

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J2122

REV.
APR94

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Superseding J2122 NOV90

Submitted for recognition as an American National Standard

(R) NUMBERING SYSTEM FOR SINGLE DIAMETER DRILLS

1. **Scope**—This SAE Recommended Practice provides a systematic method for the identification of single diameter drills. It is intended to assist in the cataloging and supplying of these tools.

NOTE—Caution must be taken when assigning codes for designators to prevent specifying drills that cannot be physically or economically manufactured.

2. References

2.1 **Related Publications**—The following publications (latest revision) are provided for information purposes only and are not a required part of this document.

NOTE—Reference information not specified to be manufacturer's standard practices. Manufacturer to supply information for regrind upon request.

2.1.1 **ANSI PUBLICATIONS**—Available from American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002.

ANSI B5.10—Machine Tapers

ANSI B94.11—Twist Drills

ANSI B94.11M-1979—Nomenclature, Definitions, Sizes, and Tolerances of Twist Drills

2.1.2 **DATOM ENGINEERING SOFTWARE, INC. PUBLICATION**—Available from Datom Engineering Software, Inc., 561 Somerset, Suite 3, Crystal Lake, IL 60014, (815) 477-3380.

Datom Engrg. Software Inc. TMS III-Drills-Electronic Reference Manual—Nomenclature, Definitions, Sizes, and Tolerances of Twist Drills

NOTE—Reference information not specified to be manufacturer's standard practices. Manufacturer to supply information for regrind upon request.

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2.1.3 DIN PUBLICATIONS—Available from Beuth Verlag GmbH, Burggrafenstrasse 6, D-1000 Berlin 30 Germany. (The publications are also available through American National Standards Institute.)

DIN 228 Part 1—Morse Taper Shanks
DIN 332—60 Degree Center Holes
DIN 333—60 Degree Center Drills
DIN 333R—Center Drills With Radius Step Angles
DIN 338—Parallel Shank Twist Drills—Jobbers Series
DIN 339—Parallel Shank Twist Drills for Use in Jig Bushings
DIN 340—Parallel Shank Twist Drills—Long Series
DIN 341—Morse Taper Shank Twist Drills—Long Series
DIN 345—Morse Taper Shank Twist Drills—for Use in Jig Bushings
DIN 346—Morse Taper Shank Twist Drill With Oversize Shank
DIN 1412—Twist Drill Definitions
DIN 1414—Twist Drills of High Speed Steel—Technical Conditions of Delivery
DIN 1809—Driving Tenons for Tools With Parallel Shanks
DIN 1861—Twist Drills for Jig Boring Machines
DIN 1869—Extra Length Drills Series 1, 2 and 3
DIN 1870—Extra Length Taper Shank Drills Series 1 & 2
DIN 1897—Stub Length Drills
DIN 1899—Cobalt Micro Precision Drills HSCO Form A
DIN 6539—Continuous Parallel Shank Solid Hardmetal Twist Drills
DIN 7168 Part 1—General Tolerances; Linear and Angular Dimensions
DIN 8037—Twist Drills With Parallel Shank With Carbide Tips for Drilling Metal
DIN 8038—Twist Drills With Parallel Shank With Carbide Tips for Drilling Plastics
DIN 8039—Parallel Shank Masonry Drills With Carbide Tips
DIN 8041—Twist Drills With Morse Taper Shanks With Carbide Tips for Drilling Steel
DIN 17350—Tools Steels—Technical Conditions of Delivery

2.1.4 ISO PUBLICATIONS—Available from International Organization for Standardization, 1 Rue DeVarembe, Case Postal 56, CH1211 Geneva 20 Switzerland. (The publications are also available through American National Standards Institute.)

ISO 235—Parallel Shank Jobbers, Stub Series Drills and Morse Taper Shank Drills
ISO 286/2—System of Limits and Fits
ISO 296—Machine Tools—Self Holding Tapers for Tool Shanks
ISO 494—Parallel Shank Twist Drills—Long Series
ISO 866—Center Drills for Center Holes Without Protecting Chamfers—Type A
ISO 2306¹—Drills for Use Prior to Tapping Screw Threads
ISO 2540—Centre Drills for Centre Holes With Protecting Chamfer—Type B
ISO 2541—Centre Drills for Centre Holes With Radius Form—Type R
ISO 3291—Extra Long Morse Taper Shank Twist Drills

¹ Should not be included in SAE drill document reference at this time.

ISO 3292—Extra Long Parallel Shank Twist Drills
ISO 3438²—Subland Twist Drills With Morse Taper Shanks for Holes Prior to Tapping Screw Threads
ISO 3439²—Subland Twist Drills With Parallel Shank for Holes Prior to Tapping Screw Threads
ISO 4203—Parallel Shank Tools—Driving Tenons and Sockets
ISO 5413—Machine Tools—Positive Drive of Morse Taper Shanks
ISO 5419—Twist Drills—Terms, Definitions, and Types
ISO 7079—Core Drills With Parallel Shank and With Morse Taper Shanks
ISO 10898—Spot Drills

2.1.5 USCTI PUBLICATIONS—Available from United States Cutting Tool Institute, 1300 Summer Avenue, Cleveland, OH 44115.

Standard Drills—Handbook of Specifications
USCTI—Handbook of Standard Drills

3. Numbering System

3.1 **Formats**—The basic numbering system is subdivided into two formats for drills:

3.1.1 **FORMAT—17 POSITION**—Drills with flute lengths and overall lengths which comply with the referenced Standards.

3.1.2 **FORMAT—27 POSITION**—Drills with flute lengths and/or overall lengths which do not comply with the referenced Standards.

3.2 **Content of Numbering System**—The numbering system utilizes 17 or 27 positions to fully describe the various dimensions, types, materials, and characteristics of drills.

Figure 1 illustrates the content and sequence of the 17 positions in the numbering system for drills whose flute lengths and overall lengths comply with the referenced Standards.

Figure 2 illustrates the content and sequence of the 27 positions in the numbering system for drills whose flute lengths and/or overall lengths do not comply with the referenced Standards.

² Should not be included in SAE drill document reference at this time.

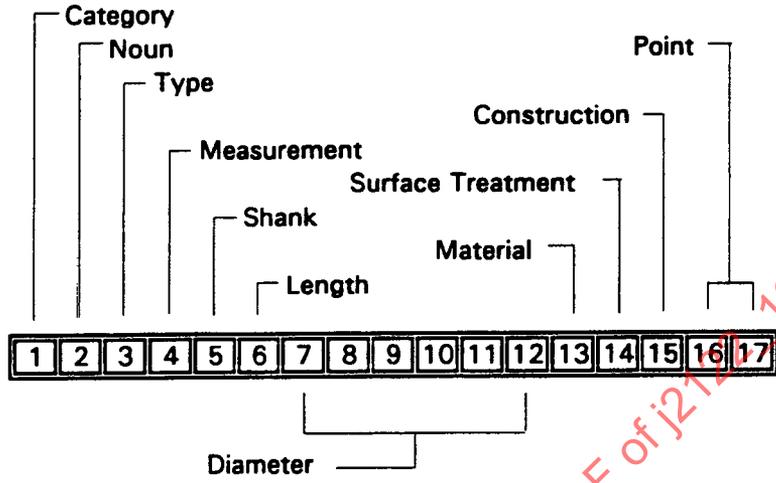


FIGURE 1—FORMAT—17 POSITION

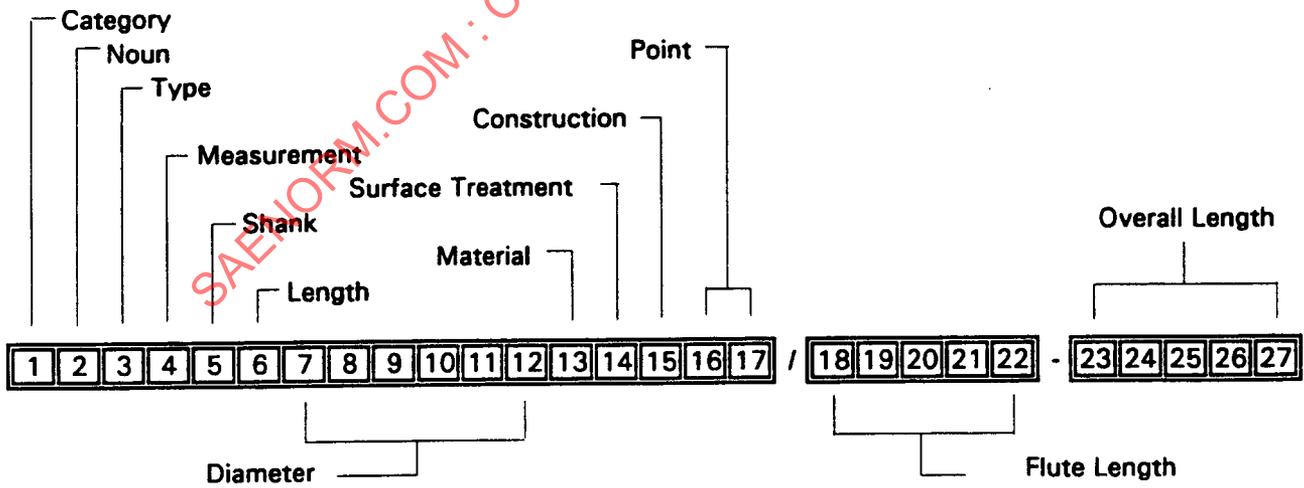


FIGURE 2—FORMAT—27 POSITION

3.3 Positions—The content of each position is explained in detail in the following sections:

3.3.1 POSITIONS 1 AND 2, CATEGORY AND NOUN—Positions 1 and 2 will always be alphabetic. The following designations have been assigned:

Position 1: T - designates TOOL

Position 2: D - designates DRILL

3.3.2 POSITION 3, TYPE—Position 3 will always be numeric based on the type of drill. The following codes have been assigned:

3 - Core Drill 3-Flute

4 - Core Drill 4-Flute

5 - Combined Drill and Countersink

6 - Center Drill

7 - Straight Flute

8 - Twist Drill, 1 Flute

9 - Twist Drill, 2 Flute

0 - Twist Drill, 3 Flute

3.3.3 POSITION 4, MEASUREMENT SPIRAL—Position 4 will always be alphabetic. The following codes have been assigned:

C - Inch, Right Hand - ANSI Standards

L - Inch, Left Hand - ANSI Standards

M - Metric, Right Hand - ANSI Standards

N - Metric, Left Hand - ANSI Standards

U - Metric, Right Hand - DIN Standards

V - Metric, Left Hand - DIN Standards

W - Metric, Right Hand - ISO Standards

Z - Metric, Left Hand - ISO Standards

3.3.4 POSITION 5, SHANK—Position 5 can be alpha or numeric.

0 - No. 0 Morse Taper

1 - No. 1 Morse Taper

2 - No. 2 Morse Taper

3 - No. 3 Morse Taper

4 - No. 4 Morse Taper

5 - No. 5 Morse Taper

6 - No. 6 Morse Taper

S - Straight Shank

T - Straight Shank - Tanged

U - 1/4 in Diameter Reduced Straight Shank

V - 3/8 in Diameter Reduced Straight Shank

W - 1/2 in Diameter Reduced Straight Shank

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NOTE—Automotive Taper Length (long flute length) —

- Position 4 indicates "C" or "L"
- Position 5 indicates "S" or "T"
- Position 6 indicates "3"
- Drill diameter is over 1/2 in (0.5000 in)

Then the drills have reduced shanks as follows in Table 1:

TABLE 1—REDUCED SHANKS

Drill Diameter	Shank Diameter
0.5000 to 0.6250 in	0.5000 in
Over 0.6250 to 0.7344 in	0.6250 in
Over 0.7344 to 0.9219 in	0.7500 in
Over 0.9219 to 1.2500 in	0.9375 in
Over 12.80 to 15.80 mm	0.5000 in
Over 15.80 to 19.00 mm	0.6250 in
Over 19.00 to 23.50 mm	0.7500 in
Over 23.50 to 25.00 mm	0.9375 in

3.3.5 POSITION 6, LENGTH—Position 6 can be alpha or numeric. The following codes have been assigned:

NOTE—When Position 6 is an "X" then the 27 position format must be used.

- 1 - Taper Length (ANSI)/Long Series (DIN/ISO)
- 2 - Jobbers Length (ANSI)/Jobbers Series (DIN/ISO)
- 3 - Automotive Taper Length (long flute length)
- 4 - For Use in Jig Bushes (DIN)
- 6 - Center Drill
- 7 - Regular Length - Solid Carbide
- 8 - Stub Length - Solid Carbide
- 9 - Screw Machine Length (ANSI)/Stub Series (ISO)
- 0 - Combination Drill and Countersink
- A - 6 in Aircraft Extension Length
- B - 12 in Aircraft Extension Length
- R - 1/4 in Reduced Shank Length
- S - 1/2 in Reduced Shank Length (Silver and Deming)
- X - Special Length

3.3.6 POSITIONS 7, 8, 9, 10, 11, AND 12, DIAMETER (METRIC OR INCH)—These positions will always be numeric with a decimal point as an integral part of the number.

NOTE—Use zeros for all open positions.

3.3.6.1 Diameter-Drill (Metric)—Position 4 indicates "M," "N," "U," "V," "W," or "Z."

The diameter will be specified to the thousandths of a millimeter, with the decimal point located in Position 9.

Maximum diameter will be (99.999 mm).

Examples:

00.900 mm
03.250 mm
09.750 mm
15.000 mm
57.500 mm
75.500 mm

3.3.6.2 Diameter-Drill (Inch)—Position 4 indicates "C" or "L."

The diameter will be specified to the ten thousandths of an inch, with the decimal point located in Position 8.

Maximum diameter will be (9.9999 in).

Examples:

0.1250 in (1/8 in)
0.1876 in (3/16 in)
0.2500 in (1/4 in)
0.8750 in (7/8 in)
1.0000 in (1 in)
1.2500 in (1-1/4 in)
1.5000 in (1-1/2 in)
1.7500 in (1-3/4 in)

3.3.6.3 Diameter-Combination Drill and Countersink (Numeric)

When Position 3 indicates a "5," and
Position 4 indicates "C" or "L" and
Position 5 indicates "S" and
Position 6 indicates "0."

Positions 11 and 12 will contain the number size of the combination drill and countersink, with a decimal point located in Position 8.

Examples:

0.0001 (#1)
0.0002 (#2)
0.0003 (#3)
0.0004 (#4)
0.0005 (#5)
0.0011 (#11)
0.0012 (#12)
0.0013 (#13)
0.0014 (#14)
0.0015 (#15)

3.3.7 POSITION 13, MATERIAL DESIGNATOR—Position 13 will be alpha or numeric. The following codes have been assigned:

Manufacturer's Standard

H - High Speed Steel
C - Cobalt High Speed Steel
S - Solid Carbide
T - Carbide Tipped
P - Poly Crystalline Diamond Tipped

Other

I - High Speed Steel - M1
J - High Speed Steel - M2
K - High Speed Steel - M7
L - High Speed Steel - M10
M - Cobalt High Speed Steel - T15
D - Cobalt HSS - M35
E - Cobalt HSS - M42
F - Cobalt HSS - M33
Q - Solid Carbide - C2
R - Solid Carbide - C5
Z - Solid Carbide - Micrograin
U - Carbide Tipped - C1
V - Carbide Tipped - C2
W - Carbide Tipped - C5
A - Solid Carbide Head - Steel Body - Steel Shank
B - Solid Carbide Head - Steel Shank

3.3.8 POSITION 14, SURFACE TREATMENT—Position 14 can be alpha or numeric. The following codes have been assigned:

0 - Manufacturer's Standard Treated
1 - Untreated (Bright)
2 - Steam Oxide
3 - Nitride Plus Steam Oxide
4 - Nitride Only
5 - Hard Chrome Plate
6 - Bronze Oxide

- A - Titanium Nitride
- B - Titanium Carbo Nitride
- C - Titanium Aluminum Nitride
- D - Chrome Nitride
- E - Chrome Carbide
- F - Boron Carbide
- G - Zirconium Nitride

3.3.9 POSITION 15, CONSTRUCTION—Position 15 can be alpha or numeric. The following codes have been assigned:

- 0 - Regular Helix
- 1 - Slow Helix
- 2 - High Helix
- 3 - Heavy Duty
- 4 - Double Margin (Regular Helix)
- 5 - Triple Margin (Regular Helix)
- 6 - Full Parabolic (No Land)
- 7 - Semi-Parabolic (Partial Land)
- 8 - Pre-Thinned Web
- 9 - Heavy-Duty Blend Thin 2X Diameter
- A - NAS 907 Type A
- B - NAS 907 Type B
- C - NAS 907 Type C
- D - NAS 907 Type D
- E - NAS 907 Type E
- J - NAS 907 Type J
- K - Coolant - Slow Spiral, End Feed
- L - Coolant - Slow Spiral, Side Feed
- M - Coolant - Slow Spiral, Inducer Feed
- N - Coolant - Reg. Spiral, End Feed
- R - Coolant - Reg. Spiral, Side Feed
- P - Coolant - Reg. Spiral, Inducer Feed
- T - Crank Shaft (Manufacturer's Standard)
- W - Crank Shaft - Double Margin (Manufacturer's Standard)
- F - Body Drill
- G - Galley Hole
- H - Half Round
- V - Chipbreaker
- S - Stove Burner
- U - Uncleared (Regular Helix)

3.3.10 POSITIONS 16 AND 17, POINT—Positions 16 and 17 will be alpha and/or numeric. The following codes have been assigned:

- 00 - 118 Degrees Split Point NAS P-5
- 01 - 135 Degrees Split Point NAS P-3
- 02 - 135 Degrees Split Point NAS P-9
- 15 - 60 Degrees Point
- 20 - 90 Degrees Point
- 23 - 90 Degrees Notched Point (Manufacturer's Standard)
- 25 - 90 Degrees Split Point
- 26 - 90 Degrees x 60 Degrees Double Angle Point
- 28 - 100 Degrees Point

- 33 - 118 Degrees Point
- 35 - 118 Degrees Four Facit Point
- 36 - 118 Degrees Four Facit Split Point
- 37 - 118 Degrees Notched Point (Manufacturer's Standard)
- 39 - 118 Degrees Helical Point
- 40 - 118 Degrees Split Point
- 41 - 118 Degrees x 60 Degrees Double Angle Point
- 42 - 118 Degrees x 90 Degrees Double Angle Point
- 43 - 118 Degrees x 90 Degrees Double Angle Split Point
- 45 - 118 Degrees Flat Lip Web Thinning Point
- 49 - 130 Degrees Point
- 50 - 130 Degrees Notched Point (Manufacturer's Standard)
- 51 - 130 Degrees Split Point
- 52 - 130 Degrees Bickford Point
- 53 - 130 Degrees Helical Point
- 56 - 135 Degrees Point
- 57 - 135 Degrees Chipbreaker Point (Manufacturer's Standard)
- 58 - 135 Degrees Notched Point
- 60 - 135 Degrees Split Point
- 62 - 140 Degrees Point
- 64 - 150 Degrees Point
- 69 - 180 Degrees Point (Flat Bottom)
- 85 - Racon Point (Manufacturer's Standard)
- 86 - Fishtail Point

3.3.11 POSITIONS 18, 19, 20, 21, AND 22, FLUTE LENGTH (METRIC OR INCH)—Position 6 indicates an "X" for special length.

These positions will always be numeric, with a decimal point as an integral part of the number.

NOTE—Use zeros for all open positions.

3.3.11.1 *Flute Length-Drill (Metric)*—Position 4 indicates "M," "N," "U," "V," "W," or "Z."

The flute length will be specified to the one-tenth of a millimeter, with the decimal point located in Position 21.

Maximum flute length will be (999.9 mm).

Examples:

- 120.6 mm
- 158.7 mm
- 212.6 mm
- 247.6 mm
- 260.3 mm
- 282.4 mm

3.3.11.2 *Flute Length-Drill (Inch)*—Position 4 indicates "C" or "L."

The flute length will be specified to the one-hundredth of an inch, with the decimal point located in Position 20.

Maximum flute length will be (99.99 in).

Examples:

04.75 in
06.25 in
08.37 in
09.75 in
10.25 in
11.12 in

3.3.12 POSITIONS 23, 24, 25, 26, AND 27, OVERALL LENGTH (METRIC OR INCH)—Position 6 indicates an "X" for special length.

These positions will always be numeric, with a decimal point as an integral part of the number.

NOTE—Use zeros for all open positions.

3.3.12.1 Overall Length-Drill (Metric)—Position 4 indicates "M," "N," "U," "V," "W," or "Z."

The overall length will be specified to the one-tenth of a millimeter, with the decimal point located in Position 26.

Maximum overall length will be (999.9 mm).

Examples:

174.5 mm
244.3 mm
292.1 mm
349.2 mm
390.4 mm
460.2 mm

3.3.12.2 Overall Length-Drill (Inch)—Position 4 indicates "C" or "L."

The overall length will be specified to the one-hundredth of an inch, with the decimal point located in Position 25.

Maximum overall length will be (99.99 in).

Examples:

06.87 in
09.62 in
11.50 in
13.75 in
15.37 in
18.12 in