

GGG-C-613D
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SUPERSEDING
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January 25, 1963

FEDERAL SPECIFICATION

COUNTERSINKS; AND COUNTERSINKS AND DRILLS

This specification was approved by the Commissioner,
Federal Supply Service, General Services Administration,
for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers countersinks and combination countersinks and drills (center drill) for use in centering work pieces and countersinking holes.

1.1.1 Federal specification coverage. This Federal specification does not cover all types and classes of countersinks indicated by the title of this specification, but is intended to cover only those which are generally used by the Federal Government.

1.2 Classification.

1.2.1 Types and classes. Countersinks and combination countersinks and drills (center drill) shall be of the following types and classes, as specified (see 6.1):

Type I - Back.

Class A - Without pilot.

Class B - With pilot.

Type II - Bitstock shank.

Class A - Regular.

Class B - Rose.

Class C - Snail ("S").

Class D - Stepped body.

Type III - Combined countersink and drill.

Class A - Plain.

Class B - Bell.

Type IV - Straight shank, center reamer pattern.

Class A - Short.

Class B - Long.

Class C - Spiral flute.

Class D - Single flute.

Type V - Taper shank, American standard taper (Morse).

Type VI - Straight shank, integral pilot.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Federal Specifications:

FFP-P-40 - Packaging and Packing of Hand Tools.

FFP-T-1150 - Tools and Tool Accessories for Power Driven Metal and Woodworking Machinery:
Packaging and Packing of.

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(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC-20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Standard:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Illustrations. The illustrations shown herein are for the convenience of identification and are not intended to preclude the purchase of countersinks which are otherwise in accordance with the requirements of this specification.

3.2 Material. Countersinks shall be made of good quality high-speed or carbon steel, as specified for the individual types and classes. High-speed steel countersinks shall be suitable for countersinking in tough metals such as alloy and corrosion resisting steels.

3.3 Design. Countersinks shall be in substantial agreement with the figure to which reference is made. Countersinks shall be right-hand, except type I, which shall be left-hand. Cutting edges of all countersinks shall have a ground radial relief suitable for insuring free-cutting action. Points, cutting edges, shanks, and bodies shall be properly centered about the axis of rotation. The countersinks shall be clean and smooth. Countersink bodies shall be ground or unground, at the option of the contractor, except that bodies of type III combined countersinks and drills, and shanks of type IV, straight shank and type V taper shank countersinks shall be ground. The full lengths of the flutes of countersinks shall be properly hardened and tempered.

3.4 Identification marking. In addition to the markings specified for individual types, all countersinks shall be stamped or marked in a legible and permanent manner with the manufacturer's name or trademark of such known character that the source of manufacture may be readily determined. High-speed steel countersinks shall also be stamped or marked, in a legible and permanent manner, with either the words "High-Speed" or the letters "HS".

3.5 Type I, back. Type I back countersinks shall have a cutter capable of being attached easily by hand (without the aid of tools) to a driving shaft (pilot) for the purpose of countersinking holes on the far or bottom side of holes. Countersinks shall be stamped or marked in a legible and permanent manner with the nominal body diameter in inches and the cutter angle in degrees.

3.5.1 Class A, without pilot. Class A countersinks shall be similar to figure 1 and shall conform to the dimensional requirements of table I. They shall be made of high-speed steel and have six straight flutes with a Rockwell hardness of not less than 62 nor more than 65 on the "C" scale. The hole "E" shall have a taper of 1/4 inch per foot and be drilled and reamed so that the largest diameter of the hole equals the largest diameter of the taper pin shown in table I for the size specified. When specified (see 6.1), the taper pin of the applicable size, made of cold rolled steel, shall be furnished.

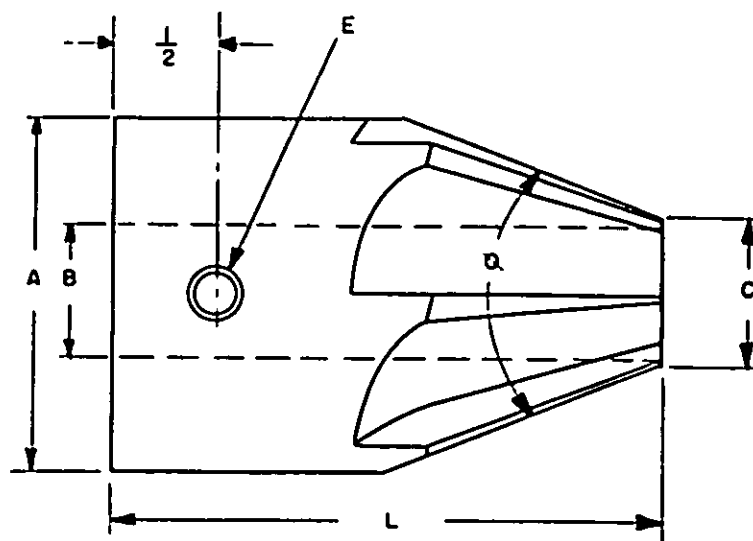


FIGURE 1. Type I, class A, back countersink without pilot.

TABLE I. Type I, class A, back countersink without pilot

Counter-sink number	Body diameter (nominal)	Included angle $\theta \pm 1$	Diameter			Overall length $L \pm 1/64$	Taper pin hole E	
			Body A ± 0.005	Hole B $+0.005 - 0$	Point C ± 0.015		For taper pin number and diameter at large end	Pin length
No.	Inches	Degrees	Inches	Inch	Inch	Inches	Inch	Inches
F-1	2	37	2.000	0.750	1.000	2-1/2	No. 4 (0.250)	2
F-2	1-5/8	45	1.625	.625	.750	2-1/2	No. 4 (0.250)	1-3/4
F-3	1-1/8	60	1.125	.500	.625	2-1/2	No. 2 (0.193)	1-1/4

3.5.2 Class B, with pilot. Class B countersinks shall be similar to figures 2 and 3 and conform to the dimensional requirements of table II and table III. The countersink and pilot shall be made of high speed steel. The countersink shall have three straight flutes, except for size number F-18 which shall have three spiral flutes. The flute hardness shall be not less than 60 nor more than 65 on the Rockwell "C" scale. Pilot hardness shall be not less than 43 nor more than 53 on the Rockwell "C" scale. The method used to assemble the cutter to the pilot shall be at the manufacturer's option, but shall be of such a design that provides a positive interlock between the pilot and the countersink, and is manufactured to specific tolerances which will insure the interchangeability of components manufactured to identical nominal dimensions.

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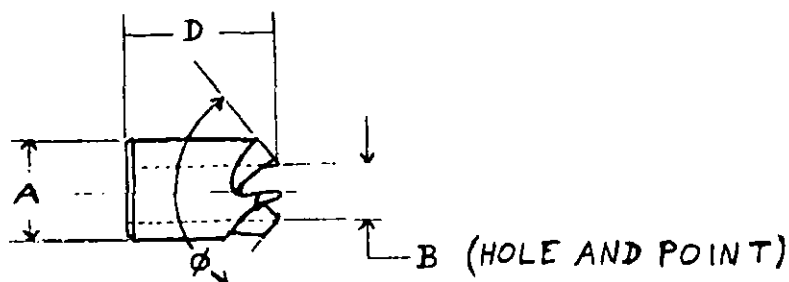


FIGURE 2. Type I, class B countersink.

TABLE II. Type I, class B, countersinks

Counter-sink number	Body diameter (nominal)	Included angle ϕ ± 1	Countersink		
			Body A ± 0.005	Hole B $+0.005$ -0	Length D ± 0.0312
No.	Inches	Degrees	Inches	Inches	Inches
F-10	1/2	100	0.500	0.1577	0.750
F-11	1/2	100	.500	.2515	.750
F-12	1/2	82	.500	.1577	.750
F-13	1/2	82	.500	.2515	.750
F-14	3/8	100	.375	.1890	.625
F-15	3/8	100	.375	.1265	.625
F-16	3/8	82	.375	.1890	.625
F-17	3/8	82	.375	.1265	.625
F-18 ^{1/}	5/16	100	.3125	.1265	.625
F-19	1/4	82	.250	.095	.500

^{1/} This item has three spiral flutes.

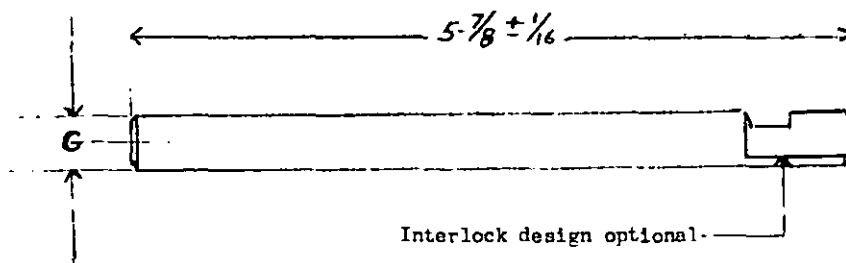


FIGURE 3. Pilot for type I, class B countersinks.

TABLE III. Type I, class B countersink pilots

Size	Body diameter G +.000 -.005
No.	Inches
1	0.0945
2	.1260
3	.1572
4	.1885
5	.2510

3.6 Type II, bitstock shank. The countersink shall be provided with a bitstock shank. The bitstock shall be of square cross section, tapered, and shall be 7/8 inch to 1-3/8 inches long when measured along the corners of the tapered square. The width of the flats of the bitstock portion of the shank shall be from 5/32 to 1/4 inch on the small end and from 5/16 to 7/16 inch on the large end. The bitstock shank shall center properly and be suitable for use in chucks or ratchet braces.

3.6.1 Class A, regular. The countersink shall be similar to figure 4 and conform to the dimensions shown in table IV for the size specified (see 6.1). The countersink shall be made of carbon steel and shall have 3, 4, or 5 straight flutes at the option of the contractor. The hardness of the flutes shall be not less than 60 and not more than 63 on the Rockwell C scale. The countersink shall be marked, with the body diameter in inches, and the included cutter angle in degrees.

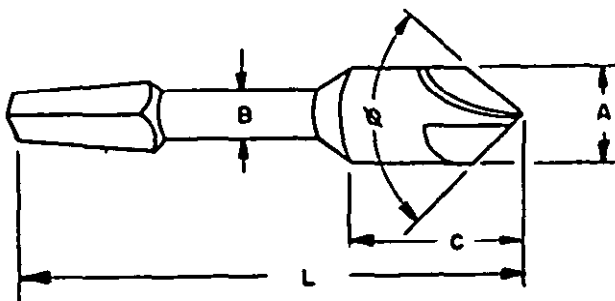


FIGURE 4. Type II, class A, bitstock shank, regular.

TABLE IV. Type II, class A, bitstock shank countersinks, regular

Size (nominal body diameter)	Included angle/ ϕ ± 1	Diameter		Length of body C (Min.)	Overall length L	
		Body A +.005 -.015	Shank B $\pm 3/64$		Min.	Max.
Inch	Degrees	Inch	Inch	Inch	Inches	Inches
1/2	60 or 82	0.500	11/32	13/16	3-9/16	4-1/4
5/8	60 or 82	.625	11/32	13/16	3-9/16	4-1/4
3/4	60 or 82	.750	11/32	13/16	4-3/16	4-3/4

^{1/} As specified in the contract or order.

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3.6.2 Class B, rose. The countersink shall be similar to figure 5 and shall conform to the dimensions shown in table V for the size specified (see 6.1). The countersink shall be made of carbon steel, have a cone or regular head, and 5, 6, 7, or 8 straight flutes at the option of the contractor. The hardness of the flutes shall be not less than 52 and not more than 63 on the Rockwell C scale. No marking is required.

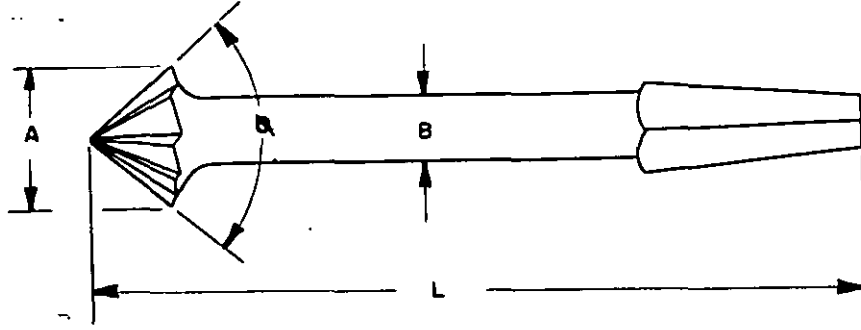


FIGURE 5. Type II, class B, bitstock shank, rose.

TABLE V. Type II, bitstock shank countersink class B, rose and class C, snail "S"

Size (nominal head diameter)	Included angle ϕ		Diameter				Length overall L	
			Head A		Shank B			
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
<u>Inch</u>	<u>Degrees</u>	<u>Degrees</u>	<u>Inch</u>	<u>Inch</u>	<u>Inch</u>	<u>Inch</u>	<u>Inches</u>	<u>Inches</u>
5/8	80	83	19/32	11/16	7/32	13/32	3	4-1/2
3/4	80	83	47/64	13/16	7/32	13/32	3	4-1/2

3.6.3 Class C, snail ("S"). The countersink shall be similar to figure 6 and shall conform to the dimensions shown in table V. The countersink shall be made of carbon steel, have a cone head and 2 flutes of the snail pattern. The hardness of the flutes shall be not less than 52 and not more than 60 on the Rockwell C scale. No marking is required.

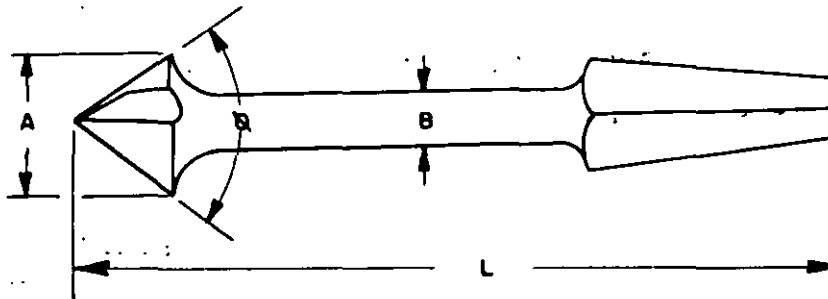


FIGURE 6. Type II, class C, bitstock shank, snail ("S").

3.6.4 Class D, stepped body. The countersink shall conform to the shape and dimensions shown in figure 7. The cutter angle (θ) shall be 60° or 82° as specified (see 6.1), within a tolerance of $\pm 1^\circ$. The countersink shall be made of high speed steel and shall have 3 flutes. The hardness of the flutes shall be not less than 60 and not more than 63 on the Rockwell C scale. A plus tolerance of 10 percent and a minus tolerance of $1/16$ inch shall be permitted in the overall length. A plus or minus tolerance of $1/64$ inch shall be permitted on the $3/8$ and $5/8$ inch step diameters and a plus or minus tolerance of 0.005 inch on the body diameter. Each countersink shall be marked with the cutter angle in degrees.

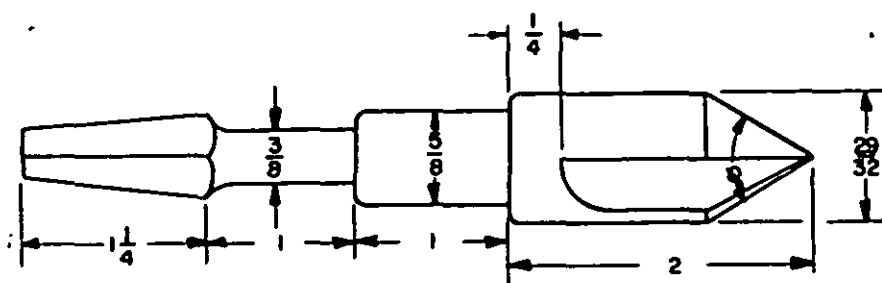


FIGURE 7. Type II, class D, bitstock shank, stepped body.

3.7 Type III, combined countersink and drill (center drill). The combined countersink and drill shall be made of high-speed steel and have a Rockwell C hardness of not less than 62 and not more than 66 on the drill and flutes. The combined countersink and drill shall be a one piece, double end cutting tool having helical or straight flutes, and shall have a drill portion and an adjacent countersink portion. Each combined countersink and drill shall be marked with the applicable size number as shown in tables VI or VII.

3.7.1 Class A, plain. The class A combined countersink and drill shall be similar to figure 8 and shall conform to the dimensions shown in table VI for the size specified (see 6.1). The drill shall have a point angle of 118° and the countersink shall have an angle of 60° . Tolerance on angles shall be $\pm 1^\circ$.

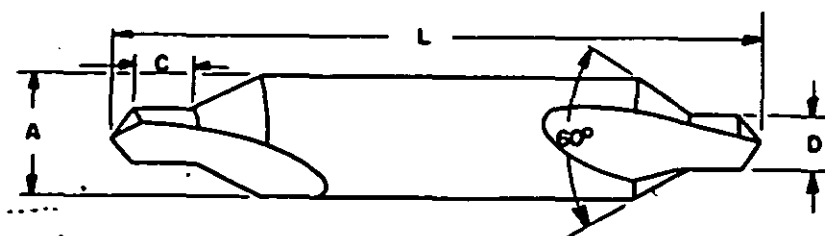


FIGURE 8. Type III, class A, combined countersink and drill, plain.

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TABLE VI. Type III, class A, combined, countersink and drill, plain

Size number	Diameter		Length	
	Body A +0.000 -0.002	Drill D +0.003 -0.000	Drill C ^{1/}	Overall L +1/32 -1/16
No.	Inch	Inch	Inch	Inches
1	1/8	3/64	3/64	1-1/4
2	3/16	5/64	5/64	1-7/8
3	1/4	7/64	7/64	2
4	5/16	1/8	1/8	2-1/8
5	7/16	3/16	3/16	2-3/4
6	1/2	7/32	7/32	3
7	5/8	1/4	1/4	3-1/4
8	3/4	5/16	5/16	3-1/2

^{1/}"C" dimensional tolerances, sizes 1 and 2 are ± 0.008 ; sizes 3 through 8, $\pm 1/64$.

3.7.2 **Class B, bell.** The class B combined countersink and drill shall be similar to figure 9 and shall conform to the dimensions shown in table VII for the size specified (see 6.1). The drill shall have a point angle of 118° , the countersink shall have an angle of 60° , and the bell shall have an angle of 120° . Tolerance on angles shall be $\pm 1^\circ$.

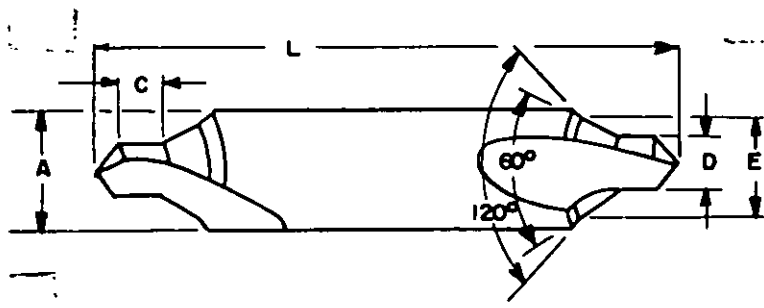


FIGURE 9. Type III, class B, combined countersink and drill, bell.

TABLE VII. Type III, class B, combined countersink and drill, bell

Size number	Diameter		Length		Diameter bell E +0.003 -0.000
	Body A +0.000 -0.002	Drill D +0.003 -0.000	Drill C ^{1/}	Overall L +1/32 -1/16	
No.	Inch	Inch	Inch	Inches	Inch
11	1/8	3/64	3/64	1-1/4	0.100
12	3/16	1/16	1/16	1-7/8	.150
13	1/4	3/32	3/32	2	.200
14	5/16	7/64	7/64	2-1/4	.250
15	7/16	5/32	5/32	2-3/4	.350
16	1/2	3/16	3/16	3	.400
17	5/8	7/32	7/32	3-1/4	.500
18	3/4	1/4	1/4	3-1/2	.600

^{1/}"C" dimensional tolerances, sizes 11 and 12 are ± 0.008 ; sizes 13 through 18, $\pm 1/64$.

3.7.3 Sets. When specified (see 6.1), combined countersink and drill shall be furnished in sets. Each set shall consist of a box and the combined drill and countersink specified (see 6.1). The box shall be hardwood, cylindrical, smooth surfaced, coated with lacquer or paint, and provided with a screw top and holes or wells for individually accommodating each combined drill and countersink.

3.8 Type IV, straight shank, center reamer pattern. The body of the countersink shall be made of high-speed steel and the hardness of the flutes shall be not less than 62 and not more than 65 on the Rockwell C scale. The countersink shall have a straight cylindrical shank and unless otherwise specified herein, not less than 3 straight flutes. Each countersink shall be marked with a body diameter in inches, and the cutter-angle in degrees.

3.8.1 Class A, short, and class C, spiral flute. The classes A and C countersinks shall be similar to figures 10 and 11 as applicable, except that class C shall have 6 spiral flutes having alternating flute angles. They shall conform to the dimensions shown in table VIII for the size (body diameter) specified (see 6.1).

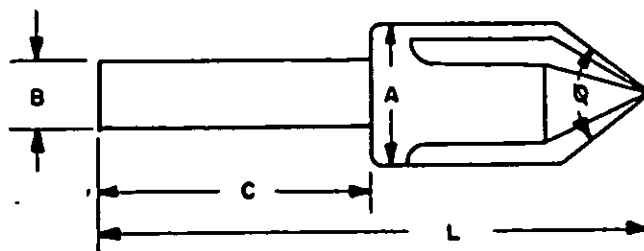


FIGURE 10. Type IV, straight shank, class A, center reamer pattern, short, and class B, long.

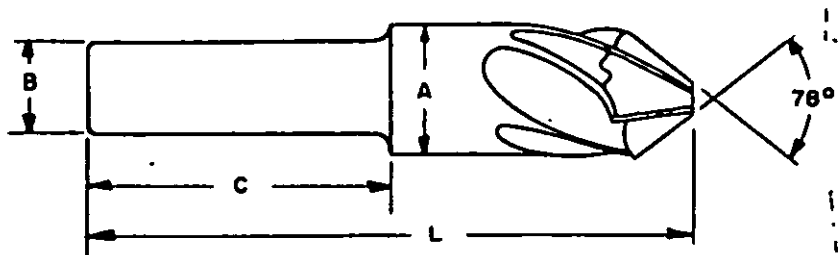


FIGURE 11. Type IV, class C, spiral flute.

TABLE VIII. Type IV, straight shank countersinks, classes A and C, center reamer pattern

Size (nominal body diameter)	Included angle ^{2/} ϕ ± 1	Diameter		Length		
		Body A +0.005 -0.015	Shank B ± 0.002	Shank C $\pm 1/16$	Overall L	
					Min.	Max.
<u>Inch</u>	<u>Degrees</u>	<u>Inch</u>	<u>Inch</u>	<u>Inches</u>	<u>Inches</u>	<u>Inches</u>
1/4	60, 78, 82, 90, 100, 110, 115, or 120	0.250	0.187	3/4	1-7/16	2
3/8	60, 78, 82, 90, 100, 110, 115, or 120	.375	.250	7/8	1-11/16	2-1/4
1/2	60, 78, 82, 90, 100, 110, 115, or 120	.500	.375	1	1-15/16	2-3/4
5/8	60, 78, 82, 90, 100, 110, 115, or 120	.625	.375	1	2-3/16	2-3/4
3/4	60, 78, 82, 90, 100, 110, 115, or 120	.750	.500	1-1/4	2-9/16	3-1/8

^{1/}When specified (see 6.1), these sizes of class A countersinks shall be furnished with 1/4 inch diameter shanks having a tolerance of ± 0.002 inch.

^{2/}As specified in the contract or order.

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3.8.2 Class B, long. The class B countersink shall be similar to figure 10 and shall conform to the dimensions shown in table IX for the size (body diameter) specified (see 6.1).

TABLE IX. Type IV, straight shank countersinks, class B, center reamer pattern

Size (nominal body diameter)	Included angle ^{1/} ϕ ± 1	Body A ± 0.005	Shank B ± 0.002	Shank C $\pm 1/16$	Overall L $\pm 1/2$ $-1/16$
<u>Inch</u>	<u>Degrees</u>	<u>Inch</u>	<u>Inch</u>	<u>Inches</u>	<u>Inches</u>
1/2	60, 78, 82, 90, 100, 115, or 120	0.500	0.500	2-1/4	3-7/8
5/8	60, 78, 82, 90, 100, 115, or 120	.625	.500	2-1/4	4
3/4	60, 78, 82, 90, 100, 115, or 120	.750	.500	2-1/4	4-1/8
7/8	60, 78, 82, 90, 100, 115, or 120	.875	.500	2-1/4	4-1/4
1	60, 78, 82, 90, 100, 115, or 120	1.000	.500	2-1/4	4-3/8

^{1/} As specified in the contract or order.

3.8.3 Class D, single flute. Class D countersink shall be similar to figure 12 and shall conform to the dimensions shown in table X for the size (body diameter) specified (see 6.1). The countersink shall have one spiral flute. The major portion of the tapered point behind the cutting edge shall be conically ground to the applicable included angle and shall provide 0.004 to 0.005 inch clearance for the cutting edge. The point area between the cutting edge and the conically ground area shall be cam relief ground to blend with the conically ground area.

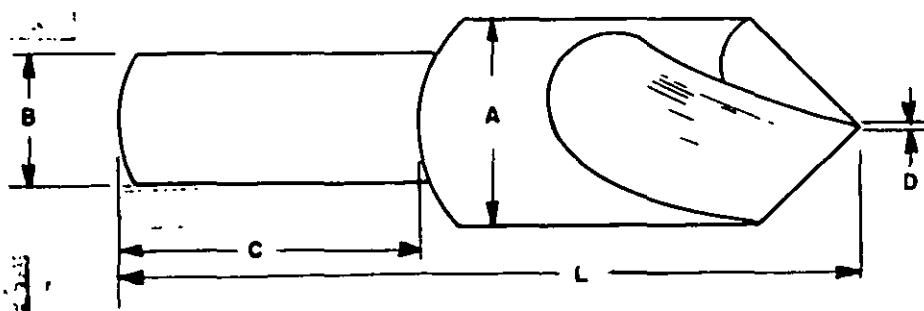


FIGURE 12. Type IV, class D, single flute.

TABLE X. Type IV, straight shank countersink, class D, single flute, center reamer pattern

Size (nominal body diameter)	Included angle ^{1/} ϕ ± 1	Body diameter A ± 0.005	Shank diameter B ± 0.002	Shank length C $\pm 1/16$	Overall length L $\pm 1/16$	End diameter D $\pm 1/64$
<u>Inch</u>	<u>Degrees</u>	<u>Inch</u>	<u>Inch</u>	<u>Inches</u>	<u>Inches</u>	<u>Inches</u>
1/4	60, 82, 90, or 100	0.250	0.250	(straight)	2	1/64
3/8	60, 82, 90, or 100	.375	.250	1	2	1/64
1/2	60, 82, 90, or 100	.500	.250	1	2-1/4	1/32
5/8	60, 82, 90, or 100	.625	.250	1	2-1/4	1/32
3/4	60, 82, 90, or 100	.750	.500	1-1/4	2-3/4	3/64

^{1/} As specified in the contract or order.

3.9 Type V, taper shank, American standard taper (Morse). The countersink shall be similar to figure 13 and conform to the requirements of table XI for the countersink number specified (see 6.1). The countersink shall be high-speed steel, and shall have an ASA (Morse) taper shank and not less than 3 flutes. All countersinks except nos. 14, 15, and 16 shall have spiral flutes; countersinks nos. 14, 15, and 16 shall have straight flutes. The hardness of the flutes shall be not less than 62 and not more than 65 on the Rockwell C scale. The clearance of the cutting edges, measured 1/8 inch back of the edges shall be not less than 0.004 and not more than 0.006 inch. The tang of the taper shank shall be relieved in a manner suitable to prevent upsetting the end and binding drill sleeves or machine spindles. Except for the fluted portion, all corners shall be rounded. The shank shall have a 3/16 inch radius fillet at its junction with the countersink body. Each countersink shall be marked, with the body diameter in inches, and the included cutter angle in degrees.

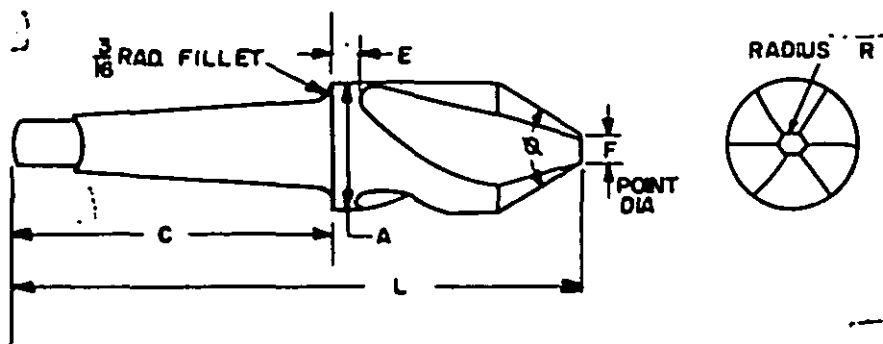


FIGURE 13. Type V, taper shank, American Standard taper (Morse).

TABLE XI. Type V, taper shank, American standard taper (Morse)

Counter-sink number	Included angle θ ± 1	Diameter body A +0.005 -0.000	Length			Diameter point F +0.005 -0.030	Morse taper shank number H	Radius R
			Shank C +1/8 -0	Overall L +1 -1/8	Shoulder E +1/16 -0			
No.	Degree	Inches	Inches	Inches	Inch	Inches	No.	Inch
1	15	2	5-1/8	11-1/2	3/8	1- 3/32	4	3/16
2	37	2	4-1/8	9-1/8	3/8	27/32	3	3/16
3	37	2	5-1/8	10-1/8	3/8	27/32	4	3/16
4	45	1-5/8	3-3/8	7-3/8	1/4	15/32	2	3/16
5	45	1-5/8	4-1/8	8-1/8	1/4	15/32	3	3/16
6	60	1-3/8	3-3/8	6-3/8	1/4	7/16	2	1/8
7	60	1-5/8	3-3/8	7-3/8	1/4	15/32	2	3/16
8	60	1-5/8	4-1/8	8-1/8	1/4	15/32	3	3/16
9	60	2	4-1/8	8-5/8	3/8	11/16	3	3/16
10	60	2	5-1/8	9-5/8	3/8	11/16	4	3/16
11	90	1-3/16	3-3/8	5-7/8	1/4	7/32	2	1/8
12	90	1	2-7/8	5-3/8	1/4	7/32	1	1/8
13	90	1	3-3/8	5-7/8	1/4	7/32	2	1/8
14	82	29/32	3-3/8	5-1/4	1/4	3/16	2	3/32
15	82	29/32	2-7/8	4-3/4	1/4	3/16	1	3/32
16	82	9/16	2-7/8	4-1/16	1/8	1/8	1	3/32

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3.10 Type VI, straight shank, integral pilot. The countersink shall be similar to figure 14 and conform to the dimensional requirements of table XII. Type VI countersink shall be of high-speed steel, and have 2 straight flutes. The hardness of the flutes shall be not less than 62 and not more than 65 on the Rockwell C scale. Countersinks shall be marked with the appropriate number as shown in table XII.

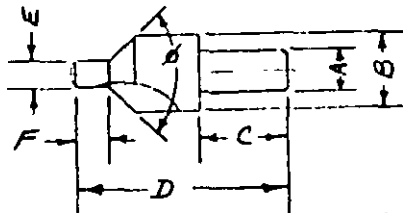


FIGURE 14. Type VI, straight shank, integral pilot.

TABLE XIII. Type VI, straight shank, integral pilot

Countersink number	Included angle ϕ ± 1	Diameter		Length		Pilot	
		Shank A $\pm 1/32$	Body B $\pm 1/32$	Shank C $\pm 1/32$	Overall D (max.)	Diameter E ± 0.005	Length F $\pm 1/16$
No.	Degrees	Inch	Inch	Inch	Inches	Inch	Inch
A	100	1/4	7/16	1	2	1/8	3/16
B	100	1/4	7/16	1	2	5/32	3/16
C	100	1/4	7/16	1	2	3/16	3/16

3.11 Workmanship. Countersinks shall be clean, shall be well made, and shall be free from any defects resulting from poor workmanship which may affect their serviceability or general appearance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Sampling for quality conformance inspection.

4.2.1 Lot. A lot shall consist of all countersinks of the same type, class, and size, or sets of countersinks of the same types, classes, and sizes offered for delivery at one time.

4.2.2 Sample. A random sample of countersinks shall be selected from each lot offered for quality conformance inspection in accordance with MIL-STD-105, inspection level II. A sample unit shall be one countersink or one set of countersinks, as applicable.

4.2.3 Quality conformance inspection. Each sample selected in accordance with 4.2.2 shall be examined in accordance with 4.2.3.1 and tested in accordance with 4.2.3.2.

4.2.3.1 Examination. Each of the sample countersinks selected in accordance with 4.2.2 shall be examined to verify compliance with the requirements of this specification. Defects shall be classified as specified in table IV. The acceptable quality level (AQL) for major defects shall be 1.5 and 4.0 for minor defects, expressed in terms of defects per hundred units.

TABLE IV. Classification of defects in accordance with MIL-STD-105

Categories	Defects
Critical:	
1	None defined.
Major:	
101	Type, number, and included angle of countersink not as specified (types I, V, and VI only).
102	Type, class, size, and included angle of countersink not as specified (types II and IV only).
103	Type, size, and included angle of countersink not as specified (type III only).
104	Material not high-speed steel (or not carbon-steel if type II, class A, B, or C).
105	Evidence of rust, pits, or cracks; countersink not clean and smooth.
106	Countersink not left-hand (type I only).
107	Countersink and drill combined not double-ended (type III only).
108	Countersink not right-hand (except type I).
109	Cutting edges not sharp, not provided with radial relief, or number of flutes not as specified.
110	Type of flutes (straight or spiral) not as specified (types IV and V only).
111	Bitstock shank not square or not tapered (type II only).
112	Included angle of cutting edges not within the specified tolerance (except type III).
113	Included angle of cutting edges (for drill or countersink) not within the specified tolerance, or length of drill portion not of sufficient length to permit the required clearance (type III only).
114	Bore diameter not within the specified tolerance (type I only).
115	Clearance of cutting edges not within the specified maximum and minimum values (type V only).
116	Body diameter not within the specified tolerance (except type II).
117	Body (or head) diameter not within the specified tolerance (type II only).
118	Taper pin hole size not as required, or taper of hole not as specified (type I only).
119	Diameter of drill not within the specified tolerance (type III only).
120	Set (if required) incomplete, defective, or not as specified (type III only).
121	Taper shank not as specified, dimensions of taper shank fail to conform with required standard dimensions, or tang of taper shank not relieved (type V only).
122	Location flute ends not within the specified tolerance (type V only).
123	Integral pilot not as specified, or not within specified tolerances (type VI only).

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TABLE XV. Classification of defects in accordance with MIL-STD-105 (Con.)

Categories	Defects
Minor:	
201	Diameter at point not within the specified tolerance (type I, type IV, class D, and type V only).
202	Location of taper pin hole not as specified (type I only).
203	Overall length of countersink not within the specified tolerance.
204	Marking, manufacturer's name or trademark missing, illegible, incorrect, or not permanent.
205	Width of flats of bitstock shank at body end or at the extremity not as specified (type II only).
206	Diameter of round shank (or steps) not within the specified tolerance (types II and VI only).
207	Location end of body not within the specified tolerance (class A, type II only).
208	Length of square bitstock less than the specified minimum (type II only).
209	Location flute ends not as specified (class D, type II only).
210	Box for set (if applicable) not provided with a screw top and wells for individually accommodating each combined drill and countersink; or box material, finish, and coating not as specified (type III only).
211	Length of shank not within the specified tolerance (types IV, V, and VI only).
212	Diameter of shank not within the specified tolerance (type IV only).
213	Corners not rounded, or fillet at junction of shank and body not as specified (type V only).
214	Radius of flutes at point end not within the specified tolerance (type V only).

4.2.3.2 Tests. Each sample unit selected in accordance with 4.2.2 shall be tested to determine compliance with the hardness requirements specified for the individual types and classes. The hardness shall be determined on a Rockwell testing machine. Every fourth countersink passing the examination and hardness test shall be tested for performance as outlined in 4.2.3.2.1, 4.2.3.2.2, or 4.2.3.2.3, as applicable. The countersinks shall cut freely without binding, and shall produce holes without excessive burrs, having a smooth surface, true to the included angle of the cutter. All of the types, classes, and sizes of countersinks tested shall be run to their intended depth.

4.2.3.2.1 Method of test for high-speed steel countersinks, type I, type II, class D, type IV, classes A, B, C, and D, and types V and VI. The test plate of steel having a 21 to 25 reading on the Rockwell C scale, shall be clamped to a drill table. Ten lead holes, approximately one-half the diameter of the countersink to be tested, shall be drilled in the test plate. The countersink shall be tested in the holes at approximately 90 surface feet per minute (measured at the body diameter), and fed to its intended depth (full diameter of the countersink) at the rate of 0.0025 inch per revolution for multiple flute countersinks, and at the rate of 0.004 inch per revolution for single flute countersinks. Soluble oil and water or similar coolant shall be used.

4.2.3.2.2 Method of testing carbon steel bitstock-shank countersinks, type II, classes A, B, and C. A test plate of mild steel shall be rigidly held and 10 or more lead holes one-fourth of the maximum diameter of the countersink to be tested, shall be drilled in the test plate. The countersinks shall be held in a standard bit brace and shall be turned down by hand to their intended depths.

4.2.3.2.3 Method of test for high speed countersinks, type III, classes A and B. Type III, classes A and B countersinks (center drill), shall be tested in carbon steel with a Brinell hardness of 187 to 197 operating at the revolution per minute and the feeds per revolution in accordance with table XVI. Each countersink without the aid of lead holes and without regrinding shall produce a minimum of 100 center holes to their intended depth maintaining surface smoothness of 32 root mean square or better.

TABLE XVI. Test data for type III countersinks

Size number		Revolutions per minute	Feed per revolution
Class A	Class B		
No.	No.	RPM	Inch
1	11	4,850	0.00075
2	12	2,450	.002
3	13	1,875	.0025
4	14	1,875	.003
5	15	750	.006
6	16	700	.007
7	17	558	.008
8	18	453	.008

4.3 Inspection of preparation for delivery. An inspection shall be made to determine that the preservation, packaging, packing, and marking comply with the requirements in section 5.

5. PREPARATION FOR DELIVERY

5.1 Countersinks. Countersinks shall be preserved, packaged, and packed, and containers marked in accordance with PPP-P-40. The level of preservation, packaging, and packing shall be level A, B, or C, as specified (see 6.1).

5.2 Countersinks and drills. Countersinks and drills shall be preserved, packaged, and packed, and containers marked in accordance with PPP-T-1150. The level of preservation, packaging, and packing shall be level A, B, or C, as specified (see 6.1).

6. NOTES

6.1 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- Title, number, and date of this specification.
- Type, class, and size (or countersink number), if any (see 1.2 and applicable tables).
- Taper pins, if required with type I, class A countersinks (see 3.5.1).
- The included angle of cutter for type II, class A (table II); type II, class D (see 3.6.4); type IV, classes A and C (see table VI); type IV, class B (table VII); and type IV, class D (table VIII).
- Whether type III shall be furnished in sets (see 3.7.3).
- If 1/4 inch diameter shanks are required for 1/2, 5/8, and 3/4 inch size, type IV, class A countersinks (table VIII).
- Applicable levels of packaging and packing (see 5.1 and 5.2).

MILITARY CUSTODIANS:

DOD has waived coordination on revisions and amendments to this Federal Specification until further notice.

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