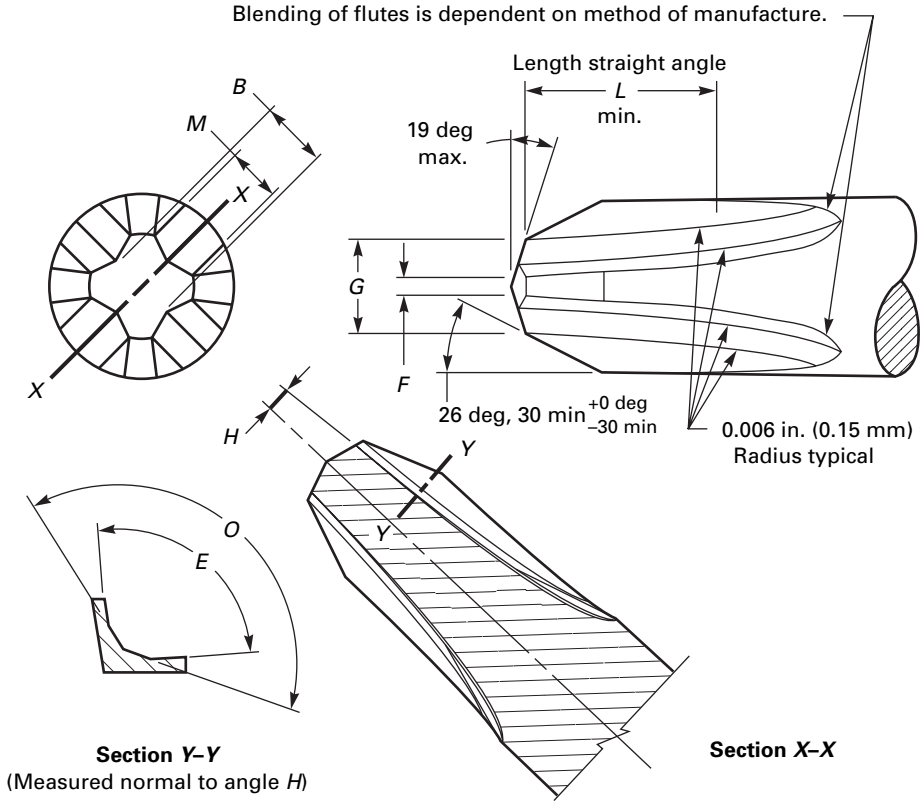


Table 4 Dimensional and Performance Characteristics of Type II (PZ) Screwdrivers

Blade		Performance			
		Test Block [Note (1)]		Torsional Test	
Point Size	Nominal Diameter, in.	Major Wing Spread, *A* (See Fig. 3) ±0.002 in.	Minor Wing Spread, *B* (See Fig. 3) ±0.002 in.	Minimum Assembly, lbf-in.	Minimum Tip, lbf-in.
0	0.12	0.09	0.0355	6	8.9
1	0.19	0.142	0.0545	25	35
2	0.25	0.233	0.095	60	100
3	0.31	0.386	0.155	150	350
4	0.37	0.486	0.203	200	550

NOTE:
(1) Test block hardness shall be no less than 60 HRC.

Table 5 Type II (PZ) Tip Dimensions

Point Size	*A*, in. ±0.010	*B*, in.		*C* (rad.), in.		*E*, deg +7/−0 min	*F* [Note (1)], in.		*G*, in.		*H*, deg +0/−30 min	*L*, in. Min.	*M*, deg +30/−0 min	*N*, deg +30/−0 min
		Max.	Min.	Max.	Min.		Max.	Min.	Max.	Min.				
0	0.125	0.280	0.0265	0.004	0.003	46	0.0175	0.0165	0.0360	0.0350	7	0.0829	4 deg, 23 min	7 deg, 45 min
1	0.188	0.0438	0.0423	0.005	0.004	46	0.0275	0.0265	0.0550	0.0540	7	0.1075	4 deg, 23 min	7 deg, 45 min
2	0.250	0.0670	0.0655	0.012	0.006	46	0.0390	0.0370	0.0960	0.0940	5 deg, 45 min	0.1538	3	6 deg, 20 min
3	0.313	0.1020	0.1005	0.014	0.008	56 deg, 15 min	0.0540	0.0530	0.1560	0.1540	5 deg, 45 min	0.1852	3	6 deg, 20 min
4	0.375	0.1520	0.1505	0.020	0.014	56 deg, 15 min	0.0820	0.0800	0.2040	0.2020	7	0.2573	4 deg, 23 min	7 deg, 45 min

GENERAL NOTE: See Fig. 5

NOTE:

(1) Resultant dimension.

Fig. 3 Type II (PZ) Cross Tip Screwdriver

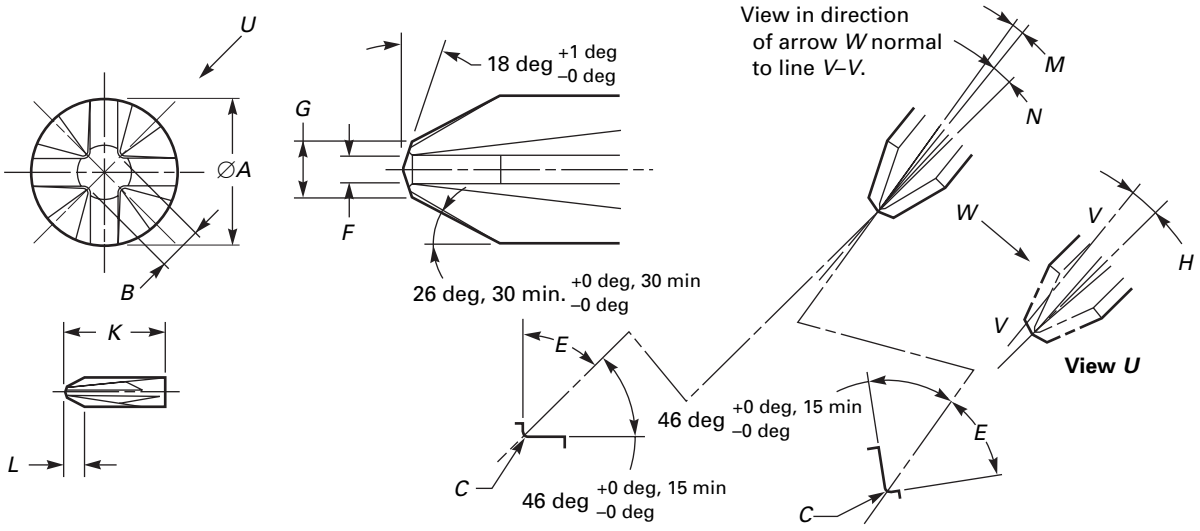
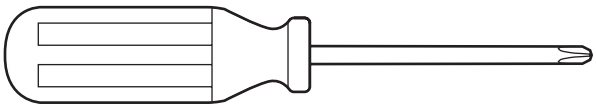


Fig. 4 Typical Appearance of a Cushion Grip Screwdriver



5.5.2 Cushion Grip. When furnished with a cushion grip, the screwdriver will typically resemble that shown in Fig. 4. The grip material shall be capable of meeting the tests of paras. 6.5 and 6.6 (see section 7 regarding limitations of use). There shall be no detectable slippage between the handle and the cushion grip under normal usage.

WARNING: Handles with or without comfort or cushion grips are not intended to give any degree of protection against electric shock and shall not be used on or near live electric circuits.[2]

6 TESTS

WARNING: Many tests required herein are inherently hazardous, and adequate safeguards for personnel and property shall be used in conducting such tests. These tests are designed to evaluate the tools and materials and do not condone the use of the tools in an environment, or in a manner, inconsistent with safe use of the tools.

6.1 Hardness Test

The Rockwell hardness test shall be conducted in accordance with ASTM E 18.

6.2 Tip Torsional Test

The tip of each sample under test shall be placed in a test block (see Fig. 5) having the corresponding size of recess of such depth that the wing spread at the surface shall be as noted in the Performance section of Table 1 or 4. When tested to the minimum tip torque value specified in Table 1 or 4, neither the shank nor the tip shall show visible permanent deformation. The torque shall be applied by forces acting perpendicular to the axis with the tip held securely in the test block. It is permissible to support the blade in a suitable position for test. The blade shall be restricted from endwise movement during testing.

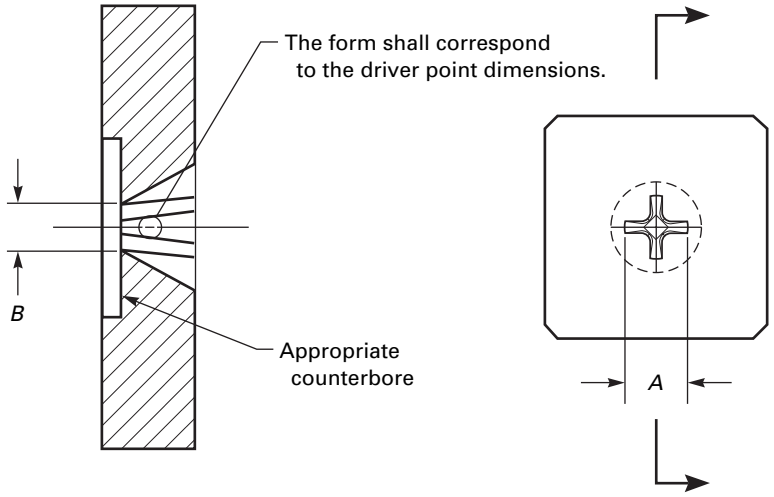
6.3 Assembly Torsional Test

The test shall be conducted after preheating the entire tool to a uniform temperature of 125°F ± 5°F. The load shall be applied within 1 min after removing the tool from the heating medium. The torque shall be applied by forces acting at or near the middle of the natural grip of the handle perpendicular to the axis with the tip held securely in the test block. It is permissible to support the shank at or near the junction of the shank and handle in a suitable position for test. The screwdriver shall be restricted from endwise movement during testing. When tested to the minimum assembly torque value specified in Table 1 or 4, the assembly shall not show a permanent slippage between the blade and handle.

6.4 Tip Toughness Test

The tip shall be torsionally tested as described in para. 6.2 except that the torque shall be increased until failure. If a fracture occurs, the pieces shall be refitted,

Fig. 5 Test Block Wing Spread



and the tip shall show that permanent deformation had occurred prior to fracture. If the tip fails without exhibiting such deformation, it shall be considered to have failed the tip toughness test.

6.5 Solvent Resistance Test

Screwdrivers shall be capable of undergoing the following test without specified damage. Handles are to be fully immersed in motor vehicle brake fluid (SAE J1703), gasoline, ethylene glycol, and ethyl alcohol for 15 min at room temperature, removed, and allowed to stand for 24 hr. A new assembly shall be used for each of the four test liquids. There shall be no permanent swelling, surface attack (except for manufacturer's identification or paint removal), or failure to comply with paras. 6.3 and 6.6.

6.6 Handle Impact Test

This test shall be performed at room temperature. The blade of the screwdriver shall be mounted vertically in a fixture affixed to the base of a suitable falling weight impact device. The blade shall rest on a solid surface to ensure that the blade does not move vertically in the fixture. The weight shall be 15 lb (6.8 kg) and dropped unrestricted with some means to ensure that the full force of the falling weight will be acting normal to the striking surface. In conducting this test, care shall be taken that the impact energy will not be expended in flexing of the blade or in driving the screwdriver tip into the surface on which it rests. The blade may be shortened or blunted, if necessary, to ensure a proper test. An equivalent test may be used if the impact energy requirement in Table 2 is met.

The blade shall not penetrate into the handle more than specified in Table 2 when the weight has been dropped ten times from the applicable height shown in Table 2. The first drop ensures that the blade is seated in the handle. The difference in length after the first and then after the tenth drop is the blade penetration.

The screwdriver handle shall neither break, crack, nor significantly distort as a result of the above test. "Significantly distort" (for the purpose of this test) means an increase of at least 5% in the handle diameter, either as a uniform or irregular bulge.

7 SAFETY REQUIREMENTS AND LIMITATIONS OF USE

Using a screwdriver as a pry bar or striking it with a hammer is clearly a misuse of the tool. Instructors and employers shall stress proper use and safety in the use of screwdrivers, information about which can be found in the Hand Tools Institute publication, Guide to Hand Tools — Selection, Safety Tips, Proper Use and Care.

ASME B107.31

SCREWDRIVERS, CROSS TIP GAGING

1 SCOPE

This Standard specifies two types of penetration gaging of Phillips (PH) and Pozidriv (PZ) screwdrivers and supplements the ASME blade and bit standards.[1]

2 CLASSIFICATION

Screwdrivers with cross tip gaging are classified in the following two types:

(a) Style A — driver penetration gage with indicator

(b) Style B — GO/NO GO ring penetration gage

3 REFERENCE

The following is a publication referenced in this Standard.

ASTM E 18-94, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959

4 GENERAL DESCRIPTION OF GAGING SYSTEMS

The two gaging systems described below are not intended to check all dimensions of the drivers. The manufacturer must be responsible for in-process measurements of the individual characteristic dimensions of the drivers.

4.1 Style A: Driver Penetration Gage With Indicator

This method of penetration gaging is a quantitative method of gaging. This method of inspection of cross tip screwdrivers involves the use of the Penetration Gage Assembly (PGA) indicator gage shown in Fig. 1. The PGA has the ring gage mounted inside. This system provides actual measurements of driver penetration as it relates to a master plug gage. Figures 2 through 14 and Table 1 provide the dimensions for the gage assembly. The ring gage dimensions are found in Tables 2 and 3 for Type PH and Table 4 for Type PZ.

The PGA is used to inspect cross tip drivers as follows:

(a) A master plug gage is inserted in the ring gage, and sufficient force is applied to fully seat the plug gage.

(b) The indicator is set to zero.

(c) The driver to be inspected is seated in the ring gage, and the penetration reading shall comply with Table 5.

4.2 Style B: GO/NO GO Ring Penetration Gage

The GO/NO GO ring penetration gaging system involves the use of master plug and ring gages. The ring gage, also known as a *step gage*, is to be used as a working gage and checked with a master plug gage periodically. The master plug gages are defined in Tables 6 through 8. Dimensions are given for the ring gages in Tables 9 through 11. The screwdriver and master plug gage shall fit the ring gage so that dimension *G* in Tables 6 through 8 falls within the step on the face of the ring gage.

[1] Phillips and Pozidriv PZ1, PZ2, and PZ3 are registered trademarks of the Phillips Screw Co.

Fig. 1 Penetration Gage Assembly for Cross Tip Screwdriver

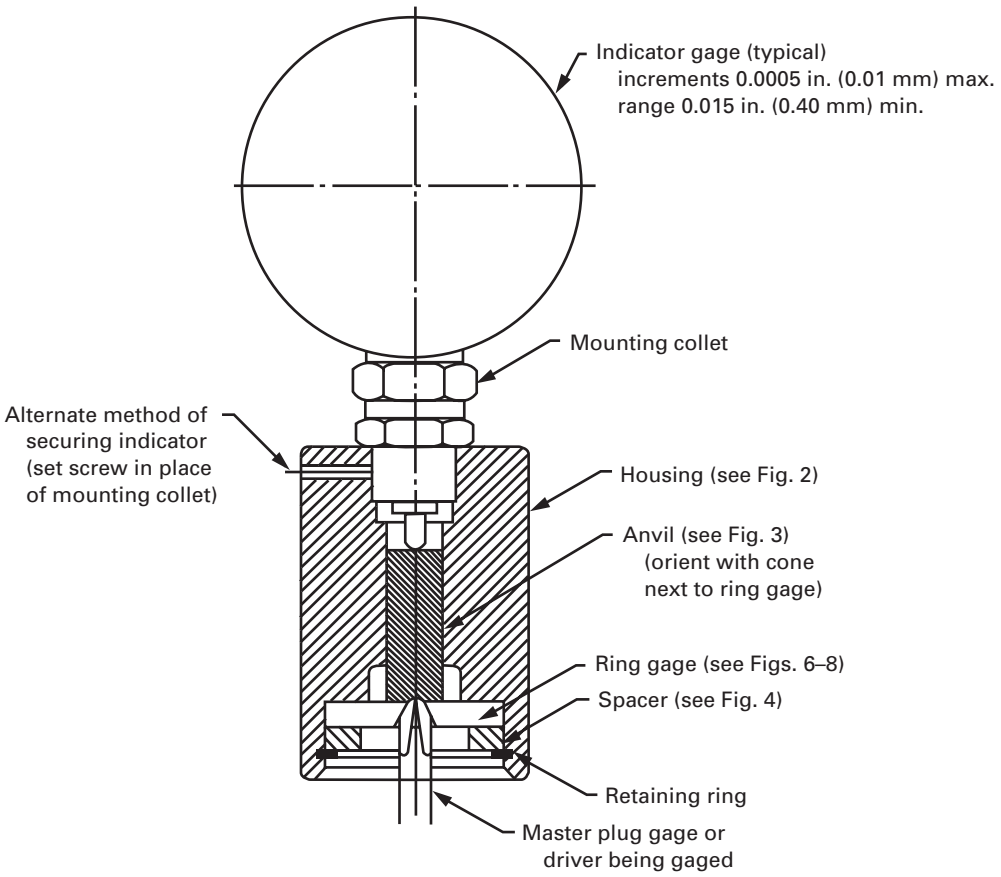
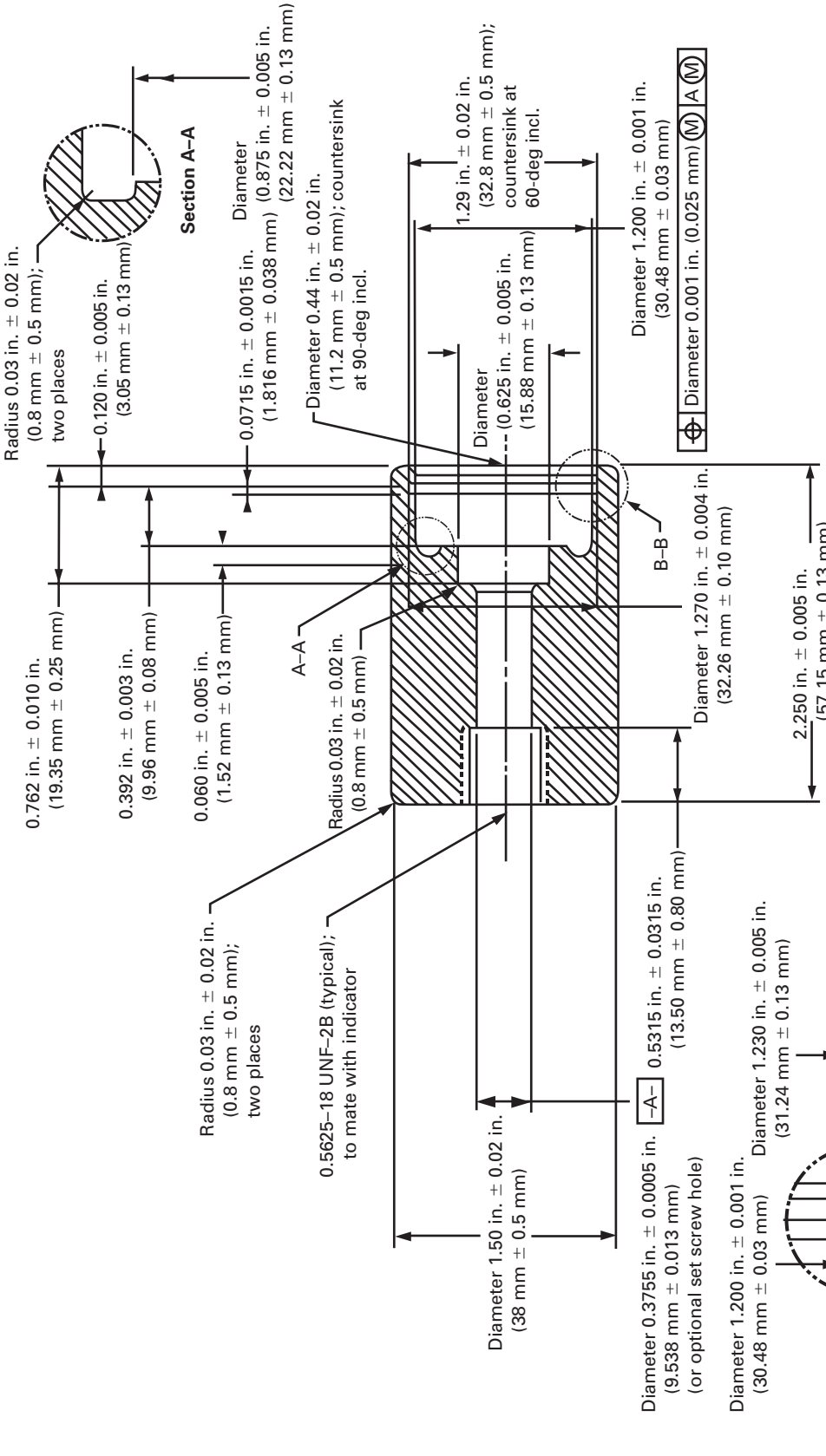
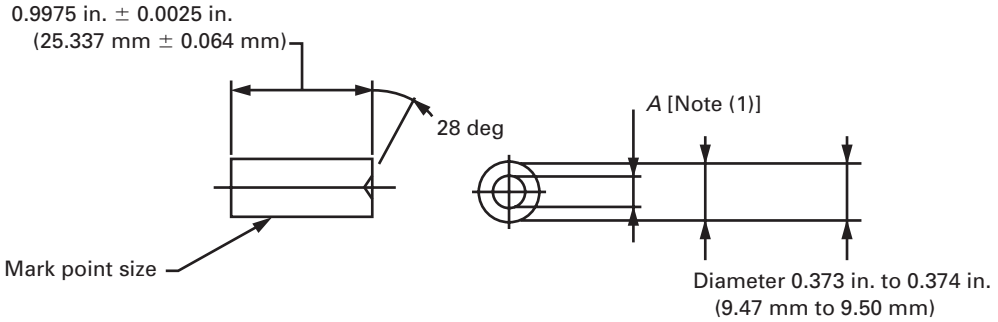


Fig. 2 Housing



GENERAL NOTE: ASTM 1040, 4140, or equivalent material; 40/44 HRC.

Fig. 3 Anvil

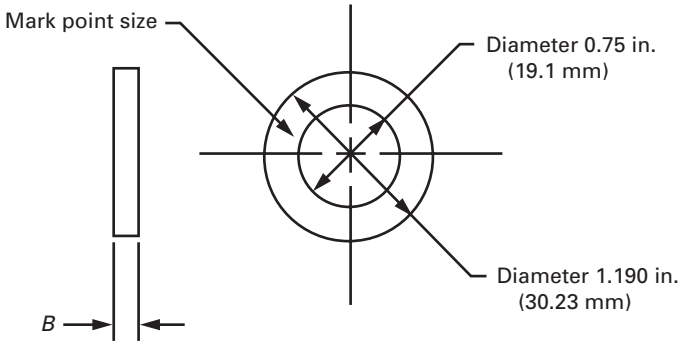


GENERAL NOTE: Tool steel material, 58–66 RC.

NOTE:

(1) Diameter *A* to be concentric to O.D. within 0.001 in. (0.025 mm).

Fig. 4 Spacer



GENERAL NOTE: ASTM 1040, 4140, or equivalent material; 40/44 HRC.

Fig. 5 Bowed Retaining Ring

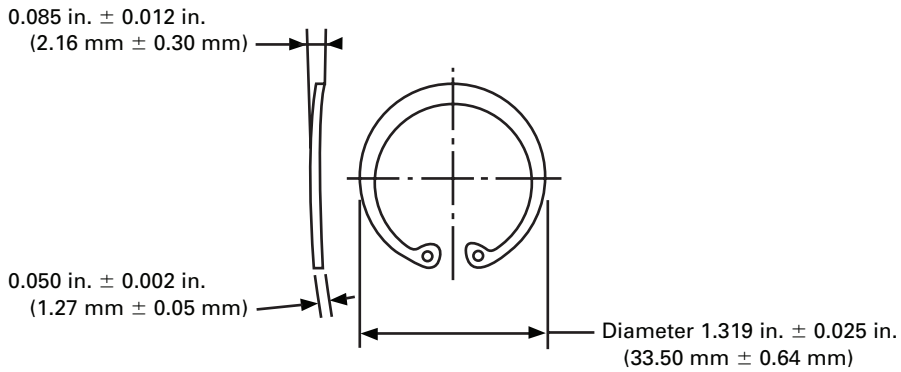
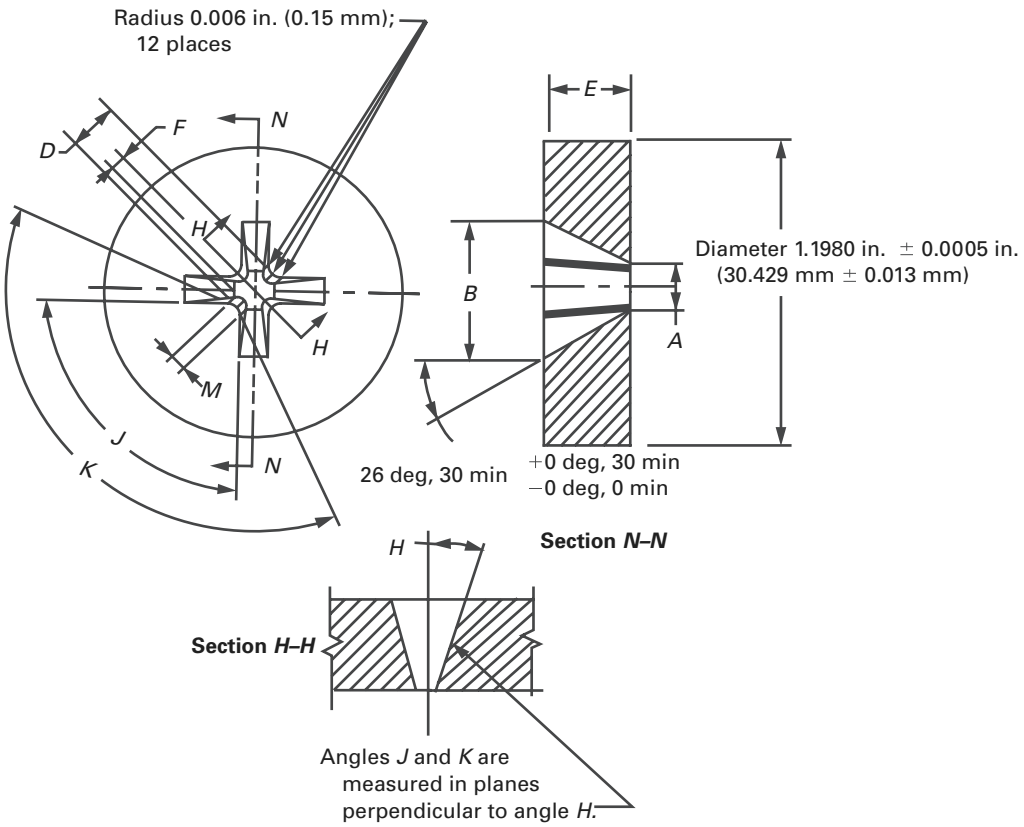


Fig. 6 Style A Ring Gage for Type PH, Sizes 1 Through 4

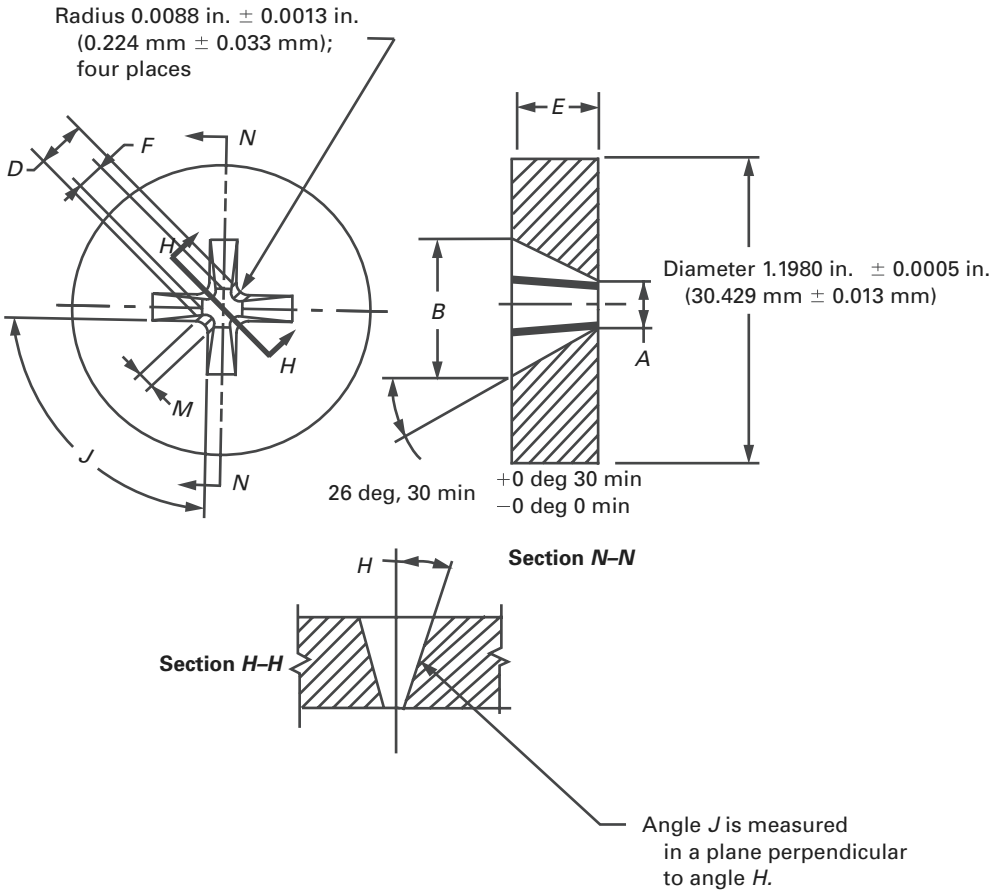


GENERAL NOTES:

(a) Tool steel material 62/66 HRC or steel 62/66 HRC equivalent case hardened at 0.010 in. (0.25 mm) minimum depth.

(b) Form concentric to O.D. within 0.002 in. (0.051 mm).

Fig. 7 Style A Ring Gage for Type PH, Size 0

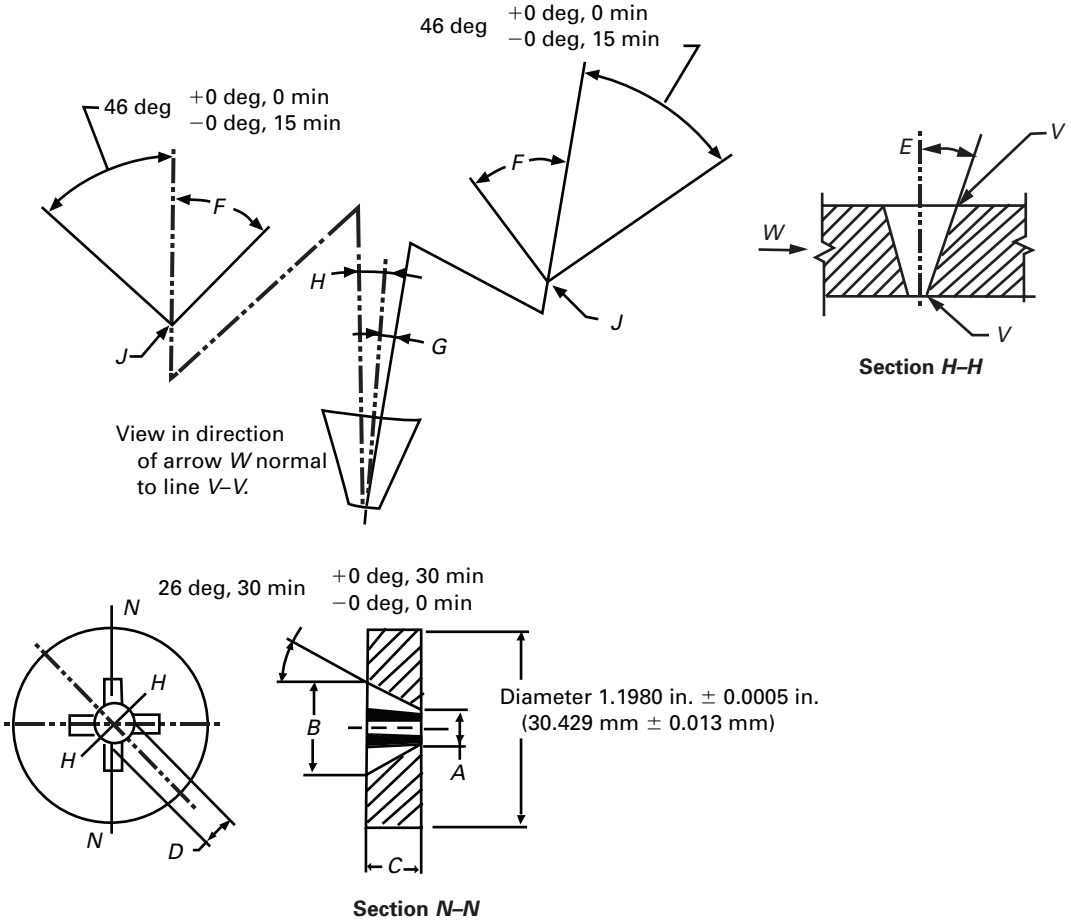


GENERAL NOTES:

(a) Tool steel material 62/66 HRC or steel 62/66 HRC equivalent case hardened at 0.010 in. (0.25 mm) minimum depth.

(b) Form concentric to O.D. within 0.002 in. (0.051 mm).

Fig. 8 Style A Ring Gage for Type PZ



GENERAL NOTES:

(a) Tool steel material 62/66 HRC or steel 62/66 HRC equivalent case hardened at 0.010 in. (0.25 mm) minimum depth.

(b) Form concentric to O.D. within 0.002 in. (0.051 mm).

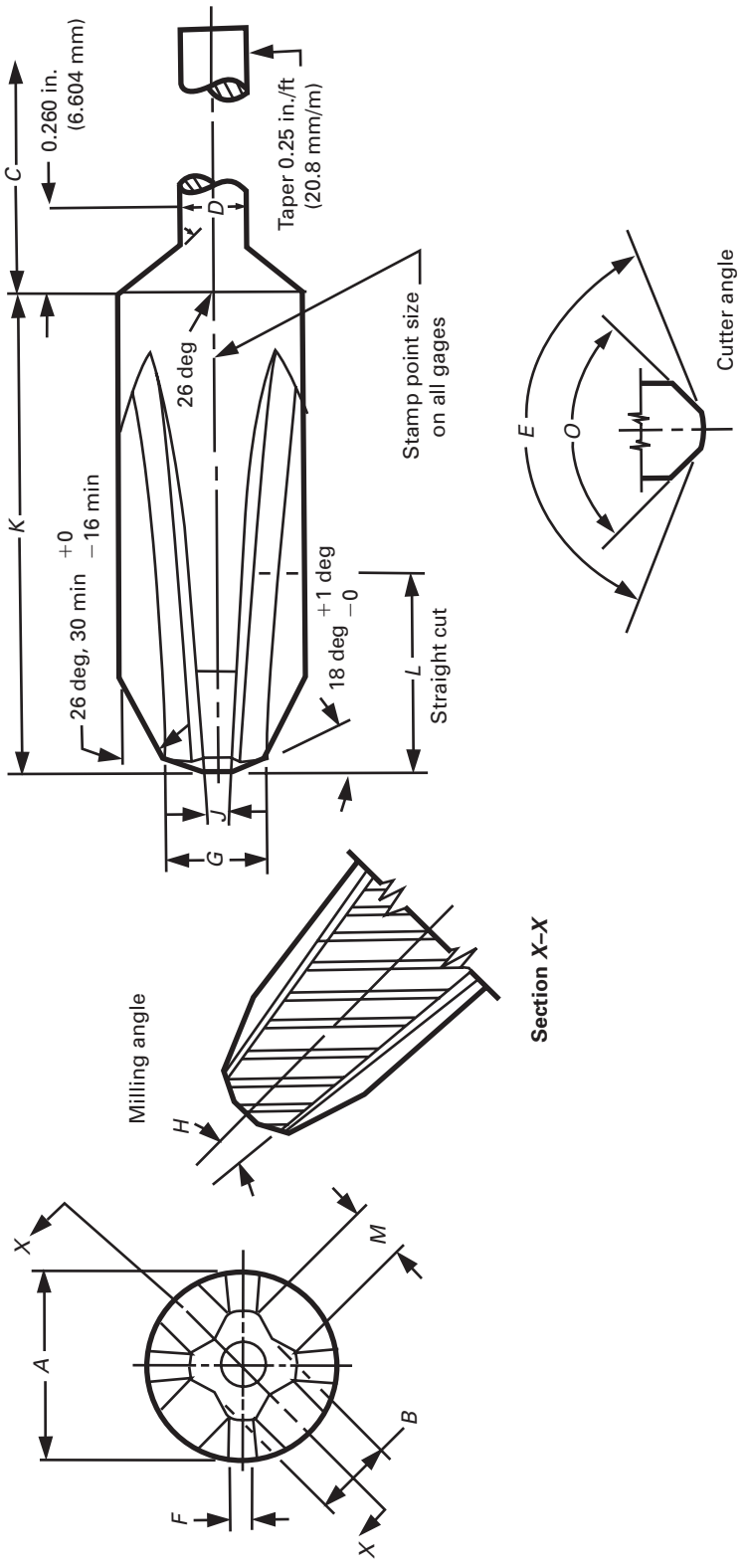


Fig. 9 Master Plug Gage (PH), Sizes 1 Through 4

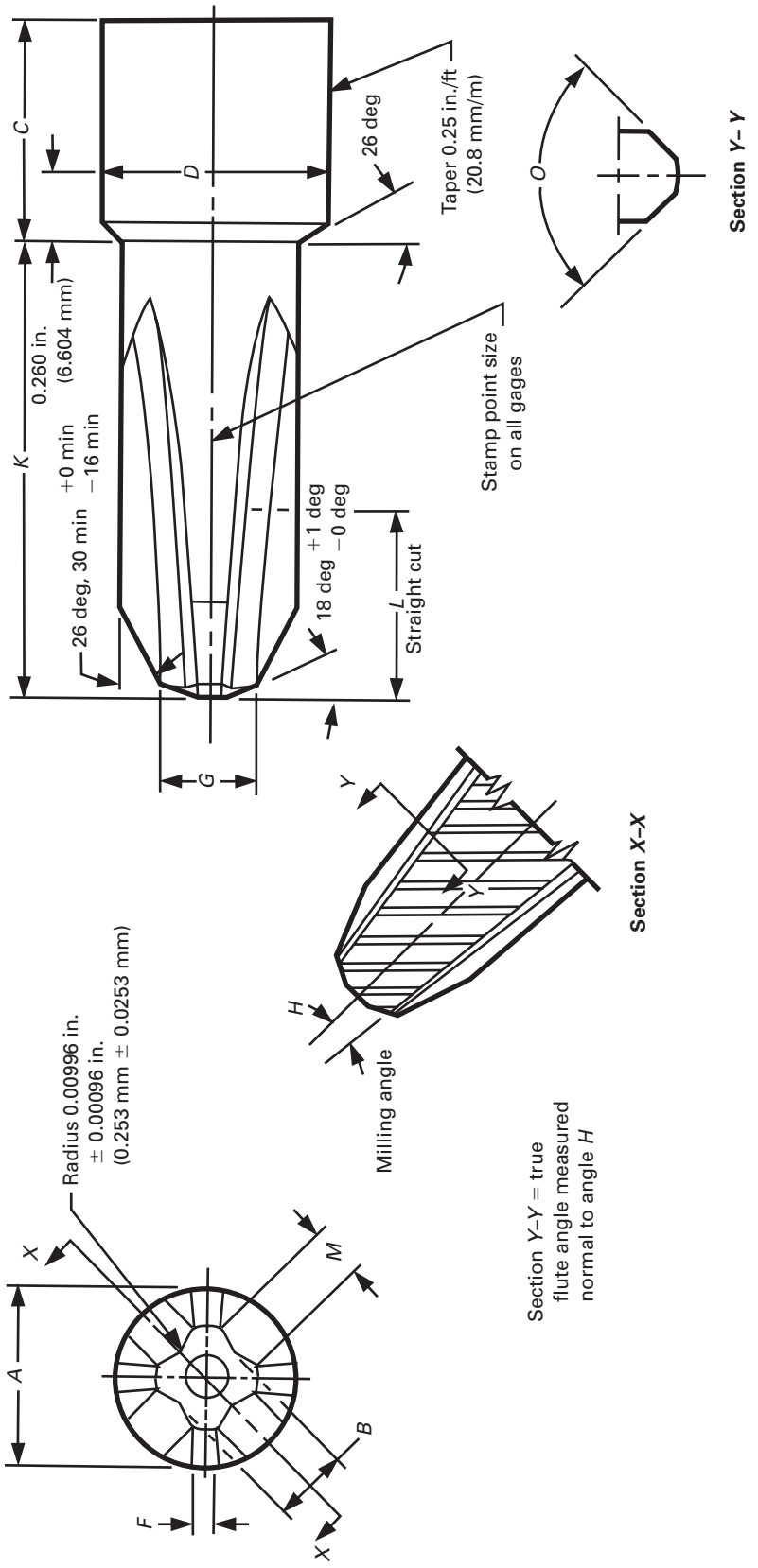
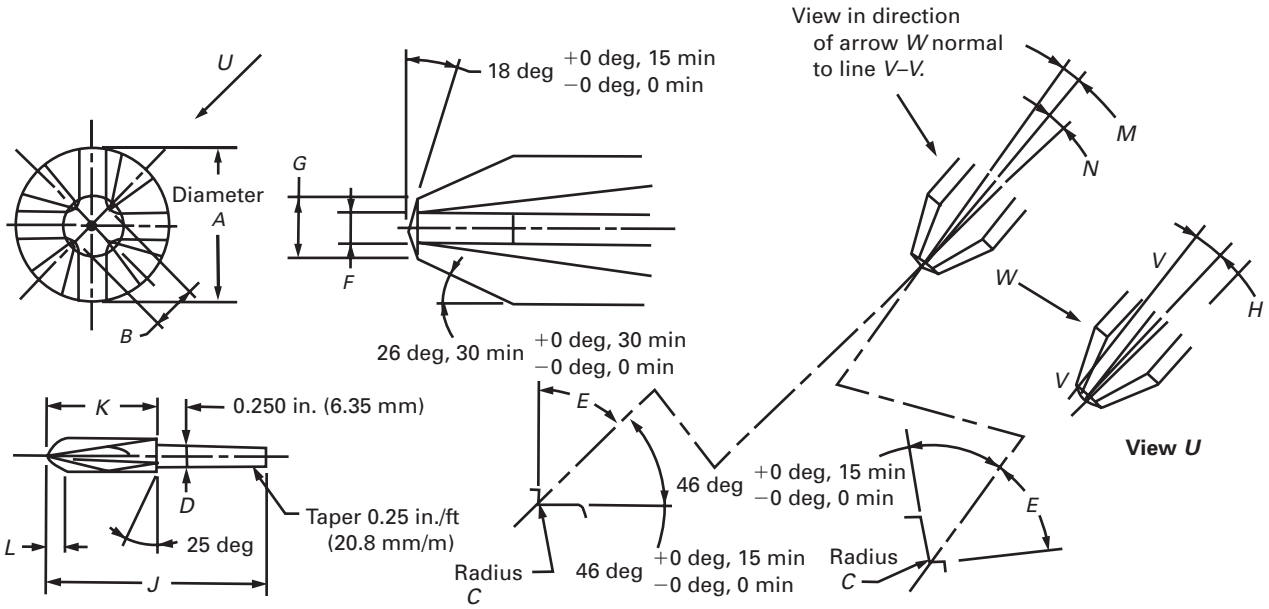


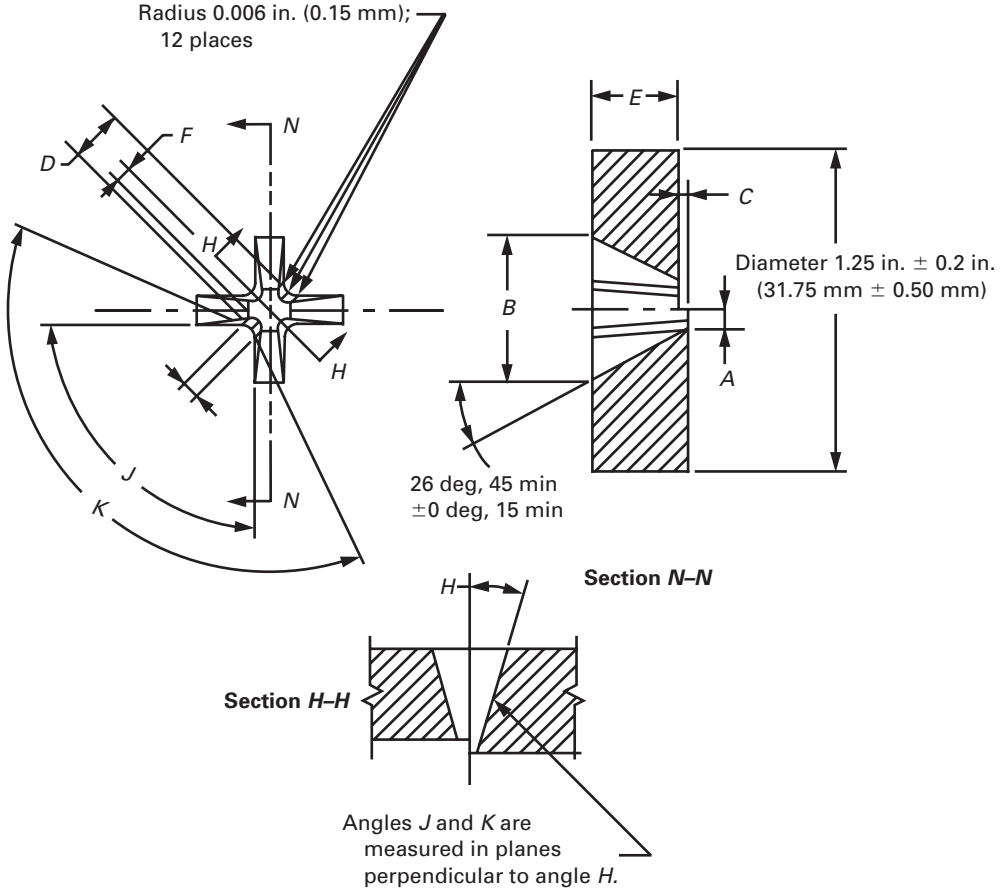
Fig. 10 Master Plug Gage (PH), Size 0

Fig. 11 Master Plug Gage (PZ)



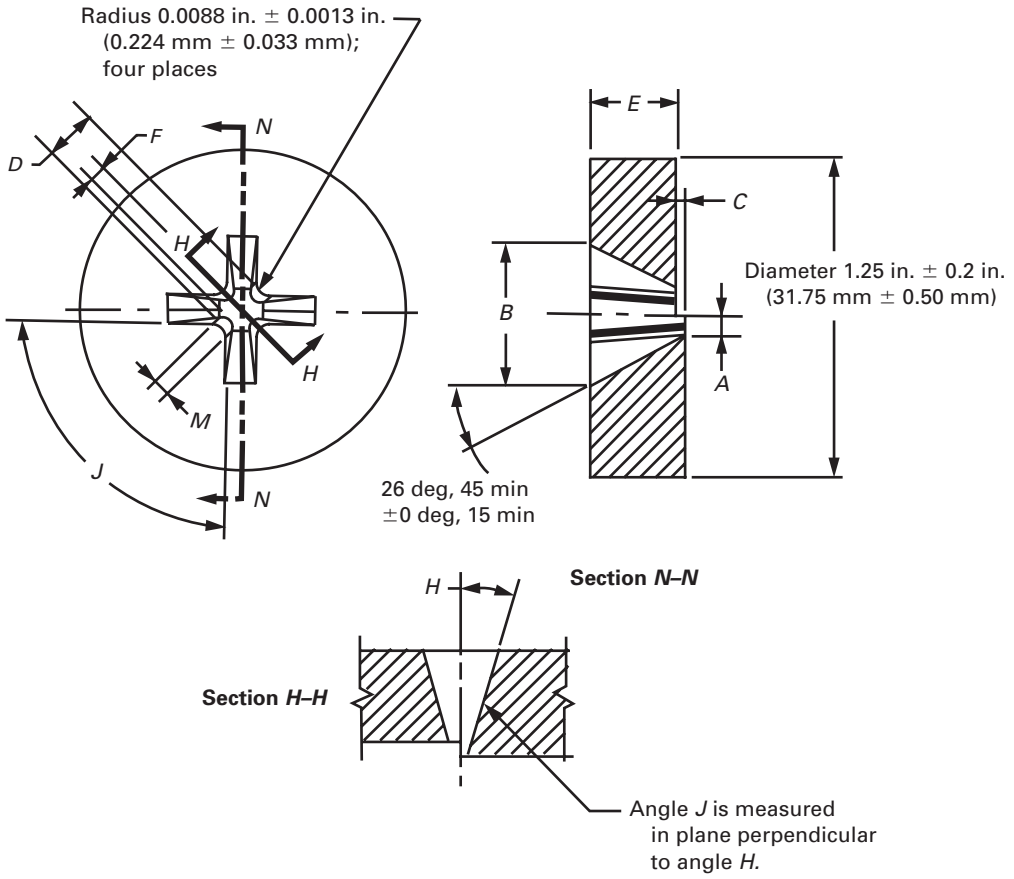
GENERAL NOTE: Tool steel material, 62/66 HRC.

Fig. 12 Style B GO/NO GO Ring Penetration Gage (PH), Sizes 1 Through 4



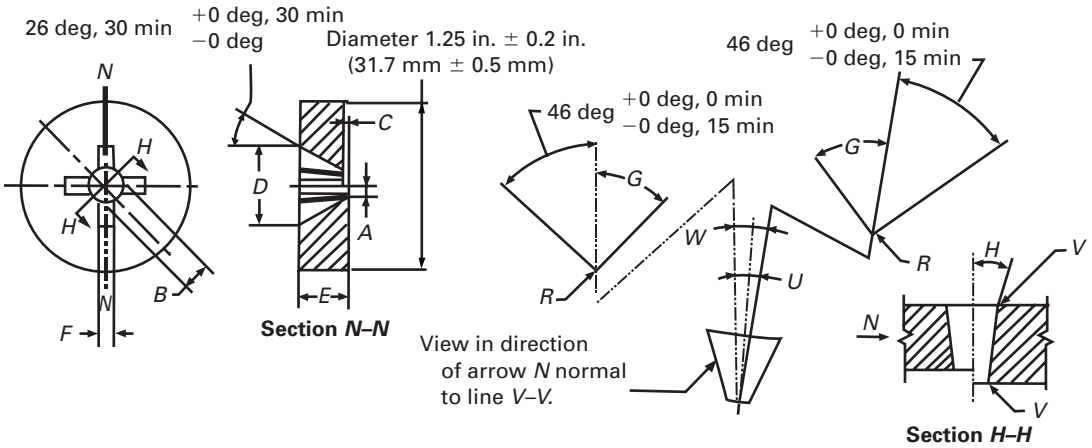
GENERAL NOTE: Tool steel material 62/66 HRC or steel 62/66 HRC equivalent case hardened at 0.010 in. (0.25 mm) minimum depth.

Fig. 13 Style B GO/NO GO Ring Penetration Gage (PH), Size 0



GENERAL NOTE: Tool steel material 62/66 HRC or steel 62/66 HRC equivalent case hardened at 0.010 in. (0.25 mm) minimum depth.

Fig. 14 Penetration GO/NO GO Gage (PZ)



GENERAL NOTE: Tool steel material 62/66 HRC or steel 62/66 HRC equivalent case hardened at 0.010 in. (0.25 mm) minimum depth.

Table 1 Anvil and Spacer Dimensions

Point Size		Anvil Cone Diameter, *A* (See Fig. 3) +0.000 in. (+0.00 mm) −0.001 in. (−0.03 mm)		Spacer Thickness, *B* (See Fig. 4) ±0.0020 in. (±0.051 mm)	
Phillips	Pozidriv	Phillips, in. (mm)	Pozidriv, in. (mm)	Phillips, in. (mm)	Pozidriv, in. (mm)
P0	PZ0	0.033 (0.84)	0.036 (0.91)	0.2520 (6.401)	0.2890 (7.341)
P1	PZ1	0.051 (1.30)	0.055 (1.40)	0.2200 (5.588)	0.2600 (6.604)
P2	PZ2	0.091 (2.31)	0.096 (2.44)	0.1575 (4.001)	0.2200 (5.588)
P3	PZ3	0.151 (3.84)	0.156 (3.96)	0.0638 (1.621)	0.1900 (4.826)
P4	PZ4	0.201 (5.11)	0.204 (5.18)	NA	0.1357 (3.447)

Table 2 Style A Ring Gage Dimensions for Phillips Screwdriver Tips, Sizes 1 Through 4

Point Size	*A*, in. (mm) ±0.0004 (±0.010)	*B*, in. (mm) (Ref.)	*D*, in. (mm) (Ref.)	*E*, in. (mm) ±0.002 (±0.051)	*F*, in. (mm) +0.0008/−0 (+0.020/−0)	*H*, deg +15/−0 min	*J*, deg +0/−15 min	*K*, deg +0/−15 min	*M*, in. (mm) +0.001 (±0.025)
1	0.0660 (1.676)	0.176 (4.470)	0.070 (1.778)	0.1100 (2.794)	0.0425 (1.080)	7	92	138	0.017 (0.432)
2	0.1060 (2.692)	0.278 (7.061)	0.098 (2.489)	0.1725 (4.382)	0.0636 (1.615)	5 deg, 45 min	92	140	0.032 (0.813)
3	0.1660 (4.216)	0.432 (10.973)	0.156 (3.962)	0.2662 (6.761)	0.1022 (2.596)	5 deg, 45 min	92	146	0.079 (2.007)
4	0.2160 (5.486)	0.544 (13.818)	0.227 (5.766)	0.3287 (8.349)	0.1459 (3.706)	7	92	153	0.095 (2.413)

GENERAL NOTES:
(a) Refer to Fig. 6.
(b) See Table 3 for size 0.

Table 3 Style A Ring Gage Dimensions for Phillips Screwdriver Tips, Size 0

Point Size	*A* in. (mm) ±0.0004 (±0.010)	*B*, in. (mm) (Ref.)	*D*, in. (mm) (Ref.)	*E*, in. (mm) ±0.002 (±0.051)	*F*, in. (mm) ±0.0004 (±0.010)	*H*, deg +15/−0 min	*J*, deg +0/−15 min.	*M*, in. (mm) ±0.0018 (±0.046)
0	0.048 (1.219)	0.1230 (3.124)	0.027 (0.686)	0.078 (1.981)	0.0265 (0.673)	7	92	0.0122 (0.310)

GENERAL NOTE: Refer to Fig. 7.

Table 4 Style A Ring Gage Dimensions for Pozidriv Screwdriver Tips

Point Size	*A*, in. (mm) ±0.0004 (±0.010)	*B*, in. (mm) (Ref.)	*C*, in. (mm) ±0.002 (±0.051)	*D*, in. (mm) +0, −0.0010 (+0, −0.025)	*E*, deg +15/−0 min	*F*, deg +0/−15 min	*G*, deg +0/−15 min	*H*, deg +0/−15 min	*J*, in. (mm) Max.	*J*, in. (mm) Min.
0	0.051 (1.295)	0.074 (1.880)	0.047 (1.194)	0.0310 (0.7874)	7	46	4 deg, 23 min	7 deg, 45 min	0.004 (0.102)	0.003 (0.076)
1	0.065 (1.651)	0.135 (3.429)	0.070 (1.778)	0.0477 (1.2116)	7	46	4 deg, 23 min	7 deg, 45 min	0.005 (0.127)	0.004 (0.102)
2	0.111 (2.819)	0.217 (5.512)	0.110 (2.794)	0.0719 (1.8263)	5 deg, 45 min	46	3°	6 deg, 20 min	0.008 (0.203)	0.006 (0.152)
3	0.171 (4.343)	0.312 (7.925)	0.140 (3.556)	0.1078 (2.2381)	5 deg, 45 min	56 deg, 15 min	3°	6 deg, 20 min	0.012 (0.305)	0.008 (0.203)
4	0.219 (5.563)	0.413 (10.490)	0.193 (4.902)	0.1587 (4.0310)	7	56 deg, 15 min	4 deg, 23 min	7 deg, 45 min	0.020 (0.508)	0.014 (0.356)

GENERAL NOTE: Refer to Fig. 8.

Table 5 Driver Penetration Limits

Phillips and Pozidriv Point Size	Dial Indicator Reading, in. (mm)
0	±0.005 (±0.13)
1	±0.005 (±0.13)
2	±0.005 (±0.13)
3	±0.005 (±0.13)
4	±0.005 (±0.13)

Table 6 Master Plug Gage Dimensions for Phillips Cross Recesses, Sizes 1 Through 4

Point Size	*A*, in. (mm) ±0.010 (±0.254)	*B*, in. (mm) +0/−0.001 (+0/−0.025)	*C*, in. (mm) ±0.06 (±1.52)	*D*, in. (mm)	*E*, deg +15/−0 min	*F*, in. (mm) (Ref.) Max.	*F*, in. (mm) (Ref.) Min.
1	0.18 (4.57)	0.0394 (1.0008)	0.75 (19.05)	0.181 (4.597)	138	0.020 (0.508)	0.018 (0.457)
2	0.25 (6.35)	0.0606 (1.5392)	0.75 (19.05)	0.181 (4.597)	140	0.025 (0.635)	0.023 (0.584)
3	0.31 (7.87)	0.0983 (2.4968)	1 (25.4)	0.240 (6.096)	146	0.031 (0.787)	0.029 (0.737)
4	0.38 (9.65)	0.1407 (3.5738)	1 (25.4)	0.240 (6.096)	153	0.044 (1.118)	0.042 (1.067)

Point Size	*G*, in. (mm) +0.001/−0 (+0.025/−0)	*H*, deg +0/−15 min	*J*, in. (mm) Max.	*J*, in. (mm) Min.	*K*, in. (mm) ±0.06 (±1.52)	*L*, Min., in. (mm)	*M*, in. (mm) +0/−0.001 (+0/−0.025)	*O*, deg +15/−0 min
1	0.050 (1.270)	7	0.020 (0.508)	0.015 (0.381)	0.88 (22.35)	0.19 (4.826)	0.0202 (0.5131)	92
2	0.090 (2.286)	5 deg, 45 min	0.020 (0.508)	0.015 (0.381)	0.88 (22.35)	0.28 (7.112)	0.0434 (1.1024)	92
3	0.150 (3.810)	5 deg, 45 min	0.020 (0.508)	0.015 (0.381)	1 (25.4)	0.44 (11.18)	0.0826 (2.0980)	92
4	0.200 (5.080)	7	0.020 (0.508)	0.015 (0.381)	1 (25.4)	0.53 (13.46)	0.1078 (2.7381)	92

GENERAL NOTES:
(a) Refer to Fig. 9.
(b) See Table 7 for size 0.

Table 7 Master Plug Gage Dimensions for Phillips Cross Recesses, Size 0

Point Size	*A*, in. (mm) ±0.010 (±0.254)	*B*, in. (mm) ±0.0005 (±0.0127)	*C*, in. (mm) ±0.06 (±1.52)	*D*, in. (mm) (Ref.)	*F*, in. (mm) ±0.001 (±0.025)	*G*, in. (mm) +0.001/−0 (+0.025/−0)	*H*, deg +0/−15 min	*K*, in. (mm) ±0.06 (±1.52)	*L*, Min., in. (mm)	*M*, in. (mm) ±0.0013 (±0.0330)	*O*, deg +15 min, −0
0	0.13 (3.30)	0.0235 (0.5969)	0.75 (19.05)	0.181 (4.597)	0.011 (0.279)	0.032 (0.813)	7	0.88 (22.35)	0.19 (4.83)	0.0138 (0.3505)	92

GENERAL NOTE: Refer to Fig. 10.

Table 8 Pozidriv Master Plug Gage Dimensions

Point Size	*A*, in. (mm) ±0.010 (±0.25)	*B*, in. (mm)		*C*, in. (mm)		*D*, in. (mm) +0/−0.001 (+0/−0.025)	*E*, deg +7/−0 min	*F*, in. (mm)	
		Max.	Min.	Max.	Min.			Max.	Min.
0	0.125 (3.175)	0.0280 (0.7112)	0.0265 (0.6731)	0.004 (0.102)	0.003 (0.076)	0.181 (4.597)	46	0.0175 (0.4445)	0.0165 (0.4191)
1	0.188 (4.775)	0.0438 (1.1125)	0.0423 (1.0744)	0.005 (0.127)	0.004 (0.102)	0.181 (4.597)	46	0.0275 (0.6985)	0.0265 (0.6731)
2	0.250 (6.350)	0.0670 (1.7018)	0.0655 (1.6637)	0.008 (0.203)	0.006 (0.152)	0.181 (4.597)	46	0.0390 (0.9906)	0.0380 (0.9652)
3	0.313 (7.950)	0.1020 (2.5908)	0.1005 (2.5527)	0.012 (0.305)	0.008 (0.203)	0.240 (6.096)	56 deg, 15 min	0.0540 (1.3716)	0.0530 (1.3462)
4	0.375 (9.525)	0.1520 (3.8608)	0.1505 (3.8227)	0.020 (0.508)	0.014 (0.356)	0.240 (6.096)	56 deg, 15 min	0.0820 (2.0828)	0.0800 (2.032)

Point Size	*G*, in. (mm) +0.001/−0 (+0.025/−0)	*H*, deg +0/−6 min	*J*, in. (mm) ±0.031 (±0.787)	*K*, in. (mm) ±0.031 (±0.787)	*L*, Min., in. (mm)	*M*, deg +6/−0 min	*N*, deg +6/−0 min
0	0.0350 (0.889)	7	1.625 (41.275)	0.875 (22.225)	0.078 (1.981)	4 deg, 23 min	7 deg, 45 min
1	0.0540 (1.372)	7	1.750 (44.450)	0.875 (22.225)	0.125 (3.175)	4 deg, 23 min	7 deg, 45 min
2	0.0950 (2.413)	5 deg, 45 min	1.750 (44.450)	0.875 (22.225)	0.188 (4.775)	3°	6 deg, 20 min
3	0.1550 (3.937)	5 deg, 45 min	2.000 (50.800)	1.000 (25.400)	0.281 (7.137)	3°	6 deg, 20 min
4	0.2030 (5.156)	7	2.000 (50.800)	1.000 (25.400)	0.344 (8.738)	4 deg, 23 min	7 deg, 45 min

GENERAL NOTE: Refer to Fig. 11.

Table 9 Style B Ring Gage Dimensions for Phillips Screwdriver Tips, Sizes 1 Through 4

Point Size	*A*, in. (mm) ±0.0002 (±0.005)	*B*, in. (mm) (Ref.)	*C*, in. (mm) ±0.001 (±0.025)	*D*, in. (mm) (Ref.)	*E*, in. (mm) +0/−0.015 (+0/−0.38)	*F*, in. (mm) ±0.0004/−0 (+0.010/−0)	*H*, deg +15/−0 min	*J*, deg +0/−15 min	*K*, deg +0/−15 min	*M*, in. (mm) ±0.001 (±0.025)
1	0.0255 (0.6477)	0.176 (4.470)	0.010 (0.254)	0.070 (1.778)	0.125 (3.175)	0.0194 (0.4928)	7	92	138	0.017 (0.432)
2	0.0455 (1.1557)	0.278 (7.061)	0.010 (0.254)	0.098 (2.489)	0.1875 (4.763)	0.0303 (0.7696)	5 deg, 45 min	92	140	0.032 (0.813)
3	0.0755 (1.9177)	0.432 (10.973)	0.010 (0.254)	0.156 (3.962)	0.2812 (7.142)	0.0496 (1.2598)	5 deg, 45 min	92	146	0.079 (2.007)
4	0.1005 (2.5527)	0.544 (13.818)	0.010 (0.254)	0.227 (5.766)	0.3437 (8.730)	0.0711 (1.8059)	7	92	153	0.95 (2.413)

GENERAL NOTES:
(a) Refer to Fig. 12.
(b) See Table 10 for size 0.

Table 10 Style B Ring Gage Dimensions for Phillips Screwdriver Tips, Size 0

Point Size	*A*, in. (mm) ±0.0002 (±0.005)	*B*, in. (mm) (Ref.)	*C*, in. (mm) ±0.001 (±0.025)	*D*, in. (mm) (Ref.)	*E*, in. (mm) +0/−0.015 (+0/−0.38)	*F*, in. (mm) ±0.0002 (±0.005)	*H*, deg +15/−0 min	*J*, deg +0/−15 min	*M*, in. (mm) ±0.0018 (±0.046)
0	0.0165 (0.419)	0.1530 (3.886)	0.010 (0.254)	0.027 (0.686)	0.094 (2.388)	0.0114 (0.290)	7	92	0.0122 (0.3099)

GENERAL NOTE: Refer to Fig. 13.

Table 11 Ring Gage Dimensions for Pozidriv Screwdriver Tips

Point Size	*A*, in. (mm) ±0.0002 (±0.005)	*B*, in. (mm) ±0.0005, −0 (±0.013, −0)	*C*, in. (mm) ±0.001 (±0.025)	*D*, in. (mm) (Ref.)	*E*, in. (mm) ±0.002 (±0.051)	*F*, in. (mm) +0.0002/−0 (+0.005/−0)	*G*, deg +15/−0 min	*H*, deg +15/−0 min	*R*, in. (mm) Max.	*R*, in. (mm) Min.	*U*, deg +15/−0 min	*W*, deg +15/−0 min
0	0.0175 (0.4445)	0.0275 (0.6985)	0.005 (0.127)	0.093 (2.362)	0.0582 (1.4783)	0.0175 (0.4445)	46	7	0.004 (0.102)	0.003 (0.076)	4 deg, 23 min	7 deg, 45 min
1	0.0270 (0.6858)	0.0440 (1.1176)	0.010 (0.254)	0.141 (3.581)	0.0872 (2.2149)	0.0275 (0.6985)	46	7	0.005 (0.127)	0.004 (0.102)	4 deg, 23 min	7 deg, 45 min
2	0.0470 (1.1938)	0.0674 (1.7120)	0.010 (0.254)	0.231 (5.867)	0.1374 (3.4900)	0.0390 (0.9906)	46	5 deg, 45 min	0.008 (0.203)	0.006 (0.152)	3	6 deg, 20 min
3	0.0770 (1.9558)	0.1028 (2.6111)	0.010 (0.254)	0.357 (9.068)	0.2036 (5.1714)	0.0540 (1.3716)	56 deg, 15 min	5 deg, 45 min	0.012 (0.305)	0.008 (0.203)	3	6 deg, 20 min
4	0.1010 (2.5654)	0.1533 (3.8938)	0.010 (0.254)	0.507 (12.878)	0.3059 (7.7699)	0.0820 (2.0828)	56 deg, 15 min	7	0.020 (0.508)	0.014 (0.356)	4 deg, 23 min	7 deg, 45 min

GENERAL NOTE: Refer to Fig. 14.

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