

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J2124

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Submitted for recognition as an American National Standard

Numbering System for Single Diameter and Taper Reamers

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

NOTE 1—Caution must be taken when assigning codes for designators to prevent specifying reamers that cannot be physically or economically manufactured.

NOTE 2—The Code Number coming from the manufacturer MUST reflect the actual tool construction.

NOTE 3—In particular without limitation, SAE disclaims all responsibility for the accuracy or completeness of information contained within this report if the standards of this report are retrieved, combined, or used in connection with any software.

2. References

- 2.1 Applicable Publications**—The following publications (latest revision) form a part of this specification to the extent specified herein.

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

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

ANSI B94.2-1983—Reamers

ANSI B5.10-1981 (R1987)—Machine Tapers

- 2.2 Related Publications**—The following publications are provided for information purposes only and are not a required part of this document.

- 2.2.1 NUMBERING SYSTEMS SOFTWARE**—Software products may exist to assist in the use of the standard. The following software product(s) are listed for information purposes only and do not constitute part of this document. **SAE expressly disclaims any responsibility for the operation of any Software used in connection with your use of this report.**

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- 2.2.1.1 *Datom Engineering Software, Inc., Publication*—Available from Datom Engineering Software, Inc., 561 Somerset, Suite 3, Crystal Lake, IL 60014, (815) 477-3380.

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

- 2.2.2 DIN PUBLICATIONS—Available from DIN Deutsches, Institut für Normung, Burggrafen g strasse 6, Postfach 1107, D-1000 Berlin 30 Germany.

DIN 9—Hand Taper Pin Reamers for Taper Pin Holes
 DIN 10—Driving Squares for Tools and Shank Diameters According to ISO for Rotating Tools
 DIN 204—Hand Taper Pin Reamers for Morse Tapers
 DIN 205—Hand Taper Pin Reamers for Metric Tapers
 DIN 208—Machine Chucking Reamers with Morse Taper Shanks
 DIN 209—Machine Reamers with Screwed-On Blades
 DIN 217—Arbors with Morse Taper for Shell Reamers and Shell Drills
 DIN 228 Part 1—Morse Taper Shanks
 DIN 254—Tapers
 DIN 311—Bridge Reamers with Morse Taper Shank
 DIN 1420—Reamers; Manufacturing Tolerances and Designation
 DIN 1809—Driving Tenons for Tools with Parallel Shanks
 DIN 1862—End Mill Reamers for Jig Boring Machines
 DIN 1895—Machine Reamers for Morse Tapers
 DIN 1896—Machine Reamers for Metric Tapers
 DIN 2179—Machine Taper Pin Reamers with Parallel Shanks
 DIN 2180—Machine Taper Pin Reamers with Morse Taper Shanks

- 2.2.3 ISO PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 236 Part 1—Hand reamers
 ISO 236 Part 2—Long fluted machine reamers, morse taper shanks
 ISO 296—Machine tools—Self holding tapers for tool shanks
 ISO 521—Machine chucking reamers with parallel shanks or morse taper shanks
 ISO 522—Special tolerances for reamers
 ISO 2238—Machine bridge reamers
 ISO 2250—Finishing reamers for morse and metric tapers, with parallel shanks and morse taper shanks
 ISO 2401—Shell reamers with taper bore (taper bore 1:30 (included)) with slot drive and arbors for shell reamers
 ISO 3465—Hand taper pin reamers
 ISO 3466—Machine taper pin reamers with parallel shanks
 ISO 3467—Machine taper pin reamers with morse taper shanks
 ISO 4203—Parallel shank tools—Driving tenons and sockets
 ISO 5413—Machine tools—Positive drive of morse taper shanks
 ISO 5420—Reamers—Terms, definitions and types

- 2.2.4 USCTI PUBLICATION—Available from United States Cutting Tool Institute, 1300 Summer Avenue, Cleveland, OH 44115.

USCTI—Handbook of Standard Reamers

3. Numbering System

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

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

3.1.2 **FORMAT—27 POSITION**—Reamers with flute lengths and 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 reamers.

Figure 1 illustrates the content and sequence of the 17 positions in the numbering system for reamers 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 reamers whose flute lengths and/or overall lengths do not comply with the referenced Standards.

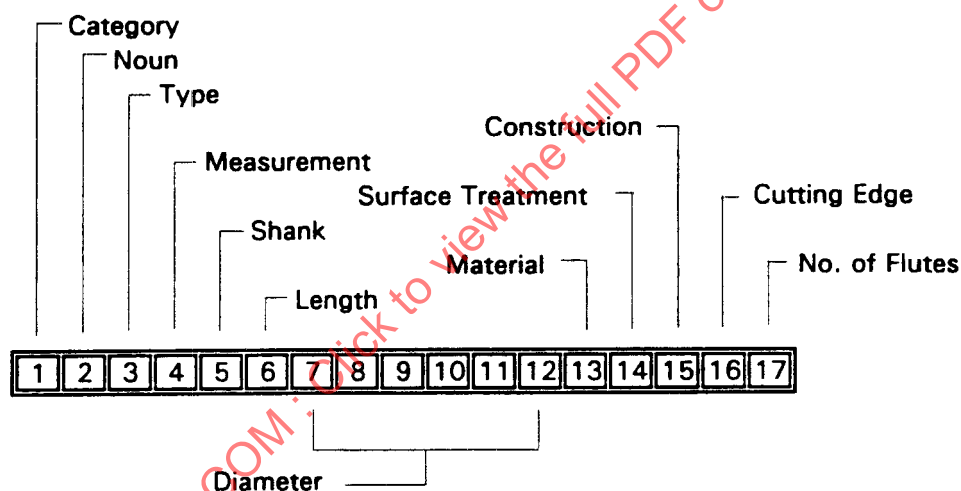


FIGURE 1—17 POSITION FORMAT

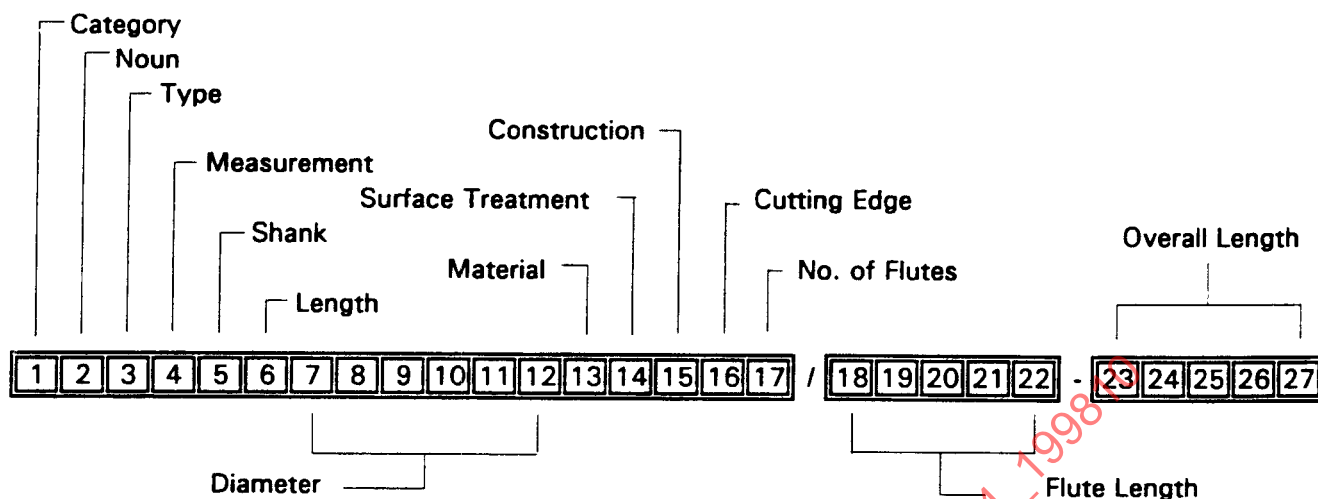


FIGURE 2—27 POSITION FORMAT

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: R - designates REAMER

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

- A – Adjustable - Inserted Blade Type, Hand
- B – Bridge
- C – Chucking
- D – Dowel Pin
- E – Chucking Expansion
- F – Car (Structural)
- G – Center
- H – Hand
- J – Jobbers
- K – Die Maker's
- L – Hand Expansion
- M – Taper Socket - Morse
- N – Adjustable - Inserted Blade Type, Chucking, Machine
- P – Taper Pipe
- R – Rose Chucking
- S – Stub Screw Machine
- U – Ground Stub Screw Machine - Unground
- T – Taper Pin
- U – Stub Screw Machine - Unground
- W – Shell Reamer - Arbor Type
- V – Taper Socket - Brown & Sharpe

3.3.3 POSITION 4, MEASUREMENT (CUTTING DIAMETER)—Position 4 will always be alphabetic. The following codes have been assigned:

- | | |
|---------------------|----------------------------------|
| 1. – Inch | ANSI |
| 2. – Metric | ANSI |
| 3. – Metric | DIN |
| 4. – Metric | ISO |
| 5. – Letter(s) Size | ANSI (Blade Type or Die Maker's) |
| 6. – Series No. | ANSI (Stub Screw Machine) |
| 7. – Number or Size | ANSI |

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

NOTE—Typical shank diameters for straight shank reamers, can be found in Appendix A.

- 0 = Morse Taper #0
- 1 = Morse Taper #1
- 2 = Morse Taper #2
- 3 = Morse Taper #3
- 4 = Morse Taper #4
- 5 = Morse Taper #5
- 6 = Morse Taper #6
- A = ANSI Arbor Drive for Shell Reamer
- P = Pin Drive Shank for Stub Screw Machine
- Q = Straight Shank - Square Drive
- S = Straight Shank - Standard Size
- T = Straight Shank - Standard Size with Tang

3.3.5 POSITION 6, LENGTH (FLUTE, SHANK, AND OVERALL)—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.

- C – ANSI Standard Lengths - Except Solid Carbide
- D – DIN Standard Lengths
- E – ISO Standard Lengths
- P – Production Length (Straight Shank Chucking Only)
- 7 – Regular Length - Solid Carbide
- X – Special Flute and Overall Length

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

NOTE—Use zeros for all open positions.

3.3.6.1 Diameter—Reamer (Metric)—Position 4 indicates "2," "3," or "4."

Diameter will be specified to the thousandth of a millimeter, with the decimal point located in Position 9.

Maximum diameter will be (99.999 mm).

Examples:

00.900 (0.90 mm)
03.250 (3.25 mm)
15.000 (15.00 mm)
75.500 (75.50 mm)

3.3.6.2 Diameter—Reamer (Inch)—Position 4 indicates "1."

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:

0.0312 (1/32 in)
0.2500 (1/4 in)
0.5625 (9/16 in)
1.0000 (1 in)
0.0400 (#60 Wire Gage)
0.1285 (#30 Wire Gage)
0.2280 (#1 Wire Gage)

3.3.6.3 Size—Reamer (Letter)—When Position 3 indicates "A" (Adjustable - Inserted Blade Type, Hand) or "K" (Die Maker's), then Position 4 will indicate "5" (Letter(s) Size).

Size will be represented by the Letter(s) located in Positions 10, 11, and 12, and the decimal point located in Position 8.

Examples:

0.0AAA (Size AAA)
0.00AA (Size AA)
0.000A (Size A)
0.000B (Size B)

- 3.3.6.4 *Series/Size—Stub Screw (UN-GROUND)*—When Position 3 indicates "S" (Stub Screw Machine - Unground) and a tool is ordered not ground to a specific diameter, then Position 4 will indicate "6" (Series No.).

Size will be represented by the series number located in Positions 11 and 12 and the decimal point located in Position 8.

Examples:

0.0000 (Series #0)
0.0010 (Series #10)
0.0020 (Series #20)
0.0023 (Series #23)

- 3.3.6.5 *Series/Size—Stub Screw (FINISH GROUND)*—When Position 3 indicates "U" (Stub Screw Machine - Ground) and a tool is ordered finish ground to a specific diameter, then Position 4 will indicate "6" (Series No.) and the Diameter will be specified per 3.3.6.1 (Metric) or 3.3.6.2 (Inch).

Examples:

03.250 (3.25 mm)
15.000 (15.00 mm)
0.2500 (1/4 in)
0.5625 (9/16 in)

- 3.3.6.6 *Size—Reamer (Number of Taper)*—When Position 3 indicates "M" (Taper Socket - Morse) or "V" (Taper Socket - Brown & Sharpe), then Position 4 will indicate "7" (Number or Size).

Size will be represented by the taper number located in Positions 11 and 12 and the decimal point located in Position 8.

Examples:

0.0000 (Taper #0)
0.0001 (Taper #1)
0.0005 (Taper #5)
0.0015 (Taper #15)

- 3.3.6.7 *Size—Taper Reamer*—When Position 3 indicates "T" (Taper Pin), then Position 4 will indicate "7" (Number or Size).

Taper Size will be represented by the number(s) located in Positions 10, 11, and 12 and the decimal point located in Position 8.

Examples:

0.0700 (Size 7/0)
0.0200 (Size 2/0)
0.0000 (Size #0)
0.0010 (Size #10)

3.3.7 POSITION 13, MATERIAL—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
2 – High Speed Steel	M3 Type 2
K – High Speed Steel	M7
L – High Speed Steel	M10
M – Cobalt High Speed Steel	T15
D – Cobalt High Speed Steel	M35
E – Cobalt High Speed Steel	M42
F – Cobalt High Speed Steel	M33
Q – Solid Carbide	C2
N – Solid Carbide	C3
R – Solid Carbide	C5
Z – Solid Carbide - Micro Grain	
U – Carbide Tipped	C1
V – Carbide Tipped	C2
O – Carbide Tipped	C3
W – Carbide Tipped	C5
X – Carbide Tipped	C6
Y – Carbide Tipped	C7
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

Other

1 – Untreated (Bright)
 2 – Steam Oxide
 3 – Nitride Plus Steam Oxide
 4 – Nitride Only
 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
 P – Polished

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

- 1 – Straight, Right Hand Cut
- 2 – Straight, Left Hand Cut
- 3 – Right Hand Spiral, Right Hand Cut
- 4 – Right Hand Spiral, Left Hand Cut
- 5 – Left Hand Spiral, Right Hand Cut
- 6 – Left Hand Spiral, Left Hand Cut
- 7 – Right Hand High Helix, Right Hand Cut
- 8 – Right Hand High Helix, Left Hand Cut
- A – Left Hand High Helix, Right Hand Cut
- B – Left Hand High Helix, Left Hand Cut
- C – Right Hand Slow Spiral, Right Hand Cut
- D – Right Hand Slow Spiral, Left Hand Cut
- E – Left Hand Slow Spiral, Right Hand Cut
- F – Left Hand Slow Spiral, Left Hand Cut

3.3.10 POSITION 16, CUTTING EDGE—Position 16 will be alpha or numeric. The following codes have been assigned:

- A – 90 Degrees Included Angle Chamfer
- B – 118 Degrees Included Angle Chamfer
- C – 180 Degrees End Cut to Bottom of Flutes
- D – 180 Degrees Center Cutting
- E – 90 Degrees Chamfer Followed by Entering Lead
- F – 118 Degrees Chamfer Followed by Entering Lead
- R – Radial Radius Form Relieved (Barber-Coleman)
- T – Taper

3.3.11 POSITION 17, NUMBER OF FLUTES—Position 17 will be alpha or numeric. The following codes have been assigned.

0 – Manufacturer's Standard (for ordering purposes ONLY)

Other

- 1 – 1 Flute
- 2 – 2 Flutes
- 3 – 3 Flutes
- 4 – 4 Flutes
- 5 – 5 Flutes
- 6 – 6 Flutes
- 7 – 7 Flutes
- 8 – 8 Flutes
- 9 – 9 Flutes
- A – 10 Flutes
- B – 11 Flutes
- C – 12 Flutes
- D – 13 Flutes
- E – 14 Flutes
- F – 16 Flutes

3.3.12 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.

3.3.12.1 *Flute Length—Reamer (Millimeter)*—Position 4 indicates "2," "3," or "4."

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

3.3.12.2 *Flute Length—Reamer (Inch)*—Position 4 indicates "1".

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

3.3.13 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.

3.3.13.1 Overall Length—Reamer (Metric)—Position 4 indicates "2," "3," or "4."

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

3.3.13.2 Overall Length—Reamer (Inch)—Position 4 indicates "1."

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

4. Notes

- 4.1 Marginal Indicia**—The change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE CUTTING TOOLS TECHNICAL COMMITTEE

APPENDIX A

SHANK DIAMETERS

TABLE A1—SHANK DIAMETERS (METRIC)

Dia. of Shank Max.	Dia. of Shank Min.	Typical Reamer Dia.
Reamer Dia. to -0.025		over 1.00 to 3.00 incl.
Reamer Dia. to -0.030		over 3.00 to 3.75 incl.
4.000	3.970	over 3.75 to 4.25 incl.
4.500	4.470	over 4.25 to 4.75 incl.
5.000	4.970	over 4.75 to 5.30 incl.
5.600	5.570	over 5.30 to 6.00 incl.
6.300	6.264	over 6.00 to 6.70 incl.
7.100	7.064	over 6.70 to 7.50 incl.
8.000	7.964	over 7.50 to 8.50 incl.
9.000	8.964	over 8.50 to 9.50 incl.
10.000	9.964	over 9.50 to 13.20 incl.
12.500	12.457	over 13.20 to 16.00 incl.
14.000	13.957	over 16.00 to 18.00 incl.
16.000	15.597	over 18.00 to 20.00 incl.