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ASME B18.6.4-1998
[Revision of ANSI B18.6.4-1981 (R1997)]

THREAD FORMING AND THREAD CUTTING TAPPING SCREWS AND METALLIC DRIVE SCREWS (INCH SERIES)

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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FOREWORD

American National Standards Committee B18 for the standardization of bolts, screws, nuts, rivets, and similar fasteners was organized in March 1922, as Sectional Committee B18 under the aegis of the American Engineering Standards Committee (later the American Standards Association, then the United States of America Standards Institute and, as of October 6, 1969, the American National Standards Institute, Inc.), with the Society of Automotive Engineers and the American Society of Mechanical Engineers as joint sponsors. Subcommittee 3[1] was subsequently established and charged with the responsibility for technical content of standards covering slotted and recessed head screws.

An American Standard setting forth slotted head proportions was approved and published in April of 1930.

Over the years following the issuance of this document, the need for standards more comprehensive than head configurations became apparent. At a meeting held on April 14, 1942, Subcommittee 3[1] was reorganized and enlarged, and the following operating scope was established:

The scope of Subcommittee 3[1] shall consist of the development and promulgation of American Standards embracing screw products variously known as machine screws, wood screws, tapping screws, slotted head cap screws and slotted headless set screws and machine screw nuts. The standards shall comprise complete product standards covering all dimensions and tolerances required for the specification and production of the products. Details shall include boundary dimensions; such as nut width and thickness; screw head dimensions; slot and recess dimensions; body dimensions; thread classification or thread detail, as required; thread length; point design; chamfers; underhead fillets; and supporting general specifications covering the quality, finish, and the acceptable tolerances and limits as well as any information that may be necessary to insure satisfactory application of the products.

Several meetings of the Subcommittee over the ensuing 3 years resulted in the development and acceptance of a proposed revision containing complete product standards coverage for slotted and recessed head machine, tapping and wood screws; slotted head and hexagon head cap screws; and slotted headless set screws. Following approval by the B18 Committee and sponsor organizations, this proposal was forwarded to the American Standards Association and declared an American Standard, ASA B18.6 on April 12, 1947.

Recognizing the need for further refinements, Subcommittee 3[1] at a meeting held on February 1, 1951, established three standing working subgroups: one to develop details pertinent to tapping screw threads; a second to review, revise, and develop head dimensions and tolerances; and a third to correlate and edit the technical information emanating from the other two groups. Also at this meeting, numerous suggested changes were reviewed and assigned to the respective subgroups for further development. Additional meetings of the Subcommittee were held on October 9, 1952, October 29, 1953, and April 1 and 2, 1954. Between each of these meetings the subgroups held numerous working sessions and carried on technical development in cooperation with the technical committees of the U.S. Machine Screw and Tapping Screw Service Bureaus.

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[1] As of April 1, 1966, Subcommittee 3 was redesignated Subcommittee 6.

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At the April 1954 meeting, Subcommittee 3,[1] contemplating a partial revision of the ASA B18.6 document, recommended the publication of standards for wood screws, cap and set screws, machine screws, and tapping and drive screws in four separate documents each of which would consist of a complete product specification. This approach was confirmed by the B18 Committee with the further stipulation that the coverage for hexagon head cap screws, square head set screws and machine screw nuts from the ASA B18.2 standard be transferred to the documents covering cap and set screws and machine screws, respectively. It was understood that jurisdiction over the square head set screws and hexagon head cap screws would remain with Subcommittee 2 and that Subcommittee 3[1] would retain responsibility for machine screw nuts. Following this confirmation and additional direction, the preparation of proposals for the new documents was undertaken.

The proposed standard covering slotted and recessed head tapping screws and metallic drive screws was approved by Subcommittee 3[1] and after being circulated to industry for comment, it was revised, and subsequently approved by letter ballot of Sectional Committee B18. The standard was approved by the sponsor organizations and the American Standards Association and formally designated an American Standard on June 4, 1958.

Following issuance of the 1958 standard, Subcommittee 3[1] and the three subgroups continued to work on revision and refinement of the specifications for tapping screws. Numerous meetings held over several years culminated in a draft proposal incorporating revisions consisting mainly of the following: Inclusion of coverage for Type AB tapping screws, 100 deg flat head for some screw types, across corners gaging of hex heads, dimensions of large hex heads for sems, and factors for determining grip lengths on pointed screws; refinement of thread lengths, materials, performance requirements and editorial format; and de-emphasis of round heads and Type A tapping screws. This draft was accepted in principle by Subcommittee 3[1] at a meeting held on September 29 and 30, 1964, with further recommendations to include coverage for the Type 1A cross recess and wobble gaging of recessed heads, and to delete the coverage for Type BG tapping screws. A second draft incorporating these recommendations was approved by Subcommittee 3[1] at a meeting held on June 22 and 23, 1965. Subsequent to its approval by letter ballot of the Sectional Committee and the sponsor organizations, the revision was submitted to the USA Standards Institute (the reconstituted American Standards Association as of August 1966) and was designated a USA Standard on December 2, 1966.

Following publication of the 1966 document, Subcommittee 6 and the subgroups thereof continued to pursue the study and development of further simplifications and refinements to the standard for tapping screws. Numerous meetings held over the ensuing years resulted in committee acceptance of a proposed revision encompassing a more definitive title; significant changes to the specifications for points; more realistic minimum practical screw lengths; changes and clarifications to thread length specifications; extension of size coverages where applicable for consistency; corrections to recess dimensional data; addition of an appendix covering wrench openings for hex head screws; relegation of the coverage for the Type C point and the truss, 100 deg flat countersunk, slotted hex and slotted hex washer head styles to the appendices; and numerous editorial corrections and format changes. This revision was duly accepted by letter ballot of Subcommittee 6. Following its approval by letter ballot of the B18 Committee and the sponsor organizations the revision was submitted to the American National Standards Institute for recognition as an American National Standard. This was granted on June 18, 1981.

In 1995 Subcommittee 6 initiated work to revise the point diameters, head diameters for flat head screws, length measurement method for oval head screws, and method of measuring thread distance from the underside of the head. Additions proposed included adding protrusion height inspection for oval head screws, ductility testing, hydrogen embrittlement testing,

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and quality assurance and designated inspection characteristics. Several drafts were prepared which resulted in further refinements. These changes were balloted and approved by the ASME B18 Committee. The proposal was submitted to the American National Standards Institute and designated an American National Standard on June 22, 1998.

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Standardization of Bolts, Nuts, Rivets, Screws, Washers, and Similar Fasteners

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Edition: Cite the applicable edition of the Standard for which the interpretation is being requested.

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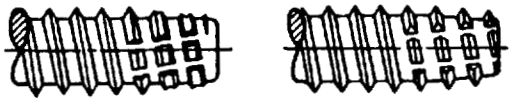
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TYPE DESIGNATIONS FOR TAPPING SCREWS AND METALLIC DRIVE SCREWS

Pictorial Representations of Screw Types	ANSI Standard Designation	Manufacturers Designation	See Table/Appendix
	AB [Note (1)]	AB [Note (1)]	Table 5
	B	B	Table 6
	BP	BP	Table 6
	BF	BF	Table 7
	BT	25	Table 7
	D	1	Table 8
	F	F	Table 8
	G	G	Table 8
	T	23	Table 8
 *Not recommended – use Type AB* [Note (2)]	A [Note (2)]	A [Note (2)]	Appendix E

(*continued*)

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TYPE DESIGNATIONS FOR TAPPING SCREWS AND METALLIC DRIVE SCREWS (CONT'D)

Pictorial Representations of Screw Types	ANSI Standard Designation	Manufacturers Designation	See Table/Appendix
	C [Note (3)]	C [Note (3)]	Appendix V
Not recommended for new designs **[Note (3)]**			
	U	U	Table 41

NOTES:
(1) Formerly designated "Type BA".
(2) See paras. 1.3.1.1 and 1.3.1.4,
(3) See para. 1.3.1.5.

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THREAD FORMING AND THREAD CUTTING TAPPING SCREWS AND METALLIC DRIVE SCREWS (INCH SERIES)

1 INTRODUCTORY NOTES

1.1 Scope

1.1.1 This Standard covers the complete general and dimensional data for the various types of slotted and recessed head tapping screws and metallic drive screws *recognized* as "American National Standard." Also included are appendices which provide specifications and instructions for protrusion gaging of flat countersunk head screws, across corners gaging of hex head screws, penetration and wobble gaging of recessed head screws, approximate hole sizes, wrench openings for hex head products, means for determining effective grip lengths on screws, documentation for screw types and head types relegated to not-recommended or limited usage status, and formulas on which dimensional data are based. It shall be understood, however, that where questions arise concerning acceptance of products, the dimensions in the tables shall govern over recalculation by formula.

1.1.2 The inclusion of dimensional data in this Standard is not intended to imply that all of the products described are stock production sizes. Consumers should consult with manufacturers concerning the availability of products.

1.2 Tapping Screw Head Types

The head types covered by this Standard and the appendices include those commonly recognized as being applicable to tapping screws and are enumerated and described in the following.

1.2.1 Flat Countersunk Head. The flat countersunk head shall have a flat top surface and a conical bearing surface with a head angle for one design of approximately 82 deg and for another design of approximately 100 deg. Dimensions for the 82 deg flat countersunk head are given in Tables 9 through 12. In deference to its limited usage and in the interest of curtailing product varieties, the 100 deg flat countersunk head is considered nonpreferred and the dimensions are documented in Appendix VI.

1.2.2 Oval Countersunk Head. The oval countersunk head shall have a rounded top surface and a conical bearing surface with a head angle of approximately 82 deg. Dimensions are given in Tables 20 through 23.

1.2.3 Undercut Flat and Oval Countersunk Heads. For short lengths, 82 deg flat and oval countersunk head tapping screws shall have heads undercut to 70% of normal side height to afford greater length of thread on the screws. Dimensions are given in Tables 13 through 16, and 24 through 27, respectively.

1.2.4 Flat and Oval Countersunk Trim Heads. Flat and oval countersunk trim heads shall be similar to the 82 deg flat and oval countersunk heads except that the size of head for a given size screw is one (large trim head) or two (small trim head) sizes smaller than the regular flat and oval countersunk head size, and oval countersunk trim heads shall have a definite radius where the curved top surface meets the conical bearing surface. Trim heads are furnished only in cross recessed head types. Dimensions are given in Tables 17 through 19, and 28 through 30, respectively.

1.2.5 Pan Head. The slotted pan head shall have a flat or slightly rounded top surface rounding into cylindrical sides and a flat bearing surface. The recessed pan head shall have a rounded top surface blending into cylindrical sides and a flat bearing surface. Dimensions are given in Tables 31 through 34.

1.2.6 Fillister Head. The fillister head shall have a rounded top surface, cylindrical sides, and a flat bearing surface. Dimensions are given in Tables 35 through 38.

1.2.7 Hex Head. The hex head shall have a flat or indented top surface, six flat sides, and a flat bearing surface. Dimensions for regular and large hex heads are given in Table 39. Because the slotted hex head requires a secondary operation that often results in

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burrs at the extremity of slot which interfere with socket wrench engagement and the wrenching capability of the hex far exceeds that of the slot, it is not recommended for new design and the dimensions accordingly are given in Appendix VII.

1.2.8 Hex Washer Head. The hex washer head shall have an indented top surface and six flat sides formed integrally with a flat washer which projects beyond the sides and provides a flat bearing surface. Dimensions are given in Table 40. Because the slotted hex washer head requires a secondary operation that often results in burrs at the extremity of slot which interfere with socket wrench engagement and the wrenching capability of the hex far exceeds that of the slot in the indented head, it is not recommended for new design and the dimensions are documented for reference purposes in Appendix H.

1.2.9 Truss Head. The truss head shall have a low rounded top surface with a flat bearing surface, the diameter of which for a given screw size shall be larger than the diameter of the corresponding round head. In the interest of product simplification and recognizing that the truss head is an inherently weak design, it is not recommended for new design and the dimensional data is documented for reference purposes in Appendix F.

1.2.10 Round Head. The round head shall have a semielliptical top surface and a flat bearing surface. In recognition of superior slot driving characteristics of pan head screws over round head screws, and the overlap in the dimensions of cross recessed pan heads and round heads, it is recommended that pan head screws be used in new designs and wherever possible substituted in existing designs. To expedite elimination of the necessity for perpetuating stocks of finished products and tooling, it should be recognized that during the transition period manufacturers may, when it is agreeable to users, substitute pan head where round head is specified. Dimensions are given for reference purposes in Appendix G.

1.3 Screw Types and Application

Screws covered by this Standard and the appendices include tapping screws of both the thread forming and thread cutting varieties, and metallic drive screws. The type designations, descriptions, and applications are as follows. (Former or alternative type designations are documented for reference purposes in the chart on pages xv and xvi.)

1.3.1 Thread Forming Tapping Screws. Thread forming tapping screws are generally for application in materials where large internal stresses are permissible, or desirable, to increase resistance to loosening. They shall be of the following types.

1.3.1.1 Type AB. Type AB tapping screws shall have spaced threads, with same pitches as Type B, and a gimlet point. They are primarily intended for use in thin metal, resin impregnated plywood, and asbestos compositions. Type AB screws, because they offer wider versatility of application, are recommended over Type A screws. Dimensions are given in Table 5.

1.3.1.2 Type B. Type B tapping screws shall have spaced threads and a blunt point with incomplete entering threads. They are intended for use in materials, such as thin metal, nonferrous castings, plastics, resin impregnated plywood, and asbestos compositions. Dimensions are given in Table 6.

1.3.1.3 Type BP. Type BP tapping screws shall have spaced threads the same as Type B but shall have a conical point extending beyond the incomplete entering threads. They are intended for piercing fabrics or in assemblies where holes may be misaligned. Dimensions are given in Table 6.

1.3.1.4 Type A. Type A tapping screws shall have coarse spaced threads and a gimlet point. They are primarily intended for use in thin metal, resin impregnated plywood, and asbestos compositions. Type A screws are not recommended for new design and will be supplanted by Type AB screws. Refer to para. 1.3.1.1. To expedite elimination of the necessity for perpetuating stocks of raw materials, tooling, and finished products, it is recommended that Type AB screws be used in all new designs and wherever possible substituted for Type A screws in existing designs. Dimensions are given for reference purposes in Appendix E.

1.3.1.5 Type C. Type C tapping screws shall have threads of machine screw diameter-pitch combinations approximating Unified Form with a blunt point and tapered incomplete entering threads. Type C tapping screws are not subject to thread gaging but shall meet all dimensional requirements specified herein. They are intended for application where the use of a machine screw pitch thread is preferable to the use of the spaced thread types of thread forming screws, or where chips from machine screw pitch thread cutting screws are objectionable. In view of the declining use of Type C screws, which in general require high driving torques, in favor of more efficient designs of thread forming

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tapping screws, they are not recommended for new design. Accordingly, the dimensions are documented in Appendix V.

1.3.2 Thread Cutting Tapping Screws. Thread cutting tapping screws are generally for application in materials where disruptive internal stresses are undesirable or where excessive driving torques are encountered with thread forming screws. They shall be of the following types.

1.3.2.1 Types BF and BT. Types BF and BT tapping screws shall have spaced threads with a blunt point and tapered entering threads, as on Type B, with one or more cutting edges and chip cavities. The tapered threads of the Type BF screw may be complete or incomplete at the manufacturer's option; all other types shall have incomplete tapered threads. These screws are intended for use in plastics, asbestos, and other similar compositions. Dimensions are given in Table 7.

1.3.2.2 Type D, F, G, and T. Types D, F, G, and T tapping screws shall have threads of machine screw diameter-pitch combinations approximating Unified Form with a blunt point and tapered entering threads having one or more cutting edges and chip cavities. The tapered threads of the Type F screw may be complete or incomplete at the manufacturer's option; all other types shall have incomplete tapered threads, Types D, F, G, and T tapping screws are not subject to thread gaging but shall meet dimensions specified in Table 8. These screws are intended for use in materials, such as aluminum, zinc, and lead die castings; steel sheets and shapes; cast iron; brass; plastics; etc.

1.3.3 Metallic Drive Screws. Metallic drive screws are designated Type U. They shall have multiple start threads of large helix angle with a pilot point. These screws are intended for making permanent fastenings in metals and plastics, when forced into the work under pressure. Dimensions are given Table 41.

1.4 Assembly Considerations

The finish (plating or coating) on tapping screws and the material composition and hardness of the mating component are factors which affect assembly torques in individual applications. Although the recommended hole sizes shown in Appendix B were originally based on the use of plain unfinished carbon steel screws, experience has since proven that the specified holes are also suitable for screws having most types of commercial finishes. However, it should be noted that, due to various finishes providing different degrees of lubricity, some adjustment of installation torques may be necessary to suit individual applications. Also, where exceptionally heavy finishes are involved or screws are to be assembled into materials of higher hardness, some deviation from the specified hole sizes may be required to provide optimum assembly. The necessity and extent of such deviations can best be determined by experiment in the particular assembly environment.

1.5 Dimensions

All dimensions in this Standard are given in inches, unless stated otherwise.

1.6 Options

Options, where specified, shall be at the discretion of the manufacturer unless otherwise agreed upon by the manufacturer and the purchaser.

1.7 Responsibility for Modification

The manufacturer shall not be held responsible for malfunctions of product determined to be due to plating or other modifications when such plating or modification is not accomplished under his control or direction.

1.8 Terminology

For definitions of terms relating to fasteners of features thereof used in this Standard, refer to ASME B18.12, Glossary of Terms for Mechanical Fasteners.

1.9 Related Standards

It should be noted that standards for cap screws, set screws, machine screws and machine screw nuts, wood screws, sems, washers, and other related fasteners are published under separate cover as listed on the back sheets of this Standard.

1.10 Designation

To promote uniformity and understanding in communications relating to products conforming to this Standard, it is recommended they be designated in accordance with the following.

1.10.1 Tapping Screws. Tapping screws shall be designated by the following data in the sequence shown: nominal size (number, fraction or decimal equivalent); threads per inch; nominal length (fraction or decimal equivalent); point type; product name, including head type and driving provision; material; protective finish,

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if required; or, optionally by ASME B18.24.1 PIN code. See examples below:

1/4–14 × 1 1/4	Type AB, Slotted Pan Head Tapping Screw, Steel **S640NE97TAD19155NNAA1**
6–32 × 3/4	Type T, Type 1A Cross Recessed Pan Head Tapping Screw, Corrosion Resistant Steel **S640NF26TA614439NNAB1**
8–18 × 1/2	Type B, Type 1 Cross Recessed Small Oval Countersunk Trim Head Tapping Screw, Steel, Chromium Plated **S640NE28TA8AM155NNJA1**
.375–16 × 1.50	Type D, Hex Washer Head Tapping Screw, Steel **S640ND76TAK21155NNAA1**
.190–16 × 1.50	Type BP, Type II Crossed Recessed Flat Countersunk Head Tapping Screw, Steel, Nickel Plated **S640NC29TAA21155NNRA1**

1.10.2 Metallic Drive Screws. Type U metallic drive screws shall be designated by the following data in the sequence shown: nominal size (number, fraction or decimal equivalent); nominal length (fraction or decimal equivalent); product name, including head type; material; protective finish, if required; or, optionally, by ASME B18.24.1 PIN code. See examples below:

10 × 5/16	Round Head Metallic Drive Screw, Steel **S640NG88TAA07155NNAA1**
.315 × .50	Round Head Metallic Drive Screw, Steel, Zinc Plated **S640NG88TAG10155NNCF1**

1.11 Comparison With ISO

This Standard has no ISO counterpart.

1.12 Referenced Standards

Unless otherwise specified at the time the order is placed, the latest level of all referenced standards shall be used.

ANSI and ISO standards may be obtained from ANSI, the American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002.

ANSI or ASME standards may be obtained from ASME, the American Society of Mechanical Engineers, 22 Law Drive, Box 2300, Fairfield, New Jersey, 07007-2300.

ASTM standards may be obtained from ASTM, the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA, 19428-2959.

SAE standards may be obtained from SAE, the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001.

1.13 Inspection and Quality Assurance

Unless otherwise specified, acceptability to this Standard shall be determined in accordance with ASME B18.18.1M, Inspection and Quality Assurance for General Purpose Fasteners.

When applicable, the following designated characteristics shall be inspected to the inspection levels shown according to ASME B18.18.2M, Inspection and Quality Assurance for High Volume Machine Assembly Fasteners, and shall be within their specified limits.

Designated Characteristic	Inspection Level
Recess penetration depth	C
Slot depth	C
Width across corners	C
Major diameter	C
Drive test	C
Torsional strength test	C
Ductility test	C
Hydrogen embrittlement test	C

If verifiable in-process inspection is used, inspection sample sizes and reporting shall be in accordance with the applicable ASME, ASTM, or SAE quality system consensus standard.

For nondesignated dimensional characteristics, the provisions of ASME B18.18.1M shall apply. Should a nondesignated dimension be determined to be outside its specified limits, it shall be deemed conforming to this Standard if the user who is the installer accepts the dimension, based upon form, fit, and function considerations.

2 GENERAL DATA FOR TAPPING SCREWS

2.1 Heads

2.1.1 Head Height. All dimensions pertaining to head height specified in the dimensional tables shall be measured parallel to the axis of screw, and those relating to the top of head shall represent a metal to metal measurement. In other words, any truncation of rounded head contours due to the slot or recess shall not be considered part of the head height.

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Total or overall head heights shall be measured from the top of the head to the plane of the bearing surface for flat bearing surface type heads, to the plane of the undercut for undercut countersunk heads, and to the junction of conical bearing surface with the basic screw diameter for countersunk heads.

Head side heights shall be measured from the theoretical intersection of the top surface of head with the head diameter to the plane of the bearing surface for flat bearing surface type heads, to the plane of the undercut for undercut countersunk heads, and to the junction of conical bearing surface with the basic screw diameter for countersunk heads.

On countersunk heads, the junction of conical bearing surface with the basic screw diameter may not necessarily be the same as the actual junction of head with shank and the head height delineating the conical bearing surface is a reference dimension.

2.1.2 Bearing Surface. The bearing surface of flat bearing surface type tapping screw heads shall be perpendicular to the axis of the screw shanks within 2 deg.

2.1.3 Depth and Wobble of Recess. The depth of recess in recessed head screws shall be measured, parallel to the axis of screw, from the intersection of the maximum diameter of the recess with the head surface to the bottom of the recess.

Recess penetration gaging depth values are included in the respective dimensional tables, and the method of gaging and specifications for gages are contained in Appendix III.

Recess wobble gages, gaging procedures, and permissible limits are given in Appendix IV.

2.1.4 Depth of Slot. The depth of slot in slotted head screws shall be measured, parallel to the axis of screw, from the top of the head to the intersection of the bottom of the slot with the head surface or bearing surface.

2.1.5 Feature Positional Tolerances. The positional relationship of the heads and driving provisions of screws with respect to the shanks of screws (formerly defined as eccentricity) shall be as follows.

2.1.5.1 True Position of Head. The axis of the head shall be located at true position relative to the axis of the screw shank within a tolerance zone having a diameter equivalent to 6% of the specified maximum head diameter, or maximum width across flats of hex and hex washer heads, regardless of feature size.

2.1.5.2 True Position of Recess. The recess in cross recessed head tapping screws shall be located at true position relative to the axis of the screw shank within a tolerance zone having a diameter equivalent to 12% of the basic screw diameter or 0.030 in., whichever is greater, regardless of feature size.

2.1.5.3 True Position of Slot. The slot in slotted head tapping screws shall be located at true position relative to the axis of the screw shank within a tolerance zone having a diameter equivalent to 12% of the basic screw diameter or 0.020 in., whichever is greater.

2.1.6 Underhead Fillets. Tapping screws shall have a definite under head fillet large enough to ensure that full fastener strength is achieved. The radius of the fillet under countersunk head screws shall be no greater than 40% of the basic screw diameter. The radius of the fillet under truss heads and number 6 sized pan heads shall be no greater than 25% of the basic screw diameter. The radius of the fillet under all other head styles shall be no greater than 15% of the basic screw diameter.

2.2 Length

2.2.1 Measurement. The nominal length of screw L shall be measured, parallel to the axis of screw, from the extreme point to the plane of the bearing surface for screws having perpendicular bearing surface type heads, and to the theoretical intersection of the top surface of head with the head diameter for screws having countersunk type heads. For all oval heads, the overall length L_o shall be measured, parallel to the axis of the screw, from the extreme point to the top of the head, where $L_o = L + C$.

2.2.2 Tolerance on Length. The length tolerance shall apply to L_o for all oval heads, and to L for all other head styles. The tolerance on the length of tapping screws shall conform to the following for the respective screw types.

2.2.2.1 Types AB, A, and BP. The tolerance on length shall be as tabulated below:

Nominal Screw Length	Tolerance on Length
Up to 1 in., incl.	±0.03
Over 1 in.	±0.05

2.2.2.2 Types B, BF, BT, C, D, F, G, and T. The tolerance on length shall be as tabulated below.

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Nominal Screw Length	Tolerance on Length
Up to 3/4 in., incl.	−0.03
Over 3/4 to 1 1/2 in., incl.	−0.05
Over 1 1/2 in.	−0.06

2.3 Threads and Points

The threads and points applicable to screws covered by this Standard are generally described under para. 1.3. Types B, BP, BF, BT, C, D, F, G, and T tapping screws shall have tapered entering threads from a diameter slightly less than the thread minor diameter. Point taper length is the length from the pointed end to the first fully formed thread at major diameter as determined by the distance that the point enters into a cylindrical NOT GO major diameter ring gage. For other details and dimensions, refer to the tables covering the respective screw types.

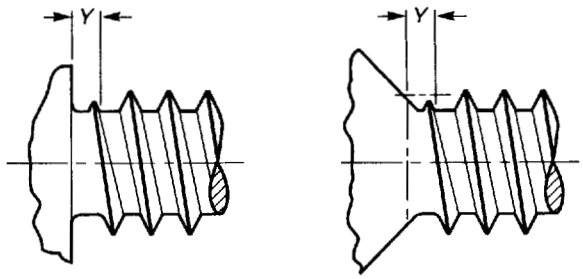
2.4 Length of Thread

2.4.1 Tapping screws shall have thread lengths conforming to the following.

2.4.1.1 Types AB, A, B, BF, BP, and BT. For screws of nominal lengths equal to or shorter than the nominal screw lengths listed in column L of Table 1, the full form threads shall extend close to the head such that the specified thread minor diameter limits are maintained to within Y distance from the underside of the head, or closer if practicable. See Fig. 1. Screws of nominal lengths longer than those tabulated in column L shall, unless otherwise specified by the purchaser, have a minimum length of full form thread as shown in column L_T of Table 1.

2.4.1.2 Types C, D, G, and T. For screws of nominal lengths within the ranges listed under the column Fully Threaded of Table 2, full form threads shall extend to within the respective Y max unthreaded length limits from the underside of the head, or closer, if practicable. Unthreaded length Y represents the distance, measured parallel to the axis of the screw, from the underside of the head to the face of a nonchamfered or noncounterbored thread ring set to Class 3A GO limits, assembled by hand as far as the thread will permit. See Fig. 2. Screws of nominal lengths longer than those tabulated under column Partially Threaded of Table 2 shall, unless otherwise specified by the purchaser, have a minimum length of full form thread as shown in column L_T min.

2.4.1.3 Type F. For screws of nominal lengths within the ranges listed under the column Fully Threaded of Table 2, the full form threads shall extend close to the head such that the specified thread major diameter limits are maintained to within the respective Y max unthreaded length limits from the underside of the head, or closer, if practicable. See Fig. 3. Screws of nominal lengths longer than those tabulated under column Partially Threaded of Table 2 shall, unless otherwise specified by the purchaser, have a minimum length of full form thread as shown in column L_T min.



90° Head Screws

Flat and Oval Countersunk Head Screws

FIG. 1 TYPES AB, A, B, BF, BP, AND BT

2.5 Diameter of Body

2.5.1 Tapping Screws. Except for trim head styles, tapping screw body diameters shall conform to the following.

2.5.1.1 Types AB, A, B, BF, BP, and BT. The diameter of body shall not be less than the minimum minor diameter nor greater than the maximum major diameter of the thread.

2.5.1.2 Types C, D, F, G, and T. The diameter of body shall not be less than the Class 2A thread minimum pitch diameter nor greater than the maximum major diameter of the thread.

2.5.2 Trim Head Tapping Screws. Flat and oval countersunk trim head tapping screw body diameters shall conform to the following.

2.5.2.1 Types AB, A, B, BF, and BT. The diameter of body shall not be less than the minimum minor diameter nor greater than the maximum major diameter of the thread. Screws not threaded to head shall have a 0.062 in. minimum length shoulder under the head with diameter limits as specified in the dimensional tables. At manufacturer's option, the specified shoulder diameter may extend the entire length from the head to the thread.

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TABLE 1 THREAD LENGTHS FOR TYPES AB, A, B, BF, BP, and BT TAPPING SCREWS

		Equal to or Shorter Than Nominal Length *L*		Longer Than Nominal Length *L*
		Fully Threaded		Partially Threaded
Nominal Screw Size	Nominal Screw Length *L*	Type A only	Types AB, B, BF, BP, and BT	Types A, AB, B, BF, BP, and BT
		Y Max. (1)	*Y* Max. (1)	*L*, Min. (2)
0	7/16	0.025	0.021	0.360
1	9/16	0.031	0.024	0.440
2	5/8	0.031	0.031	0.520
3	3/4	0.036	0.036	0.590
4	13/16	0.042	0.042	0.670
5	15/16	0.050	0.050	0.750
6	1	0.056	0.050	0.830
7	1 1/8	0.062	0.053	0.910
8	1 1/4	0.067	0.056	0.980
10	1 3/8	0.083	0.062	1.140
12	1 5/8	0.091	0.071	1.300
14	1 3/4	0.100	...	1.450
1/4	1 13/16	...	0.071	1.500
16	1 13/16	0.100	...	1.500
18	1 13/16	0.111	...	1.500
5/16	1 13/16	...	0.083	1.500
20	1 7/8	0.111	...	1.500
24	1 7/8	0.111	...	1.500
3/8	1 7/8	...	0.083	1.500
7/16	1 7/8	...	0.100	1.500
1/2	1 7/8	...	0.100	1.500

NOTES:
(1) Tabulated values are equal to 1 times the pitch length of the thread, rounded to three decimal places.
(2) Tabulated values through No. 14 size are equal to 6 times the basic screw diameter, rounded to two decimal places.

2.5.2.2 Types C, D, F, G, and T. The diameter of body shall not be less than the Class 2A thread minimum pitch diameter nor greater than the maximum major diameter of the thread. Screws not threaded to head shall have a 0.062 in. minimum length shoulder under the head with diameter limits as specified in the dimensional tables.

2.6 Material and Heat Treatment

2.6.1 Steel. Tapping screws are normally fabricated from carbon steel of high quality, case hardened to meet the performance requirements set forth in these specifications. At the option of the manufacturer, the steel shall be AISI 1016, 1018, 1019, 1021, 1022, or 1024, either killed or capped but not rimmed.

2.6.2 Other Materials. Where so specified, tapping screws may also be made from corrosion resistant steel, brass, monel, and aluminum alloys. The materials and properties shall be as mutually agreed upon between the manufacturer and purchaser.

2.7 Finishes

Unless otherwise specified, tapping screws shall be supplied with a natural (as processed) finish, unplated or uncoated. Where corrosion preventative treatment is required, screws shall be plated or coated as agreed

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TABLE 2 THREAD LENGTHS FOR TYPES C, D, F, G, AND T TAPPING SCREWS

	Fully Threaded						Partially Threaded	
		Unthreaded Length Under Head			Unthreaded Length Under Head			
		Y Max. (1)		For Nominal Screw Lengths	*Y* Max. (2)		Full Form Thread Length	
Nominal Screw Size	For Nominal Screw Lengths Equal to or Shorter Than	Course Thread	Fine Thread	Longer Than / Equal to or Shorter Than	Course Thread	Fine Thread	For Nominal Screw Lengths Longer Than	L_r Min. (3)
2	1/4	0.018	0.016	1/4 – 5/8	0.036	0.032	5/8	0.520
3	5/16	0.021	0.018	5/16 – 3/4	0.042	0.036	3/4	0.590
4	11/32	0.025	0.021	11/32 – 7/8	0.050	0.042	7/8	0.670
5	3/8	0.025	0.023	3/8 – 1	0.050	0.046	1	0.750
6	13/32	0.031	0.025	13/32 – 1 1/16	0.062	0.050	1 1/16	0.830
8	1/2	0.031	0.028	1/2 – 1 3/16	0.062	0.056	1 3/16	0.980
10	9/16	0.042	0.031	9/16 – 1 3/8	0.083	0.062	1 3/8	1.140
12	5/8	0.042	0.036	5/8 – 1 9/16	0.083	0.071	1 9/16	1.300
1/4	3/4	0.050	0.036	3/4 – 1 13/16	0.100	0.071	1 13/16	1.500
5/16	15/16	0.056	0.042	15/16 – 1 7/8	0.111	0.083	1 7/8	1.500
3/8	1 1/8	0.062	0.042	1 1/8 – 2	0.125	0.083	2	1.500
7/16	1 5/16	0.071	0.050	1 5/16 – 2	0.143	0.100	2	1.500
1/2	1 1/2	0.077	0.050	1 1/2 – 2	0.154	0.100	2	1.500

NOTES:
(1) Tabulated values are equal to 1 times the pitch length of the thread, rounded to three decimal places.
(2) Tabulated values are equal to 2 times the pitch length of the thread, rounded to three decimal places.
(3) Tabulated values through No. 12 size are equal to 6 times the basic screw diameter, rounded to two decimal places.

upon between the manufacturer and the purchaser. However, where carbon steel screws are plated or coated and subject to hydrogen embrittlement, they shall be suitably treated subsequent to the plating or coating operation to obviate such embrittlement.

2.8 Workmanship

Tapping screws shall be free from burrs, means, laps, loose scale, and other defects affecting their serviceability.

2.9 Performance Requirements and Tests

2.9.1 The suitability of the mechanical properties and thread forming characteristics of carbon steel tapping screws only shall be determined by subjecting the screws to the applicable tests specified below. The drive test requirements shall apply to Types AB, A, B, RP, C, D, F, G, and T tapping screws only. Other test requirements shall apply to all types of carbon steel tapping screws only. Performance requirements for tapping screws made from other materials shall be subject to agreement between the manufacturer and purchaser.

2.9.1.1 Drive Test. Screws shall be driven into standard test plates as specified in Table 3. Test plates shall be prepared from half-hard low carbon cold rolled steel of the material gage or thickness indicated, having a minimum hardness of Rockwell B 70 (70 HRB), or equivalent. For plate procurement purposes, it is suggested that the hardness not exceed Rockwell B 85 (85 HRB). The test holes shall be drilled or punched and redrilled or reamed to within plus or minus 0.001 in. of the nominal diameters specified.

Thread forming types of tapping screws shall, without deformation of their own threads, form a mating thread in the test plate until the tapered threads of the point are completely through the test plate.

Thread cutting types of tapping screws shall, without deformation of their own threads, cut or form a mating thread in the test plate until the tapered threads of the point are completely through the test plate.

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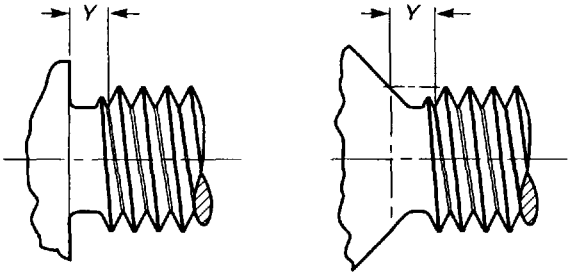


FIG. 2 TYPES C, D, G, AND T

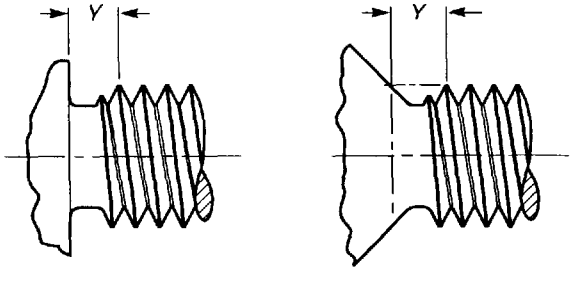


FIG. 3 TYPE F

The test hole sizes specified in Table 3 were predicated originally on the testing of plain finish (uncoated or unplated) screws. Subsequent experience has shown these hole sizes to be satisfactory for the testing of screws having most types of commercial finishes. However, some finishes, heavy coatings in particular, alter the performance characteristics of the screws. Where screws with such finishes fail the test, they shall be stripped of plating, baked, lubricated with machine oil, and retested in the plain finish condition. If screws so tested pass the test, it will be determined that they are acceptable, and the problem arising from the finish shall be subject to resolution between the manufacturer and purchaser. In cases where screws are plated subsequent to delivery to the purchaser, or where plating of screws is otherwise under control of the purchaser, the screw manufacturer shall not be held responsible for failures due to plating.

2.9.1.2 Torsional Strength Test. Screws shall be securely clamped by suitable means, such that the clamped portion of threads are not damaged and that at least two full threads project above the clamping device, and that at least two full threads exclusive of point, flutes, or end slot, are held within the clamping device. (A blind hole may be used in place of a threaded clamping device, provided the hole depth is such as to insure that breakage will occur beyond the point or the full length of the flutes or end slot.) By means of a suitably calibrated torque measuring device, torque shall be applied to the screw until failure occurs. The torque required to cause failure shall equal or exceed the minimum value given in Table 4 for the type and size of screw being tested. A typical fixture for conducting torsional strength tests on tapping screws is depicted in Fig. 4.

2.9.1.3 Ductility Test. The sample screw shall be inserted into a hole in a hardened 10 deg wedge block, or other suitable device. Hole shall be 0.020 to 0.040 in. (0.5 to 1.0 mm) larger than the nominal screw diameter. An axial compressive load shall be applied against the top of the screw head and continued until the plane of the underhead bearing surface is bent permanently through 10 deg with respect to a plane perpendicular to the axis of the screw. This may be accomplished utilizing a hammer and applying a single or repeated blows, as necessary, to achieve a permanent bend. Head separation shall be cause for rejection.

2.9.1.4 Hydrogen Embrittlement Test. Plated or coated screws shall be installed into a steel test plate as specified in Table 3 with the head of the screw seated against a standard steel flat washer for protruding style heads or against a mating countersunk steel spacer for flat and oval style heads. Additional washers should be used under the bearing washer or spacer as necessary to provide a minimum stack thickness corresponding to the maximum unthreaded length on screws threaded full length. For longer screws having an unthreaded shank portion, cold rolled steel spacers, of a length which will insure that full form thread engagement is maintained within the test plate thickness, shall be used between the spacer or washer and the test plate. The screws shall be tightened to a torque equivalent to 80% of the failure torque determined by tightening five screws to failure (that is screw breakage into two or more parts) and obtaining the average failure torque of the five screws. The screws shall be allowed to remain in this tightened state for a period of 24 hr. The original embrittlement test torque shall then be reapplied and the screws shall be disassembled by the application of removal torque. There shall be no evidence of failure of the screws.

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TABLE 3 STANDARD TEST PLATE THICKNESSES AND HOLE SIZES FOR DRIVE TEST INSPECTION OF TAPPING SCREWS

Nominal Screw Size	Thickness					Hole Size											
		Types AB, A, B, BP, and C		Types D, F, G, and T						Type C				Types D, F, G, and T			
						Type A		Types AB, B, and BP		Course Thread		Fine Thread		Coarse Thread		Fine Thread	
	Gage	Max.	Min.	Max.	Min.	Drill Size	Hole Dia.	Drill Size	Hole Dia.	Drill Size	Hole Dia.	Drill Size	Hole Dia.	Drill Size	Hole Dia.	Drill Size	Hole Dia.
1	18	0.0500	0.0460	0.0800	0.0760	# 48	0.0760	# 48	0.0760	# 48	0.0760	# 48	0.0760	# 49	0.0730	...	...
3	18	0.0500	0.0460	0.0960	0.0920	# 46	0.0810	# 46	0.0810	# 44	0.0860	# 43	0.0890	# 46	0.0810	...	...
1	18	0.0500	0.0460	0.1110	0.1070	# 44	0.0860	# 44	0.0860	# 41	0.0960	# 40	0.0980	# 41	0.0960	...	...
5	18	0.0500	0.0460	0.1110	0.1070	# 36	0.1065	# 36	0.1065	# 35	0.1100	# 35	0.1100	# 37	0.1010	...	...
6	14	0.0770	0.0730	0.1425	0.1385	# 32	0.1160	# 32	0.1160	# 31	0.1200	1/8	0.1250	# 31	0.1200	...	...
7	14	0.0770	0.0730	...	...	# 30	0.1285	# 30	0.1285	...	...	...	...	...	...	...	...
8	14	0.0770	0.0730	0.1420	0.1380	# 29	0.1360	# 29	0.1360	# 27	0.1440	# 26	0.1470	# 26	0.1470	...	...
10	1/8	0.1270	0.1230	0.1905	0.1845	# 21	0.1590	# 21	0.1590	# 19	0.1660	11/64	0.1719	# 17	0.1730	# 16	0.1770
12	1/8	0.1270	0.1230	0.1905	0.1845	3/16	0.1875	3/16	0.1875	# 11	0.1910	# 10	0.1935	# 8	0.1990	...	...
14	1/8	0.1270	0.1230	...	...	5.5 mm	0.2165	...	...	...	...	...	...	...	...	...	...
1/4	3/16	0.1905	0.1845	0.2530	0.2470	...	...	5.5 mm	0.2165	7/32	0.2188	1	0.2280	1	0.2280	A	0.2340
16	3/16	0.1905	0.1845	...	...	B	0.2380	...	...	...	...	...	...	...	...	...	...
18	3/16	0.1905	0.1845	...	...	G	0.2610	...	...	...	...	...	...	...	...	...	...
5/16	3/16	0.1905	0.1845	0.3155	0.3095	...	...	I	0.2720	J	0.2770	L	0.2900	L	0.2900	M	0.2950
20	3/16	0.1905	0.1845	...	...	L	0.2900	...	...	...	...	...	...	...	...	...	...
24	3/16	0.1905	0.1845	...	...	11/32	0.3438	...	...	...	...	...	...	...	...	...	...
3/8	3/16	0.1905	0.1845	0.3780	0.3720	...	...	21/64	0.3281	R	0.3390	11/32	0.3438	T	0.3580	T	0.3580
7/16	3/16	0.1905	0.1845	...	...	...	...	13/32	0.4062	...	...	...	...	...	...	...	...
1/2	3/16	0.1905	0.1845	...	...	...	...	15/32	0.4688	...	...	...	...	...	...	...	...

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TABLE 4 TORSIONAL STRENGTH REQUIREMENTS FOR TAPPING SCREWS

Nominal Screw Size	Minimum Torsional Strength, lb-in.			
	Type A	Types AB, B, BF, BP, and BT	Types C, D, F, G, and T	
			Coarse Thread	Fine Thread
2	4	4	5	6
3	9	9	9	10
4	12	13	13	15
5	18	18	18	20
6	24	24	23	27
7	30	30	...	...
8	39	39	42	47
10	48	56	56	74
12	83	88	93	108
14	125	...	...	...
1/4	...	142	140	179
16	152	...	...	...
18	196	...	...	...
5/16	...	290	306	370
20	250	...	...	...
24	492	...	...	...
3/8	...	590	560	710
7/16	...	620	700	820
1/2	...	1020	1075	1285

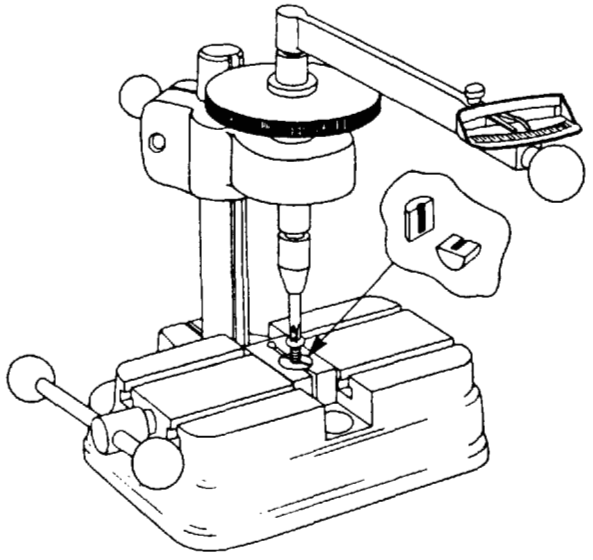


FIG. 4 TYPICAL TORSIONAL STRENGTH TEST FIXTURE

3 GENERAL DATA FOR METALLIC DRIVE SCREWS

3.1 Heads

3.1.1 Bearing Surface. The bearing surface of screw heads shall be perpendicular to the axis of the screw shanks within 2 deg.

3.1.2 True Position of Head. The axis of the head shall be located at true position relative to the axis of the screw shank within a tolerance zone having a diameter equivalent to 6% of the specified maximum head diameter, regardless of feature size.

3.2 Length

3.2.1 Measurement. The length of screw shall be measured, parallel to the axis of the screw, from the plane of the bearing surface of the head to the extreme point.

3.2.2 Tolerance on Length. The tolerance on length of Type U metallic drive screws shall be as tabulated below:

Nominal Screw Length	Tolerance on Length
Up to 3/8 in., incl.	±0.02
Over 3/8 in.	±0.03

3.3 Threads

Type U metallic drive screws shall have multiple start threads, as specified for the respective screw size, with a helix angle of 45 to 65 deg.

3.4 Points

Type U metallic drive screws shall have a pilot point. The blunt end of pilot may be slightly angular, as depicted in the illustration, due to the natural flow of material in the cut-off process.

3.5 Length of Thread

Type U metallic drive screws shall have fully formed threads extending from the base of pilot to the head except that threads at the starting end and under the head may be incomplete for a length equal to one-half of the maximum screw diameter, due to the natural flow of material in the thread forming operation.

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3.6 Material and Heat Treatment

3.6.1 Steel. Type U metallic drive screws are normally made of steel suitably hardened to meet the performance requirements specified herein.

3.6.2 Other Materials. Where so specified by the purchaser, drive screws may be made from corrosion resistant steel or nonferrous metals. The materials and properties shall be as mutually agreed upon between the manufacturer and purchaser.

3.7 Finishes

Unless otherwise specified, screws shall be supplied with a natural (as processed) finish, unplated or uncoated. Where corrosion preventative treatment is required, screws shall be plated or coated as agreed upon between the manufacturer and the purchaser. However, where carbon steel screws are plated or coated and subject to hydrogen embrittlement, they shall be suitably treated subsequent to the plating or coating operation to obviate such embrittlement.

3.8 Workmanship

Type U metallic drive screws shall be free from burrs, seams, laps, loose scale, and other defects affecting their serviceability.

3.9 Performance Requirements and Tests

Type U metallic drive screws when driven into holes, of sizes recommended (see Table 41) in steel test plates having a hardness of Rockwell B70 to B85 (70 to 85 HRB), or in cast iron, shall produce mating threads without shearing of the threads on the screw or breaking the screw.

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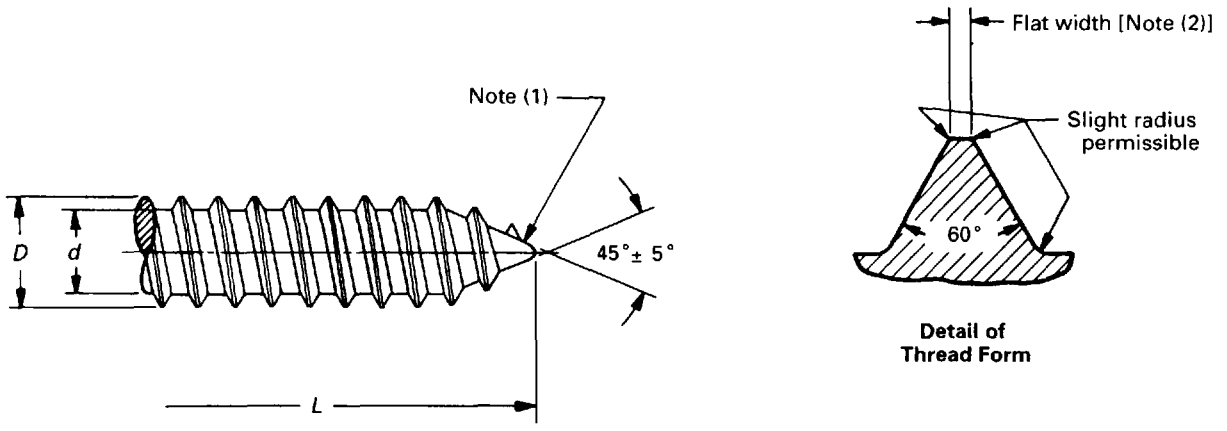


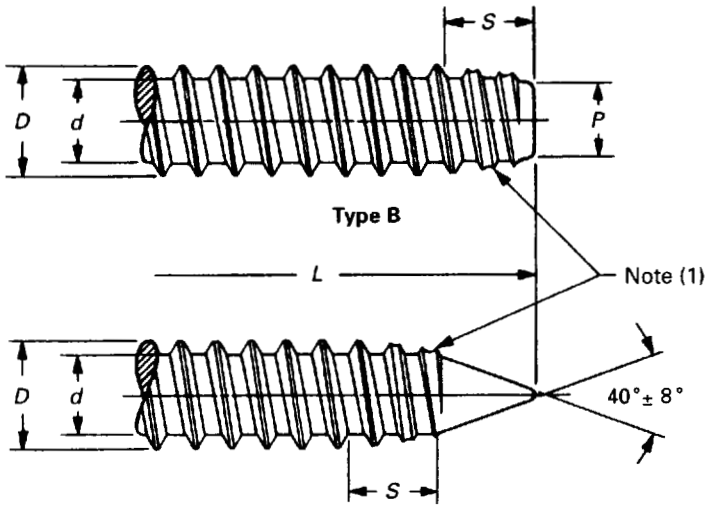
TABLE 5 DIMENSIONS OF THREADS AND POINTS FOR TYPE AB THREAD FORMING TAPPING SCREWS

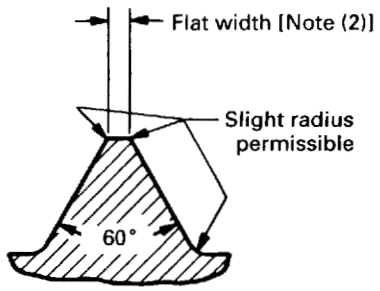
Nominal Size (3) or Basic Screw Diameter		Threads per inch	*D* Major Diameter Max.	*D* Major Diameter Min.	*d* Minor Diameter Max.	*d* Minor Diameter Min.	*L* Minimum Practical Nominal Screw Lengths 90° Heads	*L* Minimum Practical Nominal Screw Lengths Csk. Heads
0	0.0600	48	0.060	0.054	0.036	0.033	1/8	5/32
1	0.0730	42	0.075	0.069	0.049	0.046	5/32	3/16
2	**0.0860**	**32**	**0.088**	**0.082**	**0.064**	**0.060**	3/16	7/32
3	0.0990	28	0.101	0.095	0.075	0.071	3/16	1/4
4	**0.1120**	**24**	**0.114**	**0.108**	**0.086**	**0.082**	7/32	9/32
5	0.1250	20	0.130	0.123	0.094	0.090	1/4	5/16
6	**0.1380**	**20**	**0.139**	**0.132**	**0.104**	**0.099**	9/32	11/32
7	0.1510	19	0.154	0.147	0.115	0.109	5/16	3/8
8	**0.1640**	**18**	**0.166**	**0.159**	**0.122**	**0.116**	5/16	3/8
10	**0.1900**	**16**	**0.189**	**0.182**	**0.141**	**0.135**	3/8	7/16
12	0.2160	14	0.215	0.208	0.164	0.157	7/16	21/32
1/4	**0.2500**	**14**	**0.246**	**0.237**	**0.192**	**0.185**	1/2	19/32
5/16	0.3125	12	0.315	0.306	0.244	0.236	5/8	3/4
3/8	0.3750	12	0.380	0.371	0.309	0.299	3/4	29/32
7/16	0.4375	10	0.440	0.429	0.359	0.349	7/8	1 1/32
1/2	0.5000	10	0.504	0.493	0.423	0.413	1	1 5/32

GENERAL NOTES:
(a) For additional requirements, refer to para. 2.
(b) Sizes shown in boldface type are preferred.
(c) For determining the effective grip length of Type AB screws, see Appendix D.

NOTES:
(1) No extrusion of excess metal beyond apex of the point resulting from thread rolling shall be permissible. A slight rounding or truncation of the point is desirable.
(2) The width of flat at crest of thread shall not exceed 0.004 in. for sizes up to and including No. 8, and 0.006 in. for larger sizes.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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Detail of Thread Form

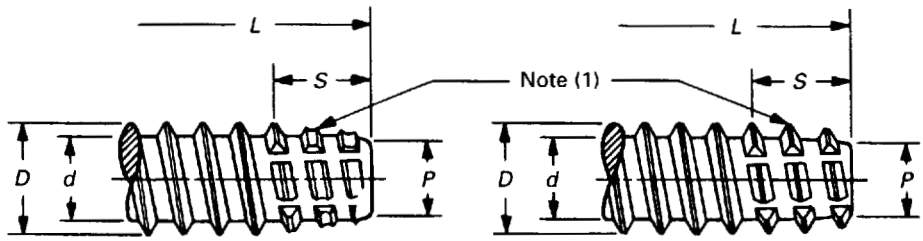
TABLE 6 DIMENSIONS OF THREADS AND POINTS FOR TYPES B AND BP THREAD FORMING TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Threads per inch	D Major Diameter Max.	D Major Diameter Min.	d Minor Diameter Max.	d Minor Diameter Min.	P Point Diameter Ref.	S Point Taper Length Max.	S Point Taper Length Min.	L Minimum Practical Nominal Screw Lengths — Type B 90° Heads	Type B Csk. Heads	Type BP 90° Heads	Type BP Csk. Heads
0	0.0600	48	0.060	0.054	0.036	0.033	0.031	0.042	0.031	1/8	1/8	5/32	3/16
1	0.0730	42	0.075	0.069	0.049	0.046	0.044	0.048	0.036	1/8	5/32	3/16	7/32
2	0.0860	32	0.088	0.082	0.064	0.060	0.058	0.062	0.047	5/32	3/16	1/4	9/32
3	0.0990	28	0.101	0.095	0.075	0.071	0.068	0.071	0.054	3/16	7/32	9/32	5/16
4	0.1120	24	0.114	0.108	0.086	0.082	0.079	0.083	0.063	3/16	1/4	5/16	11/32
5	0.1250	20	0.130	0.123	0.094	0.090	0.087	0.100	0.075	7/32	9/32	11/32	13/32
6	0.1380	20	0.139	0.132	0.104	0.099	0.095	0.100	0.075	1/4	9/32	3/8	7/16
7	0.1510	19	0.154	0.147	0.115	0.109	0.105	0.105	0.079	1/4	5/16	13/32	15/32
8	0.1640	18	0.166	0.159	0.122	0.116	0.112	0.111	0.083	9/32	11/32	7/16	1/2
10	0.1900	16	0.189	0.182	0.141	0.135	0.130	0.125	0.094	5/16	3/8	1/2	19/32
12	0.2160	14	0.215	0.208	0.164	0.157	0.152	0.143	0.107	11/32	7/16	9/16	21/32
1/4	0.2500	14	0.246	0.237	0.192	0.185	0.179	0.143	0.107	3/8	1/2	21/32	3/4
5/16	0.3125	12	0.315	0.306	0.244	0.236	0.230	0.167	0.125	15/32	19/32	27/32	31/32
3/8	0.3750	12	0.380	0.371	0.309	0.299	0.293	0.167	0.125	17/32	11/16	15/16	1 1/8
7/16	0.4375	10	0.440	0.429	0.359	0.349	0.343	0.200	0.150	5/8	25/32	1 1/8	1 1/4
1/2	0.5000	10	0.504	0.493	0.423	0.413	0.407	0.200	0.150	11/16	27/32	1 1/4	1 13/32

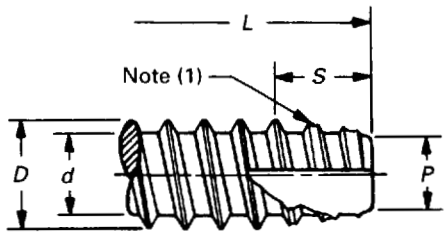
GENERAL NOTES:
(a) For additional requirements, refer to para. 2.
(b) For determining the effective grip length of BP screws, see Appendix D.

NOTES:
(1) Threads within point taper length shall have unfinished crests.
(2) The width of flat at crest of thread shall not exceed 0.004 in. for sizes up to and including No. 8, and 0.006 in. for larger sizes.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

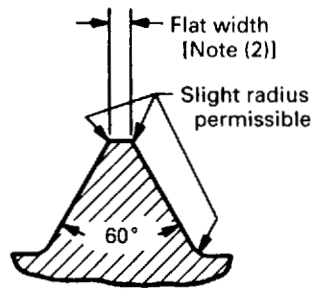
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Type BF



Type BT



Detail of
Thread Form

TABLE 7 DIMENSIONS OF THREADS AND POINTS FOR TYPES BF AND BT THREAD CUTTING TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Threads per inch	D Major Diameter Max.	D Major Diameter Min.	d Minor Diameter Max.	d Minor Diameter Min.	P Point Diameter Ref.	S Point Taper Length Max.	S Point Taper Length Min.	L Minimum Practical Nominal Screw Lengths 90° Heads	L Minimum Practical Nominal Screw Lengths Csk. Heads
0	0.0600	48	0.060	0.054	0.036	0.033	0.031	0.042	0.031	1/8	1/8
1	0.0730	42	0.075	0.069	0.049	0.046	0.044	0.048	0.036	1/8	5/32
2	0.0860	32	0.088	0.082	0.064	0.060	0.058	0.062	0.047	5/32	3/16
3	0.0990	28	0.101	0.095	0.075	0.071	0.068	0.071	0.054	3/16	7/32
4	0.1120	24	0.114	0.108	0.086	0.082	0.079	0.083	0.063	3/16	1/4
5	0.1250	20	0.130	0.123	0.094	0.090	0.087	0.100	0.075	7/32	9/32
6	0.1380	20	0.139	0.132	0.104	0.099	0.095	0.100	0.075	1/4	9/32
7	0.1510	19	0.154	0.147	0.115	0.109	0.105	0.105	0.079	1/4	5/16
8	0.1640	18	0.166	0.159	0.122	0.116	0.112	0.111	0.083	9/32	11/32
10	0.1900	16	0.189	0.182	0.141	0.135	0.130	0.125	0.094	5/16	3/8
12	0.2160	14	0.215	0.208	0.164	0.157	0.152	0.143	0.107	11/32	7/16
1/4	0.2500	14	0.246	0.237	0.192	0.185	0.179	0.143	0.107	3/8	1/2
5/16	0.3125	12	0.315	0.306	0.244	0.236	0.230	0.167	0.125	15/32	19/32
3/8	0.3750	12	0.380	0.371	0.309	0.299	0.293	0.167	0.125	17/32	11/16
7/16	0.4375	10	0.440	0.429	0.359	0.349	0.343	0.200	0.150	5/8	25/32
1/2	0.5000	10	0.504	0.493	0.423	0.413	0.407	0.200	0.150	11/16	27/32

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:

(1) Points of screws shall be tapered and fluted or slotted as illustrated above for the respective types. The flute on Type BT screws shall have an included angle of 90° to 95° and the thread cutting edge located above the axis of screw. Tapered threads shall have unfinished crests, and the flutes or slots shall extend through first full form thread beyond taper except for Type BF screws on which tapered threads may be complete at manufacturer's option and flutes may be one pitch short of first full form thread. Other details of taper and flute design shall be optional with manufacturer provided the screws meet the specified performance requirements.

(2) The width of flat at crest of thread shall not exceed 0.004 in. for sizes up to and including No. 8, and 0.006 in. for larger sizes.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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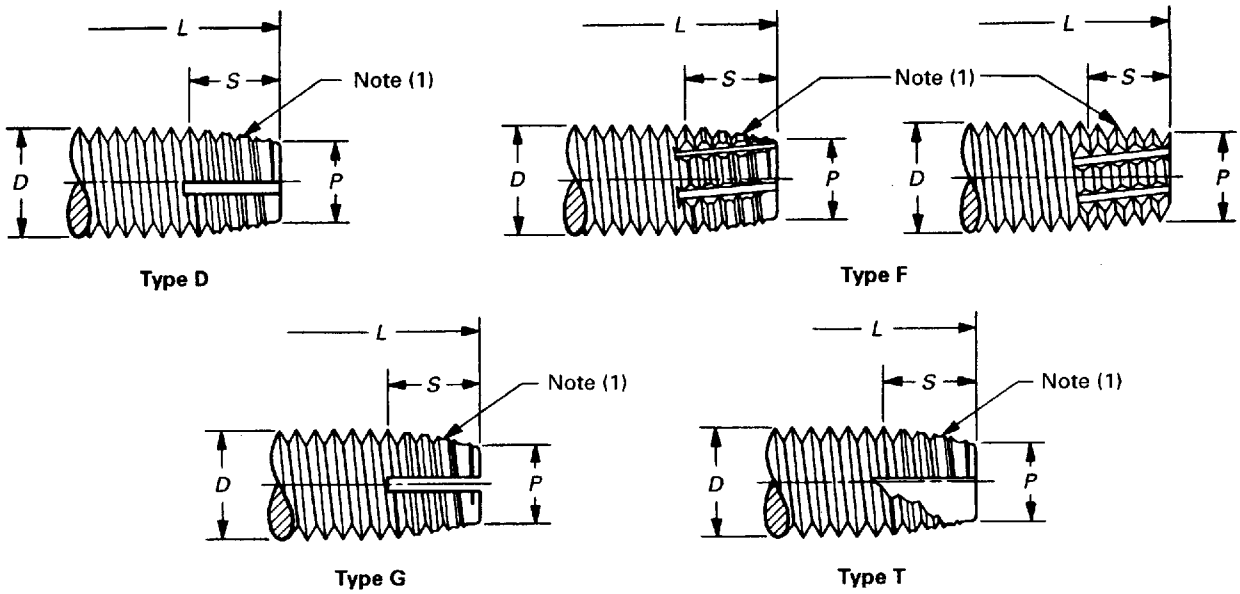


TABLE 8 DIMENSIONS OF THREADS AND POINTS FOR TYPES D, F, G, AND T THREAD CUTTING TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Threads per inch	D Major Diameter Max.	D Major Diameter Min.	P Point Diameter Ref.	S (3) Point Taper Length For Short Screws Max.	S (3) Point Taper Length For Short Screws Min.	S (3) Point Taper Length For Long Screws Max.	S (3) Point Taper Length For Long Screws Min.	L Determinant Lengths for Point Taper (3) 90° Heads	L Determinant Lengths for Point Taper (3) Csk. Heads	L Minimum Practical Nominal Screw Lengths 90° Heads	L Minimum Practical Nominal Screw Lengths Csk. Heads
2	0.0860	56	0.0860	0.0813	0.068	0.062	0.045	0.080	0.062	5/32	3/16	5/32	3/16
2	0.0860	64	0.0860	0.0816	0.070	0.055	0.039	0.070	0.055	1/8	3/16	1/8	5/32
3	0.0990	48	0.0990	0.0938	0.078	0.073	0.052	0.094	0.073	3/16	7/32	5/32	7/32
3	0.0990	56	0.0990	0.0942	0.081	0.062	0.045	0.080	0.062	5/32	3/16	5/32	3/16
4	0.1120	40	0.1120	0.1061	0.087	0.088	0.062	0.112	0.088	7/32	1/4	3/16	1/4
4	0.1120	48	0.1120	0.1068	0.091	0.073	0.052	0.094	0.073	3/16	7/32	5/32	7/32
5	0.1250	40	0.1250	0.1191	0.100	0.088	0.062	0.112	0.088	7/32	9/32	3/16	1/4
5	0.1250	44	0.1250	0.1195	0.102	0.080	0.057	0.102	0.080	3/16	1/4	3/16	1/4
6	0.1380	32	0.1380	0.1312	0.107	0.109	0.078	0.141	0.109	1/4	5/16	1/4	5/16
6	0.1380	40	0.1380	0.1321	0.113	0.088	0.062	0.112	0.088	7/32	9/32	3/16	1/4
8	0.1640	32	0.1640	0.1571	0.132	0.109	0.078	0.141	0.109	1/4	11/32	1/4	5/16
8	0.1640	36	0.1640	0.1577	0.136	0.097	0.069	0.125	0.097	7/32	5/16	7/32	9/32
10	0.1900	24	0.1900	0.1818	0.148	0.146	0.104	0.188	0.146	11/32	7/16	5/16	13/32
10	0.1900	32	0.1900	0.1831	0.158	0.109	0.078	0.141	0.109	1/4	11/32	1/4	5/16
12	0.2160	24	0.2160	0.2078	0.174	0.146	0.104	0.188	0.146	11/32	7/16	5/16	13/32
12	0.2160	28	0.2160	0.2085	0.180	0.125	0.089	0.161	0.125	5/16	13/32	9/32	3/8
1/4	0.2500	20	0.2500	0.2408	0.200	0.175	0.125	0.225	0.175	13/32	17/32	3/8	1/2
1/4	0.2500	28	0.2500	0.2425	0.214	0.125	0.089	0.161	0.125	5/16	13/32	9/32	3/8
5/16	0.3125	18	0.3125	0.3026	0.257	0.194	0.139	0.250	0.194	15/32	19/32	7/16	9/16
5/16	0.3125	24	0.3125	0.3042	0.271	0.146	0.104	0.188	0.146	11/32	15/32	5/16	15/32
3/8	0.3750	16	0.3750	0.3643	0.312	0.219	0.156	0.281	0.219	1/2	11/16	15/32	5/8
3/8	0.3750	24	0.3750	0.3667	0.333	0.146	0.104	0.188	0.146	11/32	1/2	5/16	1/2

(continued)

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TABLE 8 DIMENSIONS OF THREADS AND POINTS FOR TYPES D, F, G, AND T THREAD CUTTING TAPPING SCREWS (CONT'D)

Nominal Size (2) or Basic Screw Diameter	Threads per inch	*D* Major Diameter Max.	*D* Major Diameter Min.	*P* Point Diameter Ref.	*S* (3) Point Taper Length For Short Screws Max.	*S* (3) Point Taper Length For Short Screws Min.	*S* (3) Point Taper Length For Long Screws Max.	*S* (3) Point Taper Length For Long Screws Min.	*L* Determinant Lengths for Point Taper 90° Heads	*L* Determinant Lengths for Point Taper Csk. Heads	*L* Minimum Practical Nominal Screw Lengths 90° Heads	*L* Minimum Practical Nominal Screw Lengths Csk. Heads
7/16 0.4375	14	0.4375	0.4258	0.366	0.250	0.179	0.321	0.250	19/32	3/4	9/16	23/32
7/16 0.4375	20	0.4375	0.4281	0.387	0.175	0.125	0.225	0.175	13/32	9/16	3/8	17/32
1/2 0.5000	13	0.5000	0.4876	0.423	0.269	0.192	0.346	0.269	5/8	25/32	19/32	3/4
1/2 0.5000	20	0.5000	0.4906	0.450	0.175	0.125	0.225	0.175	13/32	9/16	3/8	17/32

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Points of screws shall be tapered and fluted or slotted as illustrated above for the respective types. The flute on Type T screws shall have an included angle of 90° to 95° and the thread cutting edge located above the axis of screw. Tapered threads shall have unfinished crests, and the flutes or slots shall extend through the first full thread beyond taper except for Type F screws on which tapered threads may be complete at manufacturer's option and flutes may be one pitch short of the first full form thread. Other details of taper and flute design shal be optional with the manufacturer provided the screws meet the specified performance requirements.
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Screws of these nominal lengths and shorter shall have point taper lengths specified for short screws. Longer lengths shall have point taper lengths specified for long screws.

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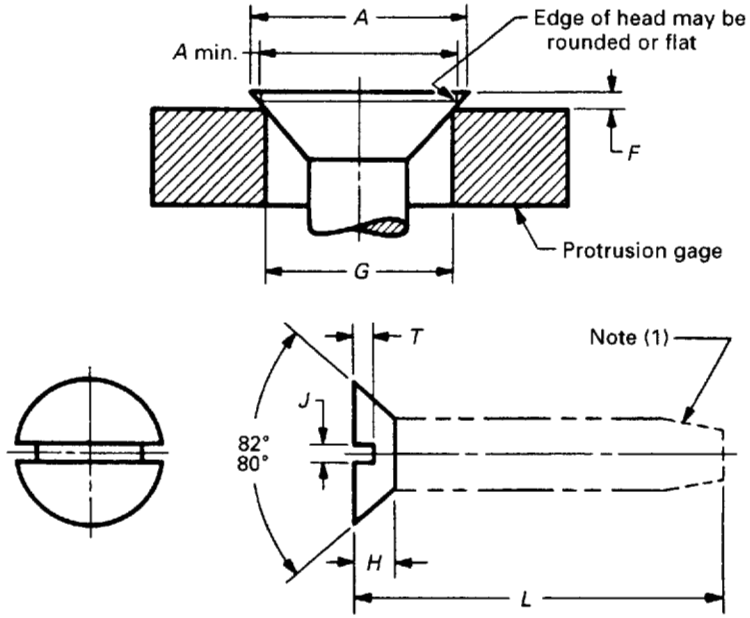


TABLE 9 DIMENSIONS OF SLOTTED FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	L (3)		A		H (4)	J		T		F (5)		G (5)
			These Lengths or Shorter are Undercut		Head Diameter		Head Height	Slot Width		Slot Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Max.	Min.	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ♦ ▲	3/16	1/8	0.112	0.096	0.035	0.023	0.016	0.015	0.010	0.026	0.016	0.078
1	0.0730	● ♦ ▲	3/16	5/32	0.137	0.120	0.043	0.026	0.019	0.019	0.012	0.028	0.016	0.101
2	0.0860	● ♦ ▲ ■	3/16	3/16	0.162	0.144	0.051	0.031	0.023	0.023	0.015	0.029	0.017	0.124
3	0.0990	● ♦ ▲ ■	7/32	7/32	0.187	0.167	0.059	0.035	0.027	0.027	0.017	0.031	0.018	0.148
4	0.1120	● ♦ ▲ ■	1/4	1/4	0.212	0.191	0.067	0.039	0.031	0.030	0.020	0.032	0.019	0.172
5	0.1250	● ♦ ▲ ■	1/4	1/4	0.237	0.215	0.075	0.043	0.035	0.034	0.022	0.034	0.020	0.196
6	0.1380	● ♦ ▲ ■	5/16	5/16	0.262	0.238	0.083	0.048	0.039	0.038	0.024	0.036	0.021	0.220
7	0.1510	● ♦ ▲	3/8	3/8	0.287	0.262	0.091	0.048	0.039	0.041	0.027	0.037	0.022	0.243

(continued)

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TABLE 9 DIMENSIONS OF SLOTTED FLAT COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (3)		*A*		*H* (4)	*J*		*T*		*F* (5)		*G* (5)
			These Lengths or Shorter are Undercut		Head Diameter		Head Height	Slot Width		Slot Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Max.	Min.	Max.	Min.	Max.	Min.	Gaging Diameter
8	0.1640	◆ ♦ ▲ ■	7/16	7/16	0.312	0.285	0.100	0.054	0.045	0.045	0.029	0.039	0.023	0.267
10	0.1900	◆ ♦ ▲ ■	1/2	1/2	0.362	0.333	0.116	0.060	0.050	0.053	0.034	0.042	0.025	0.313
12	0.2160	◆ ♦ ▲ ■	9/16	9/16	0.412	0.380	0.132	0.067	0.056	0.060	0.039	0.045	0.027	0.362
14	0.2420	♦	5/8	...	0.462	0.427	0.148	0.075	0.064	0.068	0.044	0.049	0.029	0.410
1/4	0.2500	◆ ▲ ■	5/8	5/8	0.477	0.442	0.153	0.075	0.064	0.070	0.046	0.050	0.029	0.424
16	0.2680	♦	3/4	...	0.512	0.475	0.164	0.075	0.064	0.075	0.049	0.052	0.031	0.457
18	0.2940	♦	13/16	...	0.561	0.522	0.180	0.084	0.072	0.083	0.054	0.055	0.033	0.505
5/16	0.3125	◆ ▲ ■	13/16	5/8	0.597	0.556	0.191	0.084	0.072	0.088	0.058	0.057	0.034	0.539
20	0.3200	♦	13/16	...	0.611	0.569	0.196	0.084	0.072	0.090	0.059	0.058	0.035	0.553
24	0.3720	♦	1	...	0.711	0.664	0.228	0.094	0.081	0.105	0.069	0.065	0.039	0.648
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.230	0.094	0.081	0.106	0.070	0.065	0.039	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.223	0.094	0.081	0.103	0.066	0.073	0.044	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.223	0.106	0.091	0.103	0.065	0.081	0.049	0.739

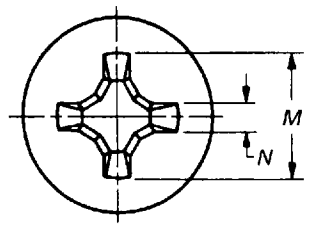
GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions.
- ◆ Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

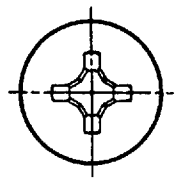
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Screws of these lengths and shorter shall have undercut heads as shown in Table 13. Use Type AB undercut head screws in place of Type A screws for these lengths and shorter.
(4) Tabulated values determined from formula for *H* max., Appendix A.
(5) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

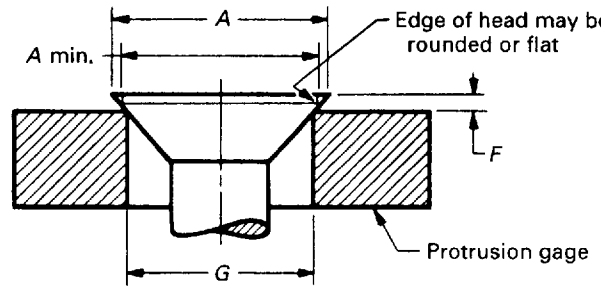
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This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.





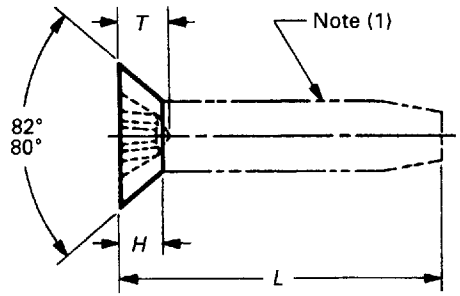


TABLE 10 DIMENSIONS OF TYPE I CROSS RECESSED FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (3)		*A*		*H* (4)	*M*	*T*	*N*		Recess Penetration Gaging Depth		*F* (5)		*G* (5)
			These Lengths or Shorter are Undercut		Head Diameter		Head Height	Recess Diameter	Recess Depth	Recess Width				Protrusion Above Gaging Diameter		
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ♦ ▲	3/16	1/8	0.112	0.096	0.035	0.062	0.035	0.014	0	0.036	0.020	0.026	0.016	0.078
1	0.0730	● ♦ ▲	3/16	5/32	0.137	0.120	0.043	0.070	0.043	0.015	0	0.044	0.028	0.028	0.016	0.101
2	0.0860	● ♦ ▲ ■	3/16	3/16	0.162	0.144	0.051	0.096	0.055	0.017	1	0.056	0.040	0.029	0.017	0.124
3	0.0990	● ♦ ▲ ■	7/32	7/32	0.187	0.167	0.059	0.100	0.060	0.018	1	0.061	0.045	0.031	0.018	0.148
4	0.1120	● ♦ ▲ ■	1/4	1/4	0.212	0.191	0.067	0.122	0.081	0.018	1	0.082	0.066	0.032	0.019	0.172
5	0.1250	● ♦ ▲ ■	1/4	1/4	0.237	0.215	0.075	0.148	0.074	0.027	2	0.075	0.052	0.034	0.020	0.196
6	0.1380	● ♦ ▲ ■	5/16	5/16	0.262	0.238	0.083	0.168	0.094	0.029	2	0.095	0.072	0.036	0.021	0.220
7	0.1510	● ♦ ▲	3/8	3/8	0.287	0.262	0.091	0.176	0.102	0.030	2	0.103	0.080	0.037	0.022	0.243

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TABLE 10 DIMENSIONS OF TYPE I CROSS RECESSED FLAT COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

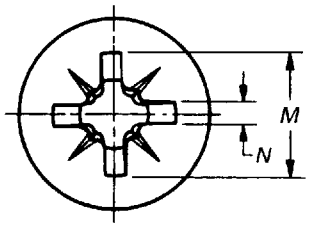
Nominal Size (2) or Basic Screw Diameter	Applicable to Screw Types (1) Code Symbols	*L* (3) These Lengths or Shorter are Undercut: Types AB & A	*L* (3) These Lengths or Shorter are Undercut: Other Types	*A* Head Diameter: Max.	*A* Head Diameter: Min.	*H* (4) Head Height: Ref.	*M* Recess Diameter: Ref.	*T* Recess Depth: Ref.	*N* Recess Width: Ref.	Driver Size	Recess Penetration Gaging Depth: Max.	Recess Penetration Gaging Depth: Min.	*F* (5) Protrusion Above Gaging Diameter: Max.	*F* (5) Protrusion Above Gaging Diameter: Min.	*G* (5) Gaging Diameter
8 0.1640	◆ ♦ ▲ ■	7/16	7/16	0.312	0.285	0.100	0.182	0.110	0.030	2	0.110	0.087	0.039	0.023	0.267
10 0.1900	● ♦ ▲ ■	1/2	1/2	0.362	0.333	0.116	0.198	0.124	0.032	2	0.125	0.102	0.042	0.025	0.313
12 0.2160	● ♦ ▲ ■	9/16	9/16	0.412	0.380	0.132	0.262	0.144	0.035	3	0.139	0.116	0.045	0.027	0.362
14 0.2420	♦	5/8	...	0.462	0.427	0.148	0.276	0.160	0.036	3	0.154	0.131	0.049	0.029	0.410
1/4 0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.153	0.276	0.160	0.036	3	0.154	0.131	0.050	0.029	0.424
16 0.2680	♦	3/4	...	0.512	0.475	0.164	0.296	0.180	0.039	3	0.174	0.151	0.052	0.031	0.457
18 0.2940	♦	13/16	...	0.561	0.522	0.180	0.358	0.205	0.061	4	0.196	0.174	0.055	0.033	0.505
5/16 0.3125	◆ ▲ ■	13/16	5/8	0.597	0.556	0.191	0.358	0.205	0.061	4	0.196	0.174	0.057	0.034	0.539
20 0.3200	♦	13/16	...	0.611	0.569	0.196	0.372	0.219	0.062	4	0.210	0.188	0.058	0.035	0.553
24 0.3720	♦	1	...	0.711	0.664	0.228	0.386	0.234	0.065	4	0.225	0.203	0.065	0.039	0.648
3/8 0.3750	▲ ■	...	5/8	0.717	0.670	0.230	0.386	0.234	0.065	4	0.225	0.203	0.065	0.039	0.653
7/16 0.4375	▲	...	3/4	0.760	0.715	0.223	0.402	0.250	0.068	4	0.241	0.219	0.073	0.044	0.690
1/2 0.5000	▲	...	3/4	0.815	0.765	0.223	0.418	0.265	0.069	4	0.256	0.234	0.081	0.049	0.739

GENERAL NOTE: For additional requirements, refer to para. 2.

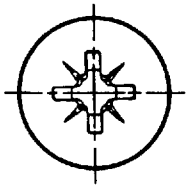
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions.
◆ Type AB thread forming, see Table 5.
♦ Type A thread forming, except short lengths, see Appendix E.
▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Screws of these lengths and shorter shall have undercut heads as shown in Table 13. Use Type AB undercut head screws in place of Type A screws for these lengths and shorter.
(4) Tabulated values determined from formula for *H* max., Appendix A.
(5) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

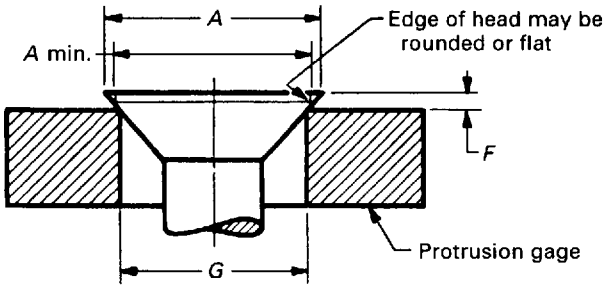
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This type of recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded.





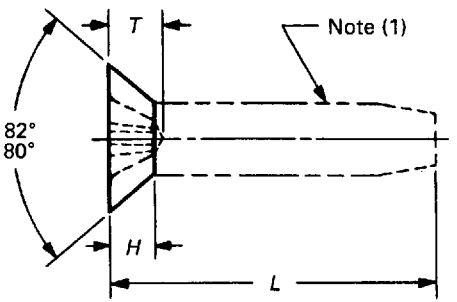


TABLE 11 DIMENSIONS OF TYPE IA CROSS RECESSED FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (3)		*A*		*H* (4)	*M*	*T*	*N*		Recess Penetration Gaging Depth		*F* (5)		*G* (5)
			These Lengths or Shorter are Undercut		Head Diameter		Head Height	Recess Diameter	Recess Depth	Recess Width				Protrusion Above Gaging Diameter		
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ♦ ▲	3/16	1/8	0.112	0.096	0.035	0.062	0.036	0.018	0	0.037	0.021	0.026	0.016	0.078
1	0.0730	● ♦ ▲	3/16	5/32	0.137	0.120	0.043	0.070	0.044	0.018	0	0.045	0.029	0.028	0.016	0.101
2	0.0860	● ♦ ▲ ■	3/16	3/16	0.162	0.144	0.051	0.096	0.055	0.029	1	0.053	0.037	0.029	0.017	0.124
3	0.0990	● ♦ ▲ ■	7/32	7/32	0.187	0.167	0.059	0.100	0.060	0.029	1	0.058	0.042	0.031	0.018	0.148
4	0.1120	● ♦ ▲ ■	1/4	1/4	0.212	0.191	0.067	0.122	0.081	0.030	1	0.079	0.063	0.032	0.019	0.172
5	0.1250	● ♦ ▲ ■	1/4	1/4	0.237	0.215	0.075	0.148	0.077	0.041	2	0.071	0.053	0.034	0.020	0.196
6	0.1380	● ♦ ▲ ■	5/16	5/16	0.262	0.238	0.083	0.168	0.098	0.041	2	0.091	0.073	0.036	0.021	0.220
7	0.1510	● ♦ ▲	3/8	3/8	0.287	0.262	0.091	0.176	0.105	0.041	2	0.099	0.081	0.037	0.022	0.243

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TABLE 11 DIMENSIONS OF TYPE IA CROSS RECESSED FLAT COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (2) or Basic Screw Diameter	Applicable to Screw Types (1)	*L* (3)		*A*		*H* (4)	*M*	*T*	*N*		Recess Penetration Gaging Depth		*F* (5)		*G* (5)
		These Lengths or Shorter are Undercut		Head Diameter		Head Height	Recess Diameter	Recess Depth	Recess Width				Protrusion Above Gaging Diameter		
	Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
8 0.1640	● ♦ ▲ ■	7/16	7/16	0.312	0.285	0.100	0.182	0.112	0.041	2	0.107	0.089	0.039	0.023	0.267
10 0.1900	● ♦ ▲ ■	1/2	1/2	0.362	0.333	0.116	0.198	0.127	0.041	2	0.122	0.104	0.042	0.025	0.313
12 0.2160	● ♦ ▲ ■	9/16	9/16	0.412	0.380	0.132	0.262	0.149	0.056	3	0.136	0.118	0.045	0.027	0.362
14 0.2420	♦	5/8	...	0.462	0.427	0.148	0.276	0.164	0.057	3	0.151	0.133	0.049	0.029	0.410
1/4 0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.153	0.276	0.164	0.057	3	0.151	0.133	0.050	0.029	0.424
16 0.2680	●	3/4	...	0.512	0.475	0.164	0.296	0.184	0.057	3	0.171	0.153	0.052	0.031	0.457
18 0.2940	●	13/16	...	0.561	0.522	0.180	0.358	0.211	0.086	4	0.193	0.175	0.055	0.033	0.505
5/16 0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.191	0.358	0.211	0.086	4	0.193	0.175	0.057	0.034	0.539
20 0.3200	●	13/16	...	0.611	0.569	0.196	0.372	0.224	0.086	4	0.206	0.188	0.058	0.035	0.553
24 0.3720	●	1	...	0.711	0.664	0.228	0.386	0.239	0.086	4	0.222	0.204	0.065	0.039	0.648
3/8 0.3750	▲ ■	...	5/8	0.717	0.670	0.230	0.386	0.239	0.086	4	0.222	0.204	0.065	0.039	0.653
7/16 0.4375	▲	...	3/4	0.760	0.715	0.223	0.402	0.256	0.086	4	0.238	0.220	0.073	0.044	0.690
1/2 0.5000	▲	...	3/4	0.815	0.765	0.223	0.418	0.271	0.086	4	0.253	0.235	0.081	0.049	0.739

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:

(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

(3) Screws of these lengths and shorter shall have undercut heads as shown in Table 13. Use Type AB undercut head screws in place of Type A screws for these lengths and shorter.

(4) Tabulated values determined from formula for *H* max., Appendix A.

(5) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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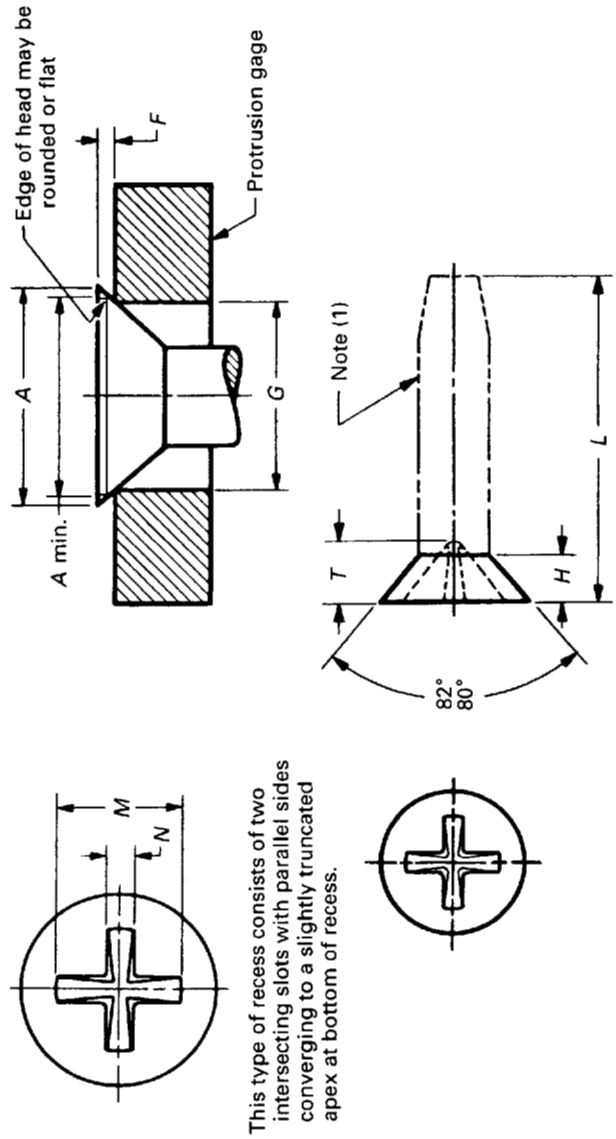


TABLE 12 ILLUSTRATION

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TABLE 12 DIMENSIONS OF TYPE II CROSS RECESSED FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	*L* (3) These Lengths or Shorter are Undercut Types AB & A	*L* (3) These Lengths or Shorter are Undercut Other Types	*A* Head Diameter Max.	*A* Head Diameter Min.	*H* (4) Head Height Ref.	*M* Recess Diameter Ref.	*T* Recess Depth Ref.	*N* Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.	*F* (5) Protrusion Above Gaging Diameter Max.	*F* (5) Protrusion Above Gaging Diameter Min.	*G* (5) Gaging Diameter
0	0.0600	◆ ♦ ▲	3/16	1/8	0.112	0.096	0.035	0.078	0.036	0.021		(6)	(6)	0.026	0.016	0.078
1	0.0730	● ♦ ▲	3/16	5/32	0.137	0.120	0.043	0.092	0.048	0.024		(6)	(6)	0.028	0.016	0.101
2	0.0860	● ♦ ▲ ■	3/16	3/16	0.162	0.144	0.051	0.114	0.060	0.027		0.040	0.029	0.029	0.017	0.124
3	0.0990	◆ ♦ ▲ ■	7/32	7/32	0.187	0.167	0.059	0.133	0.072	0.030		0.053	0.041	0.031	0.018	0.148
4	0.1120	◆ ♦ ▲ ■	1/4	1/4	0.212	0.191	0.067	0.151	0.082	0.032		0.064	0.052	0.032	0.019	0.172
5	0.1250	◆ ♦ ▲ ■	1/4	1/4	0.237	0.215	0.075	0.169	0.094	0.035		0.077	0.064	0.034	0.020	0.196
6	0.1380	● ♦ ▲ ■	5/16	5/16	0.262	0.238	0.083	0.188	0.106	0.038		0.089	0.075	0.036	0.021	0.220
7	0.1510	● ♦ ▲	3/8	3/8	0.287	0.262	0.091	0.206	0.118	0.040		0.101	0.087	0.037	0.022	0.243
8	0.1640	● ♦ ▲ ■	7/16	7/16	0.312	0.285	0.100	0.224	0.124	0.043	Point	0.113	0.099	0.039	0.023	0.267
10	0.1900	◆ ♦ ▲ ■	1/2	1/2	0.362	0.333	0.116	0.260	0.148	0.048	Same	0.137	0.122	0.042	0.025	0.313
12	0.2160	◆ ♦ ▲ ■	9/16	9/16	0.412	0.380	0.132	0.297	0.172	0.054	on all	0.162	0.145	0.045	0.027	0.362
14	0.2420	♦	5/8	...	0.462	0.427	0.148	0.334	0.188	0.059	Drivers	0.186	0.168	0.049	0.029	0.410
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.153	0.344	0.195	0.061		0.193	0.176	0.050	0.029	0.424
16	0.2680	♦	3/4	...	0.512	0.475	0.164	0.370	0.211	0.064		0.210	0.191	0.052	0.031	0.457
18	0.2940	◆	13/16	...	0.561	0.522	0.180	0.406	0.235	0.070		0.234	0.215	0.055	0.033	0.505
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.191	0.432	0.252	0.074		0.251	0.232	0.057	0.034	0.539
20	0.3200	◆	13/16	...	0.611	0.569	0.196	0.442	0.258	0.075		0.258	0.238	0.058	0.035	0.553
24	0.3720	◆	1	...	0.711	0.664	0.228	0.515	0.306	0.086		0.307	0.284	0.065	0.039	0.648
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.230	0.509	0.302	0.086		0.303	0.281	0.065	0.039	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.223	0.554	0.332	0.092		0.332	0.310	0.073	0.044	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.223	0.593	0.358	0.098		0.359	0.335	0.081	0.049	0.739

GENERAL NOTE: For reference, see Table 12 Illustration on page 24. For additional requirements, refer to para. 2.

NOTES:

(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions.
- ◆ Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

(3) Screws of these lengths and shorter shall have undercut heads as shown in Table 16. Use Type AB undercut head screws in place of Type A screws for these lengths and shorter.

(4) Tabulated values determined from formula for *H* max., Appendix A.

(5) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

(6) Not practical to gage.

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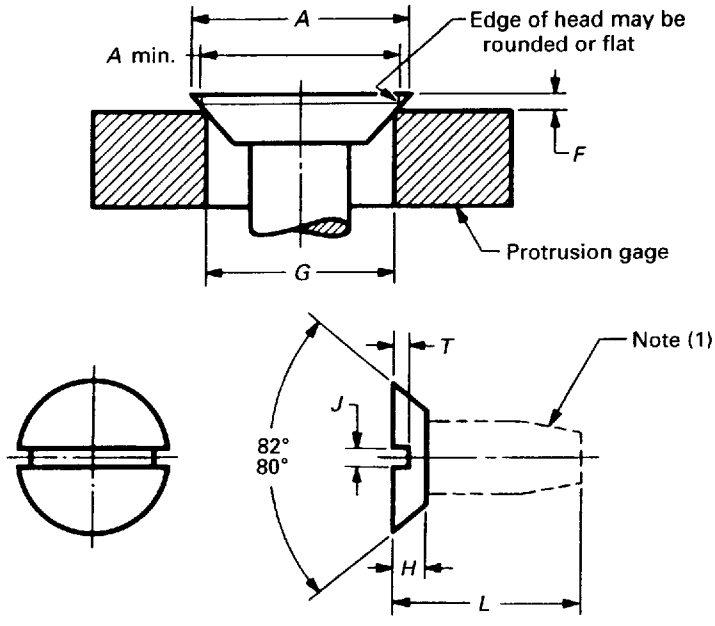


TABLE 13 DIMENSIONS OF SLOTTED UNDERCUT FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	L (3)		A		H		J		T		F (4)		G (4)
			These Lengths or Shorter are Undercut		Head Diameter		Head Height		Slot Width		Slot Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Type AB	Other Types	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	●▲	3/16	1/8	0.112	0.096	0.025	0.018	0.023	0.016	0.011	0.007	(5)	(5)	(5)
1	0.0730	●▲	3/16	5/32	0.137	0.120	0.031	0.023	0.026	0.019	0.014	0.009	(5)	(5)	(5)
2	0.0860	●▲■	3/16	3/16	0.162	0.144	0.036	0.028	0.031	0.023	0.016	0.011	0.029	0.017	0.124
3	0.0990	●▲■	7/32	7/32	0.187	0.167	0.042	0.033	0.035	0.027	0.019	0.012	0.031	0.018	0.148
4	0.1120	●▲■	1/4	1/4	0.212	0.191	0.047	0.038	0.039	0.031	0.022	0.014	0.032	0.019	0.172
5	0.1250	●▲■	1/4	1/4	0.237	0.215	0.053	0.043	0.043	0.035	0.024	0.016	0.034	0.020	0.196
6	0.1380	●▲■	5/16	5/16	0.262	0.238	0.059	0.048	0.048	0.039	0.027	0.017	0.036	0.021	0.220
7	0.1510	●▲	3/8	3/8	0.287	0.262	0.064	0.053	0.048	0.039	0.030	0.019	0.037	0.022	0.243
8	0.1640	●▲■	7/16	7/16	0.312	0.285	0.070	0.058	0.054	0.045	0.032	0.021	0.039	0.023	0.267
10	0.1900	●▲■	1/2	1/2	0.362	0.333	0.081	0.068	0.060	0.050	0.037	0.024	0.042	0.025	0.313
12	0.2160	●▲■	9/16	9/16	0.412	0.380	0.092	0.078	0.067	0.056	0.043	0.028	0.045	0.027	0.362
1/4	0.2500	●▲■	5/8	5/8	0.477	0.442	0.107	0.092	0.075	0.064	0.050	0.032	0.050	0.029	0.424
5/16	0.3125	●▲■	13/16	5/8	0.597	0.556	0.134	0.116	0.084	0.072	0.062	0.041	0.057	0.034	0.539
3/8	0.3750	▲■	...	5/8	0.717	0.670	0.161	0.140	0.094	0.081	0.075	0.049	0.065	0.039	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.156	0.133	0.094	0.081	0.072	0.045	0.073	0.044	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.156	0.130	0.106	0.091	0.072	0.046	0.081	0.049	0.739

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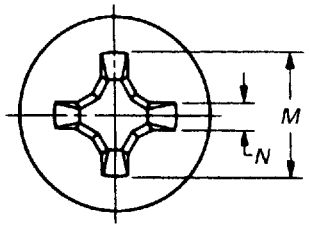
TABLE 13 DIMENSIONS OF SLOTTED UNDERCUT FLAT COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

GENERAL NOTE: For additional requirements, refer to para. 2.

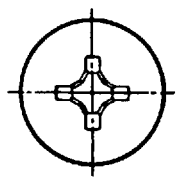
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

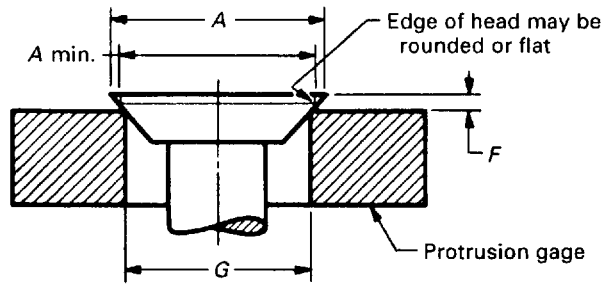
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Screws of longer lengths shall have head heights as shown in Table 9.
(4) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.
(5) Not practical to gage.

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This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.





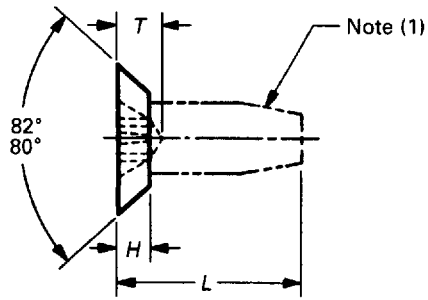


TABLE 14 DIMENSIONS OF TYPE I CROSS RECESSED UNDERCUT FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	L (3)		A		H		M	T	N		Recess Penetration Gaging Depth		F (4)		G (4)
			These Lengths or Shorter are Undercut		Head Diameter		Head Height		Recess Diameter	Recess Depth	Recess Width				Protrusion Above Gaging Diameter		
		Code Symbols	Type AB	Other Types	Max.	Min.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ▲	3/16	1/8	0.112	0.096	0.025	0.018	0.062	0.035	0.014	0	0.036	0.020	(5)	(5)	(5)
1	0.0730	● ▲	3/16	5/32	0.137	0.120	0.031	0.023	0.070	0.043	0.015	0	0.044	0.028	(5)	(5)	(5)
2	0.0860	● ▲ ■	3/16	3/16	0.162	0.144	0.036	0.028	0.088	0.048	0.017	1	0.049	0.033	0.029	0.017	0.124
3	0.0990	● ▲ ■	7/32	7/32	0.187	0.167	0.042	0.033	0.096	0.055	0.018	1	0.056	0.040	0.031	0.018	0.148
4	0.1120	● ▲ ■	1/4	1/4	0.212	0.191	0.047	0.038	0.110	0.070	0.018	1	0.071	0.055	0.032	0.019	0.172
5	0.1250	● ▲ ■	1/4	1/4	0.237	0.215	0.053	0.043	0.122	0.081	0.018	1	0.082	0.066	0.034	0.020	0.196
6	0.1380	● ▲ ■	5/16	5/16	0.262	0.238	0.059	0.048	0.140	0.066	0.025	2	0.067	0.044	0.036	0.021	0.220
7	0.1510	● ▲	3/8	3/8	0.287	0.262	0.064	0.053	0.148	0.074	0.027	2	0.075	0.052	0.037	0.022	0.243

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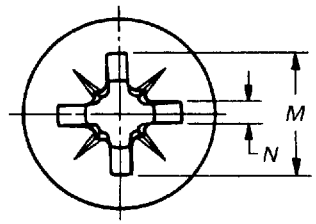
TABLE 14 DIMENSIONS OF TYPE I CROSS RECESSED UNDERCUT FLAT COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (3) These Lengths or Shorter are Undercut		*A*		*H*		*M*	*T*	*N*		Recess Penetration Gaging Depth		*F* (4) Protrusion Above Gaging Diameter		*G* (4)
		Code Symbols	Type AB	Other Types	Head Diameter Max.	Head Diameter Min.	Head Height Max.	Head Height Min.	Recess Diameter Ref.	Recess Depth Ref.	Recess Width Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
8	0.1640	◔ ▲ ■	7/16	7/16	0.312	0.285	0.070	0.058	0.168	0.094	0.029	2	0.095	0.072	0.039	0.023	0.267
10	0.1900	◔ ▲ ■	1/2	1/2	0.362	0.333	0.081	0.068	0.182	0.110	0.030	2	0.110	0.087	0.042	0.025	0.313
12	0.2160	● ▲ ■	9/16	9/16	0.412	0.380	0.092	0.078	0.226	0.110	0.030	3	0.104	0.081	0.045	0.027	0.362
1/4	0.2500	◔ ▲ ■	5/8	5/8	0.477	0.442	0.107	0.092	0.244	0.124	0.032	3	0.119	0.096	0.050	0.029	0.424
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.134	0.116	0.310	0.157	0.053	4	0.148	0.126	0.057	0.034	0.539
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.161	0.140	0.358	0.205	0.061	4	0.196	0.174	0.065	0.039	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.156	0.133	0.386	0.234	0.065	4	0.225	0.203	0.073	0.044	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.156	0.130	0.402	0.252	0.068	4	0.241	0.219	0.081	0.049	0.739

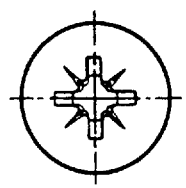
GENERAL NOTE: For additional requirements, refer to para. 2.

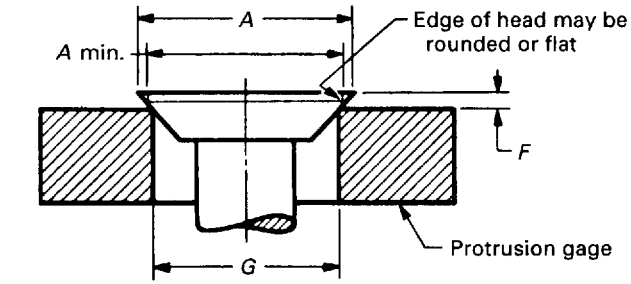
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
◔ Type AB thread forming, see Table 5.
▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Screws of longer lengths shall have head heights as shown in Table 10.
(4) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.
(5) Not practical to gage.

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This type of recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded.





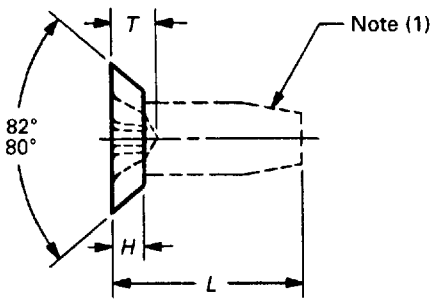


TABLE 15 DIMENSIONS OF TYPE IA CROSS RECESSED UNDERCUT FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (3)		*A*		*H*		*M*	*T*	*N*		Recess Penetration Gaging Depth		*F* (4)		*G* (4)
			These Lengths or Shorter are Undercut		Head Diameter		Head Height		Recess Diameter	Recess Depth	Recess Width				Protrusion Above Gaging Diameter		
		Code Symbols	Type AB	Other Types	Max.	Min.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ▲	3/16	1/8	0.112	0.096	0.025	0.018	0.062	0.036	0.018	0	0.037	0.021	(5)	(5)	(5)
1	0.0730	● ▲	3/16	5/32	0.137	0.120	0.031	0.023	0.070	0.044	0.018	0	0.045	0.029	(5)	(5)	(5)
2	0.0860	● ▲ ■	3/16	3/16	0.162	0.144	0.036	0.028	0.088	0.048	0.028	1	0.046	0.030	0.029	0.017	0.124
3	0.0990	● ▲ ■	7/32	7/32	0.187	0.167	0.042	0.033	0.096	0.055	0.029	1	0.053	0.037	0.031	0.018	0.148
4	0.1120	● ▲ ■	1/4	1/4	0.212	0.191	0.047	0.038	0.110	0.070	0.029	1	0.068	0.052	0.032	0.019	0.172
5	0.1250	● ▲ ■	1/4	1/4	0.237	0.215	0.053	0.043	0.122	0.081	0.030	1	0.079	0.063	0.034	0.020	0.196
6	0.1380	● ▲ ■	5/16	5/16	0.262	0.238	0.059	0.048	0.140	0.069	0.040	2	0.063	0.045	0.036	0.021	0.220
7	0.1510	● ▲	3/8	3/8	0.287	0.262	0.064	0.053	0.148	0.077	0.041	2	0.071	0.053	0.037	0.022	0.243

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TABLE 15 DIMENSIONS OF TYPE IA CROSS RECESSED UNDERCUT FLAT COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (3) These Lengths or Shorter are Undercut		*A* Head Diameter		*H* Head Height		*M* Recess Diameter	*T* Recess Depth	*N* Recess Width	Driver Size	Recess Penetration Gaging Depth		*F* (4) Protrusion Above Gaging Diameter		*G* (4)
		Code Symbols	Type AB	Other Types	Max.	Min.	Max.	Min.	Ref.	Ref.	Ref.		Max.	Min.	Max.	Min.	Gaging Diameter
8	0.1640	● ▲ ■	7/16	7/16	0.312	0.285	0.070	0.058	0.168	0.098	0.041	2	0.091	0.073	0.039	0.023	0.267
10	0.1900	◥ ▲ ■	1/2	1/2	0.362	0.333	0.081	0.068	0.182	0.112	0.041	2	0.107	0.089	0.042	0.025	0.313
12	0.2160	● ▲ ■	9/16	9/16	0.412	0.380	0.092	0.078	0.226	0.112	0.055	3	0.100	0.082	0.045	0.027	0.362
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.107	0.092	0.242	0.128	0.056	3	0.115	0.097	0.050	0.029	0.424
5/16	0.3125	◥ ▲ ■	13/16	5/8	0.597	0.556	0.134	0.116	0.310	0.163	0.085	4	0.145	0.127	0.057	0.034	0.539
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.161	0.140	0.358	0.211	0.086	4	0.193	0.175	0.065	0.039	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.156	0.133	0.386	0.239	0.086	4	0.222	0.204	0.073	0.044	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.156	0.130	0.402	0.256	0.086	4	0.238	0.220	0.081	0.049	0.739

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
◥ Type AB thread forming, see Table 5.
▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Screws of longer lengths shall have head heights as shown in Table 11.
(4) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.
(5) Not practical to gage.

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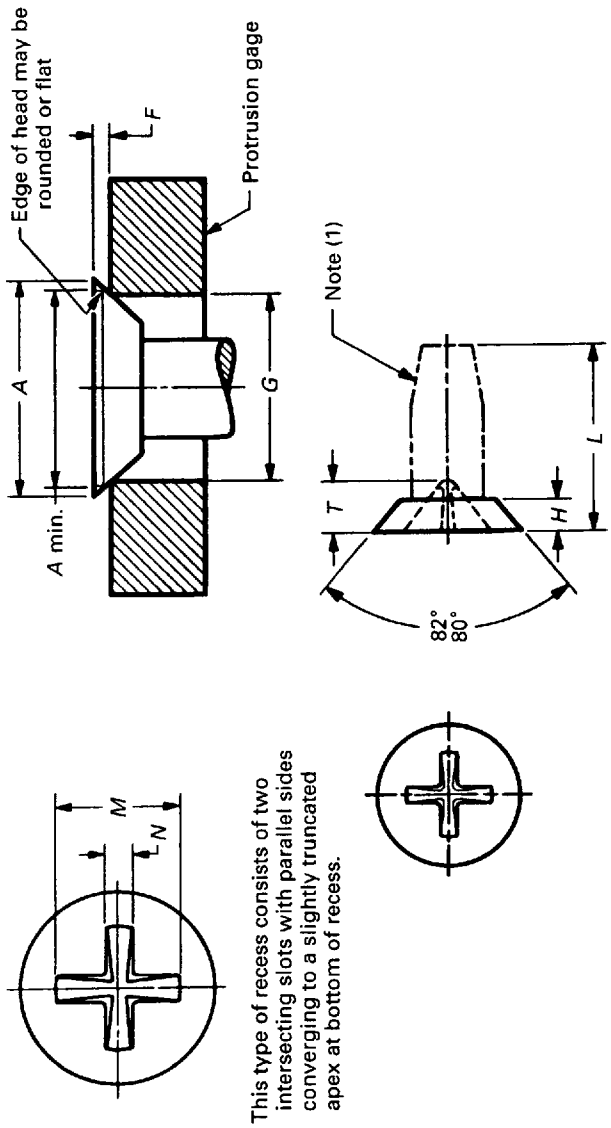


TABLE 16 ILLUSTRATION

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TABLE 16 DIMENSIONS OF TYPE II CROSS RECESSED UNDERCUT FLAT COUNTERSUNK HEAD TAPPING SCREWS

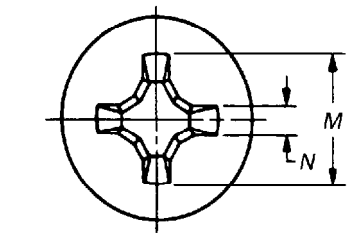
Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (3) These Lengths or Shorter are Undercut		*A* Head Diameter		*H* Head Height		*M* Recess Diameter	*T* Recess Depth	*N* Recess Width	Driver Size	Recess Penetration Gaging Depth		*F* (4) Protrusion Above Gaging Diameter		*G* (4)
		Code Symbols	Type AB	Other Types	Max.	Min.	Max.	Min.	Ref.	Ref.	Ref.		Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ▲	3/16	1/8	0.112	0.096	0.025	0.018	0.067	0.029	0.020		(5)	(5)	(5)	(5)	(5)
1	0.0730	● ▲	3/16	5/32	0.137	0.120	0.031	0.023	0.082	0.039	0.022		(5)	(5)	(5)	(5)	(5)
2	0.0860	● ▲ ■	3/16	3/16	0.162	0.144	0.036	0.028	0.100	0.050	0.025		0.030	0.020	0.029	0.017	0.124
3	0.0990	● ▲ ■	7/32	7/32	0.187	0.167	0.042	0.033	0.111	0.058	0.026		0.038	0.027	0.031	0.018	0.148
4	0.1120	● ▲ ■	1/4	1/4	0.212	0.191	0.047	0.038	0.129	0.070	0.029		0.050	0.038	0.032	0.019	0.172
5	0.1250	● ▲ ■	1/4	1/4	0.237	0.215	0.053	0.043	0.147	0.080	0.032		0.062	0.050	0.034	0.020	0.196
6	0.1380	● ▲ ■	5/16	5/16	0.262	0.238	0.059	0.048	0.161	0.088	0.034	Point	0.071	0.059	0.036	0.021	0.220
7	0.1510	● ▲	3/8	3/8	0.287	0.262	0.064	0.053	0.178	0.100	0.036	Same on	0.083	0.069	0.037	0.022	0.243
8	0.1640	◔ ▲ ■	7/16	7/16	0.312	0.285	0.070	0.058	0.197	0.112	0.039	all	0.095	0.082	0.039	0.023	0.267
10	0.1900	◔ ▲ ■	1/2	1/2	0.362	0.333	0.081	0.068	0.236	0.132	0.045	Drivers	0.121	0.107	0.042	0.025	0.313
12	0.2160	◔ ▲ ■	9/16	9/16	0.412	0.380	0.092	0.078	0.260	0.148	0.048		0.137	0.122	0.045	0.027	0.362
1/4	0.2500	◔ ▲ ■	5/8	5/8	0.477	0.442	0.107	0.092	0.304	0.169	0.054		0.167	0.150	0.050	0.029	0.424
5/16	0.3125	◔ ▲ ■	13/16	5/8	0.597	0.556	0.134	0.116	0.381	0.218	0.066		0.218	0.198	0.057	0.034	0.539
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.161	0.140	0.453	0.266	0.077		0.266	0.244	0.065	0.039	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.156	0.133	0.498	0.295	0.083		0.296	0.273	0.073	0.044	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.156	0.130	0.548	0.328	0.090		0.329	0.305	0.081	0.049	0.739

GENERAL NOTE: For reference, see Table 16 Illustration on page 32. For additional requirements, refer to para. 2.

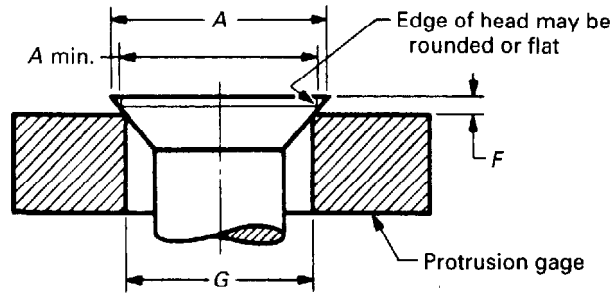
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
◔ Type AB thread forming, see Table 5.
▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Screws of longer lengths shall have head heights as shown in Table 12.
(4) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.
(5) Not practical to gage.

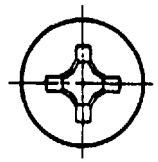
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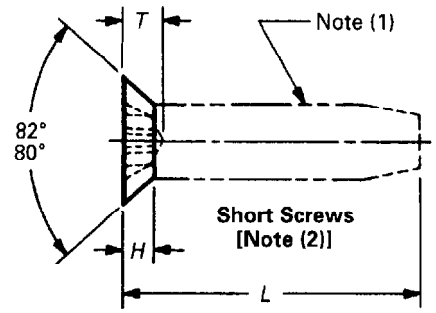
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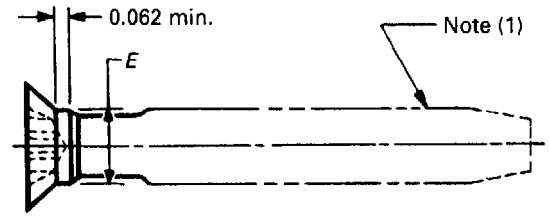
This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.







Short Screws [Note (2)]



Long Screws With Reduced Body and Shoulder

TABLE 17 DIMENSIONS OF TYPE I CROSS RECESSED FLAT COUNTERSUNK TRIM HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Head Size	Applicable to Screw Types (1) Code Symbols	E (4) Shoulder Diameter Type A Min.	E (4) Shoulder Diameter Other Types Min.	A Head Diameter Max.	A Head Diameter Min.	H (5) Head Height Ref.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.	F (6) Protrusion Above Gaging Diameter Max.	F (6) Protrusion Above Gaging Diameter Min.	G (6) Gaging Diameter
4	0.1120	3	● ♦ ▲ ■	0.105	0.106	0.187	0.167	0.052	0.100	0.060	0.018	1	0.061	0.045	0.031	0.018	0.148
5	0.1250	4	● ♦ ▲ ■	0.118	0.119	0.212	0.191	0.060	0.122	0.081	0.018	1	0.082	0.066	0.032	0.019	0.172
6	0.1380	4	● ♦ ▲ ■	0.131	0.131	0.212	0.191	0.052	0.122	0.081	0.018	1	0.082	0.066	0.032	0.019	0.172
6	0.1380	5	● ♦ ▲ ■	0.131	0.131	0.237	0.215	0.068	0.148	0.074	0.027	2	0.075	0.052	0.034	0.020	0.196
8	0.1640	5	● ♦ ▲ ■	0.157	0.157	0.237	0.215	0.052	0.158	0.084	0.029	2	0.085	0.062	0.034	0.020	0.196
8	0.1640	6	● ♦ ▲ ■	0.157	0.157	0.262	0.238	0.069	0.176	0.102	0.030	2	0.103	0.080	0.036	0.021	0.220
10	0.1900	8	● ♦ ▲ ■	0.183	0.181	0.312	0.285	0.085	0.182	0.110	0.030	2	0.110	0.087	0.039	0.023	0.267
12	0.2160	8	● ♦ ▲ ■	0.209	0.207	0.312	0.285	0.069	0.192	0.120	0.032	2	0.120	0.097	0.039	0.023	0.267
12	0.2160	10	● ♦ ▲ ■	0.209	0.207	0.362	0.333	0.101	0.198	0.124	0.032	2	0.125	0.102	0.042	0.025	0.313
14	0.2420	10	♦	0.235	...	0.362	0.333	0.080	0.198	0.124	0.032	2	0.125	0.102	0.042	0.025	0.313
14	0.2420	12	♦	0.235	...	0.412	0.380	0.112	0.262	0.144	0.035	3	0.139	0.116	0.045	0.027	0.362

(continued)

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TABLE 17 DIMENSIONS OF TYPE I CROSS RECESSED FLAT COUNTERSUNK TRIM HEAD TAPPING SCREWS (CONT'D)

Nominal Size (3) or Basic Screw Diameter	Head Size	Applicable to Screw Types (1) Code Symbols	*E* (4) Shoulder Diameter Type A Min.	*E* (4) Shoulder Diameter Other Types Min.	*A* Head Diameter Max.	*A* Head Diameter Min.	*H* (5) Head Height Ref.	*M* Recess Diameter Ref.	*T* Recess Depth Ref.	*N* Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.	*F* (6) Protrusion Above Gaging Diameter Max.	*F* (6) Protrusion Above Gaging Diameter Min.	*G* (6) Gaging Diameter
1/4 0.2500	10	♦ ▲ ■	...	0.240	0.362	0.333	0.080	0.198	0.124	0.032	2	0.125	0.102	0.042	0.025	0.313
1/4 0.2500	12	● ▲ ■	...	0.240	0.412	0.380	0.112	0.262	0.144	0.035	3	0.139	0.116	0.045	0.027	0.362
5/16 0.3125	12	♦ ▲ ■	...	0.302	0.412	0.380	0.075	0.262	0.144	0.035	3	0.139	0.116	0.045	0.027	0.362
5/16 0.3125	1/4	● ▲ ■	...	0.302	0.477	0.442	0.116	0.276	0.160	0.036	3	0.154	0.131	0.050	0.029	0.424
3/8 0.3750	5/16	▲ ■	...	0.364	0.597	0.556	0.155	0.358	0.205	0.061	4	0.196	0.174	0.057	0.034	0.539

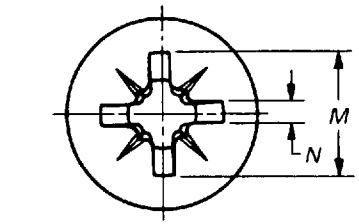
GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

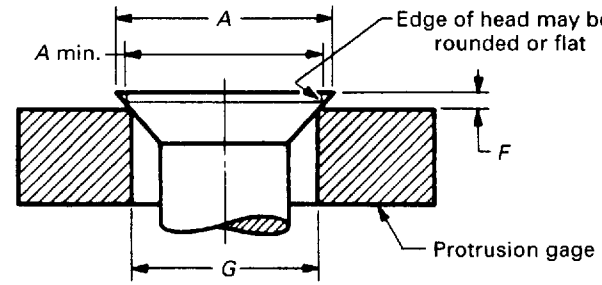
(2) Short screws are those threaded full length. Refer to para. 2.4.1 for applicable screw lengths.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Maximum diameter shall not exceed minimum plus 0.011 in. for Type A screws, and basic screw diameter for all other screw types.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

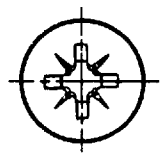
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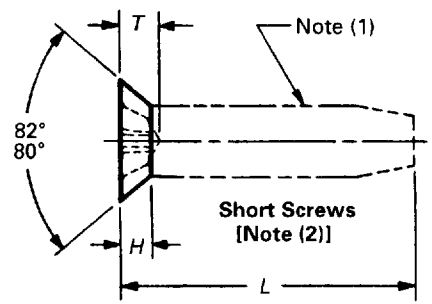
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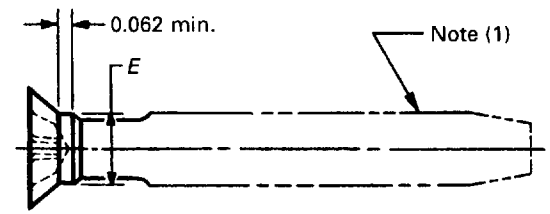
This type of recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded.







Short Screws [Note (2)]



Long Screws With Reduced Body and Shoulder

TABLE 18 DIMENSIONS OF TYPE IA CROSS RECESSED FLAT COUNTERSUNK TRIM HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Head Size	Applicable to Screw Types (1) Code Symbols	E (4) Shoulder Diameter Type A Min.	E (4) Shoulder Diameter Other Types Min.	A Head Diameter Max.	A Head Diameter Min.	H (5) Head Height Ref.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.	F (6) Protrusion Above Gaging Diameter Max.	F (6) Protrusion Above Gaging Diameter Min.	G (6) Gaging Diameter
4	0.1120	3	● ♦ ▲ ■	0.105	0.106	0.187	0.167	0.052	0.100	0.060	0.029	1	0.058	0.042	0.031	0.018	0.148
5	0.1250	4	● ♦ ▲ ■	0.118	0.119	0.212	0.191	0.060	0.122	0.081	0.030	1	0.079	0.063	0.032	0.019	0.172
6	0.1380	4	● ♦ ▲ ■	0.131	0.131	0.212	0.191	0.052	0.122	0.081	0.030	1	0.079	0.063	0.032	0.019	0.172
6	0.1380	5	● ♦ ▲ ■	0.131	0.131	0.237	0.215	0.068	0.148	0.077	0.041	2	0.071	0.053	0.034	0.020	0.196
8	0.1640	5	● ♦ ▲ ■	0.157	0.157	0.237	0.215	0.052	0.158	0.088	0.041	2	0.081	0.063	0.034	0.020	0.196
8	0.1640	6	● ♦ ▲ ■	0.157	0.157	0.262	0.238	0.069	0.176	0.105	0.041	2	0.099	0.081	0.036	0.021	0.220
10	0.1900	8	● ♦ ▲ ■	0.183	0.181	0.312	0.285	0.085	0.182	0.112	0.041	2	0.107	0.089	0.039	0.023	0.267
12	0.2160	8	● ♦ ▲ ■	0.209	0.207	0.312	0.285	0.069	0.192	0.122	0.041	2	0.117	0.099	0.039	0.023	0.267
12	0.2160	10	● ♦ ▲ ■	0.209	0.207	0.362	0.333	0.101	0.198	0.127	0.041	2	0.122	0.104	0.042	0.025	0.313
14	0.2420	10	♦	0.235	...	0.362	0.333	0.080	0.198	0.127	0.041	2	0.122	0.104	0.042	0.025	0.313
14	0.2420	12	♦	0.235	...	0.412	0.380	0.112	0.262	0.149	0.056	3	0.136	0.118	0.045	0.027	0.362

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TABLE 18 DIMENSIONS OF TYPE IA CROSS RECESSED FLAT COUNTERSUNK TRIM HEAD TAPPING SCREWS (CONT'D)

Nominal Size (3) or Basic Screw Diameter	Head Size	Applicable to Screw Types (1)	*E* (4) Shoulder Diameter		*A*		*H* (5)	*M*	*T*	*N*		Recess Penetration Gaging Depth		*F* (6) Protrusion Above Gaging Diameter		*G* (6)
			Type A	Other Types	Head Diameter		Head Height	Recess Diameter	Recess Depth	Recess Width						
		Code Symbols	Min.	Min.	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
1/4 0.2500	10	● ▲ ■	...	0.240	0.362	0.333	0.080	0.198	0.127	0.041	2	0.122	0.104	0.042	0.025	0.313
1/4 0.2500	12	● ▲ ■	...	0.240	0.412	0.380	0.112	0.262	0.149	0.056	3	0.136	0.118	0.045	0.027	0.362
5/16 0.3125	12	● ▲ ■	...	0.302	0.412	0.380	0.075	0.262	0.149	0.056	3	0.136	0.118	0.045	0.027	0.362
5/16 0.3125	1/4	● ▲ ■	...	0.302	0.477	0.442	0.116	0.276	0.164	0.057	3	0.151	0.133	0.050	0.029	0.424
3/8 0.3750	5/16	▲ ■	...	0.364	0.597	0.556	0.155	0.358	0.211	0.086	4	0.193	0.175	0.057	0.034	0.539

GENERAL NOTE: For additional requirements, refer to para. 2.

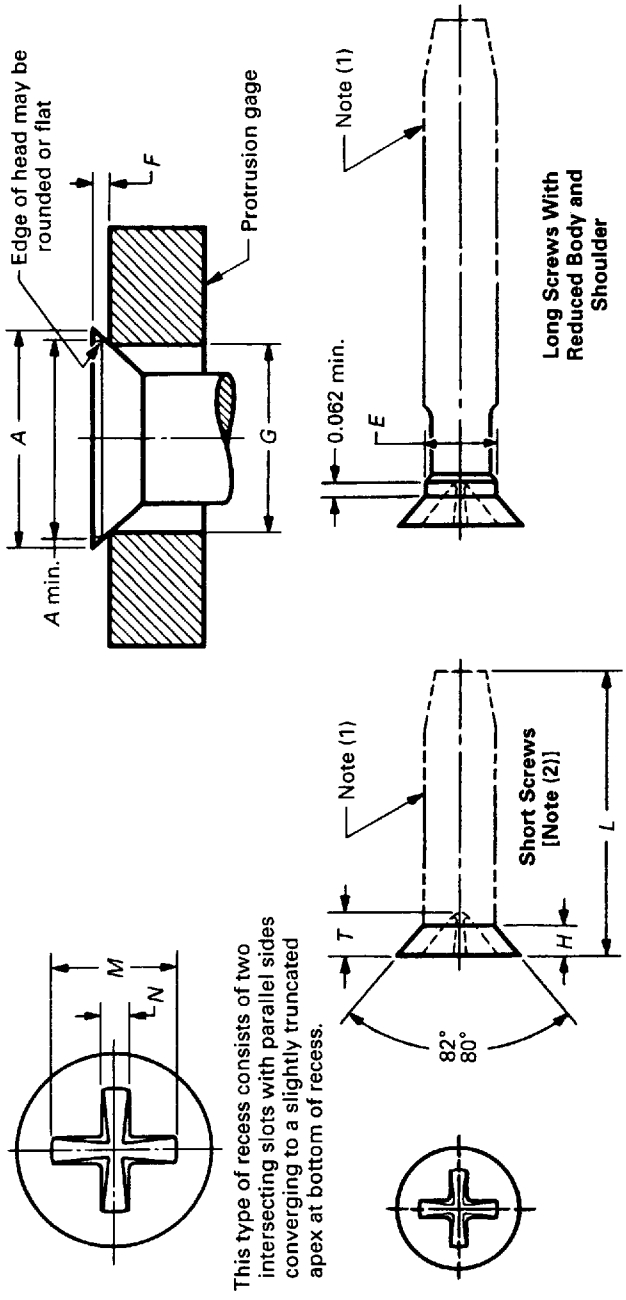
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Short screws are those threaded full length. Refer to para. 2.4.1 for applicable screw lengths.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Maximum diameter shall not exceed minimum plus 0.011 in. for Type A screws, and basic screw diameter for all other screw types.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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TABLE 19 ILLUSTRATION



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TABLE 19 DIMENSIONS OF TYPE II CROSS RECESSED FLAT COUNTERSUNK TRIM HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Head Size	Applicable to Screw Types (1) Code Symbols	E (4) Shoulder Diameter Type A Min.	E (4) Shoulder Diameter Other Types Min.	A Head Diameter Max.	A Head Diameter Min.	H (5) Head Height Ref.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.	F (6) Protrusion Above Gaging Diameter Max.	F (6) Protrusion Above Gaging Diameter Min.	G (6) Gaging Diameter
4	0.1120	3	● ♦ ▲ ■	0.105	0.106	0.187	0.167	0.052	0.133	0.072	0.030		0.053	0.041	0.031	0.018	0.148
5	0.1250	4	● ♦ ▲ ■	0.118	0.119	0.212	0.191	0.060	0.151	0.082	0.032		0.064	0.052	0.032	0.019	0.172
6	0.1380	4	● ♦ ▲ ■	0.131	0.131	0.212	0.191	0.052	0.151	0.082	0.032		0.064	0.052	0.032	0.019	0.172
6	0.1380	5	● ♦ ▲ ■	0.131	0.131	0.237	0.215	0.068	0.169	0.094	0.035		0.077	0.064	0.034	0.020	0.196
8	0.1640	5	● ♦ ▲ ■	0.157	0.157	0.237	0.215	0.052	0.169	0.094	0.035		0.077	0.064	0.034	0.020	0.196
8	0.1640	6	● ♦ ▲ ■	0.157	0.157	0.262	0.238	0.069	0.188	0.106	0.038	Point	0.089	0.075	0.036	0.021	0.220
10	0.1900	8	● ♦ ▲ ■	0.183	0.181	0.312	0.285	0.085	0.224	0.124	0.043	Same	0.113	0.099	0.039	0.023	0.267
12	0.2160	8	● ♦ ▲ ■	0.209	0.207	0.312	0.285	0.069	0.224	0.124	0.043	On	0.113	0.099	0.039	0.023	0.267
12	0.2160	10	● ♦ ▲ ■	0.209	0.207	0.362	0.333	0.101	0.260	0.148	0.048	All	0.137	0.122	0.042	0.025	0.313
14	0.2420	10	●	0.235	...	0.362	0.333	0.080	0.260	0.148	0.048	Drivers	0.137	0.122	0.042	0.025	0.313
14	0.2420	12	●	0.235	...	0.412	0.380	0.112	0.297	0.172	0.054		0.162	0.145	0.045	0.027	0.362
1/4	0.2500	10	● ▲ ■	...		0.240	0.362	0.333	0.080	0.260	0.148	0.048		0.137	0.122	0.042	0.025	0.313
1/4	0.2500	12	● ▲ ■	...		0.240	0.412	0.380	0.112	0.297	0.172	0.054		0.162	0.145	0.045	0.027	0.362
5/16	0.3125	12	● ▲ ■	...		0.302	0.412	0.380	0.075	0.297	0.172	0.054		0.162	0.145	0.045	0.027	0.362
5/16	0.3125	1/4	● ▲ ■	...		0.302	0.477	0.442	0.116	0.344	0.195	0.061		0.193	0.176	0.050	0.029	0.424
3/8	0.3750	5/16	▲ ■	...		0.364	0.597	0.556	0.155	0.432	0.252	0.074		0.251	0.232	0.057	0.034	0.539

GENERAL NOTE: For reference, see Table 19 Illustration on page 38. For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Short screws are those threaded full length. Refer to para. 2.4.1 for applicable screw lengths.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Maximum diameter shall not exceed minimum plus 0.011 in. for Type A screws, and basic screw diameter for all other screw types.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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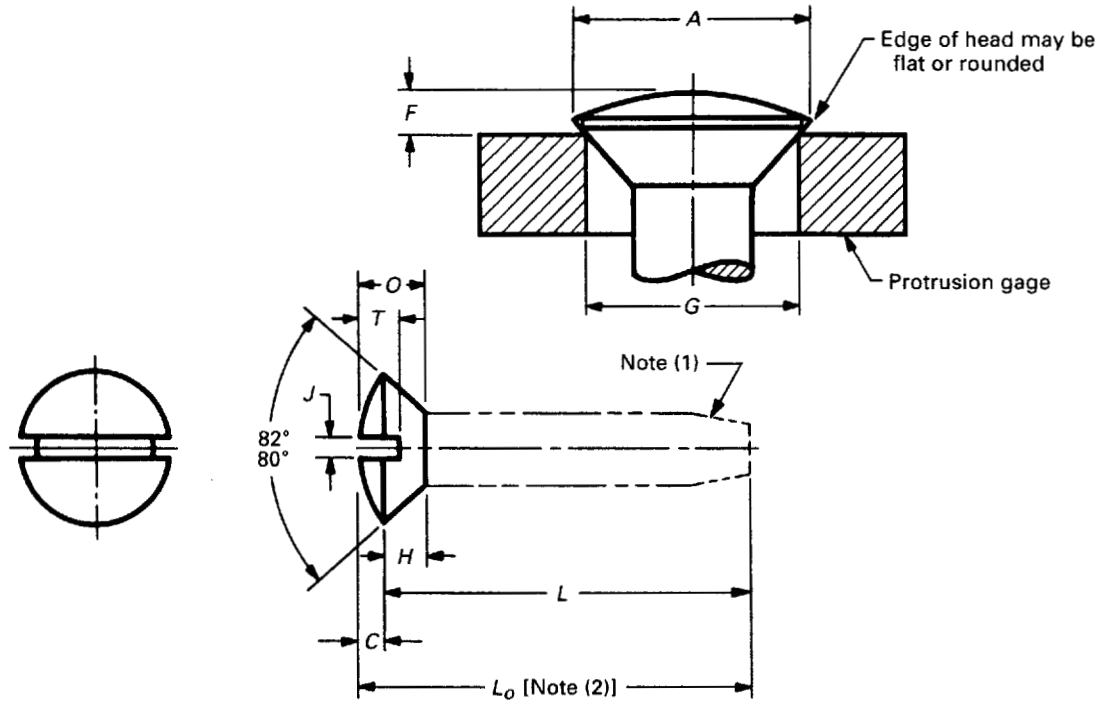


TABLE 20 DIMENSIONS OF SLOTTED OVAL COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	L (4) These Lengths or Shorter Are Undercut		A Head Diameter		H (5) Head Side Height	C Head Crown Height	O (6) Total Head Height	J Slot Width		T Slot Depth		F (7) Protrusion Above Gaging Diameter		G (7)
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Max.	Min.	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ◆ ▲	3/16	1/8	0.112	0.096	0.035	0.021	0.056	0.023	0.016	0.030	0.025	0.047	0.031	0.078
1	0.0730	● ◆ ▲	3/16	5/32	0.137	0.120	0.043	0.025	0.068	0.026	0.019	0.038	0.031	0.053	0.035	0.101
2	0.0860	● ◆ ▲ ■	3/16	3/16	0.162	0.144	0.051	0.029	0.080	0.031	0.023	0.045	0.037	0.058	0.039	0.124
3	0.0990	● ◆ ▲ ■	7/32	7/32	0.187	0.167	0.059	0.033	0.092	0.035	0.027	0.052	0.043	0.064	0.044	0.148
4	0.1120	● ◆ ▲ ■	1/4	1/4	0.212	0.191	0.067	0.037	0.104	0.039	0.031	0.059	0.049	0.069	0.048	0.172
5	0.1250	● ◆ ▲ ■	1/4	1/4	0.237	0.215	0.075	0.041	0.116	0.043	0.035	0.067	0.055	0.075	0.053	0.196
6	0.1380	● ◆ ▲ ■	5/16	5/16	0.262	0.238	0.083	0.045	0.128	0.048	0.039	0.074	0.060	0.080	0.057	0.220
7	0.1510	● ◆ ▲	3/8	3/8	0.287	0.262	0.091	0.049	0.140	0.048	0.039	0.081	0.066	0.085	0.062	0.243

(continued)

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TABLE 20 DIMENSIONS OF SLOTTED OVAL COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4)		*A*		*H* (5)	*C*	*O* (6)	*J*		*T*		*F* (7)		*G* (7)
			These Lengths or Shorter Are Undercut		Head Diameter		Head Side Height	Head Crown Height	Total Head Height	Slot Width		Slot Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Max.	Min.	Max.	Min.	Max.	Min.	Gaging Diameter
8	0.1640	● ● ▲ ■	7/16	7/16	0.312	0.285	0.100	0.052	0.152	0.054	0.045	0.088	0.072	0.091	0.066	0.267
10	0.1900	● ♦ ▲ ■	1/2	1/2	0.362	0.333	0.116	0.060	0.176	0.060	0.050	0.103	0.084	0.102	0.075	0.313
12	0.2160	● ♦ ▲ ■	9/16	9/16	0.412	0.380	0.132	0.068	0.200	0.067	0.056	0.117	0.096	0.113	0.084	0.362
14	0.2420	♦	5/8	...	0.462	0.427	0.148	0.076	0.224	0.075	0.064	0.132	0.108	0.125	0.093	0.410
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.153	0.079	0.232	0.075	0.064	0.136	0.112	0.129	0.095	0.424
16	0.2680	♦	3/4	...	0.512	0.475	0.164	0.084	0.248	0.075	0.064	0.146	0.120	0.136	0.102	0.457
18	0.2940	♦	13/16	...	0.561	0.522	0.180	0.092	0.272	0.084	0.072	0.160	0.132	0.147	0.111	0.505
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.191	0.099	0.290	0.084	0.072	0.171	0.141	0.155	0.117	0.539
20	0.3200	●	13/16	...	0.611	0.569	0.196	0.100	0.296	0.084	0.072	0.175	0.144	0.158	0.120	0.553
24	0.3720	●	1	...	0.711	0.664	0.228	0.116	0.344	0.094	0.081	0.204	0.168	0.181	0.138	0.648
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.230	0.117	0.347	0.094	0.081	0.206	0.170	0.182	0.139	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.223	0.122	0.345	0.094	0.081	0.210	0.174	0.195	0.150	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.223	0.131	0.354	0.106	0.091	0.216	0.176	0.212	0.163	0.739

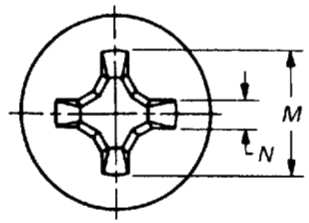
GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions.
- ● Type AB thread forming, see Table 5.
- ● Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

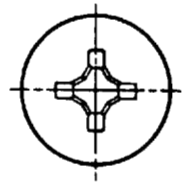
(2) See para. 2.2.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Screws of these lengths and shorter shall have undercut heads, see Table 24. Use Type AB undercut head screws in place of Type A screws for these lengths and shorter.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) Tabulated values determined from formula for *O* max., Appendix A.
(7) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.



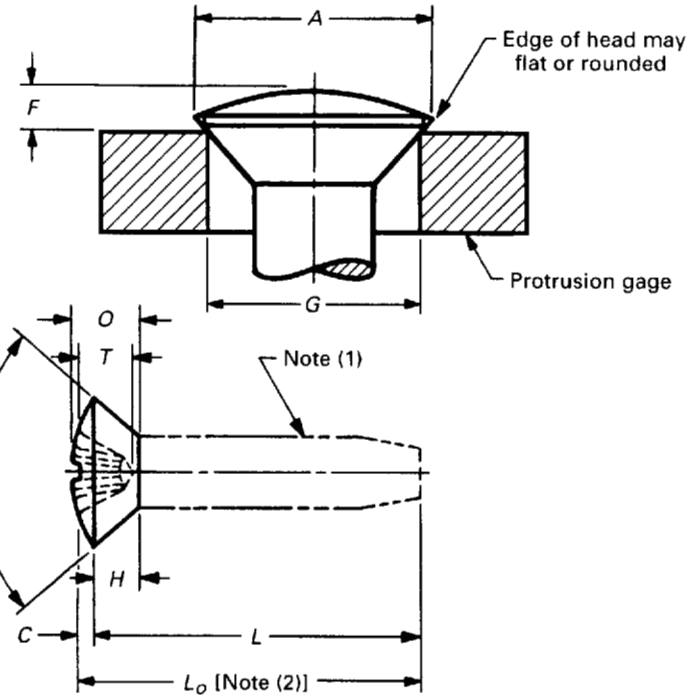


TABLE 21 DIMENSIONS OF TYPE I CROSS RECESSED OVAL COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	L (4)		A		H (5)	C	O (6)	M	T	N		F (7)			G (7)
			These Lengths or Shorter Are Undercut		Head Diameter		Head Side Height	Head Crown Height	Total Head Height	Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ♦ ▲	3/16	1/8	0.112	0.096	0.035	0.021	0.056	0.068	0.036	0.014	0	0.038	0.020	0.047	0.031	0.078
1	0.0730	● ♦ ▲	3/16	5/32	0.137	0.120	0.043	0.025	0.068	0.070	0.039	0.015	0	0.041	0.023	0.053	0.035	0.101
2	0.0860	● ♦ ▲ ■	3/16	3/16	0.162	0.144	0.051	0.029	0.080	0.106	0.060	0.018	1	0.062	0.045	0.058	0.039	0.124
3	0.0990	● ♦ ▲ ■	7/32	7/32	0.187	0.167	0.059	0.033	0.092	0.118	0.072	0.019	1	0.074	0.057	0.064	0.044	0.148
4	0.1120	● ♦ ▲ ■	1/4	1/4	0.212	0.191	0.067	0.037	0.104	0.130	0.086	0.019	1	0.087	0.070	0.069	0.048	0.172
5	0.1250	● ♦ ▲ ■	1/4	1/4	0.237	0.215	0.075	0.041	0.116	0.152	0.073	0.028	2	0.074	0.050	0.075	0.053	0.196
6	0.1380	● ♦ ▲ ■	5/16	5/16	0.262	0.238	0.083	0.045	0.128	0.172	0.092	0.030	2	0.094	0.069	0.080	0.057	0.220
7	0.1510	● ♦ ▲	3/8	3/8	0.287	0.262	0.091	0.049	0.140	0.176	0.098	0.030	2	0.100	0.075	0.085	0.062	0.243

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TABLE 21 DIMENSIONS OF TYPE I CROSS RECESSED OVAL COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4) These Lengths or Shorter Are Undercut		*A* Head Diameter		*H* (5) Head Side Height	*C* Head Crown Height	*O* (6) Total Head Height	*M* Recess Diameter	*T* Recess Depth	*N* Recess Width		*F* (7) Recess Penetration Gaging Depth		*F* (7) Protrusion Above Gaging Diameter		*G* (7)
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
8	0.1640	● ♦ ▲ ■	7/16	7/16	0.312	0.285	0.100	0.052	0.152	0.186	0.107	0.031	2	0.108	0.084	0.091	0.066	0.267
10	0.1900	● ♦ ▲ ■	1/2	1/2	0.362	0.333	0.116	0.060	0.176	0.202	0.125	0.033	2	0.126	0.102	0.102	0.075	0.313
12	0.2160	● ♦ ▲ ■	9/16	9/16	0.412	0.380	0.132	0.068	0.200	0.264	0.140	0.038	3	0.135	0.111	0.113	0.084	0.362
14	0.2420	●	5/8	...	0.462	0.427	0.148	0.076	0.224	0.282	0.152	0.039	3	0.156	0.131	0.125	0.093	0.410
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.153	0.079	0.232	0.284	0.160	0.040	3	0.156	0.131	0.129	0.095	0.424
16	0.2680	●	3/4	...	0.512	0.475	0.164	0.084	0.248	0.326	0.202	0.046	3	0.197	0.172	0.136	0.102	0.457
18	0.2940	♦	13/16	...	0.561	0.522	0.180	0.092	0.272	0.374	0.214	0.064	4	0.206	0.182	0.147	0.111	0.505
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.191	0.099	0.290	0.384	0.226	0.065	4	0.218	0.194	0.155	0.117	0.539
20	0.3200	●	13/16	...	0.611	0.569	0.196	0.100	0.296	0.394	0.233	0.066	4	0.225	0.201	0.158	0.120	0.553
24	0.3720	♦	1	...	0.711	0.664	0.228	0.116	0.344	0.430	0.270	0.072	4	0.262	0.238	0.181	0.138	0.648
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.230	0.117	0.347	0.404	0.245	0.068	4	0.237	0.213	0.182	0.139	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.223	0.122	0.345	0.416	0.257	0.070	4	0.249	0.225	0.195	0.150	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.223	0.131	0.354	0.430	0.271	0.071	4	0.263	0.239	0.212	0.163	0.739

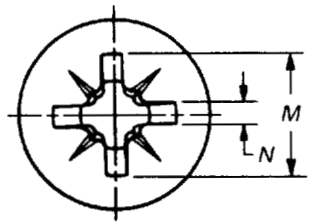
GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

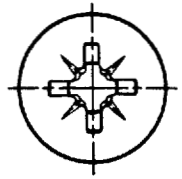
(2) See para. 2.2.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Screws of these lengths and shorter shall have undercut heads, see Table 25. Use Type AB undercut head screws in place of Type A screws for these lengths and shorter.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) Tabulated values determined from formula for *O* max., Appendix A.
(7) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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This type of recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded.



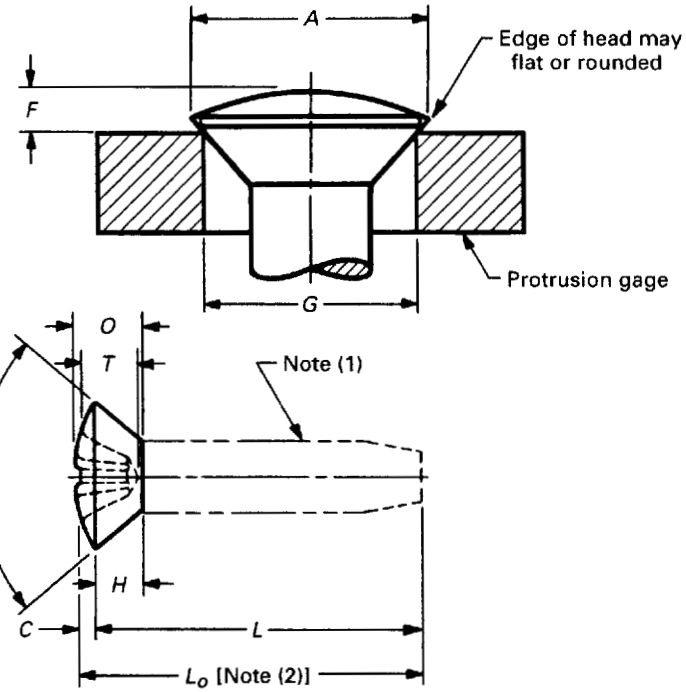


TABLE 22 DIMENSIONS OF TYPE IA CROSS RECESSED OVAL COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4)		*A*		*H* (5)	*C*	*O* (6)	*M*	*T*	*N*				*F* (7)		*G* (7)
			These Lengths or Shorter Are Undercut		Head Diameter		Head Side Height	Head Crown Height	Total Head Height	Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ◆ ▲	3/16	1/8	0.112	0.096	0.035	0.021	0.056	0.068	0.040	0.018	0	0.042	0.024	0.047	0.031	0.078
1	0.0730	● ◆ ▲	3/16	5/32	0.137	0.120	0.043	0.025	0.068	0.070	0.043	0.018	0	0.043	0.027	0.053	0.035	0.101
2	0.0860	● ◆ ▲ ■	3/16	3/16	0.162	0.144	0.051	0.029	0.080	0.106	0.065	0.029	1	0.062	0.046	0.058	0.039	0.124
3	0.0990	● ◆ ▲ ■	7/32	7/32	0.187	0.167	0.059	0.033	0.092	0.118	0.077	0.030	1	0.074	0.058	0.064	0.044	0.148
4	0.1120	● ◆ ▲ ■	1/4	1/4	0.212	0.191	0.067	0.037	0.104	0.130	0.089	0.030	1	0.086	0.070	0.069	0.048	0.172
5	0.1250	● ◆ ▲ ■	1/4	1/4	0.237	0.215	0.075	0.041	0.116	0.152	0.080	0.041	2	0.074	0.056	0.075	0.053	0.196
6	0.1380	● ◆ ▲ ■	5/16	5/16	0.262	0.238	0.083	0.045	0.128	0.172	0.100	0.041	2	0.093	0.075	0.080	0.057	0.220
7	0.1510	● ◆ ▲	3/8	3/8	0.287	0.262	0.091	0.049	0.140	0.176	0.105	0.041	2	0.099	0.081	0.085	0.062	0.243

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TABLE 22 DIMENSIONS OF TYPE IA CROSS RECESSED OVAL COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	*L* (4) These Lengths or Shorter Are Undercut Types AB & A	*L* (4) Other Types	*A* Head Diameter Max.	*A* Head Diameter Min.	*H* (5) Head Side Height Ref.	*C* Head Crown Height Ref.	*O* (6) Total Head Height Ref.	*M* Recess Diameter Ref.	*T* Recess Depth Ref.	*N* Recess Width Ref.	Driver Size	*F* (7) Recess Penetration Gaging Depth Max.	*F* (7) Recess Penetration Gaging Depth Min.	*F* (7) Protrusion Above Gaging Diameter Max.	*F* (7) Protrusion Above Gaging Diameter Min.	*G* (7) Gaging Diameter
8	0.1640	● ♦ ▲ ■	7/16	7/16	0.312	0.285	0.100	0.052	0.152	0.186	0.115	0.041	2	0.108	0.090	0.091	0.066	0.267
10	0.1900	● ♦ ▲ ■	1/2	1/2	0.362	0.333	0.116	0.060	0.176	0.202	0.132	0.041	2	0.125	0.107	0.102	0.075	0.313
12	0.2160	● ♦ ▲ ■	9/16	9/16	0.412	0.380	0.132	0.068	0.200	0.264	0.148	0.056	3	0.135	0.117	0.113	0.084	0.362
14	0.2420	♦	5/8	...	0.462	0.427	0.148	0.076	0.224	0.282	0.166	0.057	3	0.153	0.135	0.125	0.093	0.410
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.153	0.079	0.232	0.284	0.168	0.057	3	0.155	0.137	0.129	0.095	0.424
16	0.2680	♦	3/4	...	0.512	0.475	0.164	0.084	0.248	0.326	0.210	0.057	3	0.197	0.179	0.136	0.102	0.457
18	0.2940	♦	13/16	...	0.561	0.522	0.180	0.092	0.272	0.374	0.223	0.085	4	0.205	0.187	0.147	0.111	0.505
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.191	0.099	0.290	0.384	0.232	0.086	4	0.215	0.197	0.155	0.117	0.539
20	0.3200	♦	13/16	...	0.611	0.569	0.196	0.100	0.296	0.394	0.242	0.086	4	0.225	0.207	0.158	0.120	0.553
24	0.3720	♦	1	...	0.711	0.664	0.228	0.116	0.344	0.430	0.279	0.087	4	0.261	0.243	0.181	0.138	0.648
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.230	0.117	0.347	0.404	0.253	0.086	4	0.235	0.217	0.182	0.139	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.223	0.122	0.345	0.416	0.265	0.086	4	0.247	0.229	0.195	0.150	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.223	0.131	0.354	0.430	0.280	0.086	4	0.262	0.244	0.212	0.163	0.739

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) See para. 2.2
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Screws of these lengths and shorter shall have undercut heads, see Table 26. Use Type AB undercut head screws in place of Type A screws for these lengths and shorter.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) Tabulated values determined from formula for *O* max., Appendix A.
(7) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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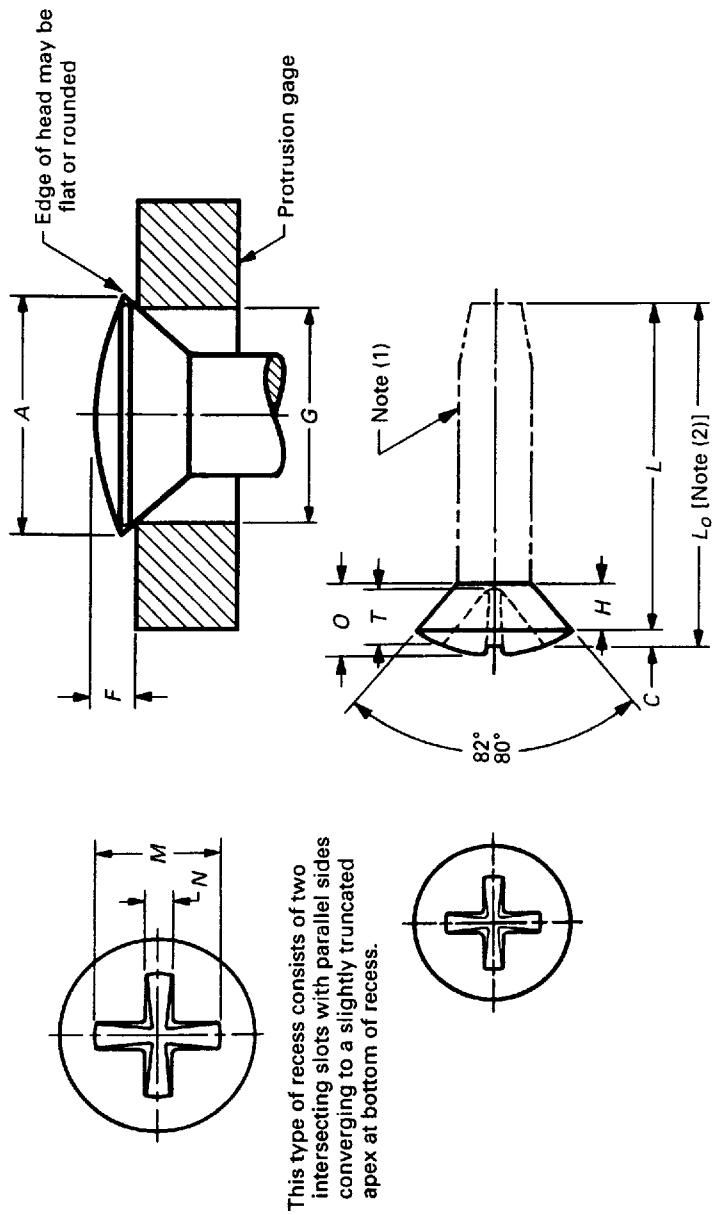


TABLE 23 ILLUSTRATION

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TABLE 23 DIMENSIONS OF TYPE II CROSS RECESSED OVAL COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4)		*A*		*H* (5)	*C*	*O* (6)	*M*	*T*	*N*		*F* (7)		*G* (7)
			These Lengths or Shorter Are Undercut		Head Diameter		Head Side Height	Head Crown Height	Total Head Height	Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Types AB & A	Other Types	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ♦ ▲	3/16	1/8	0.112	0.096	0.035	0.021	0.056	0.078	0.036	0.021		(8)	(8)	0.047	0.031	0.078
1	0.0730	● ♦ ▲	3/16	5/32	0.137	0.120	0.043	0.025	0.068	0.092	0.048	0.024		(8)	(8)	0.053	0.035	0.101
2	0.0860	● ♦ ▲ ■	3/16	3/16	0.162	0.144	0.051	0.029	0.080	0.114	0.060	0.027		0.040	0.029	0.058	0.039	0.124
3	0.0990	● ♦ ▲ ■	7/32	7/32	0.187	0.167	0.059	0.033	0.092	0.133	0.072	0.030		0.053	0.041	0.064	0.044	0.148
4	0.1120	● ♦ ▲ ■	1/4	1/4	0.212	0.191	0.067	0.037	0.104	0.151	0.082	0.032		0.064	0.052	0.069	0.048	0.172
5	0.1250	● ♦ ▲ ■	1/4	1/4	0.237	0.215	0.075	0.041	0.116	0.169	0.094	0.035		0.077	0.064	0.075	0.053	0.196
6	0.1380	● ♦ ▲ ■	5/16	5/16	0.262	0.238	0.083	0.045	0.128	0.188	0.106	0.038		0.089	0.075	0.080	0.057	0.220
7	0.1510	● ♦ ▲	3/8	3/8	0.287	0.262	0.091	0.049	0.140	0.206	0.118	0.040		0.101	0.087	0.085	0.062	0.243
8	0.1640	● ♦ ▲ ■	7/16	7/16	0.312	0.285	0.100	0.052	0.152	0.224	0.124	0.043	Point	0.113	0.099	0.091	0.066	0.267
10	0.1900	● ♦ ▲ ■	1/2	1/2	0.362	0.333	0.116	0.060	0.176	0.260	0.148	0.048	Same	0.137	0.122	0.102	0.075	0.313
12	0.2160	● ♦ ▲ ■	9/16	9/16	0.412	0.380	0.132	0.068	0.200	0.297	0.172	0.054	On	0.162	0.145	0.113	0.084	0.362
14	0.2420	♦	5/8	...	0.462	0.427	0.148	0.076	0.224	0.334	0.188	0.059	All Drivers	0.186	0.168	0.125	0.093	0.410
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.153	0.079	0.232	0.344	0.195	0.061		0.193	0.176	0.129	0.095	0.424
16	0.2680	♦	3/4	...	0.512	0.475	0.164	0.084	0.248	0.370	0.211	0.064		0.210	0.191	0.136	0.102	0.457
18	0.2940	♦	13/16	...	0.561	0.522	0.180	0.092	0.272	0.406	0.235	0.070		0.234	0.215	0.147	0.111	0.505
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.191	0.099	0.290	0.432	0.252	0.074		0.251	0.232	0.155	0.117	0.539
20	0.3200	♦	13/16	...	0.611	0.569	0.196	0.100	0.296	0.442	0.258	0.075		0.258	0.238	0.158	0.120	0.553
24	0.3720	♦	1	...	0.711	0.664	0.228	0.116	0.344	0.515	0.306	0.086		0.307	0.284	0.181	0.138	0.648
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.230	0.117	0.347	0.509	0.302	0.086		0.303	0.281	0.182	0.139	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.223	0.122	0.345	0.554	0.332	0.092		0.332	0.310	0.195	0.150	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.223	0.131	0.354	0.593	0.358	0.098		0.359	0.335	0.212	0.163	0.739

GENERAL NOTE: For reference, see Table 23 Illustration on page 46. For additional requirements, refer to para. 2.

NOTES:

(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) See para. 2.2.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

(4) Screws of these lengths and shorter shall have undercut heads, see Table 27. Use Type AB undercut head screws in place of Type A screws for these lengths and shorter.

(5) Tabulated values determined from formula for *H* max., Appendix A.

(6) Tabulated values determined from formula for *O* max., Appendix A.

(7) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

(8) Not practicable to gage.

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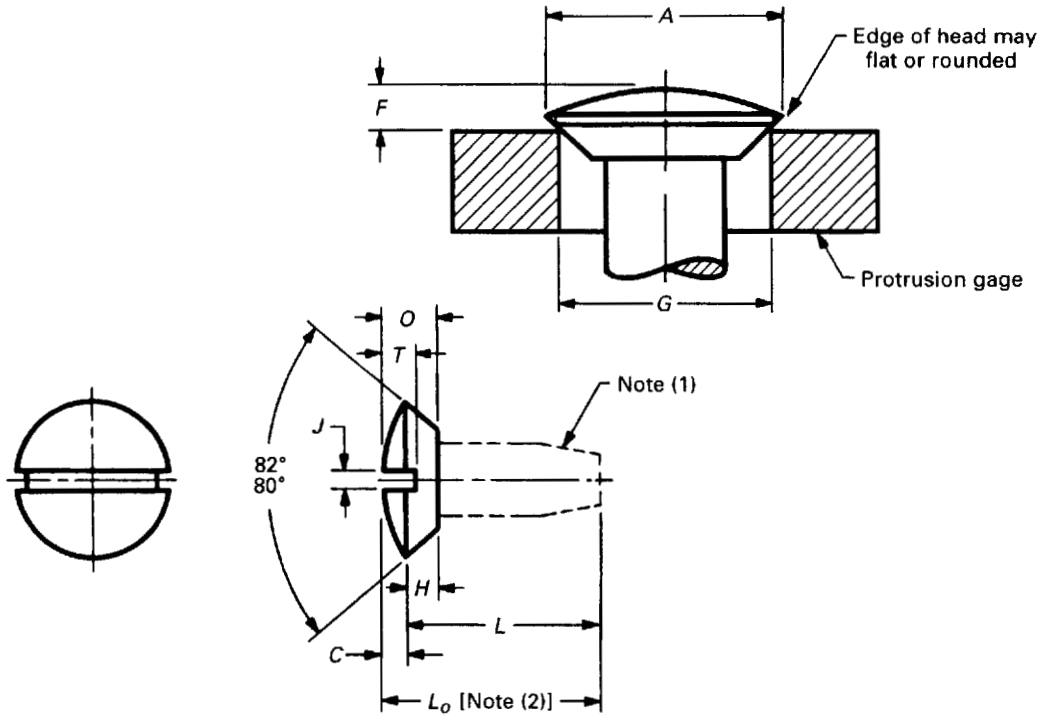


TABLE 24 DIMENSIONS OF SLOTTED UNDERCUT OVAL COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	L (4) These Lengths or Shorter Are Undercut		A Head Diameter		H (5) Head Side Height	C Head Crown Height	O Total Head Height		J Slot Width		T Slot Depth		F (6) Protrusion Above Gaging Diameter		G (6)
		Code Symbols	Type AB	Other Types	Max.	Min.	Ref.	Ref.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ▲	3/16	1/8	0.112	0.096	0.025	0.021	0.046	0.033	0.023	0.016	0.028	0.022	0.047	0.031	0.078
1	0.0730	● ▲	3/16	5/32	0.137	0.120	0.031	0.025	0.056	0.042	0.026	0.019	0.034	0.027	0.053	0.035	0.101
2	0.0860	● ▲ ■	3/16	3/16	0.162	0.144	0.036	0.029	0.065	0.050	0.031	0.023	0.040	0.033	0.058	0.039	0.124
3	0.0990	● ▲ ■	7/32	7/32	0.187	0.167	0.042	0.033	0.075	0.059	0.035	0.027	0.047	0.038	0.064	0.044	0.148
4	0.1120	● ▲ ■	1/4	1/4	0.212	0.191	0.047	0.037	0.084	0.067	0.039	0.031	0.053	0.043	0.069	0.048	0.172
5	0.1250	● ▲ ■	1/4	1/4	0.237	0.215	0.053	0.041	0.094	0.076	0.043	0.035	0.059	0.048	0.075	0.053	0.196
6	0.1380	● ▲ ■	5/16	5/16	0.262	0.238	0.059	0.045	0.104	0.084	0.048	0.039	0.065	0.053	0.080	0.057	0.220
7	0.1510	● ▲	3/8	3/8	0.287	0.262	0.064	0.049	0.113	0.093	0.048	0.039	0.071	0.059	0.085	0.062	0.243

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TABLE 24 DIMENSIONS OF SLOTTED UNDERCUT OVAL COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

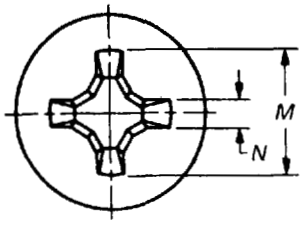
Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4) These Lengths or Shorter Are Undercut		*A* Head Diameter		*H* (5) Head Side Height	*C* Head Crown Height	*O* Total Head Height		*J* Slot Width		*T* Slot Depth		*F* (6) Protrusion Above Gaging Diameter		*G* (6)
		Code Symbols	Type AB	Other Types	Max.	Min.	Ref.	Ref.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Gaging Diameter
8	0.1640	● ▲ ■	7/16	7/16	0.312	0.285	0.070	0.052	0.123	0.101	0.054	0.045	0.078	0.064	0.091	0.066	0.267
10	0.1900	● ▲ ■	1/2	1/2	0.362	0.333	0.081	0.060	0.142	0.118	0.060	0.050	0.090	0.074	0.102	0.075	0.313
12	0.2160	● ▲ ■	9/16	9/16	0.412	0.380	0.092	0.068	0.161	0.135	0.067	0.056	0.103	0.085	0.113	0.084	0.362
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.107	0.079	0.186	0.158	0.075	0.064	0.119	0.098	0.129	0.095	0.424
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.134	0.099	0.232	0.198	0.084	0.072	0.149	0.124	0.155	0.117	0.539
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.161	0.117	0.278	0.239	0.094	0.081	0.179	0.149	0.182	0.139	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.156	0.122	0.279	0.239	0.094	0.081	0.184	0.154	0.195	0.150	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.156	0.131	0.288	0.244	0.106	0.091	0.204	0.169	0.212	0.163	0.739

GENERAL NOTE: For additional requirements, refer to para. 2.

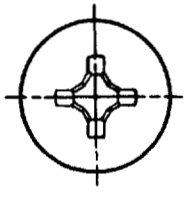
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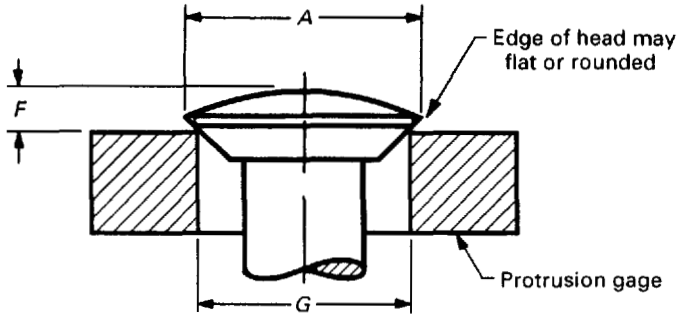
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) See para. 2.2.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Longer lengths shall have head heights as shown in Table 20.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.



This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.





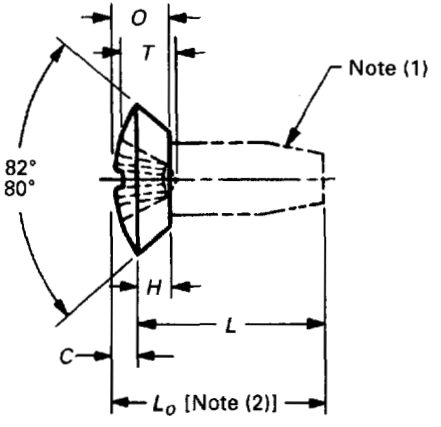


TABLE 25 DIMENSIONS OF TYPE I CROSS RECESSED UNDERCUT OVAL COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	L (4) These Lengths or Shorter Are Undercut		A Head Diameter		H (5) Head Side Height	C Head Crown Height	O Total Head Height		M Recess Diameter	T Recess Depth	N Recess Width		Recess Penetration Gaging Depth		F (6) Protrusion Above Gaging Diameter		G (6)
		Code Symbols	Type AB	Other Types	Max.	Min.	Ref.	Ref.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	◔ ▲	3/16	1/8	0.112	0.096	0.025	0.021	0.046	0.033	0.068	0.036	0.014	0	0.038	0.020	0.047	0.031	0.078
1	0.0730	● ▲	3/16	5/32	0.137	0.120	0.031	0.025	0.056	0.042	0.070	0.039	0.015	0	0.041	0.023	0.053	0.035	0.101
2	0.0860	● ▲ ■	3/16	3/16	0.162	0.144	0.036	0.029	0.065	0.050	0.106	0.060	0.018	1	0.062	0.045	0.058	0.039	0.124
3	0.0990	◔ ▲ ■	7/32	7/32	0.187	0.167	0.042	0.033	0.075	0.059	0.118	0.072	0.019	1	0.074	0.057	0.064	0.044	0.148
4	0.1120	◔ ▲ ■	1/4	1/4	0.212	0.191	0.047	0.037	0.084	0.067	0.130	0.086	0.019	1	0.087	0.070	0.069	0.048	0.172
5	0.1250	● ▲ ■	1/4	1/4	0.237	0.215	0.053	0.041	0.094	0.076	0.152	0.073	0.028	2	0.074	0.050	0.075	0.053	0.196
6	0.1380	◔ ▲ ■	5/16	5/16	0.262	0.238	0.059	0.045	0.104	0.084	0.172	0.092	0.030	2	0.094	0.069	0.080	0.057	0.220
7	0.1510	● ▲	3/8	3/8	0.287	0.262	0.064	0.049	0.113	0.093	0.176	0.098	0.030	2	0.100	0.075	0.085	0.062	0.243

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TABLE 25 DIMENSIONS OF TYPE I CROSS RECESSED UNDERCUT OVAL COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4) These Lengths or Shorter Are Undercut		*A*		*H* (5)	*C*	*O*		*M*	*T*	*N*		*F* (6)				*G* (6)
					Head Diameter		Head Side Height	Head Crown Height	Total Head Height		Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Type AB	Other Types	Max.	Min.	Ref.	Ref.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
8	0.1640	● ▲ ■	7/16	7/16	0.312	0.285	0.070	0.052	0.123	0.101	0.186	0.107	0.031	2	0.108	0.084	0.091	0.066	0.267
10	0.1900	● ▲ ■	1/2	1/2	0.362	0.333	0.081	0.060	0.142	0.118	0.202	0.125	0.033	2	0.126	0.102	0.102	0.075	0.313
12	0.2160	● ▲ ■	9/16	9/16	0.412	0.380	0.092	0.068	0.161	0.135	0.264	0.140	0.038	3	0.135	0.111	0.113	0.084	0.362
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.107	0.079	0.186	0.158	0.284	0.160	0.040	3	0.156	0.131	0.129	0.095	0.424
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.134	0.099	0.232	0.198	0.374	0.214	0.064	4	0.206	0.182	0.155	0.117	0.539
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.161	0.117	0.278	0.239	0.394	0.233	0.066	4	0.225	0.201	0.182	0.139	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.156	0.122	0.279	0.239	0.404	0.245	0.068	4	0.237	0.213	0.195	0.150	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.156	0.131	0.288	0.244	0.416	0.257	0.070	4	0.249	0.225	0.212	0.163	0.739

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
● Type AB thread forming, see Table 5.
▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.
(2) See para. 2.2
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Longer lengths shall have head heights as shown in Table 21.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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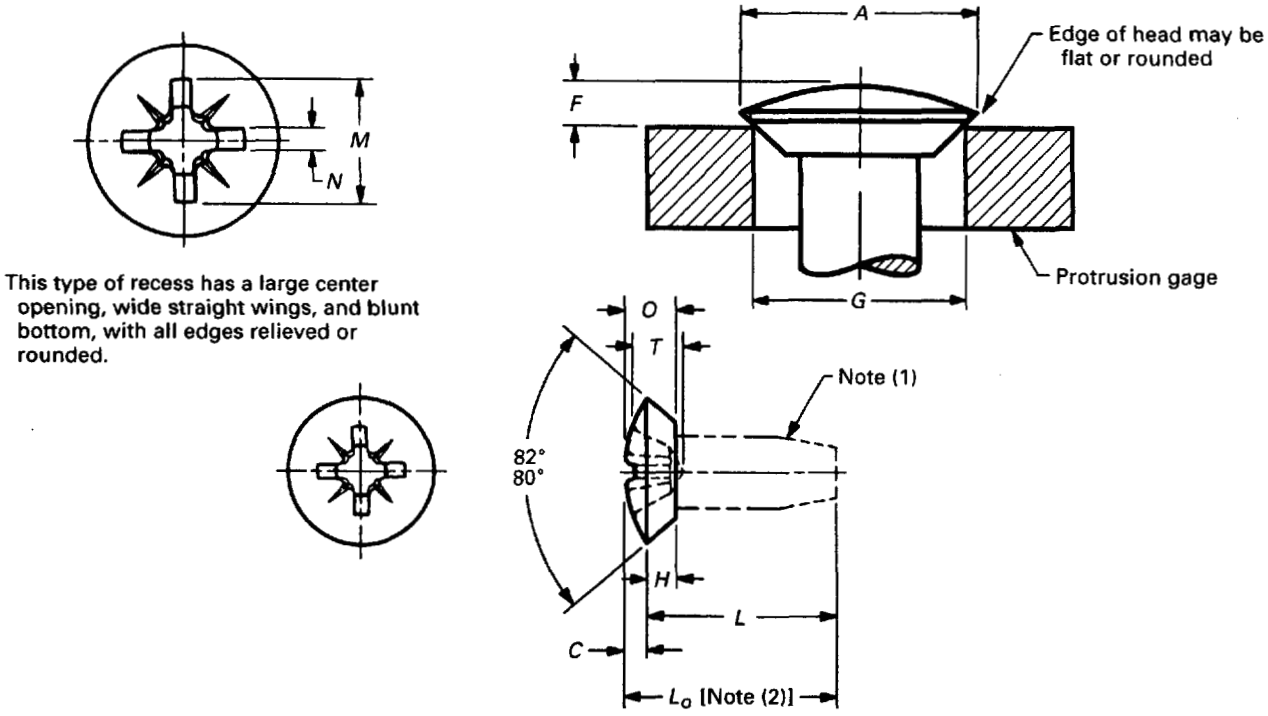


TABLE 26 DIMENSIONS OF TYPE IA CROSS RECESSED UNDERCUT OVAL COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4) These Lengths or Shorter Are Undercut		*A*		*H* (5)	*C*	*O*		*M*	*T*	*N*		*F* (6)		*G* (6)
					Head Diameter		Head Side Height	Head Crown Height	Total Head Height		Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Type AB	Other Types	Max.	Min.	Ref.	Ref.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	◆ ▲	3/16	1/8	0.112	0.096	0.025	0.021	0.046	0.033	0.068	0.040	0.018	0	0.040	0.024	0.047	0.031	0.078
1	0.0730	◆ ▲	3/16	5/32	0.137	0.120	0.031	0.025	0.056	0.042	0.070	0.043	0.018	0	0.043	0.027	0.053	0.035	0.101
2	0.0860	◆ ▲ ■	3/16	3/16	0.162	0.144	0.036	0.029	0.065	0.050	0.106	0.065	0.029	1	0.062	0.046	0.058	0.039	0.124
3	0.0990	◆ ▲ ■	7/32	7/32	0.187	0.167	0.042	0.033	0.075	0.059	0.118	0.077	0.030	1	0.074	0.058	0.064	0.044	0.148
4	0.1120	◆ ▲ ■	1/4	1/4	0.212	0.191	0.047	0.037	0.084	0.067	0.130	0.089	0.030	1	0.086	0.070	0.069	0.048	0.172
5	0.1250	● ▲ ■	1/4	1/4	0.237	0.215	0.053	0.041	0.094	0.076	0.152	0.080	0.041	2	0.074	0.056	0.075	0.053	0.196
6	0.1380	◆ ▲ ■	5/16	5/16	0.262	0.238	0.059	0.045	0.104	0.084	0.172	0.100	0.041	2	0.093	0.075	0.080	0.057	0.220
7	0.1510	◆ ▲	3/8	3/8	0.287	0.262	0.064	0.049	0.113	0.093	0.176	0.105	0.041	2	0.099	0.081	0.085	0.062	0.243

(continued)

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TABLE 26 DIMENSIONS OF TYPE IA CROSS RECESSED UNDERCUT OVAL COUNTERSUNK HEAD TAPPING SCREWS (CONT'D)

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4) These Lengths or Shorter Are Undercut		*A*		*H* (5)	*C*	*O*		*M*	*T*	*N*		*F* (6)				*G* (6)
					Head Diameter		Head Side Height	Head Crown Height	Total Head Height		Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Type AB	Other Types	Max.	Min.	Ref.	Ref.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
8	0.1640	● ▲ ■	7/16	7/16	0.312	0.285	0.070	0.052	0.123	0.101	0.186	0.115	0.041	2	0.108	0.090	0.091	0.066	0.267
10	0.1900	● ▲ ■	1/2	1/2	0.362	0.333	0.081	0.060	0.142	0.118	0.202	0.132	0.041	2	0.125	0.107	0.102	0.075	0.313
12	0.2160	● ▲ ■	9/16	9/16	0.412	0.380	0.092	0.068	0.161	0.135	0.264	0.148	0.056	3	0.135	0.117	0.113	0.084	0.362
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.107	0.079	0.186	0.158	0.284	0.168	0.057	3	0.155	0.137	0.129	0.095	0.424
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.134	0.099	0.232	0.198	0.374	0.223	0.086	4	0.205	0.187	0.155	0.117	0.539
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.161	0.117	0.278	0.239	0.394	0.243	0.086	4	0.225	0.207	0.182	0.139	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.156	0.122	0.279	0.239	0.404	0.253	0.086	4	0.235	0.217	0.195	0.150	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.156	0.131	0.288	0.244	0.416	0.265	0.086	4	0.247	0.229	0.212	0.163	0.739

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) See para. 2.2.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Longer lengths shall have head heights as shown in Table 22.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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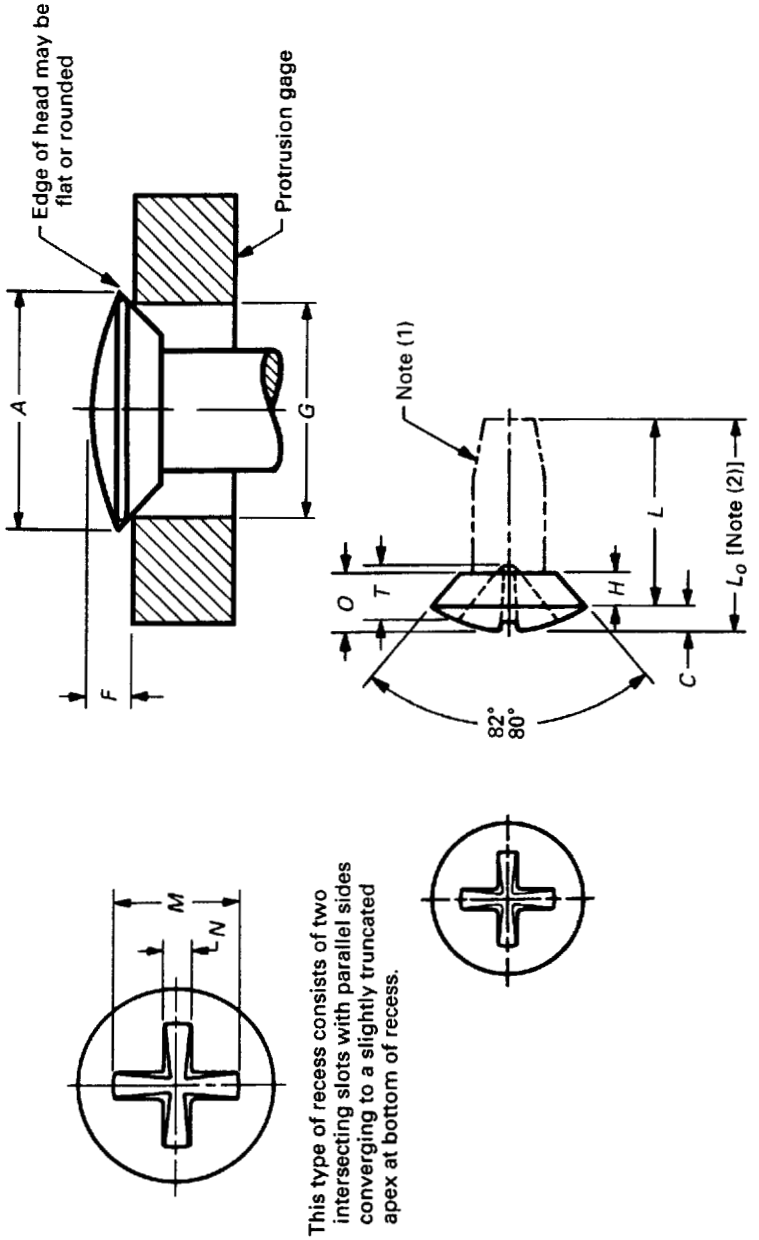


TABLE 27 ILLUSTRATION

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TABLE 27 DIMENSIONS OF TYPE II CROSS RECESSED UNDERCUT OVAL COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (1)	*L* (4) These Lengths or Shorter Are Undercut		*A* Head Diameter		*H* (5) Head Side Height	*C* Head Crown Height	*O* Total Head Height		*M* Recess Diameter	*T* Recess Depth	*N* Recess Width		*F* (6) Recess Penetration Gaging Depth		*F* (6) Protrusion Above Gaging Diameter		*G* (6)
		Code Symbols	Type AB	Other Types	Max.	Min.	Ref.	Ref.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
0	0.0600	● ▲	3/16	1/8	0.112	0.096	0.025	0.021	0.046	0.033	0.067	0.029	0.020		(7)	(7)	0.047	0.031	0.078
1	0.0730	● ▲	3/16	5/32	0.137	0.120	0.031	0.025	0.056	0.042	0.082	0.039	0.022		(7)	(7)	0.053	0.035	0.101
2	0.0860	● ▲ ■	3/16	3/16	0.162	0.144	0.036	0.029	0.065	0.050	0.100	0.050	0.025		0.030	0.020	0.058	0.039	0.124
3	0.0990	● ▲ ■	7/32	7/32	0.187	0.167	0.042	0.033	0.075	0.059	0.111	0.058	0.026		0.038	0.027	0.064	0.044	0.148
4	0.1120	● ▲ ■	1/4	1/4	0.212	0.191	0.047	0.037	0.084	0.067	0.129	0.070	0.029		0.050	0.038	0.069	0.048	0.172
5	0.1250	● ▲ ■	1/4	1/4	0.237	0.215	0.053	0.041	0.094	0.076	0.147	0.080	0.032		0.062	0.050	0.075	0.053	0.196
6	0.1380	● ▲ ■	5/16	5/16	0.262	0.238	0.059	0.045	0.104	0.084	0.161	0.088	0.034	Point	0.071	0.059	0.080	0.057	0.220
7	0.1510	● ▲	3/8	3/8	0.287	0.262	0.064	0.049	0.113	0.093	0.178	0.100	0.036	Same On	0.083	0.069	0.085	0.062	0.243
8	0.1640	● ▲ ■	7/16	7/16	0.312	0.285	0.070	0.052	0.123	0.101	0.197	0.112	0.039	All	0.095	0.082	0.091	0.066	0.267
10	0.1900	● ▲ ■	1/2	1/2	0.362	0.333	0.081	0.060	0.142	0.118	0.236	0.132	0.045	Drivers	0.121	0.107	0.102	0.075	0.313
12	0.2160	● ▲ ■	9/16	9/16	0.412	0.380	0.092	0.068	0.161	0.135	0.260	0.148	0.048		0.137	0.122	0.113	0.084	0.362
1/4	0.2500	● ▲ ■	5/8	5/8	0.477	0.442	0.107	0.079	0.186	0.158	0.304	0.169	0.054		0.167	0.150	0.129	0.095	0.424
5/16	0.3125	● ▲ ■	13/16	5/8	0.597	0.556	0.134	0.099	0.232	0.198	0.381	0.218	0.066		0.218	0.198	0.155	0.117	0.539
3/8	0.3750	▲ ■	...	5/8	0.717	0.670	0.161	0.117	0.278	0.239	0.453	0.266	0.077		0.266	0.244	0.182	0.139	0.653
7/16	0.4375	▲	...	3/4	0.760	0.715	0.156	0.122	0.279	0.239	0.498	0.295	0.083		0.296	0.273	0.195	0.150	0.690
1/2	0.5000	▲	...	3/4	0.815	0.765	0.156	0.131	0.288	0.244	0.548	0.328	0.090		0.329	0.305	0.212	0.163	0.739

GENERAL NOTE: For reference, see Table 27 Illustration on page 54. For additional requirements, refer to para. 2.

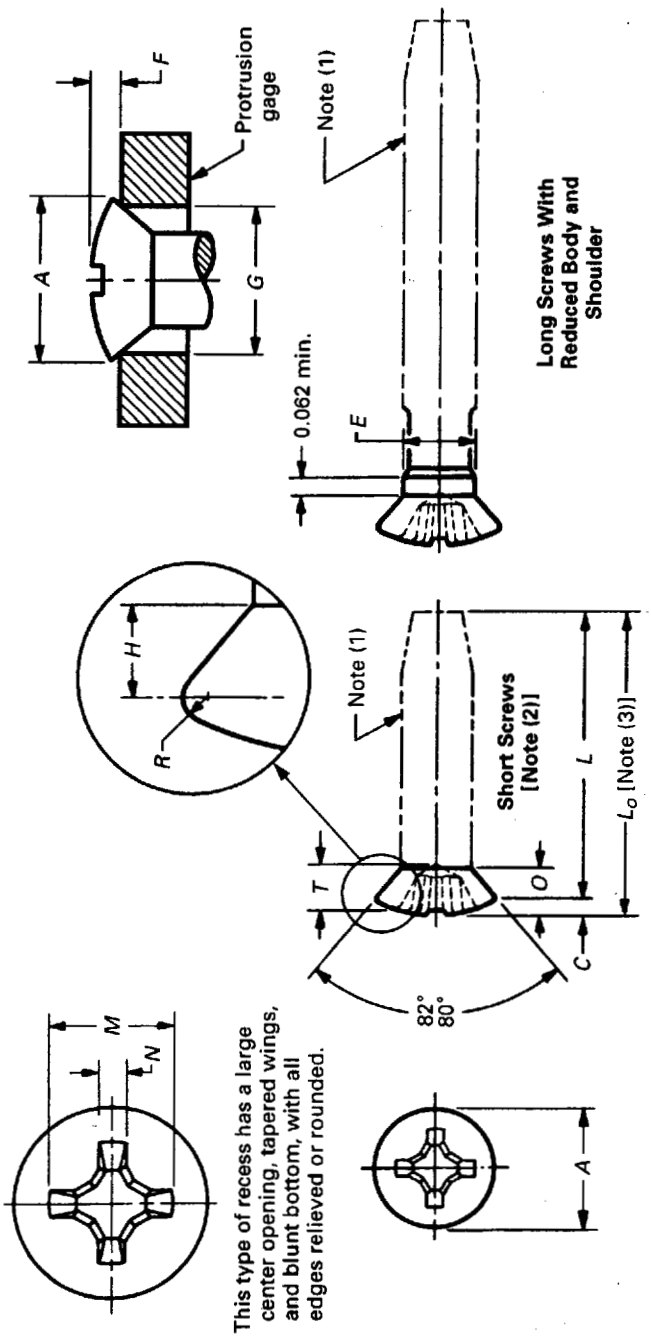
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) See para. 2.2.
(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omited.
(4) Longer lengths shall have head heights as shown in Table 23.
(5) Tabulated values determined from formula for *H* max., Appendix A.
(6) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.
(7) Not practicable to gage.

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TABLE 28 ILLUSTRATION



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TABLE 28 DIMENSIONS OF TYPE I CROSS RECESSED OVAL COUNTERSUNK TRIM HEAD TAPPING SCREWS

For Short Screws

Nominal Size (4) or Basic Screw Diameter		Head Size	Applicable to Screw Types (1) Code Symbols	E (5) Shoulder Diameter Type A Min.	E (5) Shoulder Diameter Other Types Min.	A Head Diameter Max.	A Head Diameter Min.	H (6) Head Side Height Ref.	C Head Crown Height Ref.	O (7) Total Head Height Ref.	R Head Radius Ref.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	F (8) Recess Penetration Gaging Depth Max.	F (8) Recess Penetration Gaging Depth Min.	G (8) Protrusion Above Gaging Diameter Max.	G (8) Protrusion Above Gaging Diameter Min.	Gaging Diameter
4	0.1120	3	● ♦ ▲ ■	...	...	0.187	0.167	0.057	0.033	0.086	0.014	0.118	0.072	0.019	1	0.074	0.057	0.064	0.044	0.148
5	0.1250	4	● ♦ ▲ ■	...	...	0.212	0.191	0.066	0.037	0.099	0.017	0.130	0.086	0.019	1	0.087	0.070	0.069	0.048	0.172
6	0.1380	4	● ♦ ▲ ■	...	...	0.212	0.191	0.058	0.037	0.099	0.017	0.130	0.086	0.019	1	0.087	0.070	0.069	0.048	0.172
6	0.1380	5	● ♦ ▲ ■	...	...	0.237	0.215	0.075	0.041	0.112	0.019	0.152	0.073	0.028	2	0.074	0.050	0.075	0.053	0.196
8	0.1640	5	● ♦ ▲ ■	...	...	0.237	0.215	0.060	0.041	0.096	0.019	0.152	0.073	0.028	2	0.074	0.050	0.075	0.053	0.196
8	0.1640	6	● ♦ ▲ ■	...	...	0.262	0.238	0.076	0.045	0.117	0.021	0.172	0.092	0.030	2	0.094	0.069	0.080	0.057	0.220
10	0.1900	8	● ♦ ▲ ■	...	...	0.312	0.285	0.094	0.076	0.141	0.025	0.186	0.107	0.031	2	0.108	0.084	0.091	0.066	0.267
12	0.2160	8	● ♦ ▲ ■	...	...	0.312	0.285	0.078	0.076	0.125	0.025	0.186	0.107	0.031	2	0.108	0.084	0.091	0.066	0.267
12	0.2160	10	● ♦ ▲ ■	...	...	0.362	0.333	0.111	0.060	0.166	0.029	0.202	0.125	0.033	2	0.126	0.102	0.102	0.075	0.333
14	0.2420	10	♦	...	...	0.362	0.333	0.091	0.060	0.146	0.029	0.202	0.125	0.033	2	0.126	0.102	0.102	0.075	0.333
14	0.2420	12	♦	...	...	0.412	0.380	0.124	0.068	0.187	0.033	0.264	0.140	0.038	3	0.135	0.111	0.133	0.084	0.362
1/4	0.2500	10	● ▲ ■	...	...	0.362	0.333	0.091	0.060	0.146	0.029	0.202	0.125	0.033	2	0.126	0.102	0.102	0.075	0.313
1/4	0.2500	12	● ▲ ■	...	...	0.412	0.380	0.124	0.068	0.187	0.033	0.264	0.140	0.038	3	0.135	0.111	0.113	0.084	0.362
5/16	0.3125	12	● ▲ ■	...	...	0.412	0.380	0.087	0.068	0.150	0.033	0.264	0.140	0.038	3	0.135	0.111	0.113	0.084	0.362
5/16	0.3125	1/4	● ▲ ■	...	...	0.477	0.442	0.130	0.079	0.202	0.038	0.284	0.160	0.040	3	0.156	0.131	0.129	0.095	0.424
3/8	0.3750	5/16	▲ ■	...	...	0.597	0.556	0.173	0.099	0.265	0.048	0.384	0.226	0.065	4	0.218	0.194	0.155	0.117	0.539

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TABLE 28 DIMENSIONS OF TYPE I CROSS RECESSED OVAL COUNTERSUNK TRIM HEAD TAPPING SCREWS (CONT'D)

For Long Screws With Shoulder

Nominal Size (4) or Basic Screw Diameter		Head Size	Applicable to Screw Types (1) Code Symbols	E (5) Shoulder Diameter Type A Min.	E (5) Shoulder Diameter Other Types Min.	A Head Diameter Max.	A Head Diameter Min.	H (6) Head Side Height Ref.	C Head Crown Height Ref.	O (7) Total Head Height Ref.	R Head Radius Ref.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	F (8) Recess Penetration Gaging Depth Max.	F (8) Recess Penetration Gaging Depth Min.	F (8) Protrusion Above Gaging Diameter Max.	F (8) Protrusion Above Gaging Diameter Min.	G (8) Gaging Diameter
4	0.1120	3	● ♦ ▲ ■	0.105	0.106	0.187	0.167	0.057	0.033	0.086	0.014	0.118	0.072	0.019	1	0.074	0.057	0.064	0.044	0.148
5	0.1250	4	● ♦ ▲ ■	0.118	0.119	0.212	0.191	0.066	0.037	0.099	0.017	0.130	0.086	0.019	1	0.087	0.070	0.069	0.048	0.172
6	0.1380	4	● ♦ ▲ ■	0.131	0.131	0.212	0.191	0.058	0.037	0.091	0.017	0.130	0.086	0.019	1	0.087	0.070	0.069	0.048	0.172
6	0.1380	5	● ♦ ▲ ■	0.131	0.131	0.237	0.215	0.075	0.041	0.112	0.019	0.162	0.084	0.028	2	0.085	0.061	0.075	0.053	0.196
8	0.1640	5	● ♦ ▲ ■	0.157	0.157	0.237	0.215	0.060	0.041	0.096	0.019	0.162	0.084	0.028	2	0.085	0.061	0.075	0.053	0.196
8	0.1640	6	● ♦ ▲ ■	0.157	0.157	0.262	0.238	0.076	0.045	0.117	0.021	0.188	0.108	0.031	2	0.110	0.085	0.080	0.057	0.220
10	0.1900	8	● ♦ ▲ ■	0.183	0.181	0.312	0.285	0.094	0.076	0.141	0.025	0.200	0.122	0.031	2	0.124	0.099	0.091	0.066	0.267
12	0.2160	8	● ♦ ▲ ■	0.209	0.207	0.312	0.285	0.078	0.076	0.125	0.025	0.200	0.122	0.031	2	0.124	0.099	0.091	0.066	0.267
12	0.2160	10	● ♦ ▲ ■	0.209	0.207	0.362	0.333	0.111	0.060	0.166	0.029	0.214	0.136	0.033	2	0.137	0.112	0.102	0.075	0.313
14	0.2420	10	♦	0.235	...	0.362	0.333	0.091	0.060	0.146	0.029	0.214	0.136	0.033	2	0.137	0.112	0.102	0.075	0.313
14	0.2420	12	♦	0.235	...	0.412	0.380	0.124	0.068	0.187	0.033	0.264	0.140	0.038	3	0.135	0.111	0.113	0.084	0.362
1/4	0.2500	10	● ▲ ■	...		0.240	0.362	0.333	0.091	0.060	0.146	0.029	0.214	0.136	0.033	2	0.137	0.112	0.102	0.075	0.313
1/4	0.2500	12	● ▲ ■	...		0.240	0.412	0.380	0.124	0.068	0.187	0.033	0.264	0.140	0.038	3	0.135	0.111	0.113	0.084	0.362
5/16	0.3125	12	● ▲ ■	...		0.302	0.412	0.380	0.087	0.068	0.150	0.033	0.264	0.140	0.038	3	0.135	0.111	0.113	0.084	0.362
5/16	0.3125	1/4	● ▲ ■	...		0.302	0.477	0.442	0.130	0.079	0.202	0.038	0.284	0.160	0.040	3	0.156	0.131	0.129	0.095	0.424
3/8	0.3750	5/16	▲ ■	...		0.364	0.597	0.556	0.173	0.099	0.265	0.048	0.384	0.226	0.065	4	0.218	0.194	0.155	0.117	0.539

GENERAL NOTE: For reference, see Table 28 Illustration on page 56. For additional requirements, refer to para 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Short screws are those threaded full length. Refer to para. 2.4.1 for applicable screw lengths.
(3) See para. 2.2.
(4) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(5) Maximum diameter shall not exceed minimum plus 0.11 in. for Type A screws, and basic screw diameter for all other screw types.
(6) Tabulated values determined from formula for *H* max., Appendix A.
(7) Tabulated values determined from formula for *O* max., Appendix A.
(8) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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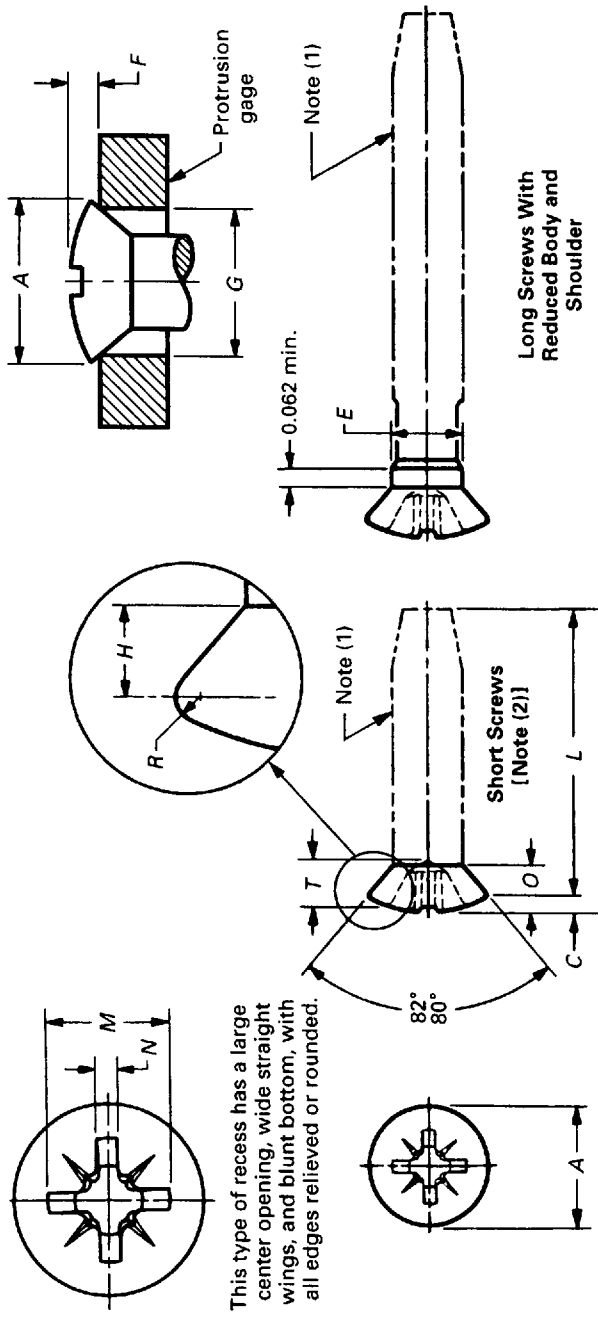


TABLE 29 ILLUSTRATION

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TABLE 29 DIMENSIONS OF TYPE IA CROSS RECESSED OVAL COUNTERSUNK TRIM HEAD TAPPING SCREWS

For Short Screws

Nominal Size (4) or Basic Screw Diameter		Head Size	Applicable to Screw Types (1) Code Symbols	E (5) Shoulder Diameter Type A Min.	E (5) Shoulder Diameter Other Types Min.	A Head Diameter Max.	A Head Diameter Min.	H (6) Head Side Height Ref.	C Head Crown Height Ref.	O (7) Total Head Height Ref.	R Head Radius Ref.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	F (8) Recess Penetration Gaging Depth Max.	F (8) Recess Penetration Gaging Depth Min.	F (8) Protrusion Above Gaging Diameter Max.	F (8) Protrusion Above Gaging Diameter Min.	G (8) Gaging Diameter
4	0.1120	3	● ◆ ▲ ■	...	...	0.187	0.167	0.057	0.033	0.086	0.014	0.118	0.077	0.030	1	0.074	0.058	0.064	0.044	0.148
5	0.1250	4	● ◆ ▲ ■	...	...	0.212	0.191	0.066	0.037	0.099	0.017	0.130	0.089	0.030	1	0.086	0.070	0.069	0.048	0.172
6	0.1380	4	● ◆ ▲ ■	...	...	0.212	0.191	0.058	0.037	0.091	0.017	0.130	0.089	0.030	1	0.086	0.070	0.069	0.048	0.172
6	0.1380	5	● ◆ ▲ ■	...	...	0.237	0.215	0.075	0.041	0.112	0.019	0.152	0.080	0.041	2	0.074	0.056	0.075	0.053	0.196
8	0.1640	5	● ◆ ▲ ■	...	...	0.237	0.215	0.060	0.041	0.096	0.019	0.152	0.080	0.041	2	0.074	0.056	0.075	0.053	0.196
8	0.1640	6	● ◆ ▲ ■	...	...	0.262	0.238	0.076	0.045	0.117	0.021	0.172	0.100	0.041	2	0.093	0.075	0.080	0.057	0.220
10	0.1900	8	● ◆ ▲ ■	...	...	0.312	0.285	0.094	0.076	0.141	0.025	0.186	0.115	0.041	2	0.108	0.090	0.091	0.066	0.267
12	0.2160	8	● ◆ ▲ ■	...	...	0.312	0.285	0.078	0.076	0.125	0.025	0.186	0.115	0.041	2	0.108	0.090	0.091	0.066	0.267
12	0.2160	10	● ◆ ▲ ■	...	...	0.362	0.333	0.111	0.060	0.166	0.029	0.202	0.132	0.041	2	0.125	0.107	0.102	0.075	0.313
14	0.2420	10	◆	...	...	0.362	0.333	0.091	0.060	0.146	0.029	0.202	0.132	0.041	2	0.125	0.107	0.102	0.075	0.313
14	0.2420	12	◆	...	...	0.412	0.380	0.124	0.068	0.187	0.033	0.264	0.148	0.056	3	0.135	0.117	0.113	0.084	0.362
1/4	0.2500	10	● ▲ ■	...	...	0.362	0.333	0.091	0.060	0.146	0.029	0.202	0.132	0.041	2	0.125	0.107	0.102	0.075	0.313
1/4	0.2500	12	● ▲ ■	...	...	0.412	0.380	0.124	0.068	0.187	0.033	0.264	0.148	0.056	3	0.135	0.117	0.113	0.084	0.362
5/16	0.3125	12	● ▲ ■	...	...	0.412	0.380	0.087	0.068	0.150	0.033	0.264	0.148	0.056	3	0.135	0.117	0.113	0.084	0.362
5/16	0.3125	1/4	● ▲ ■	...	...	0.477	0.442	0.130	0.079	0.202	0.038	0.284	0.168	0.057	3	0.155	0.137	0.129	0.095	0.424
3/8	0.3750	5/16	▲ ■	...	...	0.597	0.556	0.173	0.099	0.265	0.048	0.384	0.232	0.086	4	0.215	0.197	0.155	0.117	0.539

(continued)

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TABLE 29 DIMENSIONS OF TYPE IA CROSS RECESSED OVAL COUNTERSUNK TRIM HEAD TAPPING SCREWS (CONT'D)

For Long Screws With Shoulder

Nominal Size (4) or Basic Screw Diameter		Head Size	Applicable to Screw Types (1) Code Symbols	*E* (5) Shoulder Diameter Type A Min.	*E* (5) Shoulder Diameter Other Types Min.	*A* Head Diameter Max.	*A* Head Diameter Min.	*H* (6) Head Side Height Ref.	*C* Head Crown Height Ref.	*O* (7) Total Head Height Ref.	*R* Head Radius Ref.	*M* Recess Diameter Ref.	*T* Recess Depth Ref.	*N* Recess Width Ref.	Driver Size	*F* (8) Recess Penetration Gaging Depth Max.	*F* (8) Recess Penetration Gaging Depth Min.	*G* (8) Protrusion Above Gaging Diameter Max.	*G* (8) Protrusion Above Gaging Diameter Min.	*G* (8) Gaging Diameter
4	0.1120	3	● ◆ ▲ ■	0.105	0.106	0.187	0.167	0.057	0.033	0.086	0.014	0.118	0.077	0.030	1	0.074	0.058	0.064	0.044	0.148
5	0.1250	4	● ◆ ▲ ■	0.118	0.119	0.212	0.191	0.066	0.037	0.099	0.017	0.130	0.089	0.030	1	0.086	0.070	0.069	0.048	0.172
6	0.1380	4	● ◆ ▲ ■	0.131	0.131	0.212	0.191	0.058	0.037	0.091	0.017	0.130	0.089	0.030	1	0.086	0.070	0.069	0.048	0.172
6	0.1380	5	● ◆ ▲ ■	0.131	0.131	0.237	0.215	0.075	0.041	0.112	0.019	0.162	0.091	0.041	2	0.084	0.066	0.075	0.053	0.196
8	0.1640	5	● ◆ ▲ ■	0.157	0.157	0.237	0.215	0.060	0.041	0.096	0.019	0.162	0.091	0.041	2	0.084	0.066	0.075	0.053	0.196
8	0.1640	6	● ◆ ▲ ■	0.157	0.157	0.262	0.238	0.076	0.045	0.117	0.021	0.188	0.117	0.041	2	0.109	0.091	0.080	0.057	0.220
10	0.1900	8	● ◆ ▲ ■	0.183	0.181	0.312	0.285	0.094	0.076	0.141	0.025	0.200	0.130	0.041	2	0.122	0.104	0.091	0.066	0.267
12	0.2160	8	● ◆ ▲ ■	0.209	0.207	0.312	0.285	0.078	0.076	0.125	0.025	0.200	0.130	0.041	2	0.122	0.104	0.091	0.066	0.267
12	0.2160	10	● ◆ ▲ ■	0.209	0.207	0.362	0.333	0.111	0.060	0.166	0.029	0.214	0.143	0.041	2	0.136	0.118	0.102	0.075	0.313
14	0.2420	10	◆	0.235	...	0.362	0.333	0.091	0.060	0.146	0.029	0.214	0.143	0.041	2	0.136	0.118	0.102	0.075	0.313
14	0.2420	12	◆	0.235	...	0.412	0.380	0.124	0.068	0.187	0.033	0.264	0.148	0.056	3	0.135	0.117	0.113	0.084	0.362
1/4	0.2500	10	● ▲ ■	...		0.240	0.362	0.333	0.091	0.060	0.146	0.029	0.214	0.143	0.041	2	0.136	0.118	0.102	0.075	0.313
1/4	0.2500	12	● ▲ ■	...		0.240	0.412	0.380	0.124	0.068	0.187	0.033	0.264	0.148	0.056	3	0.135	0.117	0.113	0.084	0.362
5/16	0.3125	12	● ▲ ■	...		0.302	0.412	0.380	0.087	0.068	0.150	0.033	0.264	0.148	0.056	3	0.135	0.117	0.113	0.084	0.362
5/16	0.3125	1/4	● ▲ ■	...		0.302	0.477	0.442	0.130	0.079	0.202	0.038	0.284	0.168	0.057	3	0.155	0.137	0.129	0.095	0.424
3/8	0.3750	5/16	▲ ■	...		0.364	0.597	0.556	0.173	0.099	0.265	0.048	0.384	0.232	0.086	4	0.215	0.197	0.155	0.117	0.539

GENERAL NOTE: For reference, see Table 29 Illustration on page 59. For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ◆ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Short screws are those threaded full length. Refer to para. 2.4.1 for applicable screw lengths.
(3) See para. 2.2.
(4) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(5) Maximum diameter shall not exceed minimum plus 0.11 in. for Type A screws, and basic screw diameter for all other screw types.
(6) Tabulated values determined from formula for *H* max., Appendix A.
(7) Tabulated values determined from formula for *O* max., Appendix A.
(8) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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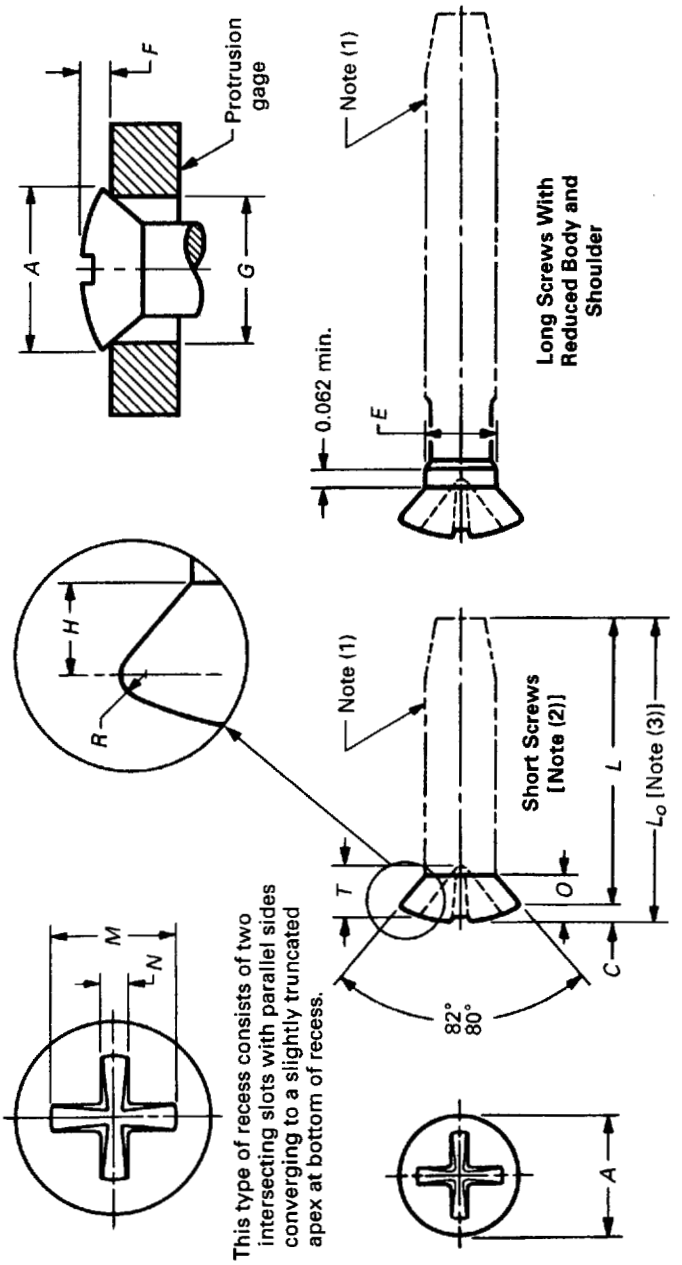


TABLE 30 ILLUSTRATION

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TABLE 30 DIMENSIONS OF TYPE II CROSS RECESSED OVAL COUNTERSUNK TRIM HEAD TAPPING SCREWS

Nominal Size (4) or Basic Screw Diameter		Head Size	Applicable to Screw Types (1) Code Symbols	*E* (5) Shoulder Diameter Type A Min.	*E* (5) Shoulder Diameter Other Types Min.	*A* Head Diameter Max.	*A* Head Diameter Min.	*H* (6) Head Side Height Ref.	*C* Head Crown Height Ref.	*O* (7) Total Head Height Ref.	*R* Head Radius Ref.	*M* Recess Diameter Ref.	*T* Recess Depth Ref.	*N* Recess Width Ref.	Driver Size	*F* (8) Recess Penetration Gaging Depth Max.	*F* (8) Recess Penetration Gaging Depth Min.	*F* (8) Protrusion Above Gaging Diameter Max.	*F* (8) Protrusion Above Gaging Diameter Min.	*G* (8) Gaging Diameter
4	0.1120	3	◆ ♦ ▲ ■	0.105	0.106	0.187	0.167	0.057	0.033	0.086	0.014	0.133	0.072	0.030		0.053	0.041	0.064	0.044	0.148
5	0.1250	4	● ◆ ▲ ■	0.118	0.119	0.212	0.191	0.066	0.037	0.099	0.017	0.151	0.082	0.032		0.064	0.052	0.069	0.048	0.172
6	0.1380	4	● ♦ ▲ ■	0.131	0.131	0.212	0.191	0.058	0.037	0.091	0.017	0.151	0.082	0.032		0.064	0.052	0.069	0.048	0.172
6	0.1380	5	● ♦ ▲ ■	0.131	0.131	0.237	0.215	0.075	0.041	0.112	0.019	0.169	0.094	0.035		0.077	0.064	0.075	0.053	0.196
8	0.1640	5	● ♦ ▲ ■	0.157	0.157	0.237	0.215	0.060	0.041	0.096	0.019	0.169	0.094	0.035		0.077	0.064	0.075	0.053	0.196
8	0.1640	6	● ♦ ▲ ■	0.157	0.157	0.262	0.238	0.076	0.045	0.117	0.021	0.188	0.106	0.038	Point	0.089	0.075	0.080	0.057	0.220
10	0.1900	8	● ♦ ▲ ■	0.183	0.181	0.312	0.285	0.094	0.076	0.141	0.025	0.224	0.124	0.043	Same	0.113	0.099	0.091	0.066	0.267
12	0.2160	8	● ♦ ▲ ■	0.209	0.207	0.312	0.285	0.078	0.076	0.125	0.025	0.224	0.124	0.043	On	0.113	0.099	0.091	0.066	0.267
12	0.2160	10	◆ ♦ ▲ ■	0.209	0.207	0.362	0.333	0.111	0.060	0.166	0.029	0.260	0.148	0.048	All	0.137	0.122	0.102	0.075	0.313
14	0.2420	10	♦	0.235	...	0.362	0.333	0.091	0.060	0.146	0.029	0.260	0.148	0.048	Drivers	0.137	0.122	0.102	0.075	0.313
14	0.2420	12	♦	0.235	...	0.412	0.380	0.124	0.068	0.187	0.033	0.297	0.172	0.054		0.162	0.145	0.113	0.084	0.362
1/4	0.2500	10	● ▲ ■	...	0.240	0.362	0.333	0.091	0.060	0.146	0.029	0.260	0.148	0.048		0.137	0.122	0.102	0.075	0.313
1/4	0.2500	12	● ▲ ■	...	0.240	0.412	0.380	0.124	0.068	0.187	0.033	0.297	0.172	0.054		0.162	0.145	0.113	0.084	0.362
5/16	0.3125	12	● ▲ ■	...	0.302	0.412	0.380	0.087	0.068	0.150	0.033	0.297	0.172	0.054		0.162	0.145	0.113	0.084	0.362
5/16	0.3125	1/4	● ▲ ■	...	0.302	0.477	0.442	0.130	0.079	0.202	0.038	0.344	0.195	0.061		0.193	0.176	0.129	0.095	0.424
3/8	0.3750	5/16	▲ ■	...	0.364	0.597	0.556	0.173	0.099	0.265	0.048	0.432	0.252	0.074		0.251	0.232	0.155	0.117	0.539

GENERAL NOTE: For reference, see Table 30 Illustration on page 62. For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
◆ Type AB thread forming, see Table 5.
♦ Type A thread forming, except for short lengths, see Appendix E.
▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.
(2) Short screws are those threaded full length. Refer to para. 2.4.1 for applicable screw lengths.
(3) See para. 2.2.
(4) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(5) Maximum diameter shall not exceed minimum plus 0.11 in. for Type A screws, and basic screw diameter for all other screw types.
(6) Tabulated values determined from formula for *H* max., Appendix A.
(7) Tabulated values determined from formula for *O* max., Appendix A.
(8) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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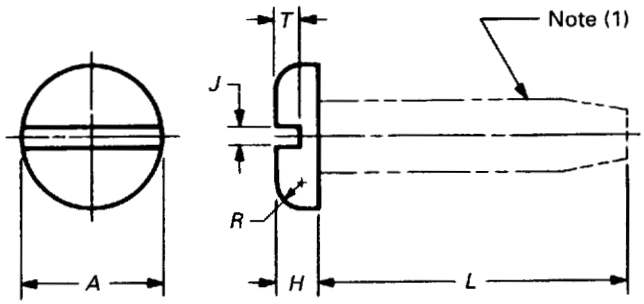


TABLE 31 DIMENSIONS OF SLOTTED PAN HEAD TAPPING SCREWS

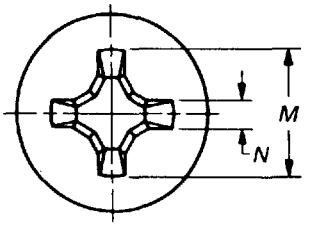
Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	A		H		R	J		T	
			Head Diameter		Head Height		Head Radius	Slot Width		Slot Depth	
		Code Symbols	Max.	Min.	Max.	Min.	Max.	Max.	Min.	Max.	Min.
0	0.0600	● ♦ ▲	0.116	0.104	0.039	0.031	0.020	0.023	0.016	0.022	0.014
1	0.0730	● ♦ ▲	0.142	0.130	0.046	0.038	0.025	0.026	0.019	0.027	0.018
2	0.0860	● ♦ ▲ ■	0.167	0.155	0.053	0.045	0.035	0.031	0.023	0.031	0.022
3	0.0990	● ♦ ▲ ■	0.193	0.180	0.060	0.051	0.037	0.035	0.027	0.036	0.026
4	0.1120	● ♦ ▲ ■	0.219	0.205	0.068	0.058	0.042	0.039	0.031	0.040	0.030
5	0.1250	● ♦ ▲ ■	0.245	0.231	0.075	0.065	0.044	0.043	0.035	0.045	0.034
6	0.1380	● ♦ ▲ ■	0.270	0.256	0.082	0.072	0.046	0.048	0.039	0.050	0.037
7	0.1510	● ♦ ▲	0.296	0.281	0.089	0.079	0.049	0.048	0.039	0.054	0.041
8	0.1640	● ♦ ▲ ■	0.322	0.306	0.096	0.085	0.052	0.054	0.045	0.058	0.045
10	0.1900	● ♦ ▲ ■	0.373	0.357	0.110	0.099	0.061	0.060	0.050	0.068	0.053
12	0.2160	● ♦ ▲ ■	0.425	0.407	0.125	0.112	0.078	0.067	0.056	0.077	0.061
14	0.2420	♦	0.476	0.457	0.139	0.126	0.087	0.075	0.064	0.085	0.068
1/4	0.2500	● ▲ ■	0.492	0.473	0.144	0.130	0.087	0.075	0.064	0.087	0.070
16	0.2680	♦	0.528	0.508	0.153	0.139	0.094	0.075	0.064	0.093	0.074
18	0.2940	♦	0.579	0.558	0.168	0.153	0.099	0.084	0.072	0.100	0.080
5/16	0.3125	● ▲ ■	0.615	0.594	0.178	0.162	0.099	0.084	0.072	0.106	0.085
20	0.3200	♦	0.631	0.608	0.182	0.166	0.121	0.084	0.072	0.108	0.087
24	0.3720	♦	0.734	0.709	0.211	0.193	0.143	0.094	0.081	0.123	0.100
3/8	0.3750	▲ ■	0.740	0.716	0.212	0.195	0.143	0.094	0.081	0.124	0.100
7/16	0.4375	▲	0.863	0.837	0.247	0.228	0.153	0.094	0.081	0.142	0.116
1/2	0.5000	▲	0.987	0.958	0.281	0.260	0.175	0.106	0.091	0.161	0.131

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.

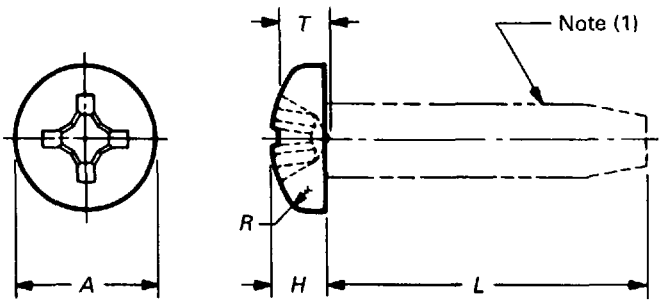


TABLE 32 DIMENSIONS OF TYPE I CROSS RECESSED PAN HEAD TAPPING SCREWS

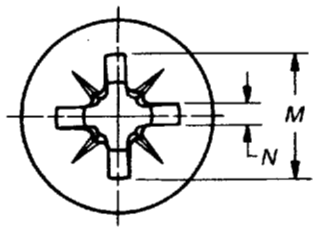
Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Height Max.	H Head Height Min.	R Head Radius Min.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.
0	0.0600	● ♦ ▲	0.116	0.104	0.044	0.036	0.005	0.060	0.030	0.013	0	0.032	0.014
1	0.0730	● ♦ ▲	0.142	0.130	0.053	0.044	0.005	0.068	0.035	0.014	0	0.040	0.022
2	0.0860	● ♦ ▲ ■	0.167	0.155	0.062	0.053	0.010	0.098	0.050	0.017	1	0.052	0.034
3	0.0990	● ♦ ▲ ■	0.193	0.180	0.071	0.062	0.010	0.106	0.059	0.019	1	0.061	0.043
4	0.1120	● ♦ ▲ ■	0.219	0.205	0.080	0.070	0.010	0.116	0.069	0.019	1	0.071	0.053
5	0.1250	● ♦ ▲ ■	0.245	0.231	0.089	0.079	0.015	0.152	0.070	0.028	2	0.072	0.046
6	0.1380	● ♦ ▲ ■	0.270	0.256	0.097	0.087	0.015	0.160	0.078	0.028	2	0.080	0.055
7	0.1510	● ♦ ▲	0.296	0.281	0.106	0.096	0.015	0.170	0.088	0.029	2	0.089	0.064
8	0.1640	● ♦ ▲ ■	0.322	0.306	0.115	0.105	0.015	0.176	0.095	0.030	2	0.097	0.071
10	0.1900	● ♦ ▲ ■	0.373	0.357	0.133	0.122	0.020	0.192	0.112	0.031	2	0.113	0.089
12	0.2160	● ♦ ▲ ■	0.425	0.407	0.151	0.139	0.025	0.252	0.128	0.034	3	0.124	0.098
14	0.2420	●	0.476	0.457	0.169	0.156	0.035	0.274	0.148	0.036	3	0.144	0.118
1/4	0.2500	● ▲ ■	0.492	0.473	0.175	0.162	0.035	0.274	0.148	0.036	3	0.144	0.118
16	0.2680	●	0.528	0.508	0.187	0.173	0.035	0.286	0.162	0.037	3	0.158	0.132
18	0.2940	●	0.579	0.558	0.205	0.191	0.035	0.328	0.166	0.056	4	0.158	0.134
5/16	0.3125	● ▲ ■	0.615	0.594	0.218	0.203	0.040	0.344	0.181	0.059	4	0.173	0.149
20	0.3200	♦	0.631	0.608	0.223	0.208	0.040	0.344	0.181	0.059	4	0.173	0.149
24	0.3720	●	0.734	0.709	0.259	0.242	0.040	0.382	0.222	0.065	4	0.213	0.190
3/8	0.3750	▲ ■	0.740	0.716	0.261	0.244	0.040	0.382	0.222	0.065	4	0.213	0.190
7/16	0.4375	▲	0.863	0.837	0.305	0.284	0.050	0.406	0.246	0.068	4	0.239	0.214
1/2	0.5000	▲	0.987	0.958	0.348	0.325	0.055	0.428	0.268	0.071	4	0.260	0.235

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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This type of recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded.

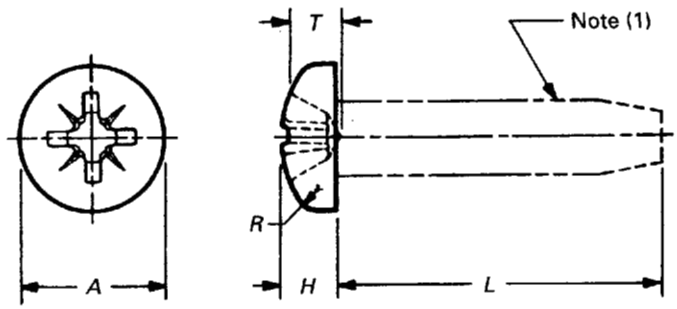


TABLE 33 DIMENSIONS OF TYPE IA CROSS RECESSED PAN HEAD TAPPING SCREWS

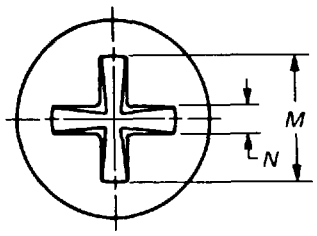
Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	A		H		R	M	T	N		Recess Penetration Gaging Depth	
			Head Diameter		Head Height		Head Radius	Recess Diameter	Recess Depth	Recess Width			
		Code Symbols	Max.	Min.	Max.	Min.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.
0	0.0600	● ♦ ▲	0.116	0.104	0.044	0.036	0.005	0.060	0.032	0.018	0	0.033	0.017
1	0.0730	● ♦ ▲	0.142	0.130	0.053	0.044	0.005	0.068	0.039	0.018	0	0.040	0.024
2	0.0860	● ♦ ▲ ■	0.167	0.155	0.062	0.053	0.010	0.098	0.056	0.028	1	0.053	0.037
3	0.0990	● ♦ ▲ ■	0.193	0.180	0.071	0.062	0.010	0.106	0.065	0.029	1	0.062	0.046
4	0.1120	● ♦ ▲ ■	0.219	0.205	0.080	0.070	0.010	0.116	0.075	0.029	1	0.072	0.056
5	0.1250	● ♦ ▲ ■	0.245	0.231	0.089	0.079	0.015	0.148	0.075	0.040	2	0.068	0.050
6	0.1380	● ♦ ▲ ■	0.270	0.256	0.097	0.087	0.015	0.156	0.083	0.040	2	0.076	0.058
7	0.1510	● ♦ ▲	0.296	0.281	0.106	0.096	0.015	0.164	0.092	0.041	2	0.085	0.067
8	0.1640	● ♦ ▲ ■	0.322	0.306	0.115	0.105	0.015	0.170	0.099	0.041	2	0.092	0.074
10	0.1900	● ♦ ▲ ■	0.373	0.357	0.133	0.122	0.020	0.186	0.115	0.041	2	0.108	0.090
12	0.2160	● ♦ ▲ ■	0.425	0.407	0.151	0.139	0.025	0.248	0.130	0.056	3	0.117	0.099
14	0.2420	♦	0.476	0.457	0.169	0.156	0.035	0.266	0.150	0.057	3	0.137	0.119
1/4	0.2500	● ▲ ■	0.492	0.473	0.175	0.162	0.035	0.266	0.150	0.057	3	0.137	0.119
16	0.2680	♦	0.528	0.508	0.187	0.173	0.035	0.278	0.162	0.057	3	0.149	0.131
18	0.2940	♦	0.579	0.558	0.205	0.191	0.035	0.322	0.169	0.084	4	0.152	0.134
5/16	0.3125	● ▲ ■	0.615	0.594	0.218	0.203	0.040	0.334	0.182	0.086	4	0.164	0.146
20	0.3200	♦	0.631	0.608	0.223	0.208	0.040	0.344	0.182	0.086	4	0.164	0.146
24	0.3720	♦	0.734	0.709	0.259	0.242	0.040	0.370	0.219	0.086	4	0.201	0.183
3/8	0.3750	▲ ■	0.740	0.716	0.261	0.244	0.040	0.370	0.219	0.086	4	0.201	0.183
7/16	0.4375	▲	0.863	0.837	0.305	0.284	0.050	0.392	0.242	0.086	4	0.224	0.206
1/2	0.5000	▲	0.987	0.958	0.348	0.325	0.055	0.414	0.264	0.086	4	0.246	0.228

GENERAL NOTE: For additional requirements, refer to para. 2.

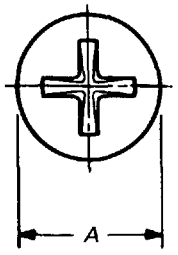
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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This type of recess consists of two intersecting slots with parallel sides converging to a slightly truncated apex at bottom of recess.



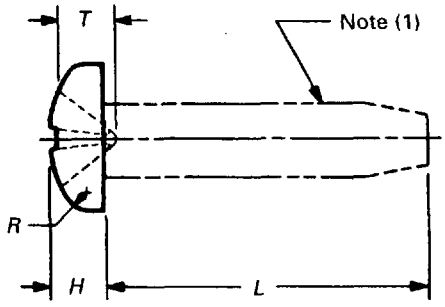


TABLE 34 DIMENSIONS OF TYPE II CROSS RECESSED PAN HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Height Max.	H Head Height Min.	R Head Radius Min.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.
0	0.0600	● ♦ ▲	0.116	0.104	0.044	0.036	0.005	0.070	0.032	0.022		(3)	(3)
1	0.0730	● ♦ ▲	0.142	0.130	0.053	0.044	0.005	0.084	0.040	0.024		(3)	(3)
2	0.0860	● ♦ ▲ ■	0.167	0.155	0.062	0.053	0.010	0.103	0.052	0.027		0.033	0.022
3	0.0990	● ♦ ▲ ■	0.193	0.180	0.071	0.062	0.010	0.119	0.062	0.029		0.043	0.034
4	0.1120	● ♦ ▲ ■	0.219	0.205	0.080	0.070	0.010	0.136	0.072	0.032		0.055	0.043
5	0.1250	● ♦ ▲ ■	0.245	0.231	0.089	0.079	0.015	0.152	0.083	0.034		0.066	0.052
6	0.1380	● ♦ ▲ ■	0.270	0.256	0.097	0.087	0.015	0.169	0.089	0.037		0.077	0.064
7	0.1510	● ♦ ▲	0.296	0.281	0.106	0.096	0.015	0.182	0.098	0.039		0.086	0.072
8	0.1640	● ♦ ▲ ■	0.322	0.306	0.115	0.105	0.015	0.200	0.108	0.041	Point	0.097	0.083
10	0.1900	● ♦ ▲ ■	0.373	0.357	0.133	0.122	0.020	0.232	0.130	0.046	Same	0.118	0.104
12	0.2160	● ♦ ▲ ■	0.425	0.407	0.151	0.139	0.025	0.263	0.150	0.051	On	0.139	0.124
14	0.2420	♦	0.476	0.457	0.169	0.156	0.035	0.299	0.166	0.056	All	0.163	0.147
1/4	0.2500	● ▲ ■	0.492	0.473	0.175	0.162	0.035	0.309	0.172	0.058	Drivers	0.169	0.153
16	0.2680	♦	0.528	0.508	0.187	0.173	0.035	0.332	0.186	0.061		0.184	0.168
18	0.2940	♦	0.579	0.558	0.205	0.191	0.035	0.365	0.208	0.066		0.206	0.189
5/16	0.3125	● ▲ ■	0.615	0.594	0.218	0.203	0.040	0.386	0.222	0.069		0.220	0.202
20	0.3200	♦	0.631	0.608	0.223	0.208	0.040	0.386	0.222	0.069		0.220	0.202
24	0.3720	♦	0.734	0.709	0.259	0.242	0.040	0.468	0.276	0.081		0.275	0.256
3/8	0.3750	▲ ■	0.740	0.716	0.261	0.244	0.040	0.468	0.276	0.081		0.275	0.256
7/16	0.4375	▲	0.863	0.837	0.305	0.284	0.050	0.544	0.325	0.093		0.325	0.304
1/2	0.5000	▲	0.987	0.958	0.348	0.325	0.055	0.617	0.373	0.104		0.373	0.352

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Not practical to gage.

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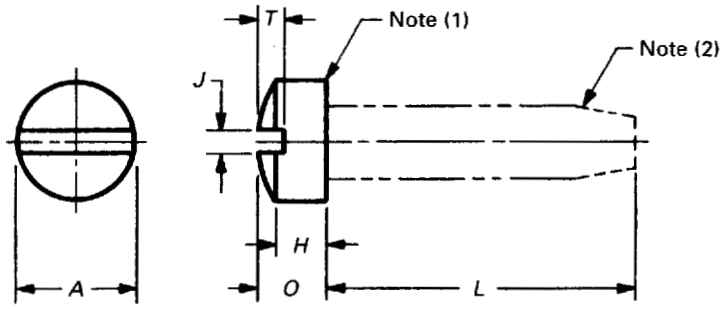


TABLE 35 DIMENSIONS OF SLOTTED FILLISTER HEAD TAPPING SCREWS

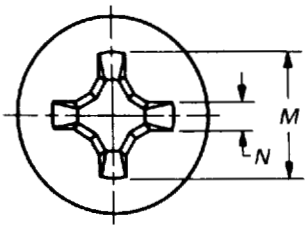
Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (2) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Side Height Max.	H Head Side Height Min.	O Total Head Height Max.	O Total Head Height Min.	J Slot Width Max.	J Slot Width Min.	T Slot Depth Max.	T Slot Depth Min.
0	0.0600	● ♦ ▲	0.096	0.083	0.043	0.038	0.055	0.047	0.023	0.016	0.025	0.015
1	0.0730	● ♦ ▲	0.118	0.104	0.053	0.045	0.066	0.058	0.026	0.019	0.031	0.020
2	0.0860	● ♦ ▲ ■	0.140	0.124	0.062	0.053	0.083	0.066	0.031	0.023	0.037	0.025
3	0.0990	● ♦ ▲ ■	0.161	0.145	0.070	0.061	0.095	0.077	0.035	0.027	0.043	0.030
4	0.1120	● ♦ ▲ ■	0.183	0.166	0.079	0.069	0.107	0.088	0.039	0.031	0.048	0.035
5	0.1250	● ♦ ▲ ■	0.205	0.187	0.088	0.078	0.120	0.100	0.043	0.035	0.054	0.040
6	0.1380	● ♦ ▲ ■	0.226	0.208	0.096	0.086	0.132	0.111	0.048	0.039	0.060	0.045
7	0.1510	● ♦ ▲	0.248	0.229	0.105	0.094	0.144	0.122	0.048	0.039	0.065	0.049
8	0.1640	● ♦ ▲ ■	0.270	0.250	0.113	0.102	0.156	0.133	0.054	0.045	0.071	0.054
10	0.1900	● ♦ ▲ ■	0.313	0.292	0.130	0.118	0.180	0.156	0.060	0.050	0.083	0.064
12	0.2160	● ♦ ▲ ■	0.357	0.334	0.148	0.134	0.205	0.178	0.067	0.056	0.094	0.074
14	0.2420	♦	0.400	0.376	0.165	0.151	0.230	0.201	0.075	0.064	0.105	0.084
1/4	0.2500	● ▲ ■	0.414	0.389	0.170	0.155	0.237	0.207	0.075	0.064	0.109	0.087
5/16	0.3125	● ▲ ■	0.518	0.490	0.211	0.194	0.295	0.262	0.084	0.072	0.137	0.110
3/8	0.3750	▲ ■	0.622	0.590	0.253	0.233	0.355	0.315	0.094	0.081	0.164	0.133
7/16	0.4375	▲	0.625	0.589	0.265	0.242	0.368	0.321	0.094	0.081	0.170	0.135
1/2	0.5000	▲	0.750	0.710	0.297	0.273	0.412	0.362	0.106	0.091	0.190	0.151

GENERAL NOTE: For additional requirements, refer to para. 2.

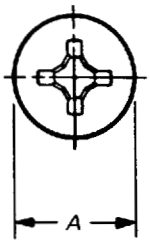
NOTES:
(1) A slight rounding of the edges at periphery of head shall be permissible provided the diameter of the bearing circle is equal to no less than 90 % of the specified minimum head diameter.
(2) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.



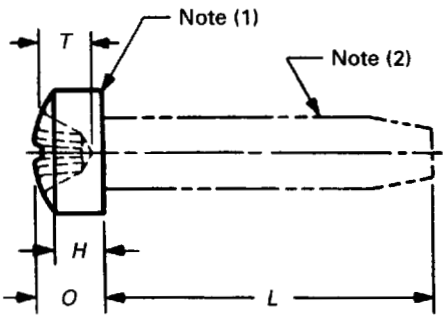


TABLE 36 DIMENSIONS OF TYPE I CROSS RECESSED FILLISTER HEAD TAPPING SCREWS

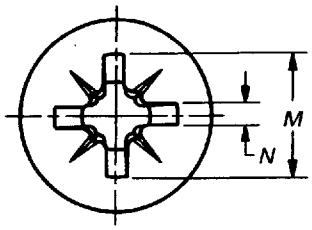
Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (2)	A		H		O		M	T	N		Recess Penetration Gaging Depth	
			Head Diameter		Head Side Height		Total Head Radius		Recess Diameter	Recess Depth	Recess Width	Driver Size		
		Code Symbols	Max.	Min.	Max.	Min.	Max.	Min.	Ref.	Ref.	Ref.		Max.	Min.
0	0.0600	● ♦ ▲	0.096	0.083	0.043	0.038	0.055	0.047	0.060	0.030	0.013	0	0.032	0.014
1	0.0730	● ♦ ▲	0.118	0.104	0.053	0.045	0.066	0.058	0.068	0.035	0.014	0	0.040	0.022
2	0.0860	● ♦ ▲ ■	0.140	0.124	0.062	0.053	0.083	0.066	0.098	0.050	0.017	1	0.052	0.034
3	0.0990	● ♦ ▲ ■	0.161	0.145	0.070	0.061	0.095	0.077	0.106	0.055	0.019	1	0.061	0.043
4	0.1120	● ♦ ▲ ■	0.183	0.166	0.079	0.069	0.107	0.088	0.116	0.069	0.019	1	0.071	0.053
5	0.1250	● ♦ ▲ ■	0.205	0.187	0.088	0.078	0.120	0.100	0.136	0.054	0.027	2	0.056	0.031
6	0.1380	● ♦ ▲ ■	0.226	0.208	0.096	0.086	0.132	0.111	0.160	0.078	0.028	2	0.080	0.055
7	0.1510	● ♦ ▲	0.248	0.229	0.105	0.094	0.144	0.122	0.170	0.088	0.029	2	0.089	0.064
8	0.1640	● ♦ ▲ ■	0.270	0.250	0.113	0.102	0.156	0.133	0.176	0.095	0.030	2	0.097	0.071
10	0.1900	● ♦ ▲ ■	0.313	0.292	0.130	0.118	0.180	0.156	0.192	0.112	0.031	2	0.113	0.089
12	0.2160	● ♦ ▲ ■	0.357	0.334	0.148	0.134	0.205	0.178	0.252	0.128	0.034	3	0.124	0.098
14	0.2420	♦	0.400	0.376	0.165	0.151	0.230	0.201	0.274	0.148	0.036	3	0.144	0.118
1/4	0.2500	● ▲ ■	0.414	0.389	0.170	0.155	0.237	0.207	0.274	0.148	0.036	3	0.144	0.118
5/16	0.3125	● ▲ ■	0.518	0.490	0.211	0.194	0.295	0.262	0.278	0.190	0.042	3	0.186	0.160
3/8	0.3750	▲ ■	0.622	0.590	0.253	0.233	0.355	0.315	0.335	0.222	0.065	4	0.213	0.190
7/16	0.4375	▲	0.625	0.589	0.265	0.242	0.368	0.321	0.344	0.246	0.068	4	0.239	0.214
1/2	0.5000	▲	0.750	0.710	0.297	0.273	0.412	0.362	0.387	0.268	0.071	4	0.260	0.235

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) A slight rounding of the edges at periphery of head shall be permissible provided the diameter of the bearing circle is equal to no less than 90% of the specified minimum head diameter.
(2) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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This type of recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded.

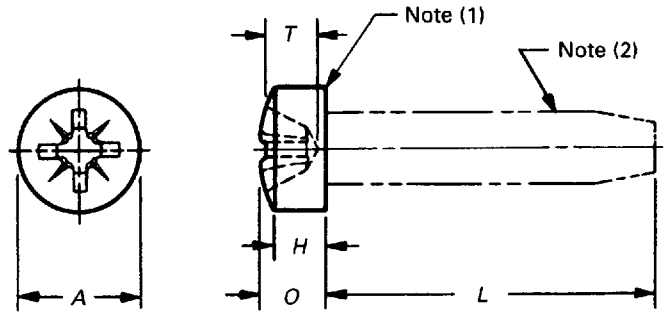


TABLE 37 DIMENSIONS OF TYPE IA CROSS RECESSED FILLISTER HEAD TAPPING SCREWS

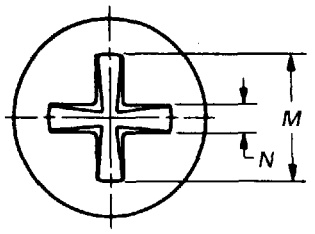
Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (2) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Side Height Max.	H Head Side Height Min.	O Total Head Radius Max.	O Total Head Radius Min.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.
0	0.0600	● ♦ ▲	0.096	0.083	0.043	0.038	0.055	0.047	0.060	0.032	0.018	0	0.033	0.017
1	0.0730	● ♦ ▲	0.118	0.104	0.053	0.045	0.066	0.058	0.068	0.039	0.018	0	0.040	0.024
2	0.0860	● ♦ ▲ ■	0.140	0.124	0.062	0.053	0.083	0.066	0.098	0.056	0.028	1	0.053	0.037
3	0.0990	● ♦ ▲ ■	0.161	0.145	0.070	0.061	0.095	0.077	0.106	0.065	0.029	1	0.062	0.046
4	0.1120	● ♦ ▲ ■	0.183	0.166	0.079	0.069	0.107	0.088	0.116	0.075	0.029	1	0.072	0.056
5	0.1250	● ♦ ▲ ■	0.205	0.187	0.088	0.078	0.120	0.100	0.134	0.061	0.040	2	0.054	0.036
6	0.1380	● ♦ ▲ ■	0.226	0.208	0.096	0.086	0.132	0.111	0.156	0.083	0.040	2	0.076	0.058
7	0.1510	● ♦ ▲	0.248	0.229	0.105	0.094	0.144	0.122	0.164	0.092	0.041	2	0.085	0.067
8	0.1640	● ♦ ▲ ■	0.270	0.250	0.113	0.102	0.156	0.133	0.170	0.099	0.041	2	0.092	0.074
10	0.1900	● ♦ ▲ ■	0.313	0.292	0.130	0.118	0.180	0.156	0.186	0.115	0.041	2	0.108	0.090
12	0.2160	● ♦ ▲ ■	0.357	0.334	0.148	0.134	0.205	0.178	0.248	0.130	0.056	3	0.117	0.099
14	0.2420	♦	0.400	0.376	0.165	0.151	0.230	0.201	0.266	0.150	0.057	3	0.137	0.119
1/4	0.2500	● ▲ ■	0.414	0.389	0.170	0.155	0.237	0.207	0.266	0.150	0.057	3	0.137	0.119
5/16	0.3125	● ▲ ■	0.518	0.490	0.211	0.194	0.295	0.262	0.308	0.193	0.057	3	0.181	0.163
3/8	0.3750	▲ ■	0.622	0.590	0.253	0.233	0.355	0.315	0.370	0.219	0.086	4	0.201	0.183
7/16	0.4375	▲	0.625	0.589	0.265	0.242	0.368	0.321	0.392	0.242	0.086	4	0.224	0.206
1/2	0.5000	▲	0.750	0.710	0.297	0.273	0.412	0.362	0.414	0.264	0.086	4	0.246	0.228

GENERAL NOTE: For additional requirements, refer to para. 2.

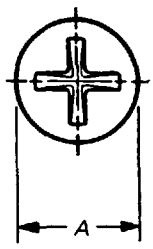
NOTES:
(1) A slight rounding of the edges at periphery of head shall be permissible provided the diameter of the bearing circle is equal to no less than 90% of the specified minimum head diameter.
(2) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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This type of recess consists of two intersecting slots with parallel sides converging to a slightly truncated apex at bottom of recess.



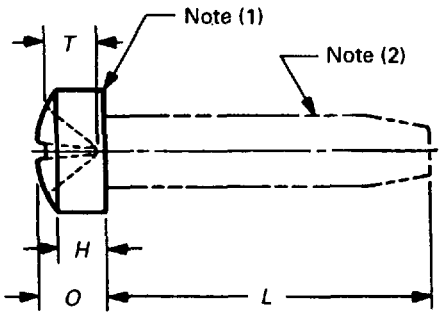


TABLE 38 DIMENSIONS OF TYPE II CROSS RECESSED FILLISTER HEAD TAPPING SCREWS

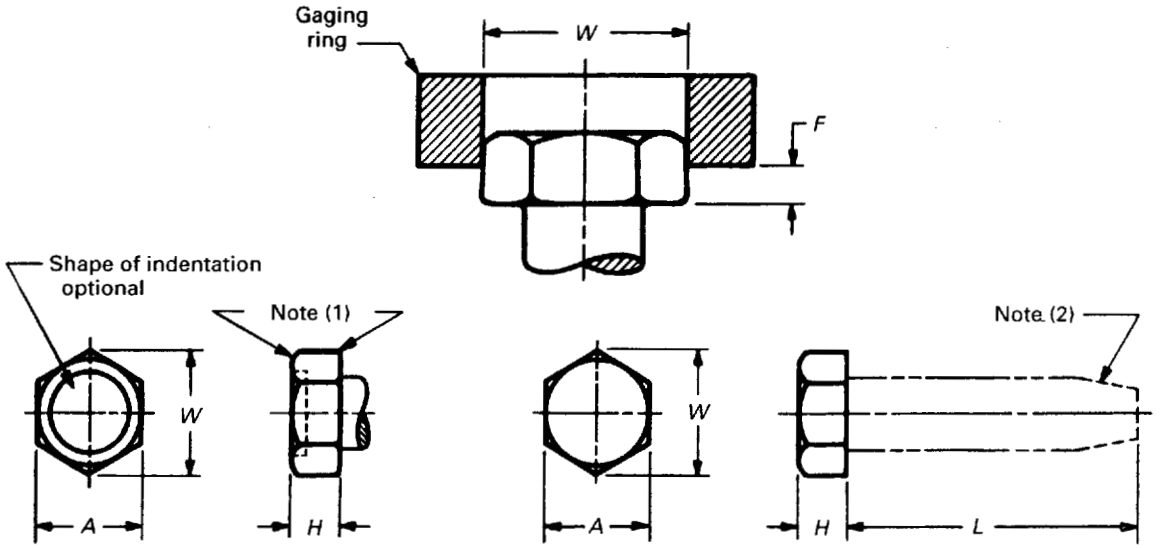
Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (2)	A		H		O		M	T	N		Recess Penetration Gaging Depth	
			Head Diameter		Head Side Height		Total Head Radius		Recess Diameter	Recess Depth	Recess Width			
		Code Symbols	Max.	Min.	Max.	Min.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.
0	0.0600	● ♦ ▲	0.096	0.083	0.043	0.038	0.055	0.047	0.067	0.029	0.020		(4)	(4)
1	0.0730	● ♦ ▲	0.118	0.104	0.053	0.045	0.066	0.058	0.083	0.040	0.022		(4)	(4)
2	0.0860	● ♦ ▲ ■	0.140	0.124	0.062	0.053	0.083	0.066	0.099	0.050	0.024		0.030	0.019
3	0.0990	● ♦ ▲ ■	0.161	0.145	0.070	0.061	0.095	0.077	0.115	0.060	0.027		0.041	0.029
4	0.1120	● ♦ ▲ ■	0.183	0.166	0.079	0.069	0.107	0.088	0.130	0.070	0.029		0.051	0.039
5	0.1250	● ♦ ▲ ■	0.205	0.187	0.088	0.078	0.120	0.100	0.147	0.079	0.031		0.062	0.049
6	0.1380	● ♦ ▲ ■	0.226	0.208	0.096	0.086	0.132	0.111	0.163	0.090	0.034	Point	0.073	0.060
7	0.1510	● ♦ ▲	0.248	0.229	0.105	0.094	0.144	0.122	0.178	0.100	0.036	Same	0.083	0.069
8	0.1640	● ♦ ▲ ■	0.270	0.250	0.113	0.102	0.156	0.133	0.194	0.110	0.039	On All	0.094	0.080
10	0.1900	● ♦ ▲ ■	0.313	0.292	0.130	0.118	0.180	0.156	0.227	0.126	0.043	Drivers	0.115	0.101
12	0.2160	● ♦ ▲ ■	0.357	0.334	0.148	0.134	0.205	0.178	0.259	0.148	0.048		0.137	0.121
14	0.2420	♦	0.400	0.376	0.165	0.151	0.230	0.201	0.291	0.168	0.053		0.157	0.142
1/4	0.2500	● ▲ ■	0.414	0.389	0.170	0.155	0.237	0.207	0.299	0.174	0.054		0.163	0.147
5/16	0.3125	● ▲ ■	0.518	0.490	0.211	0.194	0.295	0.262	0.378	0.216	0.066		0.215	0.197
3/8	0.3750	▲ ■	0.622	0.590	0.253	0.233	0.355	0.315	0.454	0.266	0.077		0.266	0.246
7/16	0.4375	▲	0.625	0.589	0.265	0.242	0.368	0.321	0.454	0.266	0.077		0.266	0.246
1/2	0.5000	▲	0.750	0.710	0.297	0.273	0.412	0.362	0.547	0.327	0.091		0.328	0.305

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) A slight rounding of the edges at periphery of head shall be permissible provided the diameter of the fearing circle is equal to no less than 90% of the specified minimum head diameter.
(2) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Not practical to gage.

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Indented Head

Trimmed Head or Fully Upset Head

TABLE 39 DIMENSIONS OF REGULAR AND LARGE HEX HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (2)	Regular Head (4)			Large Head (4) (7)			H		F (6)
			A (5)		W (5) (6)	A (5)		W (5) (6)	H		F (6)
		Code Symbols	Width Across Flats		Across Corners	Width Across Flats		Across Corners	Head Height		Protrusion Beyond Gaging Ring
			Max.	Min.	Min.	Max.	Min.	Min.	Max.	Min.	Min.
1	0.0730	● ♦ ▲	0.125	0.120	0.134	...	...	...	0.044	0.036	0.022
2	0.0860	● ♦ ▲	0.125	0.120	0.134	...	...	...	0.050	0.040	0.024
3	0.0990	● ♦ ▲	0.188	0.181	0.202	...	...	...	0.055	0.044	0.026
4	0.1120	● ♦ ▲ ■	0.188	0.181	0.202	0.219	0.213	0.238	0.060	0.049	0.029
5	0.1250	● ♦ ▲ ■	0.188	0.181	0.202	0.250	0.244	0.272	0.070	0.058	0.035
6	0.1380	● ♦ ▲ ■	0.250	0.244	0.272	...	...	...	0.093	0.080	0.048
7	0.1510	● ♦ ▲	0.250	0.244	0.272	...	...	...	0.093	0.080	0.048
8	0.1640	● ♦ ▲ ■	0.250	0.244	0.272	0.312	0.305	0.340	0.110	0.096	0.058
10	0.1900	● ♦ ▲ ■	0.312	0.305	0.340	...	...	...	0.120	0.105	0.063
12	0.2160	● ♦ ▲ ■	0.312	0.305	0.340	0.375	0.367	0.409	0.155	0.139	0.083
14	0.2420	♦	0.375	0.367	0.409	0.438	0.428	0.477	0.190	0.172	0.103
1/4	0.2500	● ▲ ■	0.375	0.367	0.409	0.438	0.428	0.477	0.190	0.172	0.103
5/16	0.3125	● ▲ ■	0.500	0.489	0.545	...	...	...	0.230	0.208	0.125
20	0.3200	♦	0.500	0.489	0.545	...	...	...	0.230	0.208	0.125
24	0.3720	♦	0.562	0.551	0.614	...	...	...	0.295	0.270	0.162
3/8	0.3750	▲ ■	0.562	0.551	0.614	...	...	...	0.295	0.270	0.162
7/16	0.4375	▲ ■	0.625	0.610	0.682	...	...	...	0.348	0.321	0.193
1/2	0.5000	▲ ■	0.750	0.735	0.820	...	...	...	0.400	0.367	0.220

(continued)

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TABLE 39 DIMENSIONS OF REGULAR AND LARGE HEX HEAD TAPPING SCREWS (CONT'D)

GENERAL NOTE:
(a) For additional requirements, refer to para. 2.
(b) For slotted regular and large hex heads, refer to Appendix VII.

NOTES:
(1) A slight rounding of all edges and corners of the hex surfaces of indented hex heads shall be permissible provided the diameter of the bearing circle is equal to no less than 90% of the specified minimum width across flats dimension.
(2) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(4) Unless otherwise specified by purchaser, regular hex heads shall be furnished, and both regular and large head styles may be of indented head, trimmed head, or fully upset head construction, at the option of manufacturer.
(5) Dimensions across flats and across corners of the head shall be measured at the point of maximum metal. Taper of sides of hex (angle between one side and the axis) shall not exceed 2° or 0.004 in., whichever is greater, the specified width across flats being the large dimension.
(6) The rounding due to lack of fill on all six corners of the head shall be reasonably uniform and the width across corners of the head shall be such that when a sharp ring having an inside diameter equal to the specified minimum width across corners is placed on the top and bottom of the head, the head shall protrude by an amount equal to, or greater than, the *F* value tabulated. See Appendix II for across corners gaging of hex heads.
(7) Large hex head is intended for screw and washer assemblies — sems, as specified in ASME B18.13, and other applications requiring large bearing.

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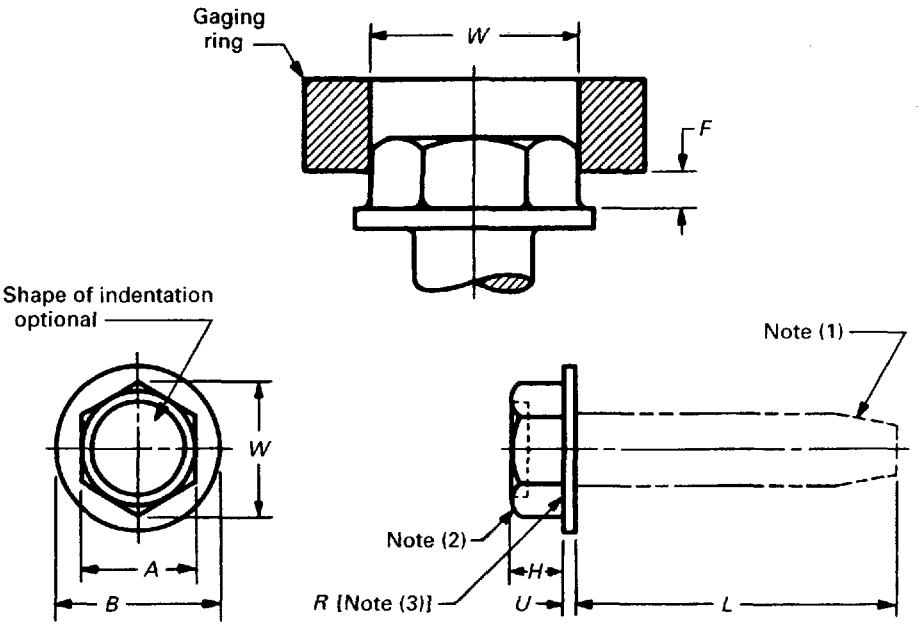


TABLE 40 DIMENSIONS OF HEX WASHER HEAD TAPPING SCREWS

Nominal Size (4) or Basic Screw Diameter		Applicable to Screw Types (1)	A (5)		W (5) (6)	H		B		U		F (6)
			Width Across Flats		Width Across Corners	Head Height		Washer Diameter		Washer Thickness		Protrusion Beyond Gaging Ring
		Code Symbols	Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.
2	0.0860	● ♦ ▲	0.125	0.120	0.134	0.050	0.040	0.166	0.154	0.016	0.010	0.024
3	0.0990	● ♦ ▲	0.125	0.120	0.134	0.055	0.044	0.177	0.163	0.016	0.010	0.026
4	0.1120	● ♦ ▲ ■	0.188	0.181	0.202	0.060	0.049	0.243	0.225	0.019	0.011	0.029
5	0.1250	● ♦ ▲ ■	0.188	0.181	0.202	0.070	0.058	0.260	0.240	0.025	0.015	0.035
6	0.1380	● ♦ ▲ ■	0.250	0.244	0.272	0.093	0.080	0.328	0.302	0.025	0.015	0.048
7	0.1510	● ♦ ▲	0.250	0.244	0.272	0.093	0.080	0.328	0.302	0.029	0.017	0.048
8	0.1640	● ♦ ▲ ■	0.250	0.244	0.272	0.110	0.096	0.348	0.322	0.031	0.019	0.058
10	0.1900	● ♦ ▲ ■	0.312	0.305	0.340	0.120	0.105	0.414	0.384	0.031	0.019	0.063
12	0.2160	● ♦ ▲ ■	0.312	0.305	0.340	0.155	0.139	0.432	0.398	0.039	0.022	0.083
14	0.2420	♦	0.375	0.367	0.409	0.190	0.172	0.520	0.480	0.050	0.030	0.103
1/4	0.2500	● ▲ ■	0.375	0.367	0.409	0.190	0.172	0.520	0.480	0.050	0.030	0.103
5/16	0.3125	● ▲ ■	0.500	0.489	0.545	0.230	0.208	0.676	0.624	0.055	0.035	0.125
20	0.3200	♦	0.500	0.489	0.545	0.230	0.208	0.676	0.624	0.055	0.035	0.125
24	0.3720	♦	0.562	0.551	0.614	0.295	0.270	0.780	0.720	0.063	0.037	0.162
3/8	0.3750	▲ ■	0.562	0.551	0.614	0.295	0.270	0.780	0.720	0.063	0.037	0.162
7/16	0.4375	▲ ■	0.625	0.610	0.682	0.348	0.321	0.870	0.790	0.073	0.043	0.193
1/2	0.5000	▲ ■	0.750	0.735	0.820	0.400	0.367	1.040	0.960	0.085	0.050	0.220

(continued)

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TABLE 40 DIMENSIONS OF HEX WASHER HEAD TAPPING SCREWS (CONT'D)

GENERAL NOTES:
(a) For additional requirements, refer to para. 2.
(b) For slotted hex washer heads, refer to Appendix H.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) A slight rounding of all edges and corners of the hex surfaces of heads shall be permissible.
(3) Fillet radius *R* at junction of sides of hex and top of washer shall not exceed 0.15 times the basic screw diameter.
(4) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(5) Dimensions across flats and across corners of the head shall be measured at the point of maximum metal. Taper of sides of hex (angle between one side and the axis) shall not exceed 2° or 0.004 in., whichever is greater, the specified width across flats being the large dimension.
(6) The rounding due to lack of fill on all six corners of the head shall be reasonably uniform and the width across corners of the head shall be such that when a sharp ring having an inside diameter equal to the specified minimum width across corners is placed on the top of the head, the hex portion of the head shall protrude by an amount equal to, or greater than, the *F* value tabulated. See Appendix II for across corners gaging of hex heads.

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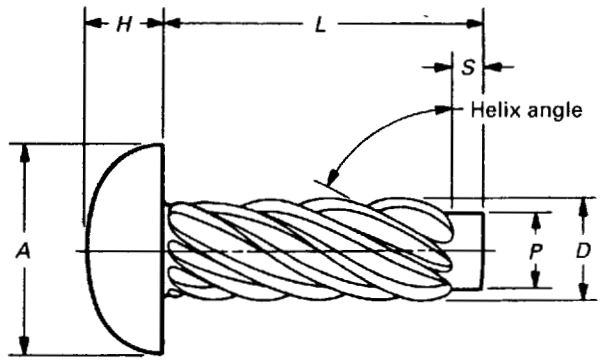


TABLE 41 DIMENSIONS OF ROUND HEAD TYPE U METALLIC DRIVE SCREWS

Nominal Size (1) or Basic Screw Diameter		Number of Thread Starts	D Outside Diameter Max.	D Outside Diameter Min.	A Head Diameter Max.	A Head Diameter Min.	H Head Height Max.	H Head Height Min.	P Pilot Diameter Max.	P Pilot Diameter Min.	Recommended Hole Size Drill Size No.	Recommended Hole Size Hole Diameter
00	0.0600	6	0.060	0.057	0.099	0.090	0.034	0.026	0.049	0.046	55	0.052
0	0.0750	6	0.075	0.072	0.127	0.118	0.049	0.041	0.063	0.060	51	0.067
2	0.1000	8	0.100	0.097	0.162	0.146	0.069	0.059	0.083	0.080	44	0.086
4	0.1160	7	0.116	0.112	0.211	0.193	0.086	0.075	0.096	0.092	37	0.104
6	0.1400	7	0.140	0.136	0.260	0.240	0.103	0.091	0.116	0.112	31	0.120
7	0.1540	8	0.154	0.150	0.285	0.264	0.111	0.099	0.126	0.122	29	0.136
8	0.1670	8	0.167	0.162	0.309	0.287	0.120	0.107	0.136	0.132	27	0.144
10	0.1820	8	0.182	0.177	0.359	0.334	0.137	0.123	0.150	0.146	20	0.161
12	0.2120	8	0.212	0.206	0.408	0.382	0.153	0.139	0.177	0.173	11	0.191
14	0.2420	9	0.242	0.236	0.457	0.429	0.170	0.155	0.202	0.198	2	0.221
5/16	0.3150	11	0.315	0.309	0.590	0.557	0.216	0.198	0.272	0.267	M	0.295
3/8	0.3780	12	0.378	0.371	0.708	0.670	0.256	0.237	0.334	0.329	T	0.358
Nominal Screw Length, L			1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1 in. and over	
Pilot Length Ref., S			0.047	0.047	0.047	0.047	0.062	0.062	0.078	0.078	0.125	

GENERAL NOTE: For additional requirements, refer to para. 3.

NOTE:
(1) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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MANDATORY APPENDIX I
PROTRUSION GAGING OF FLAT COUNTERSUNK HEADS

Suitability of flat countersunk head screws, except the No. 0 and No. 1 sizes of undercut heads, for application in countersinks designed to the principal dimensions of the screws may be determined by use of a protrusion gage as illustrated in Fig. I1.

The gaging dimensions and the gage diameters are specified in the dimensional tables for flat countersunk head and undercut flat countersunk head screws. The protrusion limits shown in the tables shall apply only when the gaging diameter is exactly as indicated with the gaging edge of a sharpness obtained by lapping the hole and the top surface of the gage. Any variation in the gaging diameter will require recalculation of protrusion values by the original formulas given below.

Maximum protrusion:[1, 2]

$$F \text{ max.} = \frac{\text{max. sharp head dia.} - \text{gage hole dia.}}{2} \times \tan\left(90 \text{ deg} - \frac{\text{min. head angle}}{2}\right)$$

Minimum protrusion:[1, 2]

$$F \text{ min.} = \frac{\text{min. sharp head dia.} - \text{gage hole dia.}}{2} \times \tan\left(90 \text{ deg} - \frac{\text{max. head angle}}{2}\right)$$

or correction of protrusion in accordance with the following formula:

$$F' = F\frac{A - G'}{A - G}$$

where

F = tabulated protrusion value
F' = corrected protrusion value
A = head diameter (maximum or minimum for maximum or minimum protrusion, respectively)
G = tabulated gage diameter
G' = measured gage diameter

To insure adequate service life, the protrusion gage should be made of tool steel having a hardness of not less than Rockwell C 60 (60 HRC).

[1] Protrusion values shown in dimensional tables were calculated from these formulas and rounded to nearest 0.001 in., upward for the maximum, and downward for the minimum.

[2] See formulas for maximum and minimum sharp head diameters in Appendix A.

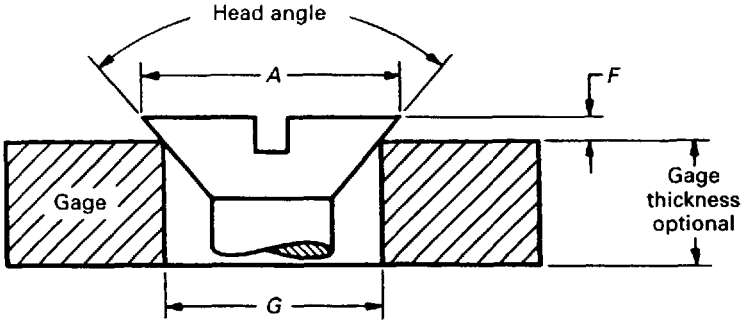


FIG. I1 PROTRUSION GAGE FOR FLAT COUNTERSUNK HEADS

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MANDATORY APPENDIX II
ACROSS CORNERS GAGING OF HEX HEADS

(a) Suitability of across corners dimensions of hex head and hex washer head screws may be determined by the use of gaging rings as described in (1) and (2) below:

(1) When the gaging ring (Fig. II1) is placed on the top of a hex or hex washer head screw, and also the bottom of a hex head screw, at right angles to the axis of the screw; the head (hex portion of washer head) must protrude beyond the ring by an amount equal to 60% of the minimum head height *H*. For convenience, the minimum protrusion values are given in the dimensional tables for hex and hex washer head screws.

(2) The gaging ring shall have an inside diameter equal to the tabulated minimum width across corners, within a tolerance of plus 0.0003 in. The gaging edges of the ring shall be sharp and opposite faces shall be parallel. To insure adequate service life, the ring should be made of tool steel and have a hardness of not less than Rockwell C 60 (60 HRC).

(b) A typical gaging fixture is shown in Fig. II2 with an explanation of its application in (1), (2), and (3) below; however, any equivalent means may be used.

(1) To check hex head screws from the top, an initial reading shall be taken with the gaging ring placed on the indexing plate. Then, with the screw placed in the fixture, the gaging ring shall be placed on top of the screw head and a second reading taken. The difference between the two readings is equal to the protrusion *F* of the head beyond the gaging ring.

(2) To check hex washer head screws, the gaging procedure shall be exactly the same as that for checking hex head screws from the top. However, in this case, the difference *X* between the two readings includes the washer thickness, and it is necessary to deduct the actual (measured) thickness of the washer portion from the differences *X* to obtain the protrusion *F* of the hex beyond the gaging ring.

(3) Gaging the bottom of the head on hex head screws may be accomplished in the same manner as gaging the top except the ring is placed below the head. The same protrusion values shall apply.

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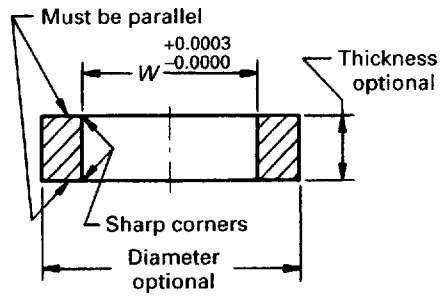


FIG. II1 GAGING RING

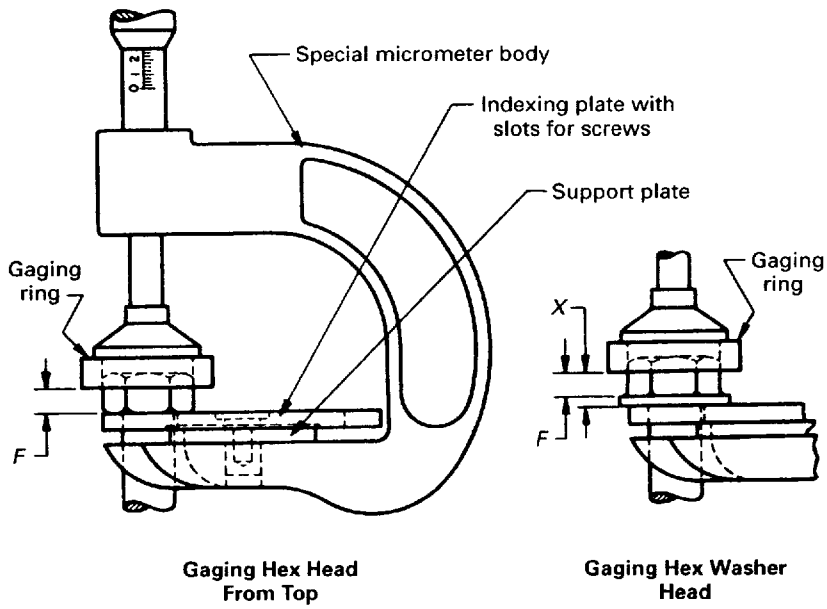


FIG. II2 TYPICAL GAGING FIXTURE

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MANDATORY APPENDIX III
PENETRATION GAGING OF RECESSED HEADS

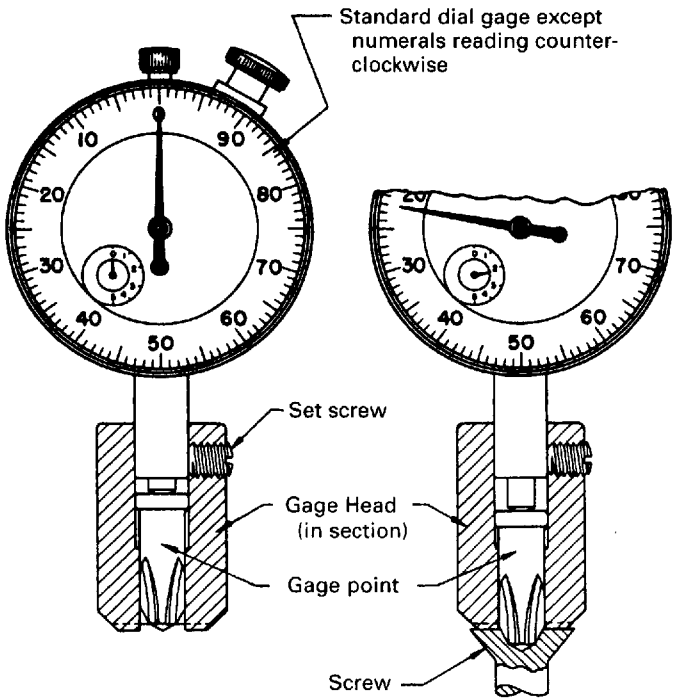
Penetration gaging is a test to determine the suitability of recesses in the heads of screws and may be used to indicate deficiencies in the dimensions of the recesses specified in the dimensional tables. Penetrations which are too deep indicate the possibility of a thin section between head and shank of screw, a weakness which might result in twisting-off screw heads during tightening of the screws. Use of screws having shallow penetrations might result in production problems such as reaming of recesses or excessive wear on driver bits.

Penetration gaging depth values for the various styles of recessed heads are included in the dimensional tables for the respective heads. These values were predicated originally on the gaging of plain finish (unplated or uncoated) screws. However, subsequent experience has shown that the Type I and Type II recess penetration limits, as tabulated, and the Type IA recess penetration depths with tabulated minimum limit reduced by up to 0.005 in., to be suitable for the gaging of screws having coating thickness of up to and including 0.0003 in. on significant surfaces. Screws having heavier coatings, which fail to meet the penetration gaging requirements, must be stripped of finish and gaged for acceptance or rejection in the plain condition.

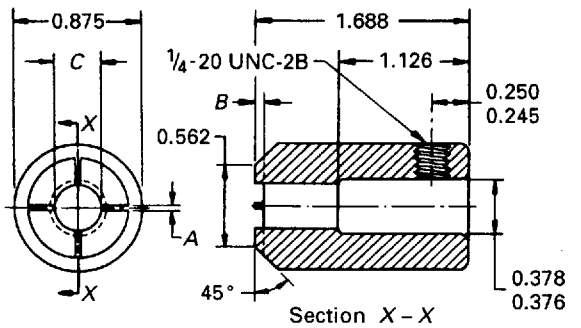
Specified herein are dimensions of gage points to be used for penetration gaging the Type I, Type IA, and Type II recesses (Figs. III1, III2, and III3). Gage points approach as nearly as possible the perfect driver form. Also specified are gage heads and bushings which adapt the gage points to standard dial gages.

Penetration is gaged relative to a reference plane defined by the intersection of the edge of the recess wings with the top surface of the screw head. This plane is the same as the top surface of a flat head screw but is somewhat below the topmost portion of heads which have rounded top surfaces. Knife edges or tapered ridges on the gage head are used to establish the reference plane. A reverse reading dial gage is used to indicate the penetration of the gage point into the recess. The gage may be zeroed on any flat surface.

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Penetration Gage



Gage Head

Tolerance ±0.005 unless otherwise specified.

Dimensions of Gage Heads

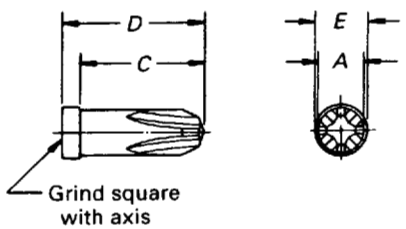
Size of Recess Gage	*A*	*B*	*C*
	±0.002	±0.003	±0.0002
No. 0	0.008	0.015	0.0460
No. 1	0.012	0.020	0.0880
No. 2	0.018	0.031	0.1420
No. 3	0.022	0.037	0.2100
No. 4	0.031	0.062	0.3130

FIG. III1 PENETRATION GAGES FOR TYPE I RECESS

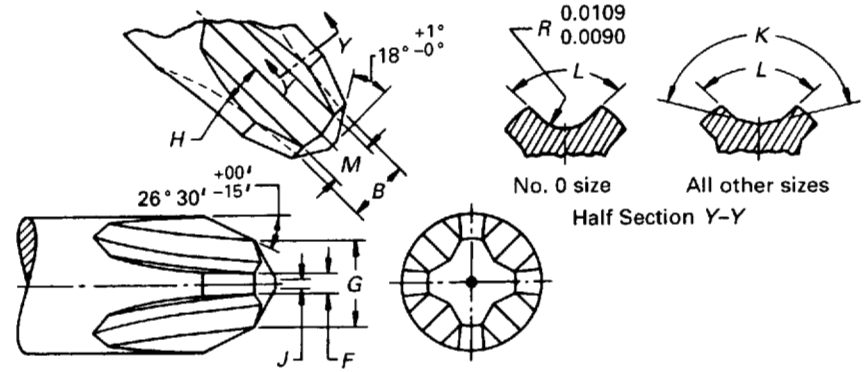
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Gage Point



Enlarged Point Detail

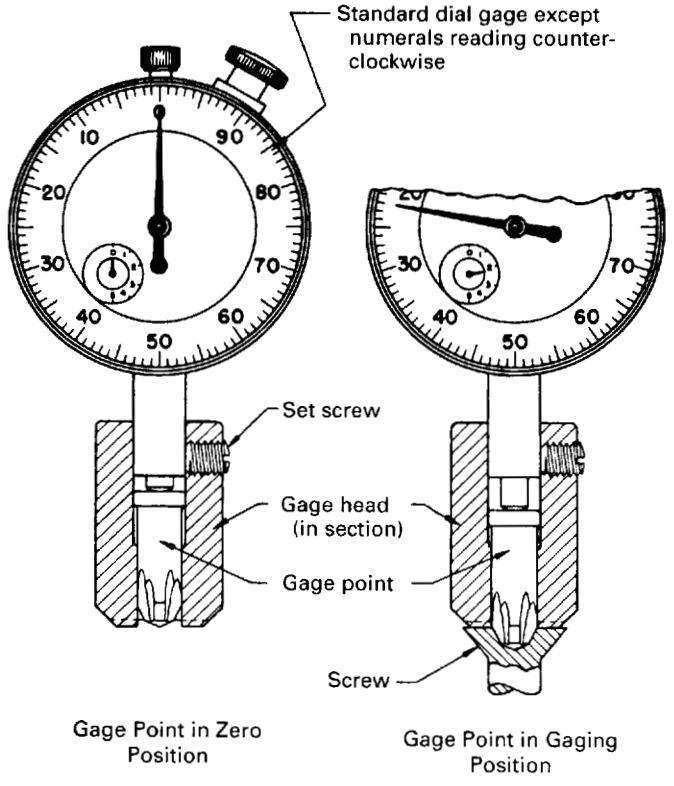
Dimensions of Gage Points

Size of Recess Gage	A	B	C	D	E	F		G	H	J		K	L	M
	Point Dia.	Point Width	Length	Length	Dia.	Wing Thickness		Point Width	Milling Angle	Flat on End		Base Flute Angle	Side Flute Angle	Flute Width at Bottom
	±0.0002	+0.0000 −0.0010	±0.005	±0.005	±0.005	Max	Min	+0.0010 −0.0000	+0°00′ −0°15′	Max	Min	+0°15′ −0°00′	+0°15′ −0°00′	+0.0000 −0.0010
No. 0	0.0450	0.0240	0.656	0.781	0.094	0.012	0.010	0.0320	7°00′	0.015	0.010	(1)	92°00′	0.0151(2)
No. 1	0.0870	0.0394	0.688	0.812	0.156	0.020	0.018	0.0500	7°00′	0.020	0.015	138°00′	92°00′	0.0202
No. 2	0.1410	0.0606	0.750	0.875	0.219	0.025	0.023	0.0900	5°45′	0.020	0.015	140°00′	92°00′	0.0434
No. 3	0.2090	0.0983	0.781	0.906	0.250	0.031	0.029	0.1500	5°45′	0.020	0.015	146°00′	92°00′	0.0826
No. 4	0.3120	0.1407	0.844	0.969	0.359	0.044	0.042	0.2000	7°00′	0.020	0.015	153°00′	92°00′	0.1078

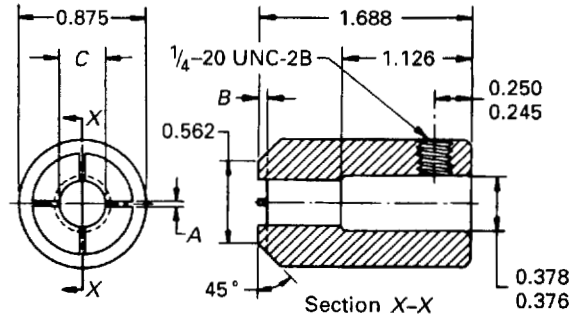
NOTES:
(1) Base of flute on size No. 0 is 0.0090 to 0.0109 in. radius.
(2) Tolerance on size No. 0 is plus 0.0000 and minus 0.0026 in.

FIG. III1 PENETRATION GAGES FOR TYPE I RECESS (CONT'D)

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Penetration Gage



Gage Head

Tolerance ±0.005 unless otherwise specified.

Dimensions of Gage Heads

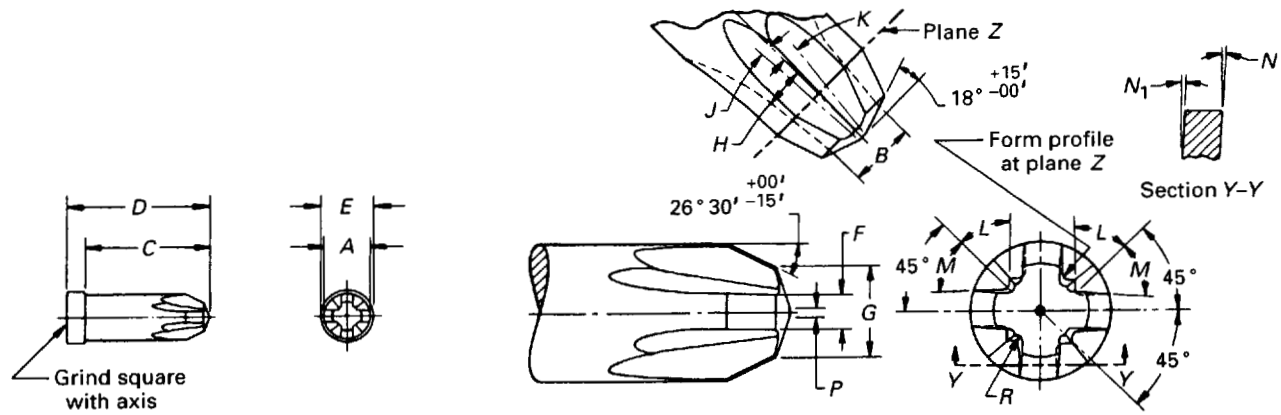
Size of Recess Gage	*A*	*B*	*C*
	±0.002	±0.003	±0.0002
No. 0	0.008	0.015	0.0460
No. 1	0.012	0.020	0.0880
No. 2	0.018	0.031	0.1420
No. 3	0.022	0.037	0.2100
No. 4	0.031	0.062	0.3130

FIG. III2 PENETRATION GAGES FOR TYPE IA RECESS

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Gage Point

Enlarged Point Detail

Dimensions of Gage Points

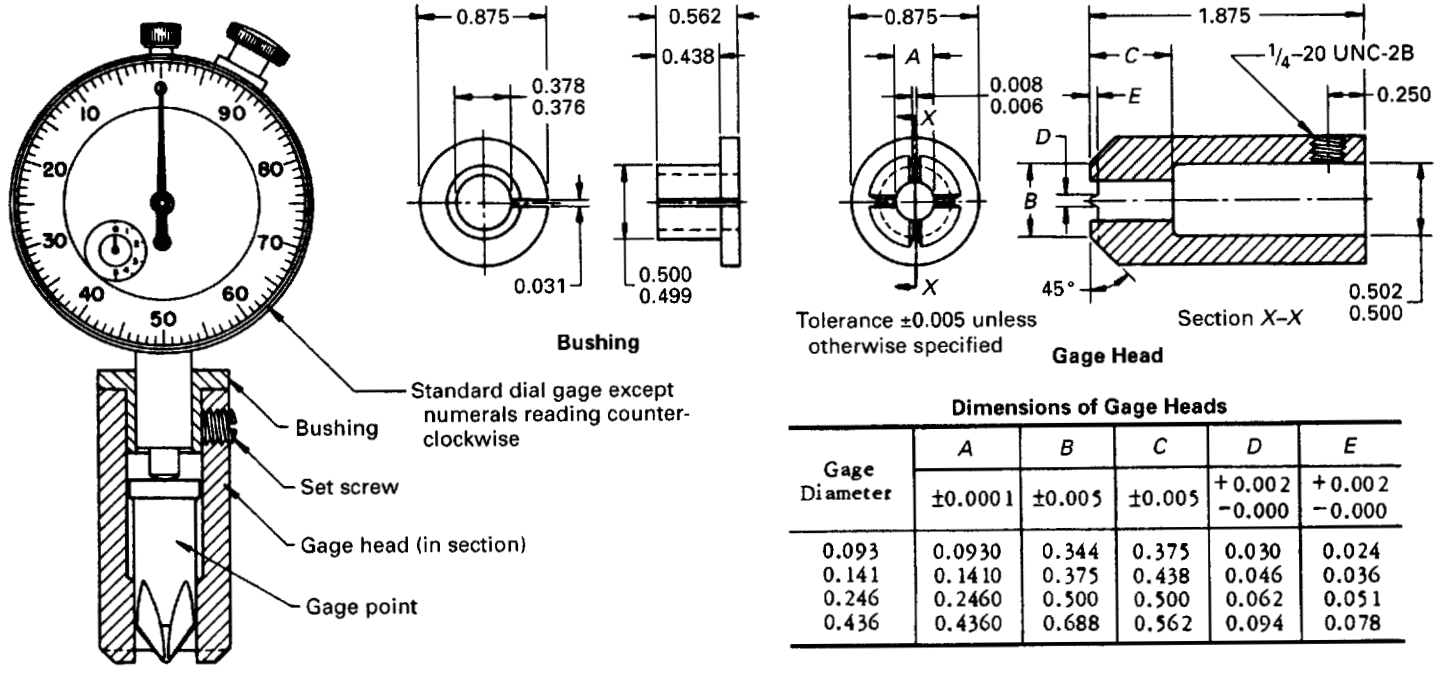
Size of Recess Gage	A	B		C	D	E	F	G	H	J	K	L(1)	M(1)	N	N_1	P	R	
	Point Dia.	Point Width (At Base of R Radius)		Length	Length	Dia.	Wing Thickness	Point Width	Milling Angle	Milling Offset Angle	Milling Offset Angle	Rib Form Angle	Wing Form Angle	Wing Offset Angle	Wing Offset Angle	Flat on End	Radius	
	±0.0002	Max	Min	±0.005	±0.005	±0.005	+0.0010 −0.0000	+0.001 −0.000	+0°00′ −0°06′	+0°06′ −0°00′	+0°06′ −0°00′	+0°07′ −0°00′	+0°07′ −0°00′			+0.005 −0.000	Max	Min
No. 0	0.0450	0.0280	0.0265	0.656	0.781	0.094	0.0165	0.035	7°00′	4°23′	7°45′	46°00′	46°00′	22′	2°00′	0.010	0.004	0.003
No. 1	0.0870	0.0438	0.0423	0.688	0.812	0.156	0.0265	0.054	7°00′	4°23′	7°45′	46°00′	46°00′	22′	2°00′	0.015	0.005	0.004
No. 2	0.1410	0.0670	0.0655	0.750	0.875	0.219	0.0380	0.095	5°45′	3°00′	6°20′	46°00′	46°00′	17′	2°04′	0.015	0.008	0.006
No. 3	0.2090	0.1020	0.1005	0.781	0.906	0.250	0.0530	0.155	5°45′	3°00′	6°20′	56°15′	46°00′	17′	2°04′	0.015	0.012	0.008
No. 4	0.3120	0.1520	0.1505	0.844	0.969	0.359	0.0810	0.203	7°00′	4°23′	7°45′	56°15′	46°00′	22′	2°00′	0.015	0.020	0.014

NOTE:
(1) These dimensions are measured normal to the milling cut.

FIG. III2 PENETRATION GAGES FOR TYPE IA RECESS (CONT'D)

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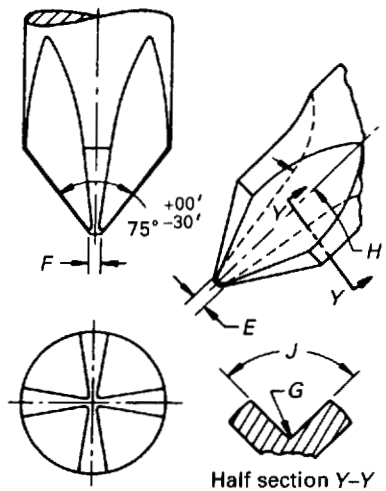
Dimensions of Gage Heads

Gage Diameter	*A*	*B*	*C*	*D*	*E*
	±0.0001	±0.005	±0.005	+0.002 −0.000	+0.002 −0.000
0.093	0.0930	0.344	0.375	0.030	0.024
0.141	0.1410	0.375	0.438	0.046	0.036
0.246	0.2460	0.500	0.500	0.062	0.051
0.436	0.4360	0.688	0.562	0.094	0.078

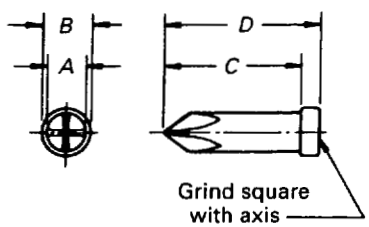
FIG. III3 PENETRATION GAGES FOR TYPE II RECESS

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Enlarged Point Detail



Gage Point

Applicability of Gage Diameters to Recess Diameters and Screw Sizes

Although these gages may be used interchangeably, showing identical readings on those sizes of screws where dimension *B* of gage head is greater than the recess diameter, the following recommendations may be applied.

Use 0.093 gage for recess diameters up to 0.150 in. [Note (1)].
Use 0.141 gage for recess diameters of 0.150 and up to 0.270 in.
Use 0.246 gage for recess diameters of 0.270 and up to 0.460 in.
Use 0.436 gage for recess diameters of 0.460 and up to 0.700 in.

NOTE:
(1) It is not practical to gage screw sizes No. 0 and No. 1 having recess diameters less than 0.102 in. maximum.

Gage Diameter	*A* Point Dia.	*B* Dia.	*C* Length	*D* Length	*E* Point Width	*F* Flat on End	*G* Radius	*H* Milling Angle	*J* Side Flute Angle
	±0.0001	±0.005	±0.005	±0.005	+0.001 −0.000	±0.002	+0.000 −0.001	+0°05′ −0°00′	+0°15′ −0°00′
0.093	0.0926	0.188	0.750	0.875	0.027	0.062	0.005	8°45′	90°00′
0.141	0.1406	0.250	0.875	1.000	0.027	0.062	0.005	8°45′	90°00′
0.246	0.2456	0.312	0.938	1.062	0.027	0.062	0.005	8°45′	90°00′
0.436	0.4356	0.469	1.125	1.250	0.027	0.062	0.005	8°45′	90°00′

FIG. III3 PENETRATION GAGES FOR TYPE II RECESS (CONT'D)

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MANDATORY APPENDIX IV
WOBBLE GAGING OF RECESSED HEADS

Wobble gaging provides a means for determining the compatibility of cross recesses in the heads of screws with companion screw drivers and will indicate the point where deviations in the recess contours affect satisfactory driver engagement. Recesses which exhibit excessive wobble characteristics will result in poor screw driveability because of driver camout prior to attaining normal torque level; damage to recesses; and/or accelerated driver wear.

The allowable total wobble gaging limits for the various types of recesses included herein (Tables IV1 and IV2) were predicated originally on the gaging of plain finish (unplated or uncoated) screws. However, subsequent experience has shown these limits to be suitable for the gaging of screws having coating thickness up to and including 0.0003 in. on significant surfaces. Screws having heavier coatings, which fail to meet the wobble gaging requirements, must be stripped of finish and gaged for acceptance or rejection in the plain condition.

Wobble gaging fixtures as illustrated in Fig. IV1 and appropriate cross recess master plug gages with handles and position indicators for the respective recess types are available through the screw suppliers. Dimensions of the points on master plug gages are, except for the body diameters tabulated herein (Table IV3), the same as those specified for the respective gage points in Appendix III.

The screw to be gaged shall be placed into the screw holding chuck and oriented such that one set of recess wings is parallel to the upright back plate. The screw shall be so positioned and the chuck shall be tightened sufficiently to prevent any tilting of the screw in the chuck when taking wobble readings.

The position gage pointer and handle with the proper master plug gage for the recess size being checked shall be positioned in the slot of the degree scale on top plate and the point of the plug gage inserted into the screw recess. It is essential that registry between the cross lines of pointer and the recess wings be maintained. To correct any misalignment, the chuck position lock screw is loosened, the chuck is rotated until registry is obtained, and the chuck raised or lowered until the gage pointer is flush with the top of the degree scale. The chuck position lock screw is then tightened and the readings taken. The gage handle, with downward pressure applied, is moved from side to side until resistance is encountered and the total reading between points of travel of the gage pointer is recorded. The allowable angular wobble limits shall not exceed the values tabulated below. Cross lines on gage pointer should be rechecked with plug gage wings to make certain cross lines and gage wings are registered on identical radials.

TABLE IV1 GAGING LIMITS FOR TYPE I AND TYPE IA RECESSES

Size of Recess Gage	Maximum Allowable Total Wobble	
	Type I	Type IA
No. 0	(1)	(1)
No. 1	15°	12°
No. 2	12°	10°
No. 3	10°	8°
No. 4	10°	8°

NOTE:
(1) Values not available at time of printing.

TABLE IV2 GAGING LIMITS FOR TYPE II RECESS

Recess Gage Diameter	Maximum Allowable Total Wobble
0.093	12°
0.141	10°
0.246	8°
0.436	6°

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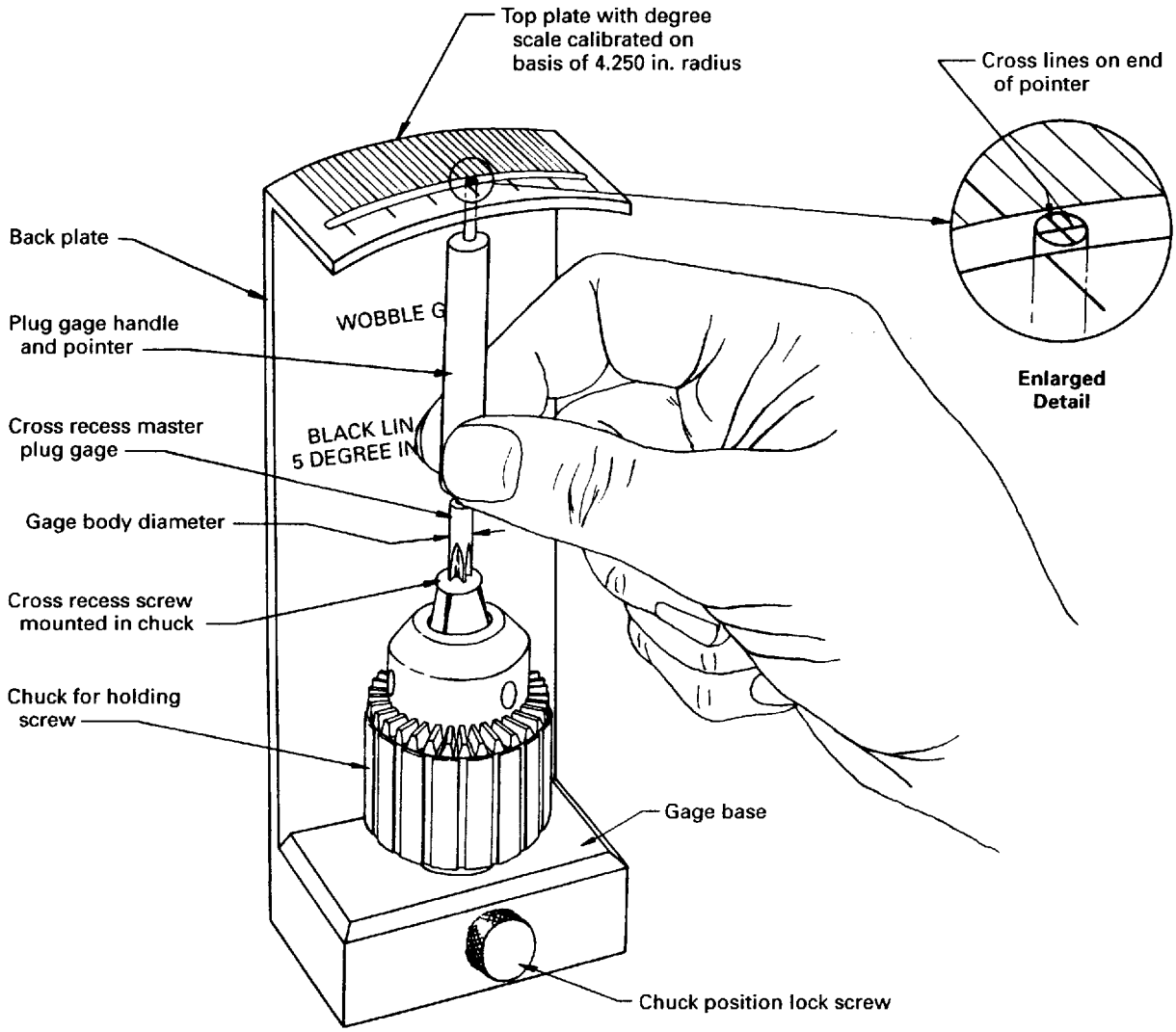


FIG. IV1 TYPICAL WOBBLE GAGING FIXTURE

TABLE IV3 GAGE BODY DIAMETERS

Size of Recess Gage	Type 1 Recess		Type 1A Recess			
	Ground Gage		Ground Gage		Pressed Gage	
	Max.	Min.	Max.	Min.	Max.	Min.
No. 0	0.135	0.115	...	...	...	...
No. 1	0.198	0.178	0.198	0.178	0.275	0.255
No. 2	0.260	0.240	0.260	0.240	0.275	0.255
No. 3	0.323	0.303	0.323	0.303	0.370	0.350
No. 4	0.385	0.365	0.385	0.365	0.475	0.455

GENERAL NOTE: Diameters of Type II recess gages are same as penetration gage points shown in Appendix III.

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MANDATORY APPENDIX V
DIMENSIONS OF TYPE C TAPPING SCREWS

For dimensions of threads and points for Type C thread forming tapping screws, see Table V1.

— NOT RECOMMENDED FOR NEW DESIGNS —

(See para. 1.3.1.5)

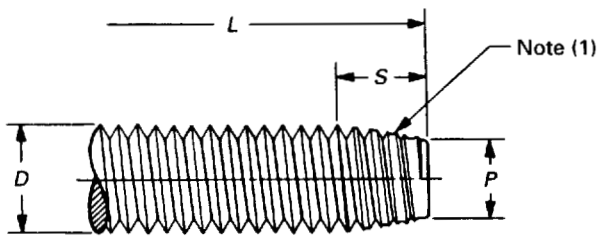


TABLE V1 DIMENSIONS OF THREADS AND POINTS FOR TYPE C THREAD FORMING TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Threads per inch	D		P	S (3)				L			
			Major Diameter		Point Diameter	Point Taper Length				Determinant Lengths for Point Taper		Minimum Practical Nominal Screw Lengths	
						For Short Screws		For Long Screws					
			Max.	Min.	Ref.	Max.	Min.	Max.	Min.	90° Heads	Csk. Heads	90° Heads	Csk. Heads
2	0.0860	56	0.0860	0.0813	0.068	0.062	0.045	0.080	0.062	5/32	3/16	5/32	3/16
2	0.0860	64	0.0860	0.0816	0.070	0.055	0.039	0.070	0.055	1/8	3/16	1/8	5/32
3	0.0990	48	0.0990	0.0938	0.078	0.073	0.052	0.094	0.073	3/16	7/32	5/32	7/32
3	0.0990	56	0.0990	0.0942	0.081	0.062	0.045	0.080	0.062	5/32	3/16	5/32	3/16
4	0.1120	40	0.1120	0.1061	0.087	0.088	0.062	0.112	0.088	7/32	1/4	3/16	1/4
4	0.1120	48	0.1120	0.1068	0.091	0.073	0.052	0.094	0.073	3/16	7/32	5/32	7/32
5	0.1250	40	0.1250	0.1191	0.100	0.088	0.062	0.112	0.088	7/32	9/32	3/16	1/4
5	0.1250	44	0.1250	0.1195	0.102	0.080	0.057	0.102	0.080	3/16	1/4	3/16	1/4
6	0.1380	32	0.1380	0.1312	0.107	0.109	0.078	0.141	0.109	1/4	5/16	1/4	5/16
6	0.1380	40	0.1380	0.1321	0.113	0.088	0.062	0.112	0.088	7/32	9/32	3/16	1/4
8	0.1640	32	0.1640	0.1571	0.132	0.109	0.078	0.141	0.109	1/4	11/32	1/4	5/16
8	0.1640	36	0.1640	0.1577	0.136	0.097	0.069	0.125	0.097	7/32	5/16	7/32	9/32
10	0.1900	24	0.1900	0.1818	0.148	0.146	0.104	0.188	0.146	11/32	7/16	5/16	13/32
10	0.1900	32	0.1900	0.1831	0.158	0.109	0.078	0.141	0.109	1/4	11/32	1/4	5/16
12	0.2160	24	0.2160	0.2078	0.174	0.146	0.104	0.188	0.146	11/32	7/16	5/16	13/32
12	0.2160	28	0.2160	0.2085	0.180	0.125	0.089	0.161	0.125	5/16	13/32	9/32	3/8

(continued)

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TABLE V1 DIMENSIONS OF THREADS AND POINTS FOR TYPE C THREAD FORMING TAPPING SCREWS (CONT'D)

Nominal Size (2) or Basic Screw Diameter	Threads per inch	D Major Diameter Max.	D Major Diameter Min.	P Point Diameter Ref.	S (3) Point Taper Length For Short Screws Max.	S (3) Point Taper Length For Short Screws Min.	S (3) Point Taper Length For Long Screws Max.	S (3) Point Taper Length For Long Screws Min.	L Determinant Lengths for Point Taper (3) 90° Heads	L Determinant Lengths for Point Taper (3) Csk. Heads	L Minimum Practical Nominal Screw Lengths 90° Heads	L Minimum Practical Nominal Screw Lengths Csk. Heads
1/4 0.2500	20	0.2500	0.2408	0.200	0.175	0.125	0.225	0.175	13/32	17/32	3/8	1/2
1/4 0.2500	28	0.2500	0.2425	0.214	0.125	0.089	0.161	0.125	5/16	13/32	9/32	3/8
5/16 0.3125	18	0.3125	0.3026	0.257	0.194	0.139	0.250	0.194	15/32	19/32	7/16	9/16
5/16 0.3125	24	0.3125	0.3042	0.271	0.146	0.104	0.188	0.146	11/32	15/32	5/16	15/32
3/8 0.3750	16	0.3750	0.3643	0.312	0.219	0.156	0.281	0.219	1/2	11/16	15/32	5/8
3/8 0.3750	24	0.3750	0.3667	0.333	0.146	0.104	0.188	0.146	11/32	1/2	5/16	1/2
7/16 0.4375	14	0.4375	0.4258	0.366	0.250	0.179	0.321	0.250	19/32	3/4	9/16	23/32
7/16 0.4375	20	0.4375	0.4281	0.387	0.175	0.125	0.225	0.175	13/32	9/16	3/8	17/32
1/2 0.5000	13	0.5000	0.4876	0.423	0.269	0.192	0.346	0.269	5/8	25/32	19/32	3/4
1/2 0.5000	20	0.5000	0.4906	0.450	0.175	0.125	0.225	0.175	13/32	9/16	3/8	17/32

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Threads within point taper length shall have unfinished crests.
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Screws of these nominal lengths and shorter shall have point taper lengths specified for short screws. Longer lengths shall have point taper lengths specified for long screws.

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MANDATORY APPENDIX VI
DIMENSIONS OF 100 deg FLAT COUNTERSUNK HEAD SCREWS

For dimensions of slotted, Type I cross recessed, Type IA cross recessed, and Type II cross recessed 100 deg flat countersunk head tapping screws, see Tables VI1, VI2, VI3, and VI4, respectively.

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(See para. 1.2.1)

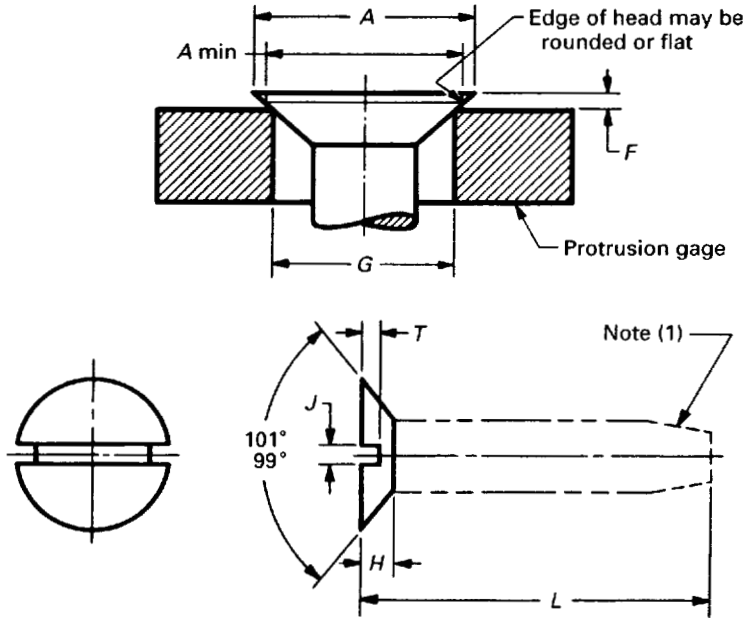


TABLE VI1 DIMENSIONS OF SLOTTED 100° FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H (3) Head Height Ref.	J Slot Width Max.	J Slot Width Min.	T Slot Depth Max.	T Slot Depth Min.	F (4) Protrusion Above Gaging Diameter Max.	F (4) Protrusion Above Gaging Diameter Min.	G (4) Gaging Diameter
4	0.1120	● ▲	0.212	0.188	0.049	0.039	0.031	0.024	0.017	0.025	0.016	0.167
6	0.1380	● ▲	0.262	0.235	0.060	0.048	0.039	0.030	0.022	0.028	0.017	0.214
8	0.1640	● ▲	0.312	0.282	0.072	0.054	0.045	0.036	0.027	0.031	0.019	0.261
10	0.1900	● ▲	0.362	0.329	0.083	0.060	0.050	0.042	0.031	0.034	0.021	0.307
1/4	0.2500	● ▲	0.477	0.437	0.110	0.075	0.064	0.055	0.042	0.040	0.025	0.415
5/16	0.3125	● ▲	0.597	0.550	0.138	0.084	0.072	0.069	0.053	0.047	0.030	0.526
3/8	0.3750	▲	0.717	0.662	0.165	0.094	0.081	0.083	0.065	0.053	0.034	0.638

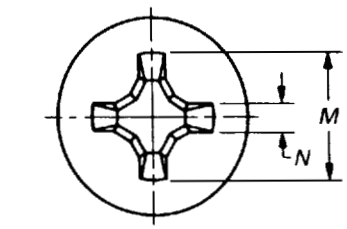
GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
● Type AB thread forming, see Table 5.
▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Tabulated values determined from formula for *H* max., Appendix A.
(4) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from the tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

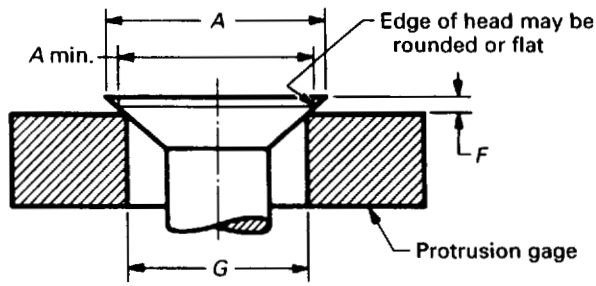
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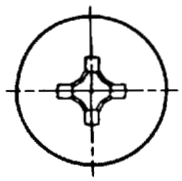
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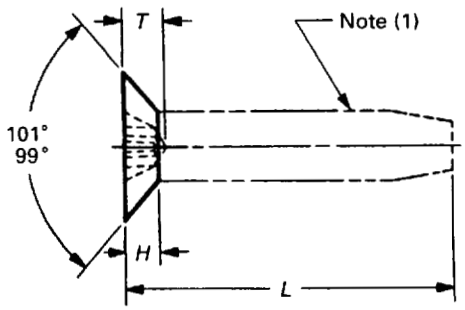
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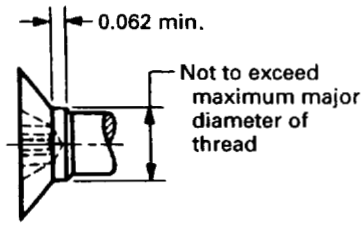


This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.









Optional Shoulder for Long Screws With Reduced Body

TABLE VI2 DIMENSIONS OF TYPE I CROSS RECESSED 100° FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*A*		*H* (3)	*M*	*T*	*N*				*F* (4)		*G* (4)
			Head Diameter		Head Height	Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
4	0.1120	● ▲	0.212	0.188	0.049	0.110	0.070	0.018	1	0.071	0.055	0.025	0.016	0.167
6	0.1380	● ▲	0.262	0.235	0.060	0.148	0.074	0.027	2	0.075	0.052	0.028	0.017	0.214
8	0.1640	● ▲	0.312	0.282	0.072	0.162	0.090	0.028	2	0.090	0.067	0.031	0.019	0.261
10	0.1900	● ▲	0.362	0.329	0.083	0.178	0.104	0.030	2	0.105	0.082	0.034	0.021	0.307
1/4	0.2500	● ▲	0.477	0.437	0.110	0.240	0.124	0.033	3	0.118	0.095	0.040	0.025	0.415
5/16	0.3125	● ▲	0.597	0.550	0.138	0.310	0.157	0.053	4	0.148	0.126	0.047	0.030	0.526
3/8	0.3750	▲	0.717	0.662	0.165	0.336	0.182	0.056	4	0.173	0.151	0.053	0.034	0.638

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:

(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ●Type AB thread forming, see Table 5.
- ▲Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

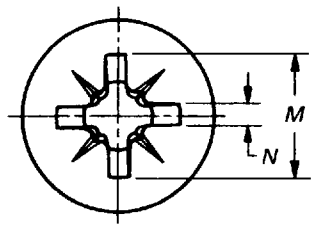
(3) Tabulated values determined from formula for *H* max., Appendix A.

(4) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from the tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

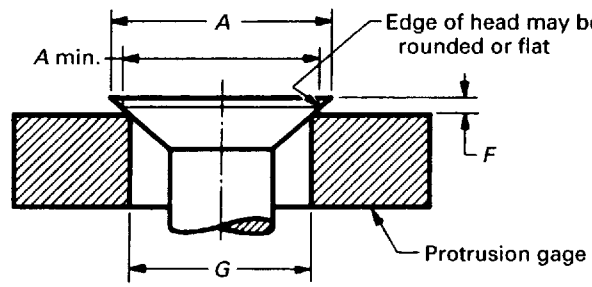
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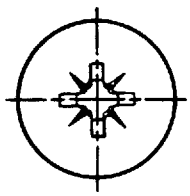
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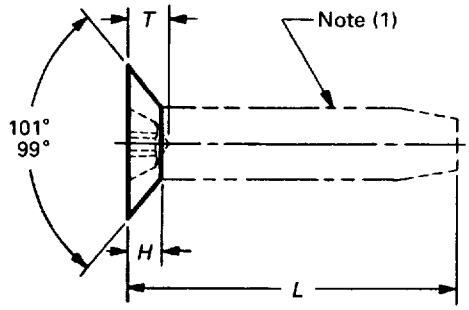
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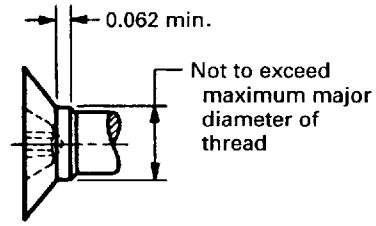


This type of recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded.









Optional Shoulder for Long Screws With Reduced Body

TABLE VI3 DIMENSIONS OF TYPE IA CROSS RECESSED 100° FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	*A*		*H* (3)	*M*	*T*	*N*				*F* (4)		*G* (4)
			Head Diameter		Head Height	Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
4	0.1120	● ▲	0.212	0.188	0.049	0.110	0.070	0.029	1	0.068	0.052	0.025	0.016	0.167
6	0.1380	● ▲	0.262	0.235	0.060	0.148	0.077	0.041	2	0.071	0.053	0.028	0.017	0.214
8	0.1640	● ▲	0.312	0.282	0.072	0.162	0.092	0.041	2	0.086	0.068	0.031	0.019	0.261
10	0.1900	● ▲	0.362	0.329	0.083	0.178	0.107	0.041	2	0.101	0.083	0.034	0.021	0.307
1/4	0.2500	● ▲	0.477	0.437	0.110	0.240	0.126	0.056	3	0.114	0.096	0.040	0.025	0.415
5/16	0.3125	● ▲	0.597	0.550	0.138	0.310	0.163	0.085	4	0.145	0.127	0.047	0.030	0.526
3/8	0.3750	▲	0.717	0.662	0.165	0.336	0.187	0.085	4	0.170	0.152	0.053	0.034	0.638

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:

(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

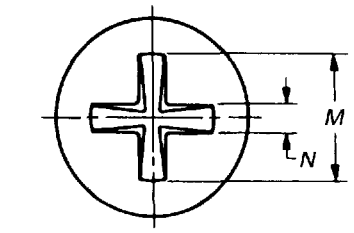
(3) Tabulated values determined from formula for *H* max., Appendix A.

(4) No tolerance for gaging diameter is given. If the gaging diameter of the gage use differs from the tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

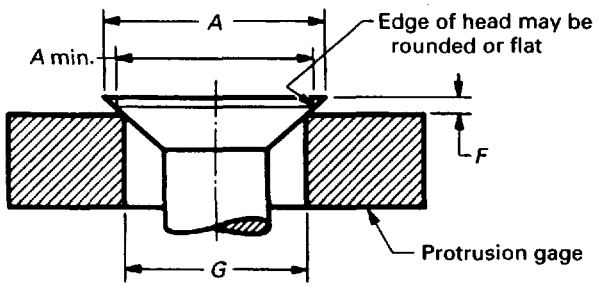
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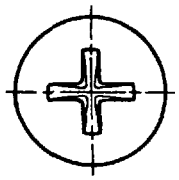
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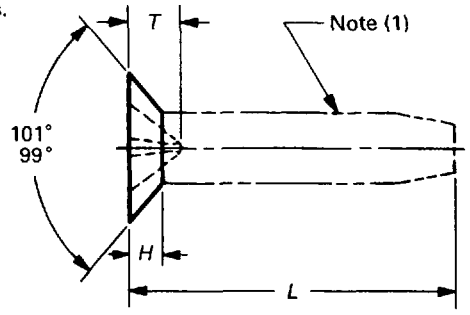
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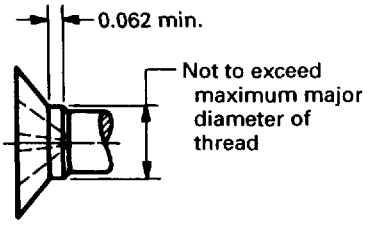


This type of recess consists of two intersecting slots with parallel sides converging to a slightly truncated apex at bottom of recess.









Optional Shoulder for Long Screws With Reduced Body

TABLE VI4 DIMENSIONS OF TYPE II CROSS RECESSED 100° FLAT COUNTERSUNK HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	A		H (3)	M	T	N		F (4)			G (4)
			Head Diameter		Head Height	Recess Diameter	Recess Depth	Recess Width		Recess Penetration Gaging Depth		Protrusion Above Gaging Diameter		
		Code Symbols	Max.	Min.	Ref.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.	Max.	Min.	Gaging Diameter
4	0.1120	● ▲	0.212	0.188	0.049	0.131	0.070	0.029		0.051	0.036	0.025	0.016	0.167
6	0.1380	● ▲	0.262	0.235	0.060	0.157	0.086	0.033		0.068	0.051	0.028	0.017	0.214
8	0.1640	● ▲	0.312	0.282	0.072	0.185	0.102	0.037	Point	0.086	0.067	0.031	0.019	0.261
10	0.1900	● ▲	0.362	0.329	0.083	0.219	0.122	0.042	Same	0.109	0.087	0.034	0.021	0.307
1/4	0.2500	● ▲	0.477	0.437	0.110	0.288	0.164	0.053	On All	0.154	0.132	0.040	0.025	0.415
5/16	0.3125	● ▲	0.597	0.550	0.138	0.355	0.207	0.063	Drivers	0.197	0.175	0.047	0.030	0.526
3/8	0.3750	▲	0.717	0.662	0.165	0.433	0.258	0.075		0.249	0.226	0.053	0.034	0.638

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:

(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

(3) Tabulated values determined from formula for *H* max., Appendix A.

(4) No tolerance for gaging diameter is given. If the gaging diameter of the gage used differs from the tabulated value, the protrusion will be affected accordingly and the proper protrusion values must be recalculated using the formulas shown in Appendix I.

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MANDATORY APPENDIX VII
DIMENSIONS OF SLOTTED HEX HEAD SCREWS

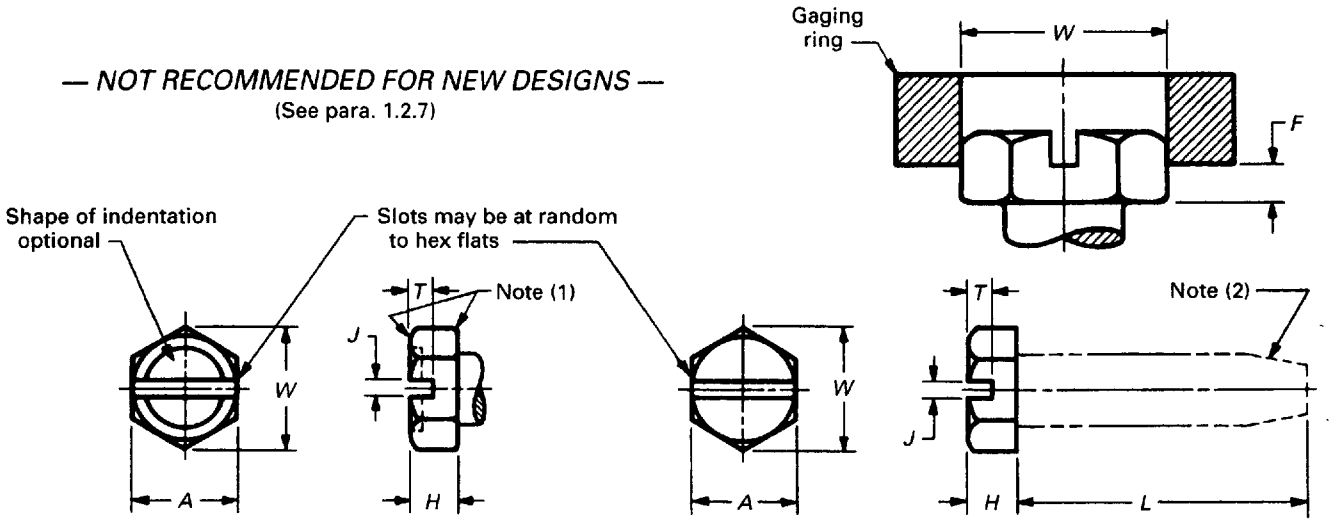
For dimensions of slotted regular and large hex head tapping screws, see Table VII1.

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Indented Head **Trimmed Head or Fully Upset Head**

TABLE VII1 DIMENSIONS OF SLOTTED REGULAR AND LARGE HEX HEAD TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Applicable to Screw Types (2)	Regular Head (4)			Large Head (4) (7)									
			A (5)		*W* (5) (6)	*A* (5)		*W* (5) (6)	*H*		*J*		*T* (8)		*F* (6)
			Width Across Flats		Across Corners	Width Across Flats		Across Corners	Head Height		Slot Width		Slot Depth		Protrusion Beyond Gaging Ring
		Code Symbols	Max.	Min.	Min.	Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.
4	0.1120	● ♦ ▲ ■	0.188	0.181	0.202	0.219	0.213	0.238	0.060	0.049	0.039	0.031	0.036	0.025	0.029
5	0.1250	● ♦ ▲ ■	0.188	0.181	0.202	0.250	0.244	0.272	0.070	0.058	0.043	0.035	0.042	0.030	0.035
6	0.1380	● ♦ ▲ ■	0.250	0.244	0.272	...	...	..	0.093	0.080	0.048	0.039	0.046	0.033	0.048
7	0.1510	● ♦ ▲	0.250	0.244	0.272	...	...	..	0.093	0.080	0.048	0.039	0.054	0.040	0.048
8	0.1640	● ♦ ▲ ■	0.250	0.244	0.272	0.312	0.305	0.340	0.110	0.096	0.054	0.045	0.066	0.052	0.058
10	0.1900	● ♦ ▲ ■	0.312	0.305	0.340	...	...	...	0.120	0.105	0.060	0.050	0.072	0.057	0.063
12	0.2160	● ♦ ▲ ■	0.312	0.305	0.340	0.375	0.367	0.409	0.155	0.139	0.067	0.056	0.093	0.077	0.083
14	0.2420	●	0.375	0.367	0.409	0.438	0.428	0.477	0.190	0.172	0.075	0.064	0.101	0.083	0.103

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TABLE VII1 DIMENSIONS OF SLOTTED REGULAR AND LARGE HEX HEAD TAPPING SCREWS (CONT'D)

Nominal Size (3) or Basic Screw Diameter	Applicable to Screw Types (2) Code Symbols	Regular Head (4) A (5) Width Across Flats Max.	Regular Head (4) A (5) Width Across Flats Min.	Regular Head (4) W (5) (6) Across Corners Min.	Large Head (4) (7) A (5) Width Across Flats Max.	Large Head (4) (7) A (5) Width Across Flats Min.	Large Head (4) (7) W (5) (6) Across Corners Min.	H Head Height Max.	H Head Height Min.	J Slot Width Max.	J Slot Width Min.	T (8) Slot Depth Max.	T (8) Slot Depth Min.	F (6) Protrusion Beyond Gaging Ring Min.
1/4 0.2500	●, ▲ ■	0.375	0.367	0.409	0.438	0.428	0.477	0.190	0.172	0.075	0.064	0.101	0.083	0.103
5/16 0.3125	●, ▲ ■	0.500	0.489	0.545	...	...	...	0.230	0.208	0.084	0.072	0.122	0.100	0.125
20 0.3200	♦	0.500	0.489	0.545	...	...	...	0.230	0.208	0.084	0.072	0.122	0.100	0.125
24 0.3720	♦	0.562	0.551	0.614	...	...	...	0.295	0.270	0.094	0.081	0.156	0.131	0.162
3/8 0.3750	▲ ■	0.562	0.551	0.614	...	...	...	0.295	0.270	0.094	0.081	0.156	0.131	0.162

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:

(1) A slight rounding of all edges and corners of the hex surfaces of indented hex heads shall be permissible provided the diameter of the bearing circle is equal to no less than 90% of the specified minimum width across flats dimension.

(2) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

(4) Unless otherwise specified by purchaser, regular hex heads shall be furnished, and both regular and large head styles may be of indented head, trimmed head, or fully upset head construction, at the option of manufacturer.

(5) Dimensions across flats and across corners of the head shall be measured at the point of maximum metal. Taper of sides of hex (angle between one side and the axis) shall not exceed 2° or 0.004 in., whichever is greater, the specified width across flats being the large dimension.

(6) The rounding due to lack of fill on all six corners of the head shall be reasonably uniform and the width across corners of the head shall be such that when a sharp ring having an inside diameter equal to the specified minimum width across corners is placed on the top and bottom of the head, the head shall protrude by an amount equal to, or greater than, the *F* value tabulated. See Appendix II for across corners gaging of hex heads.

(7) Large hex head is intended for screw and washer assemblies—sems, as specified in ASME B18.13, and other applications requiring large bearing.

(8) Slot depth beyond bottom of indentation on indented heads shall not be less than 1/3 of minimum slot depth specified.

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NONMANDATORY APPENDIX A
FORMULAS FOR DIMENSIONS

For formulas for dimensions, see Tables A1 through A13.

TABLE A1 FLAT COUNTERSUNK HEAD SCREWS

Screw Size	Head Diameter	Head Height	Slot Depth
0 through $\frac{3}{8}$	A max. (sharp) = $2.040D - 0.003$ref. [Note (1)] A min. (sharp) = $1.960D - 0.013$ref. [Note (1)] A max. (rounded or flat) = $1.920D - 0.013$ [Note (2)] A min. (rounded or flat) = $1.820D - 0.013$ [Note (2)] Gaging diameter $G = 1.830D - 0.033$	H max. = $0.619D - 0.002$ H min. = $0.552D - 0.007$ref. [Note (1)]	T max. = $0.288D - 0.002$ T min. = $0.192D - 0.002$
$\frac{7}{16}$	A max. (sharp) = $2.000D - 0.063$ref. [Note (1)] A min. (sharp) = $1.920D - 0.073$ref. [Note (1)] A max. (rounded or flat) = $1.880D - 0.063$ [Note (2)] A min. (rounded or flat) = $1.800D - 0.073$ [Note (2)] Gaging diameter $G = 1.790D - 0.093$	H max. = $0.596D - 0.038$ H min. = $0.529D - 0.042$ref. [Note (1)]	T max. = $0.274D - 0.017$ T min. = $0.184D - 0.015$
$\frac{1}{2}$	A max. (sharp) = $2.000D - 0.125$ref. [Note (1)] A min. (sharp) = $1.920D - 0.135$ref. [Note (1)] A max. (rounded or flat) = $1.880D - 0.125$ [Note (2)] A min. (rounded or flat) = $1.800D - 0.135$ [Note (2)] Gaging diameter $G = 1.790D - 0.155$	H max. = $0.596D - 0.075$ H min. = $0.529D - 0.078$ref. [Note (1)]	T max. = $0.274D - 0.034$ T min. = $0.184D - 0.027$

GENERAL NOTE: D = basic diameter of the screw

NOTES:
(1) Values no longer tabulated, formulas are retained here for reference purposes only.
(2) Values based on a sidewall of approximately 4% of the head diameter.

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TABLE A2 UNDERCUT FLAT COUNTERSUNK HEAD SCREWS

Screw Size	Head Diameter	Head Height	Slot Depth
0 through $\frac{3}{8}$	A max. (sharp) = $2.040D - 0.003$ref. [Note (1)] A min. (sharp) = $1.960D - 0.013$ref. [Note (1)] A max. (rounded or flat) = $1.920D - 0.003$ [Note (2)] A min. (rounded or flat) = $1.820D - 0.013$ [Note (2)] Gaging diameter $G = 1.830D - 0.033$	H max. = $0.432D - 0.001$ H min. = $0.386D - 0.005$	T max. = $0.202D - 0.001$ T min. = $0.134D - 0.001$
$\frac{7}{16}$	A max. (sharp) = $2.000D - 0.063$ref. [Note (1)] A min. (sharp) = $1.920D - 0.073$ref. [Note (1)] A max. (rounded or flat) = $1.880D - 0.063$ [Note (2)] A min. (rounded or flat) = $1.800D - 0.073$ [Note (2)] Gaging diameter $G = 1.790D - 0.093$	H max. = $0.417D - 0.026$ H min. = $0.370D - 0.029$	T max. = $0.192D - 0.012$ T min. = $0.129D - 0.011$
$\frac{1}{2}$	A max. (sharp) = $2.000D - 0.125$ref. [Note (1)] A min. (sharp) = $1.920D - 0.135$ref. [Note (1)] A max. (rounded or flat) = $1.880D - 0.125$ [Note (2)] A min. (rounded or flat) = $1.800D - 0.135$ [Note (2)] Gaging diameter $G = 1.790D - 0.155$	H max. = $0.417D - 0.052$ H min. = $0.370D - 0.055$	T max. = $0.192D - 0.024$ T min. = $0.129D - 0.019$

GENERAL NOTE: D = basic diameter of the screw

NOTES:
(1) Values no longer tabulated, formulas are retained here for reference purposes only.
(2) Values based on a sidewall of approximately 4% of the head diameter.

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TABLE A3 OVAL COUNTERSUNK HEAD SCREWS

Screw Size	Head Diameter	Total Head Height	Slot Depth	Head Side Height
0 through 3/8	A max. (sharp) = $2.040D - 0.003$ref. [Note (1)] A min. (sharp) = $1.960D - 0.013$ref. [Note (1)] A max. (rounded or flat) = $1.920D - 0.003$ [Note (2)] A min. (rounded or flat) = $1.820D - 0.013$ [Note (2)] Gaging diameter $G = 1.830D - 0.033$	O max. = $0.923D + 0.001$ O min. = $0.820D - 0.008$	T max. = $0.556D - 0.003$ T min. = $0.460D - 0.003$	H max. = $0.619D - 0.002$ H min. = $0.552D - 0.007$ref. [Note (1)]
7/16	A max. (sharp) = $2.000D - 0.063$ref. [Note (1)] A min. (sharp) = $1.920D - 0.073$ref. [Note (1)] A max. (rounded or flat) = $1.880D - 0.063$ [Note (2)] A min. (rounded or flat) = $1.800D - 0.073$ [Note (2)] Gaging diameter $G = 1.790D - 0.093$	O max. = $0.896D - 0.047$ O min. = $0.789D - 0.050$	T max. = $0.547D - 0.029$ T min. = $0.466D - 0.030$	H max. = $0.596D - 0.038$ H min. = $0.529D - 0.042$ref. [Note (1)]
1/2	A max. (sharp) = $2.000D - 0.125$ref. [Note (1)] A min. (sharp) = $1.920D - 0.135$ref. [Note (1)] A max. (rounded or flat) = $1.880D - 0.125$ [Note (2)] A min. (rounded or flat) = $1.800D - 0.135$ [Note (2)] Gaging diameter $G = 1.790D - 0.155$	O max. = $0.896D - 0.094$ O min. = $0.789D - 0.094$	T max. = $0.547D - 0.057$ T min. = $0.466D - 0.055$	H max. = $0.596D - 0.075$ H min. = $0.529D - 0.078$ref. [Note (1)]

GENERAL NOTE: D = basic diameter of the screw

NOTES:
(1) Values no longer tabulated, formulas are retained here for reference purposes only.
(2) Values based on a sidewall of approximately 4% of the head diameter.

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TABLE A4 UNDERCUT OVAL COUNTERSUNK HEAD SCREWS
Same as Oval Countersunk Head Except as Shown Below

Screw Size	Total Head Height	Head Side Height	Slot Depth
0 through 3/8	O max. = $0.736D + 0.002$ O min. = $0.654D - 0.006$	H max. = $0.432D - 0.001$ H min. = $0.386D - 0.005$ref. [Note (1)]	T max. = $0.480D - 0.001$ T min. = $0.402D - 0.002$
7/16	O max. = $0.717D - 0.035$ O min. = $0.630D - 0.037$	H max. = $0.417D - 0.026$ H min. = $0.370D - 0.029$ref. [Note (1)]	T max. = $0.473D - 0.023$ T min. = $0.404D - 0.023$
1/2	O max. = $0.717D - 0.071$ O min. = $0.630D - 0.071$	H max. = $0.417D - 0.052$ H min. = $0.370D - 0.055$ref. [Note (1)]	T max. = $0.473D - 0.033$ T min. = $0.404D - 0.033$

GENERAL NOTE: D = basic diameter of the screw

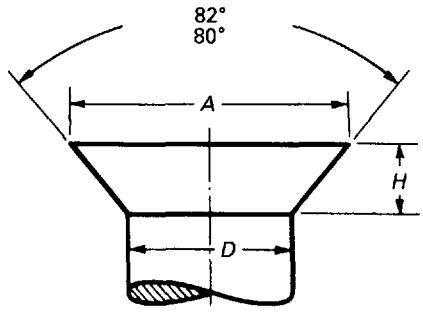
NOTE:
(1) Values no longer tabulated, formulas are retained here for reference purposes only.

TABLE A5 PAN HEAD SCREWS

		Head Height		
Screw Size	Head Diameter	Slotted	Recessed	Slot Depth
0 through 12	A max. = $1.980D - 0.003$ A min. = $1.940D - 0.012$	H max. = $0.550D + 0.006$ H min. = $0.520D$	H max. = $0.692D + 0.002$ H min. = $0.652D - 0.003$	T max. = $0.350D + 0.001$ T min. = $0.300D - 0.004$
Over 12 through 1/2	A max. = $1.980D - 0.003$ A min. = $1.940D - 0.012$	H max. = $0.550D + 0.006$ H min. = $0.520D$	H max. = $0.692D + 0.002$ H min. = $0.652D - 0.001$	T max. = $0.293D + 0.014$ T min. = $0.246D + 0.008$

GENERAL NOTE: D = basic diameter of the screw

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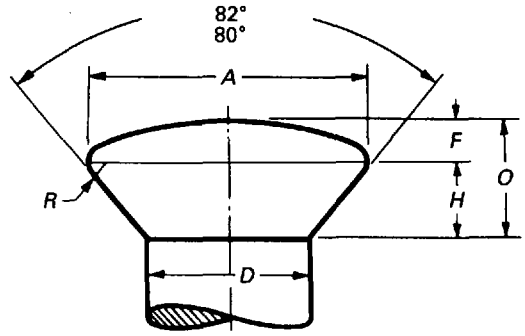


TABLE A6 FLAT AND OVAL COUNTERSUNK TRIM HEAD SCREWS

Oval Head						D	A [Note (2)]		F
	H		O	R					
Screw Size	Head Height [Note (1)]		Total Head Height	Head Radius, Ref.	Screw Size	Head Size	Shank Dia. Max.	Head Diameter Max.	Head Diameter Min.	Oval Height Ref.
All sizes	For H max., use	Max. shank diameter D; min. angle 80°; max. head diameter, A; and nominal radius, R	O max. = H max. + F	R nom. = 0.08A min.	4	3	0.112	0.199	0.181	0.029
					5	4	0.125	0.225	0.207	0.033
					6	4	0.138	0.225	0.207	0.033
					6	5	0.138	0.252	0.232	0.037
	For H min., use	Max. shank diameter, D; max. angle 82°; min. head diameter, A; and nominal radius R	O min. = H min. + F		8	5	0.164	0.252	0.232	0.037
					8	6	0.164	0.279	0.257	0.041
					10	8	0.190	0.332	0.308	0.047
					12	8	0.216	0.332	0.308	0.047
					12	10	0.216	0.385	0.359	0.055
Flat Head					1/4	10	0.250	0.385	0.359	0.055
Screw Size	Head Height				1/4	12	0.250	0.438	0.410	0.063
					5/16	12	0.3125	0.438	0.410	0.063
All sizes	$H\ \text{max.} = \frac{A\ \text{max.} - D}{2 \tan 40°}$	$H\ \text{min.} = \frac{A\ \text{min.} - D}{2 \tan 41°}$ ref. [Note (3)]			5/16	1/4	0.3125	0.507	0.477	0.072
					3/8	5/16	0.375	0.635	0.600	0.092

NOTES:
(1) Head height H dimensions have been determined on large scale layouts using the dimensions specified in this Table in the manner specified.
(2) Head diameters for head sizes indicated are derived from formulas for flat and oval countersunk head tapping screws shown in Tables A1, A2, and A3. Requirements for new head and body combinations should be referred to the subcommittee for development of proper dimensions.
(3) Values no longer tabulated; formulas are retained here for reference purposes only.

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TABLE A7 FILLISTER HEAD SCREWS

Screw Size	Head Diameter	Total Head Height	Slot Depth	Head Side Height	Oval Height
0 and 1	No formulas, see tables	No formulas, see tables	No formulas, see tables	No formulas, see tables	No formulas, see tables
2 through 3/8	A max. = $1.670D - 0.004$ A min. = $1.610D - 0.014$	O max. = H max. + F max. O min. = H min. + F min.	T max. = $0.440D - 0.001$ T min. = $0.374D - 0.007$	H max. = $0.660D + 0.005$ H min. = $0.662D$	F max. = $0.280D - 0.003$ F min. = $0.240D - 0.008$
7/16	A max. = $1.000D + 0.188$ A min. = $0.940D + 0.178$	O max. = H max. + F max. O min. = H min. + F min.	T max. = $0.500(O$ min.$) + 0.010$ T min. = T max. $- 0.066D - 0.005$	H max. = $0.550D + 0.022$ H min. = $0.510D + 0.017$	F max. = $0.220D + 0.006$ F min. = $0.180D + 0.001$
1/2	A max. = $1.000D + 0.250$ A min. = $0.940D + 0.240$	O max. = H max. + F max. O min. = H min. + F min.	T max. = $0.500(O$ min.$) + 0.010$ T min. = T max. $- 0.066D - 0.005$	H max. = $0.550D + 0.027$ H min. = $0.510D + 0.022$	F max. = $0.220D + 0.008$ F min. = $0.180D + 0.003$

GENERAL NOTE: D = basic diameter of the screw

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TABLE A8 100° FLAT COUNTERSUNK HEAD SCREWS

Screw Size	Head Diameter	Head Height	Slot Depth
0 through 3/8	A max. (sharp) = $2.040D - 0.003$ref. [Note (1)] A min. (sharp) = $1.960D - 0.013$ref. [Note (1)] A max. (rounded or flat) = $1.920D - 0.003$ [Note (2)] A min. (rounded or flat) = $1.800D - 0.013$ [Note (2)] Gaging diameter $G = 1.790D - 0.033$	H max. = $0.444D - 0.001$ H min. = $0.396D - 0.005$ref. [Note (1)]	T max. = $0.222D - 0.0005$ T min. = $0.184D - 0.004$

GENERAL NOTE: D = basic diameter of the screw

NOTES:
(1) Values no longer tabulated, formulas are retained here for reference purposes only.
(2) Values based on a sidewall of approximately 2½% of the head diameter.

TABLE A9 TRUSS HEAD SCREWS

Screw Size	Head Diameter	Head Height	Slot Depth
0 through 12	A max. = $2.440D - 0.015$ A min. = $2.360D - 0.023$	H max. = $0.620D$ H min. = $0.570D - 0.005$	T max. = $0.350D + 0.001$ T min. = $0.300D - 0.004$
Over 12 through 1/2	A max. = $2.000D + 0.073$ A min. = $1.930D + 0.063$	H max. = $0.520D + 0.020$ H min. = $0.470D + 0.015$	T max. = $0.293D + 0.014$ T min. = $0.246D + 0.008$

GENERAL NOTE: D = basic diameter of the screw

TABLE A10 ROUND HEAD SCREWS

Screw Size	Head Diameter	Head Height	Slot Depth
0 through 3/8	A max. = $1.887D$ A min. = $1.813D - 0.010$	H max. = $0.645D + 0.014$ H min. = $0.615D + 0.006$	T max. = $0.367D + 0.017$ T min. = $0.277D + 0.013$
7/16	A max. = $2.000D - 0.125$ A min. = $1.926D - 0.135$	H max. = $0.875D - 0.055$ H min. = $0.845D - 0.063$	T max. = $0.498D - 0.023$ T min. = $0.380D - 0.018$
1/2	A max. = $2.000D - 0.188$ A min. = $1.926D - 0.198$	H max. = $0.875D - 0.082$ H min. = $0.845D - 0.090$	T max. = $0.498D - 0.038$ T min. = $0.380D - 0.031$

GENERAL NOTE: D = basic diameter of the screw

TABLE A11 SLOT WIDTH IN SLOTTED HEAD SCREWS

Screw Size	Basic Width	Tolerance		
		Screw Size	Plus	Minus
0 through 10	Basic slot width = $0.280D + 0.004$ adjusted to standard cutter size	0, 1	0.003	0.004
		2, 3, 4, 5	0.003	0.005
		6, 7, 8	0.004	0.005
12 through 1/2	Basic slot width = $0.160D + 0.024$ adjusted to standard cutter size	10, 12, 14, 1/4, 16	0.005	0.006
		18, 5/16, 20	0.005	0.007
		24, 3/8, 7/16	0.005	0.008
		1/2	0.006	0.009

GENERAL NOTE: D = basic diameter of the screw

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TABLE A12 THREADS AND POINTS FOR TAPPING SCREWS

Screw Type	Screw Size	Thread Major Diameter	Point Diameter	Point Taper Length	
AB	All sizes	No formula, see Table 5	Not applicable	Not specified (See Appendix D)	
B, BF, BP, and BT	All sizes	No formula, see Tables 6 and 7	No formula, see Tables 6 and 7	All lengths	S max. = $2.000p$ S min. = $1.500p$
C, D, F, G, and T	All sizes	D max. = basic diameter of the screw D min. = min. major diameter, Class 2A thread [Note (1)]	P max. = $K + 0.200\ (2hs)$ P min. = K – Class 2A pitch dia. tol. [Note (1)]	Short screws [Note (2)]	S max. = $3.500p$ S min. = $2.500p$
				Long screws [Note (2)]	S max. = $4.500p$ S min. = $3.500p$
A	All sizes	No formula, see Appendix E	Not applicable	Not specified (See Appendix D)	

GENERAL NOTE:
K = basic minor diameter of Class 2A thread [Note (1)], hs = height of external thread (design form) [Note (1)]; and p = pitch of the thread

NOTES:
(1) Refer to ASME B1.1, Unified Inch Screw Threads (UN and UNR Thread Form).
(2) Refer to Table 8 and Appendix V for determinant lengths for point taper. Tabulated lengths represent 8 times the pitch of the thread for 90° heads and 8 times the pitch of the thread plus H max. from Table 13 for countersunk heads, rounded upward to nearest $\frac{1}{32}$ in.

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TABLE A13 MINIMUM LENGTHS FOR TAPPING SCREWS

Screw Type	Head Type	Minimum Practical Nominal Screw Length [Note (1)]
AB	90°	L min. $= 1.000D + 2.414\left(\frac{d \text{ max.} + d \text{ min.}}{4}\right)$ [Note (2)]
	Csk.	L min. $= 1.000D + 2.414\left(\frac{d \text{ max.} + d \text{ min.}}{4}\right) + H$ max. (from Table 13) [Note (2)]
B, BF, and BT	90°	L min. $= 1.000D + \frac{S \text{ max.} + S \text{ min.}}{2}$
	Csk.	L min. $= 1.000D + \frac{S \text{ max.} + S \text{ min.}}{2} + H$ max. (from Table 13)
BP	90°	L min. $= 1.000D + \frac{S \text{ max.} + S \text{ min.}}{2} + 2.748\left(\frac{d \text{ max.} + d \text{ min.}}{4}\right)$ [Note (3)]
	Csk.	L min. $= 1.000D + \frac{S \text{ max.} + S \text{ min.}}{2} + 2.748\left(\frac{d \text{ max.} + d \text{ min.}}{4}\right) + H$ max. (from Table 13) [Note (3)]
C, D, F, G, and T	90°	L min. $= 4.500p + \frac{S \text{ max.} + S \text{ min.}}{2}$ (S for short screws from Table 8)
	Csk.	L min. $= 4.500p + \frac{S \text{ max.} + S \text{ min.}}{2} + H$ max. (S for short screws from Table 8 and H from Table 13)

GENERAL NOTE: D = basic diameter of the screw, H max. = maximum head height for undercut flat countersunk head screws, p = pitch of the thread

NOTES:
(1) Lengths given in dimensional tables for respective screw types represent calculated values rounded upward to nearest $\frac{1}{32}$ in.
(2) Factor 2.414 in formula represents cotangent of 22.5°, one-half of nominal Type AB point angle.
(3) Factor 2.748 in formula represents cotangent of 20°, one-half of nominal Type BP point angle.

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NONMANDATORY APPENDIX B
APPROXIMATE HOLE SIZES FOR TAPPING SCREWS

The approximate hole sizes set forth in Tables B1 through B6 are intended to provide general guidance to the user in selecting holes for installing the respective types of thread forming and thread cutting tapping screws in various commonly used materials. It should be noted, however, that because conditions and considerations having a bearing upon screw applications differ widely, it may be necessary or desirable to vary the hole from the specified size to best suit a particular application. Refer to para. 1.4 for further explanation of some factors which affect assembly torques.

To promote uniformity in terminology and avoid possible misinterpretation, the nomenclature recognized as applicable to holes produced by various methods and the distinguishing features inherent in each are depicted in Figs. B1 through B6.

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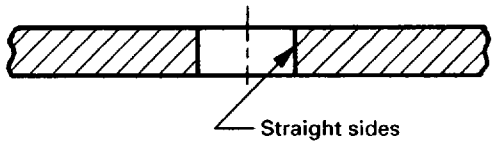


FIG. B1 DRILLED HOLE

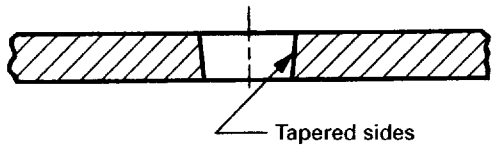


FIG. B2 CORED HOLE

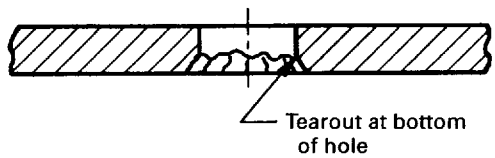


FIG. B3 PUNCHED HOLE

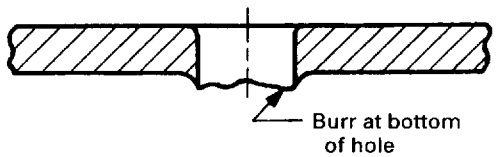


FIG. B4 HAND PIERCED HOLE

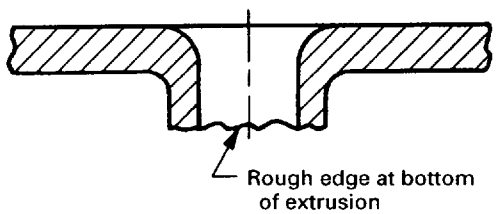


FIG. B5 TYPE I EXTRUDED HOLE

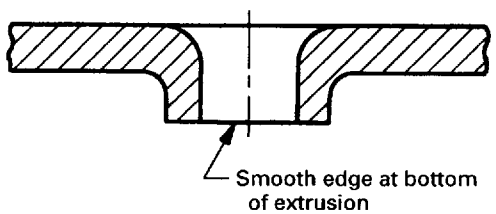


FIG. B6 TYPE II EXTRUDED HOLE

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TABLE B1 APPROXIMATE HOLE SIZES FOR STEEL TYPE AB THREAD FORMING TAPPING SCREWS

	In Sheet Metals						
Metal	Steel, Stainless Steel, Monel, Brass				Aluminum Alloy		
		Pierced or Extruded Hole	Drilled or Clean-Punched Hole		Pierced or Extruded Hole	Drilled or Clean-Punched Hole	
Screw Size	Metal Thickness	Hole Diameter	Hole Diameter (1)	Drill Size No.	Hole Diameter	Hole Diameter (1)	Drill Size No.
2	0.015	...	0.064	52	...	...	...
	0.018	...	0.064	52	...	...	...
	0.024	...	0.067	51	...	0.064	52
	0.030	...	0.070	50	...	0.064	52
	0.036	...	0.073	49	...	0.064	52
	0.048	...	0.073	49	...	0.067	51
	0.060	...	0.076	48	...	0.070	50
4	0.015	0.086	0.086	44	...	...	...
	0.018	0.086	0.086	44	...	...	...
	0.024	0.098	0.089	43	0.086	...	...
	0.030	0.098	0.094	42	0.086	0.086	44
	0.036	0.098	0.094	42	0.086	0.086	44
	0.048	...	0.096	41	0.086	0.086	44
	0.060	...	0.100	39	...	0.089	43
	0.075	...	0.102	38	...	0.089	43
6	0.015	0.111	0.104	37	...	...	...
	0.018	0.111	0.104	37	...	...	...
	0.024	0.111	0.106	36	0.111	...	...
	0.030	0.111	0.106	36	0.111	0.104	37
	0.036	0.111	0.110	35	0.111	0.104	37
	0.048	...	0.111	34	0.111	0.104	37
	0.060	...	0.116	32	...	0.106	36
	0.075	...	0.130	31	...	0.110	35
7	0.018	0.120	0.116	32	...	...	...
	0.024	0.120	0.116	32	0.120	...	...
	0.030	0.120	0.116	32	0.120	0.113	33
	0.036	0.120	0.116	32	0.120	0.113	33
	0.048	0.120	0.120	31	0.120	0.116	32
	0.060	...	0.128	30	...	0.120	31
	0.075	...	0.136	29	...	0.128	30
8	0.018	0.136	...	...	...	...	...
	0.024	0.136	0.125	1/8	0.136	...	...
	0.030	0.136	0.125	1/8	0.136	0.116	32
	0.036	0.136	0.125	1/8	0.136	0.120	31
	0.048	0.136	0.128	30	0.136	0.128	30
	0.060	...	0.136	29	...	0.136	29
	0.075	...	0.140	28	...	0.140	28

(continued)

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TABLE B1 APPROXIMATE HOLE SIZES FOR STEEL TYPE AB THREAD FORMING TAPPING SCREWS (CONT'D)

In Sheet Metals (Cont'd)							
Metal	Steel, Stainless Steel, Monel, Brass				Aluminum Alloy		
		Pierced or Extruded Hole	Drilled or Clean-Punched Hole		Pierced or Extruded Hole	Drilled or Clean-Punched Hole	
Screw Size	Metal Thickness	Hole Diameter	Hole Diameter (1)	Drill Size No.	Hole Diameter	Hole Diameter (1)	Drill Size No.
	0.018	0.157	0.144	27	...	...	...
	0.024	0.157	0.144	27	0.157	...	...
	0.030	0.157	0.144	27	0.157	...	...
10	0.036	0.157	0.147	26	0.157	0.144	27
	0.048	0.157	0.149	25	0.157	0.144	27
	0.060	...	0.154	23	...	0.144	27
	0.075	...	0.157	22	...	0.147	26
	0.018	...	...	...	...	...	...
	0.024	0.185	0.166	19	...	...	...
	0.030	0.185	0.166	19	...	...	...
12	0.036	0.185	0.166	19	...	...	...
	0.048	0.185	0.170	18	...	0.161	20
	0.060	...	0.177	16	...	0.166	19
	0.075	...	0.182	14	...	0.173	17
	0.018	...	0.196	9	...	...	...
	0.024	...	0.196	9	...	...	...
	0.030	0.209	0.196	9	...	...	...
1/4	0.036	0.209	0.196	9	...	...	...
	0.048	0.209	0.205	W	...	...	...
	0.060	...	0.228	1	...	0.199	8
	0.075	...	0.232	5.9 mm	...	0.201	7

In Plywoods (Resin Impregnated) Compreg, Pregwood, Etc.					
			Material Thickness	Penetration in Blind Holes	
Screw Size	Hole Diameter (1)	Drill Size No.	Min.	Min.	Max.
2	0.073	49	0.125	0.188	0.500
4	0.100	39	0.188	0.250	0.625
6	0.125	1/8	0.188	0.250	0.625
7	0.136	29	0.188	0.250	0.750
8	0.144	27	0.188	0.250	0.750
10	0.173	17	0.250	0.312	1.000
12	0.194	10	0.312	0.375	1.000
1/4	0.228	1	0.312	0.375	1.000

(continued)

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TABLE B1 APPROXIMATE HOLE SIZES FOR STEEL TYPE AB THREAD FORMING TAPPING SCREWS (CONT'D)

In Asbestos Compositions					
Transite, Ebony Asbestos, Etc.					
Screw Size	Hole Diameter (1)	Drill Size No.	Material Thickness	Penetration in Blind Holes	
			Min.	Min.	Max.
2	0.076	48	0.125	0.188	0.500
4	0.101	38	0.188	0.250	0.625
6	0.120	31	0.188	0.250	0.625
7	0.136	29	0.250	0.312	0.750
8	0.147	26	0.312	0.375	0.750
10	0.166	19	0.312	0.375	1.000
12	0.196	9	0.312	0.375	1.000
1/4	0.228	1	0.438	0.500	1.000

GENERAL NOTE: Because conditions differ widely, it may be necessary to vary the hole size to suit a particular application. See text on first page of this Appendix.

NOTE:
(1) Decimals shown represent standard drill sizes rounded to nearest 0.001 in.

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TABLE B2 APPROXIMATE HOLE SIZES FOR STEEL TYPES B AND BP THREAD FORMING TAPPING SCREWS

In Sheet Metals							
Metal	Steel, Stainless Steel, Monel, Brass				Aluminum Alloy		
		Pierced or Extruded Hole	Drilled or Clean-Punched Hole		Pierced or Extruded Hole	Drilled or Clean-Punched Hole	
Screw Size	Metal Thickness	Hole Diameter	Hole Diameter (1)	Drill Size No.	Hole Diameter	Hole Diameter (1)	Drill Size No.
2	0.015	...	0.064	52	...	...	...
	0.018	...	0.064	52	...	...	...
	0.024	...	0.067	51	...	0.064	52
	0.030	...	0.070	50	...	0.064	52
	0.036	...	0.073	49	...	0.064	52
	0.048	...	0.073	49	...	0.067	51
	0.060	...	0.076	48	...	0.070	50
4	0.015	0.086	0.086	44	...	...	...
	0.018	0.086	0.086	44	...	...	...
	0.024	0.098	0.089	43	0.086	...	...
	0.030	0.098	0.094	42	0.086	0.086	44
	0.036	0.098	0.094	42	0.086	0.086	44
	0.048	...	0.096	41	0.086	0.086	44
	0.060	...	0.100	39	...	0.089	43
	0.075	...	0.102	38	...	0.089	43
	0.105	...	...	...	...	0.094	42
6	0.015	0.111	0.104	37	...	...	...
	0.018	0.111	0.104	37	...	...	...
	0.024	0.111	0.106	36	0.111	...	...
	0.030	0.111	0.106	36	0.111	0.104	37
	0.036	0.111	0.110	35	0.111	0.104	37
	0.048	...	0.111	34	0.111	0.104	37
	0.060	...	0.116	32	...	0.106	36
	0.075	...	0.120	31	...	0.110	35
	0.105	...	0.128	30	...	0.111	34
	0.128 to 0.250	...	...	...	...	0.120	31
7	0.018	0.120	0.116	32	...	...	...
	0.024	0.120	0.116	32	0.120	...	...
	0.030	0.120	0.116	32	0.120	0.113	33
	0.036	0.120	0.116	32	0.120	0.113	33
	0.048	0.120	0.120	31	0.120	0.116	32
	0.060	...	0.128	30	...	0.120	31
	0.075	...	0.136	29	...	0.128	30
	0.105	...	0.140	28	...	0.136	29
	0.128 to 0.250	...	...	...	...	0.136	29
8	0.018	0.136	...	...	...	...	...
	0.024	0.136	0.125	1/8	0.136	...	...
	0.030	0.136	0.125	1/8	0.136	0.116	32
	0.036	0.136	0.125	1/8	0.136	0.120	31
	0.048	0.136	0.128	30	0.136	0.128	30
	0.060	...	0.136	29	...	0.136	29

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TABLE B2 APPROXIMATE HOLE SIZES FOR STEEL TYPES B AND BP THREAD FORMING TAPPING SCREWS (CONT'D)

In Sheet Metals (Cont'd)

Metal	Steel, Stainless Steel, Monel, Brass				Aluminum Alloy		
		Pierced or Extruded Hole	Drilled or Clean-Punched Hole		Pierced or Extruded Hole	Drilled or Clean-Punched Hole	
Screw Size	Metal Thickness	Hole Diameter	Hole Diameter (1)	Drill Size No.	Hole Diameter	Hole Diameter (1)	Drill Size No.
8	0.075	...	0.140	28	...	0.140	28
	0.105	...	0.150	25	...	0.147	26
	0.125	...	0.150	25	...	0.147	26
	0.135	...	0.152	24	...	0.149	25
	0.162 to 0.375	...	...	...	...	0.152	24
10	0.018	0.157	...	...	...	...	...
	0.024	0.157	0.144	27	0.157	...	...
	0.030	0.157	0.144	27	0.157	...	...
	0.036	0.157	0.147	26	0.157	0.144	27
	0.048	0.157	0.152	24	0.157	0.144	27
	0.060	...	0.152	24	...	0.144	27
	0.075	...	0.157	22	...	0.147	26
	0.105	...	0.161	20	...	0.147	26
	0.125	...	0.170	18	...	0.154	23
	0.135	...	0.170	18	...	0.154	23
	0.164	...	0.173	17	...	0.159	21
	0.200 to 0.375	...	...	...	...	0.166	19
12	0.024	0.185	0.166	19	...	...	...
	0.030	0.185	0.166	19	...	...	...
	0.036	0.185	0.166	19	...	...	...
	0.048	0.185	0.170	18	...	0.161	20
	0.060	...	0.177	16	...	0.166	19
	0.075	...	0.182	14	...	0.173	17
	0.105	...	0.185	13	...	0.180	15
	0.125	...	0.196	9	...	0.182	14
	0.135	...	0.196	9	...	0.182	14
	0.164	...	0.201	7	...	0.189	12
	0.200 to 0.375	...	...	...	...	0.196	9
1/4	0.030	0.209	0.194	10	...	...	...
	0.036	0.209	0.194	10	...	...	...
	0.048	0.209	0.194	10	...	...	...
	0.060	...	0.199	8	...	0.199	8
	0.075	...	0.204	6	...	0.201	7
	0.105	...	0.209	4	...	0.204	6
	0.125	...	0.228	1	...	0.209	4
	0.135	...	0.228	1	...	0.209	4
	0.164	...	0.234	15/64	...	0.213	3
	0.187	...	0.234	15/64	...	0.213	3
	0.194	...	0.234	15/64	...	0.221	2
	0.200 to 0.375	...	...	...	...	0.228	1

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TABLE B2 APPROXIMATE HOLE SIZES FOR STEEL TYPES B AND BP THREAD FORMING TAPPING SCREWS (CONT'D)

In Plywoods (Resin Impregnated)

Compreg, Pregwood, Etc.

Screw Size	Hole Diameter (1)	Drill Size No.	Material Thickness Min.	Penetration in Blind Holes Min.	Penetration in Blind Holes Max.
2	0.073	49	0.125	0.188	0.500
4	0.100	39	0.188	0.250	0.625
6	0.125	1/8	0.188	0.250	0.625
7	0.136	29	0.188	0.250	0.750
8	0.144	27	0.188	0.250	0.750
10	0.173	17	0.250	0.312	1.000
12	0.194	10	0.312	0.375	1.000
1/4	0.228	1	0.312	0.375	1.000

In Asbestos Compositions

Transite, Ebony Asbestos, Etc.

Screw Size	Hole Diameter (1)	Drill Size No.	Material Thickness Min.	Penetration in Blind Holes Min.	Penetration in Blind Holes Max.
2	0.076	48	0.125	0.188	0.500
4	0.101	38	0.188	0.250	0.625
6	0.120	31	0.188	0.250	0.625
7	0.136	29	0.250	0.312	0.750
8	0.147	26	0.312	0.375	0.750
10	0.166	19	0.312	0.375	1.000
12	0.196	9	0.312	0.375	1.000
1/4	0.228	1	0.438	0.500	1.000

In Cast Metals

Aluminum, Magnesium, Zinc, Brass, Bronze

Screw Size	Hole Diameter (1)	Drill Size No.	Minimum Penetration in Blind Holes
2	0.078	47	0.125
4	0.104	37	0.188
6	0.128	30	0.250
7	0.144	27	0.250
8	0.152	24	0.250
10	0.177	16	0.250
12	0.199	8	0.281
1/4	0.234	15/64	0.312

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TABLE B2 APPROXIMATE HOLE SIZES FOR STEEL TYPES B AND BP THREAD FORMING TAPPING SCREWS (CONT'D)

	In Plastics					
Plastic	Phenol Formaldehyde			Cellulose Acetate, Cellulose Nitrate, Acrylic Resin, and Styrene Resin		
Screw Size	Hole Diameter (1)	Drill Size No.	Minimum Penetration in Blind Holes	Hole Diameter (1)	Drill Size No.	Minimum Penetration in Blind Holes
2	0.078	47	0.188	0.078	47	0.188
4	0.100	39	0.250	0.094	42	0.250
6	0.128	30	0.250	0.120	31	0.250
7	0.136	29	0.250	0.128	30	0.250
8	0.150	25	0.312	0.144	27	0.312
10	0.177	16	0.312	0.170	18	0.312
12	0.199	8	0.375	0.191	11	0.375
1/4	0.234	15/64	0.375	0.221	2	0.375

GENERAL NOTE: Because conditions differ widely, it may be necessary to vary the hole size to suit a particular application. See text on first page of this Appendix.

NOTE:
(1) Decimals shown represent standard drill sizes rounded to nearest 0.001 in.

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TABLE B3 APPROXIMATE HOLE SIZES FOR STEEL TYPES BF AND BT THREAD CUTTING TAPPING SCREWS

In Cast Metals

Die Cast Zinc And Aluminum

Screw Size	Material Thickness	Hole Diameter (1)	Drill Size No.	Screw Size	Material Thickness	Hole Diameter (1)	Drill Size No.
	0.060	0.073	49		0.125	0.166	19
	0.083	0.073	49		0.140	0.166	19
2	0.109	0.076	48	10	0.188	0.166	19
	0.125	0.076	48		0.250	0.170	18
	0.140	0.076	48		0.312	0.172	11/64
					0.375	0.172	11/64
	0.060	0.086	44		0.125	0.191	11
	0.083	0.086	44		0.140	0.191	11
	0.109	0.086	44		0.188	0.191	11
3	0.125	0.086	44	12	0.250	0.196	9
	0.140	0.089	43		0.312	0.196	9
	0.188	0.089	43		0.375	0.196	9
	0.109	0.098	40		0.125	0.221	2
	0.125	0.100	39		0.140	0.221	2
	0.140	0.100	39		0.188	0.221	2
4	0.188	0.100	39	1/4	0.250	0.228	1
	0.250	0.102	38		0.312	0.228	1
					0.375	0.228	1
	0.109	0.111	34		0.125	0.281	K
	0.125	0.111	34		0.140	0.281	K
5	0.140	0.113	33		0.188	0.281	K
	0.188	0.113	33	5/16	0.250	0.281	K
	0.250	0.116	32		0.312	0.290	L
					0.375	0.290	L
	0.125	0.120	31		0.125	0.344	11/32
	0.140	0.120	31		0.140	0.344	11/32
	0.188	0.120	31		0.188	0.344	11/32
6	0.250	0.125	1/8	3/8	0.250	0.344	11/32
	0.312	0.125	1/8		0.312	0.348	S
					0.375	0.348	S
	0.125	0.149	25				
	0.140	0.149	25				
	0.188	0.149	25				
8	0.250	0.152	24				
	0.312	0.152	24				

In Plastics

Plastic	Phenol Formaldehyde				Cellulose Acetate, Cellulose Nitrate, Acrylic Resin, and Styrene Resin			
			Depth of Penetration				Depth of Penetration	
Screw Size	Hole Diameter (1)	Drill Size No.	Min.	Max.	Hole Diameter (1)	Drill Size No.	Min.	Max.
2	0.078	5/64	0.094	0.250	0.076	48	0.094	0.250
3	0.089	43	0.125	0.312	0.089	43	0.125	0.312
4	0.104	37	0.125	0.312	0.100	39	0.125	0.312
5	0.116	32	0.188	0.375	0.113	33	0.188	0.375
6	0.125	1/8	0.188	0.375	0.120	31	0.188	0.375

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TABLE B3 APPROXIMATE HOLE SIZES FOR STEEL TYPES BF AND BT THREAD CUTTING TAPPING SCREWS (CONT'D)

In Plastics (Cont'd)								
Plastic	Phenol Formaldehyde				Cellulose Acetate, Cellulose Nitrate, Acrylic Resin, and Styrene Resin			
Screw Size	Hole Diameter (1)	Drill Size No.	Depth of Penetration Min.	Depth of Penetration Max.	Hole Diameter (1)	Drill Size No.	Depth of Penetration Min.	Depth of Penetration Max.
8	0.147	26	0.250	0.500	0.144	27	0.250	0.500
10	0.170	18	0.312	0.625	0.166	19	0.312	0.625
12	0.194	10	0.375	0.625	0.189	12	0.375	0.625
1/4	0.228	1	0.375	0.750	0.221	2	0.375	0.750

GENERAL NOTE: Because conditions vary widely, it may be necessary to change the hole size to suit a particular application. See text on first page of this Appendix.

NOTE:
(1) Decimals shown represent standard drill sizes rounded to nearest 0.001 in.

TABLE B4 APPROXIMATE HOLE SIZES FOR STEEL TYPES D, F, G, AND T THREAD CUTTING TAPPING SCREWS

Metal			In Sheet Metals				In Cast Metals			
			Steel		Aluminum Alloy		Cast Iron		Die Cast Zinc and Aluminum	
Screw Size	Threads per Inch	Metal Thickness	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.
2	56	0.050	0.073	49	0.070	50	0.076	48	0.073	49
		0.060	0.073	49	0.073	49	0.076	48	0.073	49
		0.083	0.073	49	0.073	49	0.076	48	0.076	48
		0.109	0.073	49	0.073	49	0.078	5/64	0.076	48
		0.125	0.076	48	0.073	49	0.078	5/64	0.076	48
		0.140	0.076	48	0.073	49	0.078	5/64	0.076	48
3	48	0.050	0.081	46	0.078	5/64	0.089	43	0.082	45
		0.060	0.081	46	0.081	46	0.089	43	0.082	45
		0.083	0.082	45	0.082	45	0.089	43	0.082	45
		0.109	0.086	44	0.082	45	0.089	43	0.086	44
		0.125	0.086	44	0.082	45	0.089	43	0.089	43
		0.140	0.086	44	0.086	44	0.094	42	0.089	43
		0.187	0.089	43	0.086	44	0.094	42	0.089	43
4	40	0.050	0.089	43	0.089	43	0.100	39	0.096	41
		0.060	0.089	43	0.089	43	0.100	39	0.096	41
		0.083	0.094	42	0.089	43	0.102	38	0.096	41
		0.109	0.096	41	0.094	42	0.102	38	0.096	41
		0.125	0.098	40	0.094	42	0.102	38	0.100	39
		0.140	0.098	40	0.094	3/32	0.102	38	0.100	39
		0.187	0.102	38	0.098	40	0.104	37	0.100	39

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TABLE B4 APPROXIMATE HOLE SIZES FOR STEEL TYPES D, F, G, AND T THREAD CUTTING TAPPING SCREWS (CONT'D)

Metal			In Sheet Metals (Cont'd)				In Cast Metals (Cont'd)			
			Steel		Aluminum Alloy		Cast Iron		Die Cast Zinc and Aluminum	
Screw Size	Threads per Inch	Metal Thickness	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.
5	40	0.050	0.106	36	0.102	38	0.111	34	0.106	36
		0.060	0.106	36	0.102	38	0.111	34	0.106	36
		0.083	0.106	36	0.104	37	0.113	33	0.106	36
		0.109	0.106	36	0.104	37	0.113	33	0.110	35
		0.125	0.109	7/64	0.106	36	0.116	32	0.110	35
		0.140	0.110	35	0.106	36	0.116	32	0.110	35
		0.187	0.116	32	0.110	35	0.116	32	0.111	34
		0.250	0.116	32	0.113	33	0.116	32	0.113	33
6	32	0.050	0.110	35	0.109	7/64	0.120	31	0.116	32
		0.060	0.113	33	0.109	7/64	0.120	31	0.120	31
		0.083	0.116	32	0.111	34	0.125	1/8	0.120	31
		0.109	0.116	32	0.113	33	0.125	1/8	0.120	31
		0.125	0.116	32	0.116	32	0.125	1/8	0.120	31
		0.140	0.120	31	0.116	32	0.125	1/8	0.120	31
		0.187	0.125	1/8	0.120	31	0.128	30	0.120	31
		0.250	0.125	1/8	0.125	1/8	0.128	30	0.120	31
8	32	0.050	0.136	29	0.136	29	0.147	26	0.144	27
		0.060	0.140	28	0.136	29	0.150	25	0.144	27
		0.083	0.140	28	0.136	29	0.150	25	0.144	27
		0.109	0.144	27	0.140	28	0.150	25	0.144	27
		0.125	0.144	27	0.140	28	0.150	25	0.147	26
		0.140	0.147	26	0.144	27	0.150	25	0.147	26
		0.187	0.150	25	0.147	26	0.154	23	0.147	26
		0.250	0.150	25	0.150	25	0.154	23	0.150	25
		0.312	0.150	25	0.150	25	0.154	23	0.150	25
10	24	0.050	0.152	24	0.150	25	0.170	18	0.161	20
		0.060	0.154	23	0.152	24	0.170	18	0.166	19
		0.083	0.161	20	0.154	23	0.172	11/64	0.166	19
		0.109	0.161	20	0.157	22	0.173	17	0.166	19
		0.125	0.166	19	0.159	21	0.173	17	0.166	19
		0.140	0.170	18	0.161	20	0.173	17	0.166	19
		0.187	0.173	17	0.166	19	0.177	16	0.170	18
		0.250	0.173	17	0.172	11/64	0.177	16	0.170	18
		0.312	0.173	17	0.173	17	0.177	16	0.172	11/64
		0.375	0.173	17	0.173	17	0.177	16	0.172	11/64
10	32	0.050	0.159	21	0.161	20	0.173	17	0.170	18
		0.060	0.166	19	0.161	20	0.173	17	0.170	18
		0.083	0.166	19	0.161	20	0.177	16	0.172	11/64
		0.109	0.170	18	0.166	19	0.177	16	0.172	11/64
		0.125	0.170	18	0.166	19	0.177	16	0.172	11/64
		0.140	0.170	18	0.166	19	0.177	16	0.172	11/64
		0.187	0.177	16	0.172	11/64	0.180	15	0.172	11/64
		0.250	0.177	16	0.177	16	0.180	15	0.173	17
		0.312	0.177	16	0.177	16	0.180	15	0.173	17
		0.375	0.177	16	0.177	16	0.180	15	0.177	16

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TABLE B4 APPROXIMATE HOLE SIZES FOR STEEL TYPES D, F, G, AND T THREAD CUTTING TAPPING SCREWS (CONT'D)

Metal			In Sheet Metals (Cont'd)				In Cast Metals (Cont'd)			
			Steel		Aluminum Alloy		Cast Iron		Die Cast Zinc and Aluminum	
Screw Size	Threads per Inch	Metal Thickness	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.
12	24	0.060	0.180	15	0.177	16	0.196	9	0.189	12
		0.083	0.182	14	0.180	15	0.199	8	0.191	11
		0.109	0.188	3/16	0.182	14	0.199	8	0.191	11
		0.125	0.191	11	0.185	13	0.199	8	0.191	11
		0.140	0.191	11	0.188	3/16	0.199	8	0.194	10
		0.187	0.199	8	0.191	11	0.203	13/64	0.194	10
		0.250	0.199	8	0.199	8	0.204	6	0.196	9
		0.312	0.199	8	0.199	8	0.204	6	0.196	9
		0.375	0.199	8	0.199	8	0.204	6	0.199	8
		0.500	0.199	8	0.199	8	0.204	6	0.199	8
1/4	20	0.083	0.213	3	0.206	5	0.228	1	0.219	7/32
		0.109	0.219	7/32	0.209	4	0.228	1	0.219	7/32
		0.125	0.221	2	0.213	3	0.228	1	0.221	2
		0.140	0.221	2	0.213	3	0.228	1	0.221	2
		0.187	0.228	1	0.221	2	0.234	15/64	0.221	2
		0.250	0.228	1	0.228	1	0.234	15/64	0.228	1
		0.312	0.228	1	0.228	1	0.234	15/64	0.228	1
		0.375	0.228	1	0.228	1	0.234	15/64	0.228	1
		0.500	0.228	1	0.228	1	0.234	15/64	0.228	1
1/4	28	0.083	0.221	2	0.219	7/32	0.234	A	0.228	1
		0.109	0.228	1	0.221	2	0.234	15/64	0.228	1
		0.125	0.228	1	0.221	2	0.234	15/64	0.228	1
		0.140	0.234	A	0.221	2	0.234	15/64	0.228	1
		0.187	0.234	15/64	0.228	1	0.238	B	0.228	1
		0.250	0.234	15/64	0.234	15/64	0.238	B	0.234	A
		0.312	0.234	15/64	0.234	15/64	0.238	B	0.234	A
		0.375	0.234	15/64	0.234	15/64	0.238	B	0.234	15/64
		0.500	0.234	15/64	0.234	15/64	0.238	B	0.234	15/64
5/16	18	0.109	0.277	J	0.266	H	0.290	L	0.277	J
		0.125	0.277	J	0.272	I	0.290	L	0.281	K
		0.140	0.281	9/32	0.272	I	0.290	L	0.281	K
		0.187	0.290	L	0.281	K	0.295	M	0.281	9/32
		0.250	0.290	L	0.290	L	0.295	M	0.281	9/32
		0.312	0.290	L	0.290	L	0.295	M	0.290	L
		0.375	0.290	L	0.290	L	0.295	M	0.290	L
		0.500	0.290	L	0.290	L	0.295	M	0.290	L
5/16	24	0.109	0.290	L	0.281	K	0.295	M	0.290	L
		0.125	0.290	L	0.281	9/32	0.295	M	0.290	L
		0.140	0.290	L	0.281	9/32	0.295	M	0.290	L
		0.187	0.295	M	0.290	L	0.302	N	0.290	L
		0.250	0.295	M	0.295	M	0.302	N	0.290	L
		0.312	0.295	M	0.295	M	0.302	N	0.295	M
		0.375	0.295	M	0.295	M	0.302	N	0.295	M
		0.500	0.295	M	0.295	M	0.302	N	0.295	M

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TABLE B4 APPROXIMATE HOLE SIZES FOR STEEL TYPES D, F, G, AND T THREAD CUTTING TAPPING SCREWS (CONT'D)

Metal			In Sheet Metals (Cont'd)				In Cast Metals (Cont'd)			
			Steel		Aluminum Alloy		Cast Iron		Die Cast Zinc and Aluminum	
Screw Size	Threads per Inch	Metal Thickness	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.	Hole Diameter (1)	Drill Size No.
		0.125	0.339	R	0.328	21/64	0.348	S	0.339	R
		0.140	0.339	R	0.332	Q	0.348	S	0.339	R
		0.187	0.348	S	0.339	R	0.348	S	0.339	R
3/8	16	0.250	0.358	T	0.348	S	0.348	S	0.344	11/32
		0.312	0.358	T	0.348	S	0.348	S	0.344	11/32
		0.375	0.358	T	0.348	S	0.348	S	0.348	S
		0.500	0.358	T	0.348	S	0.348	S	0.348	S
		0.125	0.348	S	0.344	11/32	0.358	T	0.348	S
		0.140	0.348	S	0.344	11/32	0.358	T	0.348	S
		0.187	0.358	T	0.348	S	0.358	T	0.348	S
3/8	24	0.250	0.358	T	0.358	T	0.358	T	0.358	T
		0.312	0.358	T	0.358	T	0.358	T	0.358	T
		0.375	0.358	T	0.358	T	0.358	T	0.358	T
		0.500	0.358	T	0.358	T	0.358	T	0.358	T

Plastic		In Plastics							
		Phenol Formaldehyde				Cellulose Acetate, Cellulose Nitrate, Acrylic Resin, and Styrene Resin			
				Depth of Penetration				Depth of Penetration	
Screw Size	Threads per Inch	Hole Diameter (1)	Drill Size No.	Min.	Max.	Hole Diameter (1)	Drill Size No.	Min.	Max.
2	56	0.078	5/64	0.219	0.375	0.076	48	0.219	0.375
3	48	0.089	43	0.219	0.375	0.086	44	0.219	0.375
4	40	0.098	40	0.250	0.312	0.093	42	0.250	0.312
5	40	0.113	33	0.250	0.438	0.110	35	0.250	0.438
6	32	0.116	32	0.250	0.312	0.116	32	0.250	0.312
8	32	0.144	27	0.312	0.500	0.144	27	0.312	0.500
10	24	0.161	20	0.375	0.500	0.161	20	0.375	0.500
10	32	0.166	19	0.375	0.500	0.166	19	0.375	0.500
1/4	20	0.228	1	0.375	0.625	0.228	1	0.375	1.000

GENERAL NOTE: Because conditions vary widely, it may be necessary to change the hole size to suit a particular application. See text on first page of this Appendix.

NOTE:
(1) Decimals shown represent standard drill sizes rounded to nearest 0.001 in.

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TABLE B5 APPROXIMATE HOLE SIZES FOR STEEL TYPE A THREAD FORMING TAPPING SCREWS
Not Recommended — Use Type AB (See Paras. 1.3.1.1 and 1.3.1.4)

In Sheet Metals				
Steel, Stainless Steel, Monel, Brass, and Aluminum Alloy				
Screw Size	Metal Thickness	Pierced or Extruded Hole	Drilled or Clean Punched Hole	
		Hole Diameter	Hole Diameter	Drill Size No.
4	0.015	...	0.086	44
	0.018	...	0.086	44
	0.024	0.098	0.094	42
	0.030	0.098	0.094	42
	0.036	0.098	0.098	40
6	0.015	...	0.104	37
	0.018	...	0.104	37
	0.024	0.111	0.104	37
	0.030	0.111	0.104	37
	0.036	0.111	0.106	36
7	0.015	...	0.116	32
	0.018	...	0.116	32
	0.024	0.120	0.116	32
	0.030	0.120	0.116	32
	0.036	0.120	0.116	32
	0.048	0.120	0.120	31
8	0.018	...	0.125	1/8
	0.024	0.136	0.125	1/8
	0.030	0.136	0.125	1/8
	0.036	0.136	0.125	1/8
	0.048	0.136	0.128	30
10	0.018	...	0.136	29
	0.024	0.157	0.136	29
	0.030	0.157	0.136	29
	0.036	0.157	0.136	29
	0.048	0.157	0.149	25
12	0.024	...	0.161	20
	0.030	0.185	0.161	20
	0.036	0.185	0.161	20
	0.048	0.185	0.161	20
14	0.024	...	0.185	13
	0.030	0.209	0.189	12
	0.036	0.209	0.191	11
	0.048	0.209	0.196	9

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TABLE B5 APPROXIMATE HOLE SIZES FOR STEEL TYPE A THREAD FORMING TAPPING SCREWS (CONT'D)
Not Recommended — Use Type AB (See Paras. 1.3.1.1 and 1.3.1.4)

In Plywoods (Resin Impregnated)					
Compreg, Pregwood, Etc.					
Screw Size	Hole Diameter (1)	Drill Size No.	Material Thickness Min.	Penetration in Blind Holes Min.	Penetration in Blind Holes Max.
4	0.098	40	0.188	0.250	0.750
6	0.110	35	0.188	0.250	0.750
7	0.128	30	0.250	0.312	0.750
8	0.140	28	0.250	0.312	0.750
10	0.170	18	0.312	0.375	1.000
12	0.189	12	0.312	0.375	1.000
14	0.228	1	0.438	0.500	1.000
In Asbestos Compositions					
Transite, Ebony Asbestos, Etc.					
Screw Size	Hole Diameter (1)	Drill Size No.	Material Thickness Min.	Penetration in Blind Holes Min.	Penetration in Blind Holes Max.
4	0.094	42	0.188	0.250	0.750
6	0.106	36	0.188	0.250	0.750
7	0.125	1/8	0.250	0.312	0.750
8	0.136	29	0.250	0.312	0.750
10	0.161	20	0.312	0.375	1.000
12	0.185	13	0.312	0.375	1.000
14	0.213	3	0.438	0.500	1.000

GENERAL NOTE: Because conditions differ widely, it may be necessary to vary the hole size to suit a particular application. See text on first page of this Appendix.

NOTE:
(1) Decimals shown represent standard drill sizes rounded to nearest 0.001 in.

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TABLE B6 APPROXIMATE HOLE SIZES FOR STEEL TYPE C THREAD FORMING TAPPING SCREWS
Not Recommended for New Designs (See Para. 1.3.1.5)

In Sheet Metals				
Steel				
Screw Size	Threads per Inch	Metal Thickness	Hole Diameter (1)	Drill Size No.
4	40	0.037	0.094	42
		0.048	0.094	42
		0.062	0.096	41
		0.075	0.100	39
		0.105	0.102	38
		0.134	0.102	38
6	32	0.037	0.113	33
		0.048	0.116	32
		0.062	0.116	32
		0.075	0.122	3.1 mm
		0.105	0.125	1/8
		0.134	0.125	1/8
8	32	0.037	0.136	29
		0.048	0.144	27
		0.062	0.144	27
		0.075	0.147	26
		0.105	0.150	25
		0.134	0.150	25
10	24	0.037	0.154	23
		0.048	0.161	20
		0.062	0.166	19
		0.075	0.170	18
		0.105	0.173	17
		0.134	0.177	16
10	32	0.037	0.170	18
		0.048	0.170	18
		0.062	0.170	18
		0.075	0.173	17
		0.105	0.177	16
		0.134	0.177	16
12	24	0.037	0.189	12
		0.048	0.194	10
		0.062	0.194	10
		0.075	0.199	8
		0.105	0.199	8
		0.134	0.199	8
1/4	20	0.037	0.221	2
		0.048	0.221	2
		0.062	0.228	1
		0.075	0.234	A
		0.105	0.234	A
		0.134	0.236	6 mm

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TABLE B6 APPROXIMATE HOLE SIZES FOR STEEL TYPE C THREAD FORMING TAPPING SCREWS (CONT'D)
Not Recommended for New Designs (See Para. 1.3.1.5)

In Sheet Metals (Cont'd)				
Steel				
Screw Size	Threads per Inch	Metal Thickness	Hole Diameter (1)	Drill Size No.
1/4	28	0.037	0.224	5.7 mm
		0.048	0.228	1
		0.062	0.232	5.9 mm
		0.075	0.234	A
		0.105	0.238	B
		0.134	0.238	B
5/16	18	0.037	0.290	L
		0.048	0.290	L
		0.062	0.290	L
		0.075	0.295	M
		0.105	0.295	M
		0.134	0.295	M

GENERAL NOTE: Because conditions differ widely, it may be necessary to vary the hole size to suit a particular application. See text on first page of this Appendix.

NOTE:
(1) Decimals shown represent standard drill sizes rounded to nearest 0.001 in.

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NONMANDATORY APPENDIX C
WRENCH OPENINGS FOR HEX HEAD SCREWS

For wrench openings for hex head screws, see Table C1.

TABLE C1 WRENCH OPENINGS FOR HEX HEAD SCREWS

Nominal Size of Wrench (1); Also Basic (Maximum) Width Across Flats of Screw Head	Allowance Between Head Flats and Jaws of Wrench (2)	Wrench Openings			Nominal Screw Sizes		
					Hex Head Screws		Hex Washer Head Screws
		Min.	Tol. (2)	Max.	Regular Hex	Large Hex	
1/8 0.1250	0.002	0.127	0.005	0.132	1 & 2	...	2 & 3
3/16 0.1875	0.002	0.190	0.005	0.195	3, 4, & 5	...	4 & 5
7/32 0.2187	0.002	0.220	0.005	0.225	...	4	...
1/4 0.2500	0.002	0.252	0.005	0.257	6, 7, & 8	5	6, 7, & 8
5/16 0.3125	0.003	0.316	0.006	0.322	10 & 12	8	10 & 12
3/8 0.3750	0.003	0.378	0.006	0.384	14 & 1/4	12	14 & 1/4
7/16 0.4375	0.003	0.440	0.006	0.446	...	14 & 1/4	...
1/2 0.5000	0.004	0.504	0.006	0.510	5/16 & 20	...	5/16 & 20
9/16 0.5625	0.004	0.566	0.007	0.573	24 & 3/8	...	24 & 3/8
5/8 0.6250	0.004	0.629	0.007	0.636	7/16	...	7/16
3/4 0.7500	0.005	0.755	0.008	0.763	1/2	...	1/2

NOTES:
(1) Wrenches shall be marked with the "Nominal Size of Wrench" which is equal to the basic (maximum) width across flats of the corresponding screw head.
(2) The allowance (minimum clearance) between maximum width across flats of screw head and jaws of wrench equals ($0.005W + 0.001$). The tolerance on wrench opening equals plus ($0.005W + 0.004$ from minimum). W equals the nominal size of wrench.

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NONMANDATORY APPENDIX D
DETERMINATION OF MAXIMUM EFFECTIVE DESIGN GRIP LENGTHS

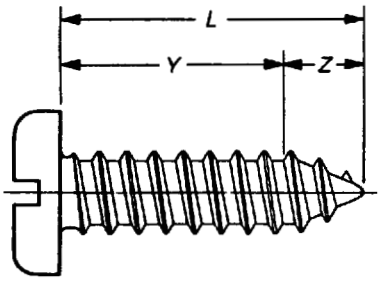
For design reference purposes and selection of proper screw lengths, it is often necessary to determine the maximum effective design grip length [that portion of the screw length extending from the head to the first complete (full form) thread beyond the point taper] on the respective types of tapping screws.

For those types of screws having specified point taper lengths, the maximum effective design grip length is determined by deducting the maximum point taper length from the minimum screw length. For Types AB, A, and BP screws having points, the lengths of which are not tabulated, it is necessary to use suitable factors reflecting the maximum point lengths for calculating the maximum effective design grip length. The constants specified in Table D1 are intended solely to assist the user in this purpose and shall not be subject to inspection.

It should be noted that for sems an additional allowance to provide for the height of washer must also be considered when determining the maximum effective design grip length.

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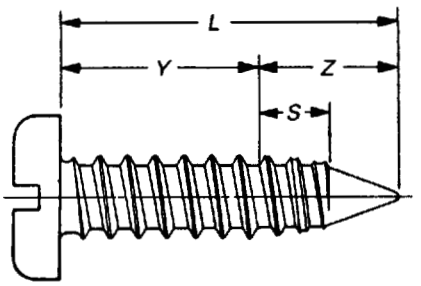
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Types AB and A

$Y = L - Z$

Where: L = minimum screw length
Y = maximum effective design grip length (minimum distance from head to first full form thread behind point)
Z = constant for point length (see tabulation below)



Type BP

TABLE D1 CONSTANTS FOR DETERMINING MAXIMUM EFFECTIVE DESIGN GRIP LENGTH ON TYPES AB, A, AND BP TAPPING SCREWS
Type A Not Recommended — Use Type AB (See Paras. 1.3.1.1 and 1.3.1.4)

Nominal Screw Size	Z — Constant For Point Length: Derived from formula $\cot 20° \left(\frac{\text{max. minor dia.}}{2}\right)$ + 1 pitch		Derived from formula $\cot 16° \left(\frac{\text{max. minor dia.}}{2}\right)$ + 1 pitch + S max.
	For Type AB	For Type A	For Type BP (1)
0	0.070	0.083	0.105
1	0.091	0.101	0.133
2	0.119	0.115	0.174
3	0.139	0.140	0.202
4	0.160	0.156	0.233
5	0.179	0.181	0.264
6	0.193	0.195	0.281
7	0.211	0.219	0.306
8	0.224	0.237	0.324
10	0.256	0.266	0.371
12	0.296	0.314	0.429
14	...	0.354	...
1/4	0.335	...	0.478
16	...	0.371	...
18	...	0.409	...
5/16	0.418	...	0.592
20	...	0.432	...
24	...	0.511	...
3/8	0.508	...	0.706
7/16	0.593	...	0.826
1/2	0.681	...	0.938

NOTE:
(1) Refer to Table 6 for S max. values applicable to respective sizes.

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NONMANDATORY APPENDIX E
DIMENSIONS OF TYPE A TAPPING SCREWS

For dimensions of threads and points for Type A thread forming tapping screws, see Table E1.

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— NOT RECOMMENDED — USE TYPE AB —

(See paras. 1.3.1.1 and 1.3.1.4)

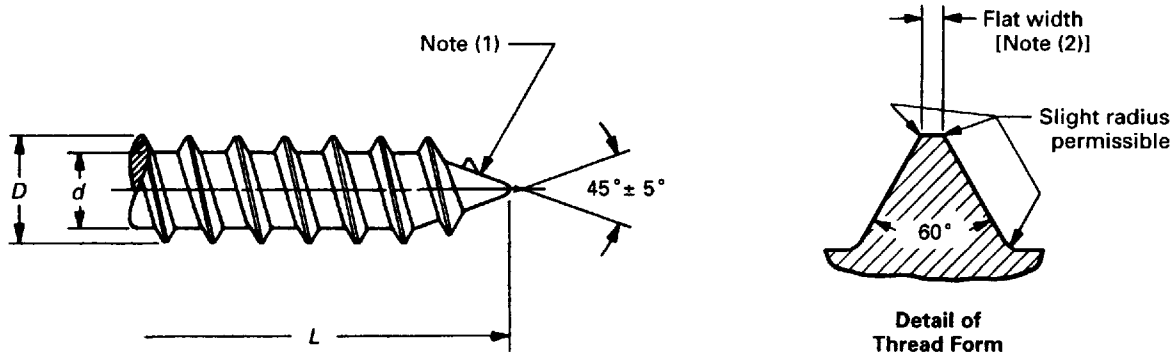


TABLE E1 DIMENSIONS OF THREADS AND POINTS FOR TYPE A THREAD FORMING TAPPING SCREWS

Nominal Size (3) or Basic Screw Diameter		Threads per Inch	D Major Diameter Max.	D Major Diameter Min.	d Minor Diameter Max.	d Minor Diameter Min.	L (4) For These Lengths or Shorter, Use Type AB 90° Heads	L (4) For These Lengths or Shorter, Use Type AB Csk. Heads
0	0.0600	40	0.060	0.057	0.042	0.039	1/8	3/16
1	0.0730	32	0.075	0.072	0.051	0.048	1/8	3/16
2	0.0860	32	0.088	0.084	0.061	0.056	5/32	3/16
3	0.0990	28	0.101	0.097	0.076	0.071	3/16	7/32
4	0.1120	24	0.114	0.110	0.083	0.078	3/16	1/4
5	0.1250	20	0.130	0.126	0.095	0.090	3/16	1/4
6	0.1380	18	0.141	0.136	0.102	0.096	1/4	5/16
7	0.1510	16	0.158	0.152	0.114	0.108	5/16	3/8
8	0.1640	15	0.168	0.162	0.123	0.116	3/8	7/16
10	0.1900	12	0.194	0.188	0.133	0.126	3/8	1/2
12	0.2160	11	0.221	0.215	0.162	0.155	7/16	9/16
14	0.2420	10	0.254	0.248	0.185	0.178	1/2	5/8
16	0.2680	10	0.280	0.274	0.197	0.189	9/16	3/4
18	0.2940	9	0.306	0.300	0.217	0.209	5/8	13/16
20	0.3200	9	0.333	0.327	0.234	0.226	11/16	13/16
24	0.3720	9	0.390	0.383	0.291	0.282	3/4	1

GENERAL NOTES:

(a) For additional requirements, refer to para. 2.

(b) For determining the effective grip length of Type A screws, see Appendix D.

NOTES:

(1) No extrusion of excess metal beyond apex of the point resulting from thread rolling shall be permissible. A slight rounding or truncation of the point is desirable.

(2) The width of flat at crest of thread shall not exceed 0.004 in. for sizes up to and including No. 8, and 0.006 in. for larger sizes.

(3) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

(4) For screws of these nominal lengths and shorter, use Type AB screws specified in Table 5.

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NONMANDATORY APPENDIX F
DIMENSIONS OF TRUSS HEAD SCREWS

For dimensions of slotted, Type I cross recessed, Type IA cross recessed, and Type II cross recessed truss head tapping screws, see Tables F1, F2, F3, and F4, respectively.

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(See para. 1.2.9)

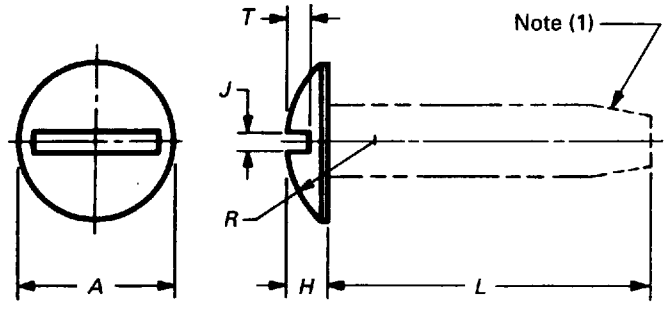


TABLE F1 DIMENSIONS OF SLOTTED TRUSS HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Height Max.	H Head Height Min.	R Head Radius Max.	J Slot Width Max.	J Slot Width Min.	T Slot Depth Max.	T Slot Depth Min.
0	0.0600	● ♦ ▲	0.131	0.119	0.037	0.029	0.087	0.023	0.016	0.022	0.014
1	0.0730	● ♦ ▲	0.164	0.149	0.045	0.037	0.107	0.026	0.019	0.027	0.018
2	0.0860	● ♦ ▲ ■	0.194	0.180	0.053	0.044	0.129	0.031	0.023	0.031	0.022
3	0.0990	● ♦ ▲ ■	0.226	0.211	0.061	0.051	0.151	0.035	0.027	0.036	0.026
4	0.1120	● ♦ ▲ ■	0.257	0.241	0.069	0.059	0.169	0.039	0.031	0.040	0.030
5	0.1250	● ♦ ▲ ■	0.289	0.272	0.078	0.066	0.191	0.043	0.035	0.045	0.034
6	0.1380	● ♦ ▲ ■	0.321	0.303	0.086	0.074	0.211	0.048	0.039	0.050	0.037
7	0.1510	● ♦ ▲	0.352	0.333	0.094	0.081	0.231	0.048	0.039	0.054	0.041
8	0.1640	● ♦ ▲ ■	0.384	0.364	0.102	0.088	0.254	0.054	0.045	0.058	0.045
10	0.1900	● ♦ ▲ ■	0.448	0.425	0.118	0.103	0.283	0.060	0.050	0.068	0.053
12	0.2160	● ♦ ▲ ■	0.511	0.487	0.134	0.118	0.336	0.067	0.056	0.077	0.061
14	0.2420	♦	0.557	0.530	0.146	0.129	0.375	0.075	0.064	0.085	0.068
1/4	0.2500	● ▲ ■	0.573	0.546	0.150	0.133	0.375	0.075	0.064	0.087	0.070
16	0.2680	♦	0.609	0.580	0.159	0.141	0.410	0.075	0.064	0.093	0.074
18	0.2940	♦	0.661	0.630	0.173	0.153	0.446	0.084	0.072	0.100	0.080
5/16	0.3125	● ▲ ■	0.698	0.666	0.183	0.162	0.457	0.084	0.072	0.106	0.085
20	0.3200	♦	0.713	0.680	0.186	0.165	0.484	0.084	0.072	0.108	0.087
24	0.3720	♦	0.817	0.780	0.213	0.190	0.557	0.094	0.081	0.123	0.100
3/8	0.3750	▲ ■	0.823	0.787	0.215	0.191	0.538	0.094	0.081	0.124	0.100
7/16	0.4375	▲	0.948	0.907	0.248	0.221	0.619	0.094	0.081	0.142	0.116
1/2	0.5000	▲	1.073	1.028	0.280	0.250	0.701	0.106	0.091	0.161	0.131

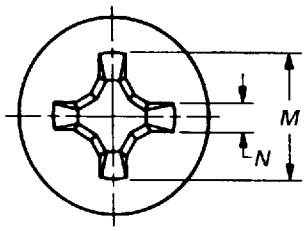
GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:

(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

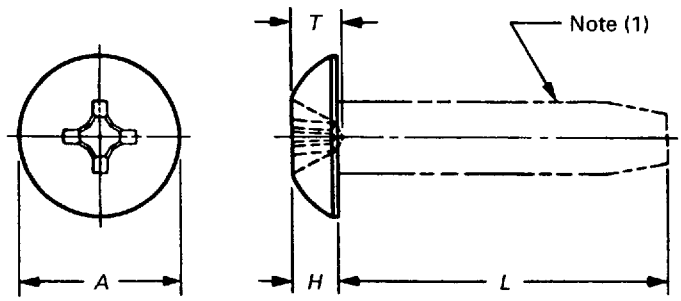
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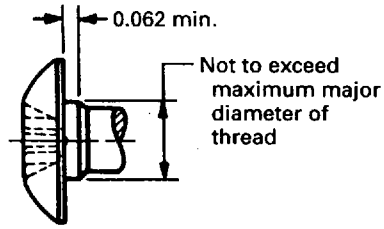


This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.

— NOT RECOMMENDED FOR NEW DESIGNS —

(See Para. 1.2.9)





Optional Shoulder for Long Screws With Reduced Body

TABLE F2 DIMENSIONS OF TYPE I CROSS RECESSED TRUSS HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	*A* Head Diameter Max.	*A* Head Diameter Min.	*H* Head Height Max.	*H* Head Height Min.	*M* Recess Diameter Ref.	*T* Recess Depth Ref.	*N* Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.
0	0.0600	● ♦ ▲	0.131	0.119	0.037	0.029	0.056	0.028	0.013	0	0.030	0.012
1	0.0730	● ♦ ▲	0.164	0.149	0.045	0.037	0.064	0.036	0.014	0	0.038	0.020
2	0.0860	● ♦ ▲ ■	0.194	0.180	0.053	0.044	0.098	0.050	0.018	1	0.052	0.034
3	0.0990	● ♦ ▲ ■	0.226	0.211	0.061	0.051	0.104	0.058	0.018	1	0.059	0.042
4	0.1120	● ♦ ▲ ■	0.257	0.241	0.069	0.059	0.106	0.060	0.018	1	0.062	0.044
5	0.1250	● ♦ ▲ ■	0.289	0.272	0.078	0.066	0.122	0.076	0.019	1	0.078	0.060
6	0.1380	● ♦ ▲ ■	0.321	0.303	0.086	0.074	0.152	0.072	0.027	2	0.073	0.048
7	0.1510	● ♦ ▲	0.352	0.333	0.094	0.081	0.158	0.078	0.028	2	0.080	0.055
8	0.1640	● ♦ ▲ ■	0.384	0.364	0.102	0.088	0.166	0.086	0.029	2	0.088	0.063
10	0.1900	● ♦ ▲ ■	0.448	0.425	0.118	0.103	0.182	0.102	0.030	2	0.104	0.079
12	0.2160	● ♦ ▲ ■	0.511	0.487	0.134	0.118	0.242	0.116	0.032	3	0.111	0.086
14	0.2420	♦	0.557	0.530	0.146	0.129	0.256	0.130	0.033	3	0.126	0.101
1/4	0.2500	● ▲ ■	0.573	0.546	0.150	0.133	0.256	0.130	0.033	3	0.126	0.101
16	0.2680	♦	0.609	0.580	0.159	0.141	0.260	0.138	0.034	3	0.134	0.109
18	0.2940	♦	0.661	0.630	0.173	0.153	0.316	0.153	0.054	4	0.145	0.121
5/16	0.3125	● ▲ ■	0.698	0.666	0.183	0.162	0.346	0.180	0.059	4	0.173	0.148
20	0.3200	♦	0.713	0.680	0.186	0.165	0.350	0.184	0.059	4	0.177	0.151
24	0.3720	♦	0.817	0.780	0.213	0.190	0.376	0.214	0.063	4	0.206	0.182
3/8	0.3750	▲ ■	0.823	0.787	0.215	0.191	0.376	0.214	0.063	4	0.206	0.182
7/16	0.4375	▲	0.948	0.907	0.248	0.221	0.408	0.244	0.068	4	0.237	0.212
1/2	0.5000	▲	1.073	1.028	0.280	0.250	0.438	0.276	0.072	4	0.268	0.243

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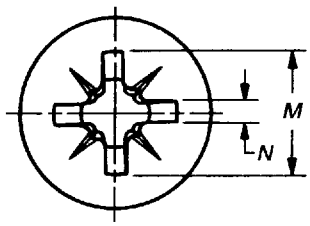
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TABLE F2 DIMENSIONS OF TYPE I CROSS RECESSED TRUSS HEAD TAPPING SCREWS (CONT'D)

GENERAL NOTE: For additional requirements, refer to para. 2.

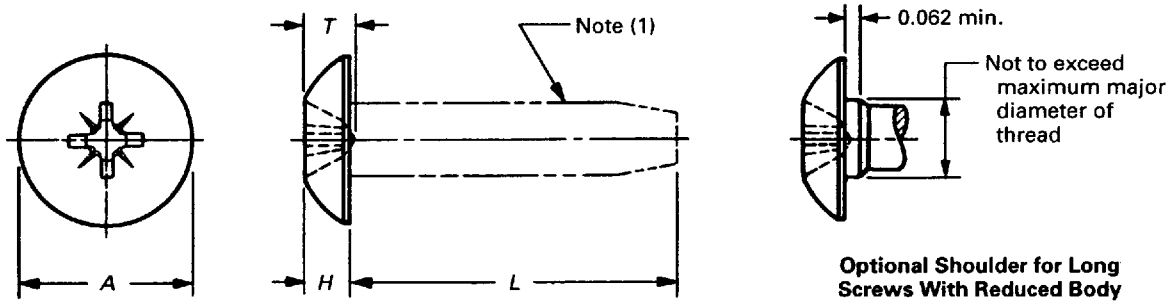
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.



— NOT RECOMMENDED FOR NEW DESIGNS —
(See Para. 1.2.9)

This type of recess has a large center opening, wide straight wings, and blunt bottom, with all edges relieved or rounded.



Optional Shoulder for Long Screws With Reduced Body

TABLE F3 DIMENSIONS OF TYPE IA CROSS RECESSED TRUSS HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Height Max.	H Head Height Min.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.
0	0.0600	● ♦ ▲	0.131	0.119	0.037	0.029	0.056	0.029	0.018	0	0.030	0.014
1	0.0730	● ♦ ▲	0.164	0.149	0.045	0.037	0.064	0.037	0.018	0	0.038	0.022
2	0.0860	● ♦ ▲ ■	0.194	0.180	0.053	0.044	0.092	0.051	0.029	1	0.049	0.033
3	0.0990	● ♦ ▲ ■	0.226	0.211	0.061	0.051	0.098	0.058	0.029	1	0.056	0.040
4	0.1120	● ♦ ▲ ■	0.257	0.241	0.069	0.059	0.102	0.061	0.029	1	0.059	0.043
5	0.1250	● ♦ ▲ ■	0.289	0.272	0.078	0.066	0.118	0.077	0.030	1	0.075	0.059
6	0.1380	● ♦ ▲ ■	0.321	0.303	0.086	0.074	0.142	0.071	0.041	2	0.065	0.047
7	0.1510	● ♦ ▲	0.352	0.333	0.094	0.081	0.148	0.078	0.041	2	0.072	0.054
8	0.1640	● ♦ ▲ ■	0.384	0.364	0.102	0.088	0.156	0.085	0.041	2	0.079	0.061
10	0.1900	● ♦ ▲ ■	0.448	0.425	0.118	0.103	0.172	0.101	0.042	2	0.095	0.077
12	0.2160	● ♦ ▲ ■	0.511	0.487	0.134	0.118	0.228	0.114	0.055	3	0.101	0.083
14	0.2420	♦	0.557	0.530	0.146	0.129	0.242	0.127	0.056	3	0.115	0.097

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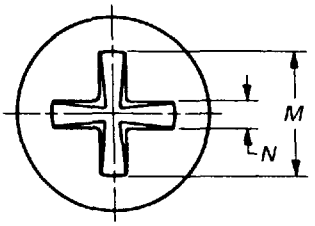
TABLE F3 DIMENSIONS OF TYPE IA CROSS RECESSED TRUSS HEAD TAPPING SCREWS (CONT'D)

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Height Max.	H Head Height Min.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.
1/4	0.2500	● ▲ ■	0.573	0.546	0.150	0.133	0.242	0.127	0.056	3	0.115	0.097
16	0.2680	●	0.609	0.580	0.159	0.141	0.250	0.135	0.056	3	0.123	0.105
18	0.2940	●	0.661	0.630	0.173	0.153	0.300	0.151	0.085	4	0.133	0.115
5/16	0.3125	● ▲ ■	0.698	0.666	0.183	0.162	0.326	0.178	0.086	4	0.161	0.143
20	0.3200	●	0.713	0.680	0.186	0.165	0.330	0.182	0.086	4	0.164	0.146
24	0.3720	♦	0.817	0.780	0.213	0.190	0.358	0.210	0.086	4	0.192	0.174
3/8	0.3750	▲ ■	0.823	0.787	0.215	0.191	0.358	0.210	0.086	4	0.192	0.174
7/16	0.4375	▲	0.948	0.907	0.248	0.221	0.388	0.240	0.086	4	0.223	0.205
1/2	0.5000	▲	1.073	1.028	0.280	0.250	0.416	0.269	0.087	4	0.251	0.233

GENERAL NOTE: For additional requirements, refer to para. 2.

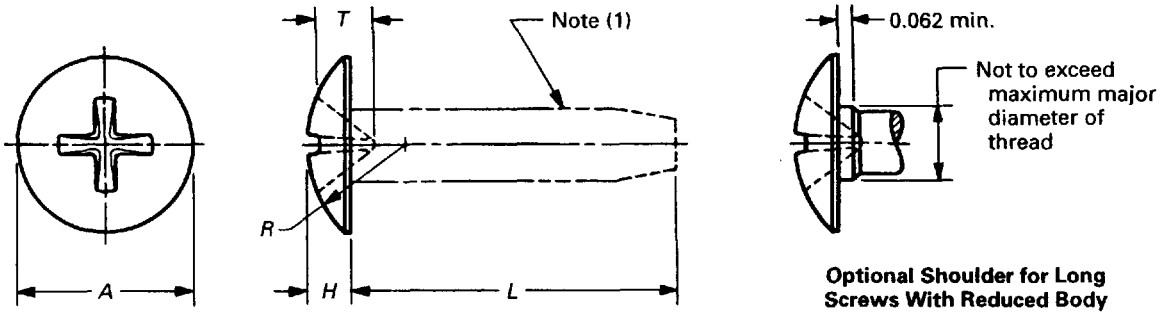
NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.



— NOT RECOMMENDED FOR NEW DESIGNS —
(See Para. 1.2.9)

This type of recess consists of two intersecting slots with parallel sides converging to a slightly truncated apex at bottom of recess.



Optional Shoulder for Long Screws With Reduced Body

TABLE F4 ILLUSTRATION

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TABLE F4 DIMENSIONS OF TYPE II CROSS RECESSED TRUSS HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	A		H		R	M	T	N		Recess Penetration Gaging Depth	
			Head Diameter		Head Height		Head Radius	Recess Diameter	Recess Depth	Recess Width			
		Code Symbols	Max.	Min.	Max.	Min.	Max.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.
0	0.0600	● ♦ ▲	0.131	0.119	0.037	0.029	0.087	0.070	0.032	0.021		(3)	(3)
1	0.0730	● ♦ ▲	0.164	0.149	0.045	0.037	0.107	0.087	0.042	0.023		(3)	(3)
2	0.0860	● ♦ ▲ ■	0.194	0.180	0.053	0.044	0.129	0.105	0.054	0.026		0.033	0.024
3	0.0990	● ♦ ▲ ■	0.226	0.211	0.061	0.051	0.151	0.122	0.066	0.028		0.045	0.035
4	0.1120	● ♦ ▲ ■	0.257	0.241	0.069	0.059	0.169	0.140	0.074	0.031		0.056	0.046
5	0.1250	● ♦ ▲ ■	0.289	0.272	0.078	0.066	0.191	0.157	0.086	0.033		0.068	0.057
6	0.1380	● ♦ ▲ ■	0.321	0.303	0.086	0.074	0.211	0.175	0.097	0.035		0.079	0.068
7	0.1510	● ♦ ▲	0.352	0.333	0.094	0.081	0.231	0.192	0.108	0.038		0.090	0.079
8	0.1640	● ♦ ▲ ■	0.384	0.364	0.102	0.088	0.254	0.210	0.115	0.041	Point	0.102	0.091
10	0.1900	● ♦ ▲ ■	0.448	0.425	0.118	0.103	0.283	0.244	0.138	0.046	Same	0.126	0.113
12	0.2160	● ♦ ▲ ■	0.511	0.487	0.134	0.118	0.336	0.280	0.160	0.051	On	0.148	0.136
14	0.2420	♦	0.557	0.530	0.146	0.129	0.375	0.304	0.169	0.056	All	0.165	0.152
											Drivers		
1/4	0.2500	● ▲ ■	0.573	0.546	0.150	0.133	0.375	0.314	0.174	0.057		0.171	0.157
16	0.2680	♦	0.609	0.580	0.159	0.141	0.410	0.333	0.188	0.059		0.184	0.170
18	0.2940	♦	0.661	0.630	0.173	0.153	0.446	0.356	0.203	0.062		0.200	0.185
5/16	0.3125	● ▲ ■	0.698	0.666	0.183	0.162	0.457	0.382	0.220	0.067		0.217	0.201
20	0.3200	♦	0.713	0.680	0.186	0.165	0.484	0.390	0.224	0.068		0.222	0.206
24	0.3720	♦	0.817	0.780	0.213	0.190	0.557	0.446	0.261	0.076		0.259	0.242
3/8	0.3750	▲ ■	0.823	0.787	0.215	0.191	0.538	0.446	0.261	0.076		0.259	0.242
7/16	0.4375	▲	0.948	0.907	0.248	0.221	0.619	0.512	0.304	0.086		0.303	0.284
1/2	0.5000	▲	1.073	1.028	0.280	0.250	0.701	0.588	0.354	0.097		0.354	0.333

GENERAL NOTE: For reference, see Table F4 Illustration on page 141. For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Not practical to gage.

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NONMANDATORY APPENDIX G
DIMENSIONS OF ROUND HEAD SCREWS

For dimensions of slotted, Type I cross recessed, and Type II cross recessed round head tapping screws, see Tables G1, G2, and G3, respectively.

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— NOT RECOMMENDED — USE PAN HEADS —

(See Para. 1.2.10 and Table 31)

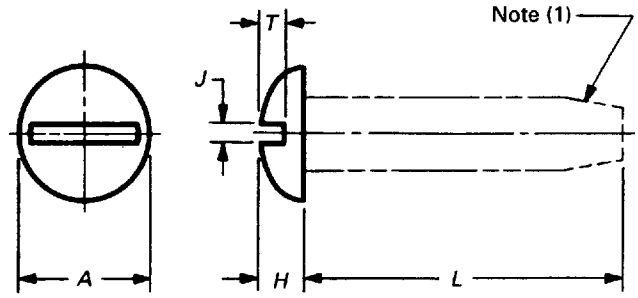


TABLE G1 DIMENSIONS OF SLOTTED ROUND HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Height Max.	H Head Height Min.	J Slot Width Max.	J Slot Width Min.	T Slot Depth Max.	T Slot Depth Min.
0	0.0600	♦ ▲	0.113	0.099	0.053	0.043	0.023	0.016	0.039	0.029
1	0.0730	♦ ▲	0.138	0.122	0.061	0.051	0.026	0.019	0.044	0.033
2	0.0860	♦ ▲ ■	0.162	0.146	0.069	0.059	0.031	0.023	0.048	0.037
3	0.0990	♦ ▲ ■	0.187	0.169	0.078	0.067	0.035	0.027	0.053	0.040
4	0.1120	♦ ▲ ■	0.211	0.193	0.086	0.075	0.039	0.031	0.058	0.044
5	0.1250	♦ ▲ ■	0.236	0.217	0.095	0.083	0.043	0.035	0.063	0.047
6	0.1380	♦ ▲ ■	0.260	0.240	0.103	0.091	0.048	0.039	0.068	0.051
7	0.1510	♦ ▲	0.285	0.264	0.111	0.099	0.048	0.039	0.072	0.055
8	0.1640	♦ ▲ ■	0.309	0.287	0.120	0.107	0.054	0.045	0.077	0.058
10	0.1900	♦ ▲ ■	0.359	0.334	0.137	0.123	0.060	0.050	0.087	0.065
12	0.2160	♦ ▲ ■	0.408	0.382	0.153	0.139	0.067	0.056	0.096	0.073
14	0.2420	♦	0.457	0.429	0.170	0.155	0.075	0.064	0.106	0.080
1/4	0.2500	▲ ■	0.472	0.443	0.175	0.160	0.075	0.064	0.109	0.082
16	0.2680	♦	0.506	0.476	0.187	0.171	0.075	0.064	0.115	0.087
18	0.2940	♦	0.555	0.523	0.204	0.187	0.084	0.072	0.125	0.094
5/16	0.3125	▲ ■	0.590	0.557	0.216	0.198	0.084	0.072	0.132	0.099
20	0.3200	♦	0.604	0.570	0.220	0.203	0.084	0.072	0.134	0.101
24	0.3720	♦	0.702	0.664	0.254	0.235	0.094	0.081	0.154	0.116
3/8	0.3750	▲ ■	0.708	0.670	0.256	0.237	0.094	0.081	0.155	0.117
7/16	0.4375	▲	0.750	0.707	0.328	0.307	0.094	0.081	0.196	0.148
1/2	0.5000	▲	0.813	0.766	0.355	0.332	0.106	0.091	0.211	0.159

GENERAL NOTE: For additional requirements, refer to para. 2.

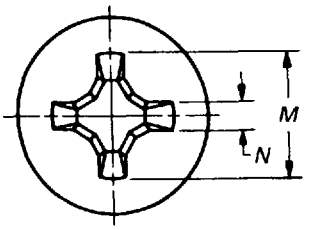
NOTES:

(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

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— NOT RECOMMENDED — USE PAN HEADS —

(See Para. 1.2.10 and Table 32)

This type of recess has a large center opening, tapered wings, and blunt bottom, with all edges relieved or rounded.

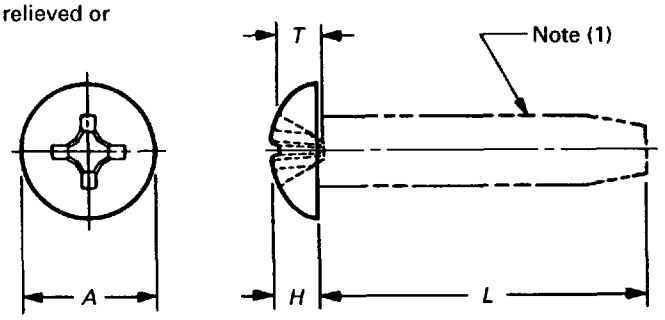


TABLE G2 DIMENSIONS OF TYPE I CROSS RECESSED ROUND HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A Head Diameter Max.	A Head Diameter Min.	H Head Height Max.	H Head Height Min.	M Recess Diameter Ref.	T Recess Depth Ref.	N Recess Width Ref.	Driver Size	Recess Penetration Gaging Depth Max.	Recess Penetration Gaging Depth Min.
0	0.0600	♦ ▲	0.113	0.099	0.053	0.043	0.066	0.032	0.014	0	0.035	0.015
1	0.0730	♦ ▲	0.138	0.122	0.061	0.051	0.076	0.042	0.015	0	0.045	0.026
2	0.0860	♦ ▲ ■	0.162	0.146	0.069	0.059	0.094	0.044	0.017	1	0.046	0.027
3	0.0990	♦ ▲ ■	0.187	0.169	0.078	0.067	0.102	0.052	0.018	1	0.055	0.035
4	0.1120	♦ ▲ ■	0.211	0.193	0.086	0.075	0.112	0.062	0.019	1	0.065	0.046
5	0.1250	♦ ▲ ■	0.236	0.217	0.095	0.083	0.148	0.060	0.027	2	0.063	0.035
6	0.1380	♦ ▲ ■	0.260	0.240	0.103	0.091	0.156	0.070	0.027	2	0.073	0.045
7	0.1510	♦ ▲	0.285	0.264	0.111	0.099	0.164	0.079	0.028	2	0.081	0.055
8	0.1640	♦ ▲ ■	0.309	0.287	0.120	0.107	0.172	0.088	0.030	2	0.090	0.064
10	0.1900	♦ ▲ ■	0.359	0.334	0.137	0.123	0.188	0.106	0.031	2	0.108	0.082
12	0.2160	♦ ▲ ■	0.408	0.382	0.153	0.139	0.242	0.112	0.032	3	0.108	0.082
14	0.2420	♦	0.457	0.429	0.170	0.155	0.258	0.129	0.034	3	0.125	0.099
1/4	0.2500	▲ ■	0.472	0.443	0.175	0.160	0.262	0.134	0.034	3	0.130	0.104
16	0.2680	♦	0.506	0.476	0.187	0.171	0.274	0.148	0.038	3	0.142	0.119
18	0.2940	♦	0.555	0.523	0.204	0.187	0.322	0.154	0.055	4	0.147	0.121
5/16	0.3125	▲ ■	0.590	0.557	0.216	0.198	0.302	0.174	0.040	3	0.170	0.144
20	0.3200	♦	0.604	0.570	0.220	0.203	0.338	0.170	0.057	4	0.163	0.137
24	0.3720	♦	0.702	0.664	0.254	0.235	0.380	0.215	0.064	4	0.208	0.182
3/8	0.3750	▲ ■	0.708	0.670	0.256	0.237	0.380	0.215	0.064	4	0.208	0.182
7/16	0.4375	▲	0.750	0.707	0.328	0.307	0.396	0.228	0.066	4	0.221	0.196
1/2	0.5000	▲	0.813	0.766	0.355	0.332	0.410	0.244	0.068	4	0.236	0.211

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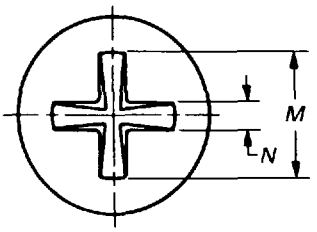
TABLE G2 DIMENSIONS OF TYPE I CROSS RECESSED ROUND HEAD TAPPING SCREWS (CONT'D)

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
- ● Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G and T thread cutting, see Table 8.

(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

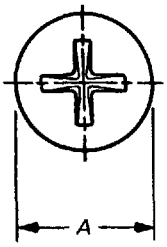
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— NOT RECOMMENDED — USE PAN HEADS —

(See Para. 1.2.10 and Table 34)

This type of recess consists of two intersecting slots with parallel sides converging to a slightly truncated apex at bottom of recess.



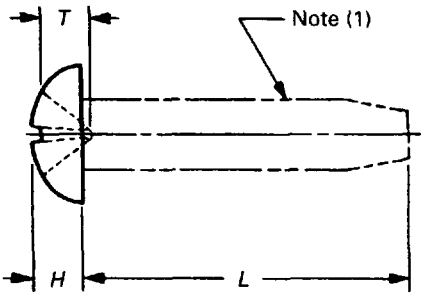


TABLE G3 DIMENSIONS OF TYPE II CROSS RECESSED ROUND HEAD TAPPING SCREWS

Nominal Size (2) or Basic Screw Diameter		Applicable to Screw Types (1)	A		H		M	T	N		Recess Penetration Gaging Depth	
			Head Diameter		Head Height		Recess Diameter	Recess Depth	Recess Width			
		Code Symbols	Max.	Min.	Max.	Min.	Ref.	Ref.	Ref.	Driver Size	Max.	Min.
0	0.0600	♦ ▲	0.113	0.099	0.053	0.043	0.068	0.030	0.020		(3)	(3)
1	0.0730	♦ ▲	0.138	0.122	0.061	0.051	0.084	0.040	0.022		(3)	(3)
2	0.0860	♦ ▲ ■	0.162	0.146	0.069	0.059	0.100	0.050	0.025		0.030	0.020
3	0.0990	♦ ▲ ■	0.187	0.169	0.078	0.067	0.116	0.061	0.027		0.041	0.030
4	0.1120	♦ ▲ ■	0.211	0.193	0.086	0.075	0.131	0.070	0.029		0.051	0.039
5	0.1250	♦ ▲ ■	0.236	0.217	0.095	0.083	0.147	0.080	0.032		0.062	0.050
6	0.1380	♦ ▲ ■	0.260	0.240	0.103	0.091	0.162	0.090	0.034		0.072	0.060
7	0.1510	♦ ▲	0.285	0.264	0.111	0.099	0.178	0.100	0.036		0.083	0.070
8	0.1640	♦ ▲ ■	0.309	0.287	0.120	0.107	0.194	0.110	0.039	Point	0.093	0.080
10	0.1900	♦ ▲ ■	0.359	0.334	0.137	0.123	0.225	0.125	0.043	Same	0.114	0.099
12	0.2160	♦ ▲ ■	0.408	0.382	0.153	0.139	0.256	0.146	0.048	On	0.135	0.120
14	0.2420	♦	0.457	0.429	0.170	0.155	0.288	0.162	0.052	All	0.156	0.140
										Drivers		
1/4	0.2500	▲ ■	0.472	0.443	0.175	0.160	0.298	0.172	0.054		0.162	0.146
16	0.2680	♦	0.506	0.476	0.187	0.171	0.319	0.178	0.057		0.176	0.159
18	0.2940	♦	0.555	0.523	0.204	0.187	0.350	0.199	0.062		0.197	0.180
5/16	0.3125	▲ ■	0.590	0.557	0.216	0.198	0.372	0.214	0.065		0.212	0.194
20	0.3200	♦	0.604	0.570	0.220	0.203	0.382	0.219	0.066		0.218	0.199
24	0.3720	♦	0.702	0.664	0.254	0.235	0.444	0.260	0.076		0.259	0.239
3/8	0.3750	▲ ■	0.708	0.670	0.256	0.237	0.448	0.262	0.076		0.262	0.241
7/16	0.4375	▲	0.750	0.707	0.328	0.307	0.474	0.279	0.080		0.279	0.258
1/2	0.5000	▲	0.813	0.766	0.355	0.332	0.513	0.304	0.086		0.306	0.282

(continued)

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TABLE G3 DIMENSIONS OF TYPE II CROSS RECESSED ROUND HEAD TAPPING SCREWS (CONT'D)

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:
(1) Applicable to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.
♦ Type A thread forming, except for short lengths, see Appendix E.
▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
■ Type C thread forming, see Appendix V; and Types D, F, G and T thread cutting, see Table 8.
(2) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.
(3) Not practical to gage.

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NONMANDATORY APPENDIX H
DIMENSIONS OF SLOTTED HEX WASHER HEAD SCREWS

For dimensions of slotted hex washer head tapping screws, see Table H1.

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— *NOT RECOMMENDED FOR NEW DESIGNS* —
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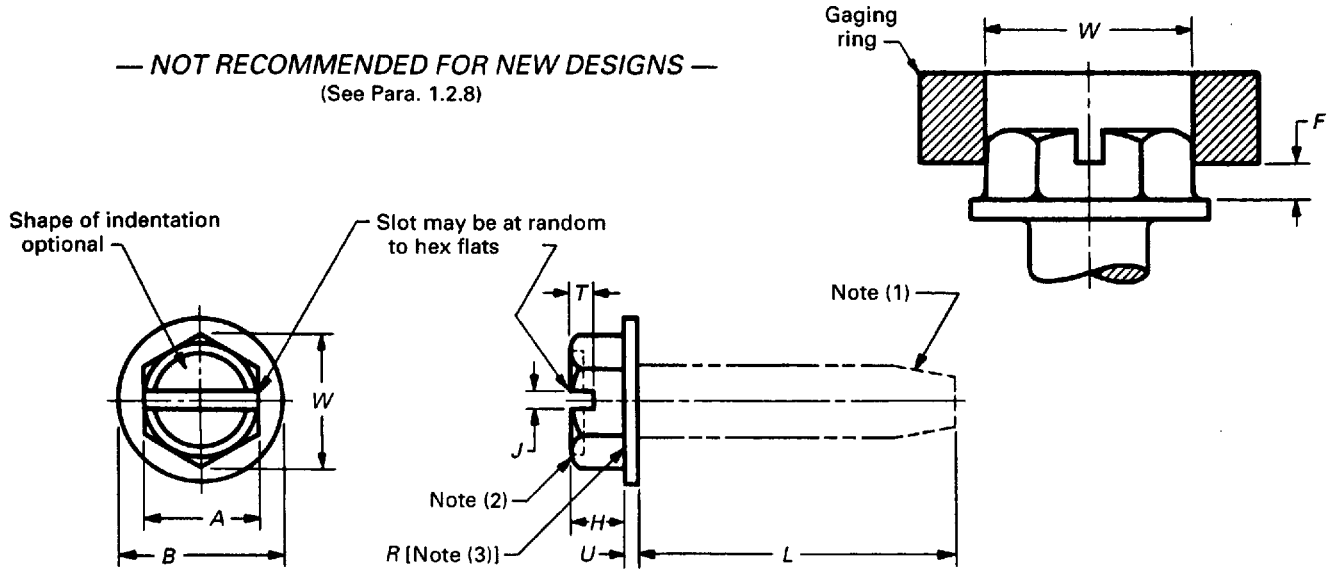


TABLE H1 DIMENSIONS OF SLOTTED HEX WASHER HEAD TAPPING SCREWS

Nominal Size (4) or Basic Screw Diameter		Applicable to Screw Types (1)	*A* (5)		*W* (5) (6)	*H*		*B*		*U*		*J*		*T* (7)		*F* (6)
			Width Across Flats		Width Across Corners	Head Height		Washer Diameter		Washer Thickness		Slot Width		Slot Depth		Protrusion Beyond Gaging Ring
		Code Symbols	Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.
4	0.1120	● ● ▲ ■	0.188	0.181	0.202	0.060	0.049	0.243	0.225	0.019	0.011	0.039	0.031	0.042	0.025	0.029
5	0.1250	● ♦ ▲ ■	0.188	0.181	0.202	0.070	0.058	0.260	0.240	0.025	0.015	0.043	0.035	0.049	0.030	0.035
6	0.1380	● ♦ ▲ ■	0.250	0.244	0.272	0.093	0.080	0.328	0.302	0.025	0.015	0.048	0.039	0.053	0.033	0.048
7	0.1510	● ♦ ▲	0.250	0.244	0.272	0.093	0.080	0.328	0.302	0.029	0.017	0.048	0.039	0.062	0.040	0.048
8	0.1640	● ● ▲ ■	0.250	0.244	0.272	0.110	0.096	0.348	0.322	0.031	0.019	0.054	0.045	0.074	0.052	0.058
10	0.1900	● ♦ ▲ ■	0.312	0.305	0.340	0.120	0.105	0.414	0.384	0.031	0.019	0.060	0.050	0.080	0.057	0.063
12	0.2160	● ● ▲ ■	0.312	0.305	0.340	0.155	0.139	0.432	0.398	0.039	0.022	0.067	0.056	0.103	0.077	0.083
14	0.2420	♦	0.375	0.367	0.409	0.190	0.172	0.520	0.480	0.050	0.030	0.075	0.064	0.111	0.083	0.103

(continued)

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TABLE H1 DIMENSIONS OF SLOTTED HEX WASHER HEAD TAPPING SCREWS (CONT'D)

Nominal Size (4) or Basic Screw Diameter		Applicable to Screw Types (1) Code Symbols	A (5) Width Across Flats Max.	A (5) Width Across Flats Min.	W (5) (6) Width Across Corners Min.	H Head Height Max.	H Head Height Min.	B Washer Diameter Max.	B Washer Diameter Min.	U Washer Thickness Max.	U Washer Thickness Min.	J Slot Width Max.	J Slot Width Min.	T (7) Slot Depth Max.	T (7) Slot Depth Min.	F (6) Protrusion Beyond Gaging Ring Min.
1/4	0.2500	● ▲ ■	0.375	0.367	0.409	0.190	0.172	0.520	0.480	0.050	0.030	0.075	0.064	0.111	0.083	0.103
5/16	0.3125	● ▲ ■	0.500	0.489	0.545	0.230	0.208	0.676	0.624	0.055	0.035	0.084	0.072	0.134	0.100	0.125
20	0.3200	●	0.500	0.489	0.545	0.230	0.208	0.676	0.624	0.055	0.035	0.084	0.072	0.134	0.100	0.125
24	0.3720	♦	0.562	0.551	0.614	0.295	0.270	0.780	0.720	0.063	0.037	0.094	0.081	0.168	0.131	0.162
3/8	0.3750	▲ ■	0.562	0.551	0.614	0.295	0.270	0.780	0.720	0.063	0.037	0.094	0.081	0.168	0.131	0.162

GENERAL NOTE: For additional requirements, refer to para. 2.

NOTES:

(1) *Application to screw types as indicated by code symbols below. See referenced tables for thread and point dimensions and minimum practical screw lengths.*
- ● Type AB thread forming, see Table 5.
- ♦ Type A thread forming, except for short lengths, see Appendix E.
- ▲ Types B and BP thread forming, see Table 6; and Types BF and BT thread cutting, see Table 7.
- ■ Type C thread forming, see Appendix V; and Types D, F, G, and T thread cutting, see Table 8.

(2) A slight rounding of all edges and corners of the hex surfaces of heads shall be permissible.

(3) Fillet radius *R* at junction of sides of hex and top of washer shall not exceed 0.15 times the basic screw diameter.

(4) Where specifying nominal size in decimals, zeros preceding decimal and in the fourth decimal place shall be omitted.

(5) Dimensions across flats and across corners of the head shall be measured at the point of maximum metal. Taper of sides of hex (angle between one side and the axis) shall not exceed 2° or 0.004 in., whichever is greater, the specified width across flats being the large dimension.

(6) The rounding due to lack of fill on all six corners of the head shall be reasonably uniform and the width across corners of the head shall be such that when a sharp ring having an inside diameter equal to the specified minimum width across corners is placed on the top of the head, the hex portion of the head shall protrude by an amount equal to, or greater than, the *F* value tabulated. See Appendix II for across corners gaging of hex heads.

(7) Slot depth beyond bottom of indentation shall not be less than 1/3 of minimum slot depth specified.

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