

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 235

PARALLEL SHANK TWIST DRILLS
JOBBER AND STUB SERIES
AND MORSE TAPER SHANK TWIST DRILLS

1st EDITION
December 1961

COPYRIGHT RESERVED

The copyright of ISO Recommendations and ISO Standards belongs to ISO Member Bodies. Reproduction of these documents, in any country, may be authorized therefore only by the national standards organization of that country, being a member of ISO.

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 235, *Parallel Shank Twist Drills, Jobber and Stub Series, and Morse Taper Shank Twist Drills*, was drawn up by Technical Committee ISO/TC 29, *Small Tools*, the Secretariat of which is held by the Association Française de Normalisation (AFNOR).

Work on this question by the Technical Committee began in 1947, taking into account the studies which had been made by the former International Federation of the National Standardizing Associations (ISA), and led, in 1958, to the adoption of a Draft ISO Recommendation.

In September 1959, this Draft ISO Recommendation (No. 301) was submitted to all the ISO Member Bodies for enquiry. It was approved, subject to some editorial amendments, by the following Member Bodies:

Austria	Hungary	Portugal
Belgium	India	Romania
Burma	Italy	Sweden
Czechoslovakia	Mexico	Switzerland
France	Netherlands	United Kingdom
Germany	Pakistan	U. S. S. R.
Greece	Poland	

Two Member Bodies opposed the approval of the Draft:
Canada, U.S.A.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in December 1961, to accept it as an ISO RECOMMENDATION.

ISO Recommendation R 235

ISO/R 235 - 1961 (E)
ERRATUM
April 1963

**PARALLEL SHANK TWIST DRILLS
JOBBER AND STUB SERIES
AND MORSE TAPER SHANK TWIST DRILLS**

1st Edition — December 1961

First Printing - June 1962

ERRATUM

Page 13, Note 3. *Shank*, 3rd line,

in place of: "...** dealing with 5 per cent tapers for tool shanks",

read: "...** dealing with self-holding tapers for tool shanks".

STANDARDSISO.COM : Click to view the full PDF of ISO/R 235:1961

STANDARDSISO.COM : Click to view the full PDF of ISO/R 235:1967

**PARALLEL SHANK TWIST DRILLS
JOBBER AND STUB SERIES
AND MORSE TAPER SHANK TWIST DRILLS**

INTRODUCTION

I. SCOPE

This ISO Recommendation relates to twist drills and deals with the following three types:

1. Parallel shank twist drills, stub series Tables 1.1 to 1.3,
2. Parallel shank twist drills, jobber series Tables 2.1 to 2.3,
3. Morse taper shank twist drills and core drills Tables 3.1 to 3.3.

Other types of twist drills will be dealt with in further ISO Recommendations as and when current work on them is completed.

For each type of drill mentioned above, the ISO Recommendation comprises three tables giving respectively:

- (1) the recommended dimensions in millimetres,
- (2) the recommended dimensions in inches,
- (3) the corresponding lengths, in millimetres and in inches, set out as functions of diameter steps.

II. INTERCHANGEABILITY

The numerical tables have been drawn up in such a way as to ensure that the standard dimensions in millimetres and inches correspond as closely as possible.

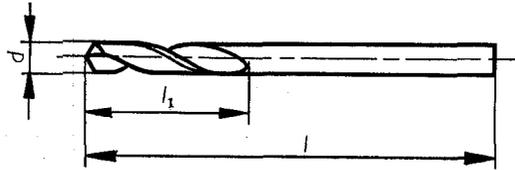
To this end, the complete range of diameters has been subdivided into a number of steps, the limits of which have been derived from the preferred number series for the metric values and converted directly from those for the inch values; the lengths and taper shank dimensions remain the same for the metric and the inch values within a given step.

The recommended diameters in the two systems of units of measurement differ, however, and the number of recommended diameters, in a given step, also differs in one system from that in the other.

Finally, the tolerance on the diameter of the cutting portion has been standardized solely on the basis of the metric values of h8*, converted directly into inches for inch drills.

* ISO System of Limits and Fits.

1. PARALLEL SHANK TWIST DRILLS, STUB SERIES



1.1 Recommended dimensions in millimetres

d	l_1	l	d	l_1	l	d	l_1	l	d	l_1	l
0.50	3	20	9.50	40	84	18.50			27.50		
0.80	5	24	9.80			18.75	64	127	27.75	81	162
1.00	6	26	10.00	43	89	19.00			28.00		
1.20	8	30	10.20			19.25			28.25		
1.50	9	32	10.50			19.50	66	131	28.50		
1.80	11	36	10.80			19.75			28.75		
2.00	12	38	11.00			20.00			29.00	84	168
2.20	13	40	11.20	47	95	20.25			29.25		
2.50	14	43	11.50			20.50	68	136	29.50		
2.80		46	11.80			20.75			29.75		
3.00	16	46	12.00			21.00			30.00		
3.20	18	49	12.20			21.25			30.25		
3.50	20	52	12.50			21.50			30.50		
3.80		55	12.80	51	102	21.75	70	141	30.75	87	174
4.00	22	55	13.00			22.00			31.00		
4.20			13.20			22.25			31.25		
4.50	24	58	13.50			22.50			31.50		
4.80			13.80	54	107	22.75			31.75		
5.00	26	62	14.00			23.00	72	146	32.00		
5.20			14.25			23.25			32.50	90	180
5.50			14.50			23.50			33.00		
5.80	28	66	14.75	56	111	23.75			33.50		
6.00			15.00			24.00			34.00		
6.20	31	70	15.25			24.25	75	151	34.50	93	186
6.50			15.50	58	115	24.50			35.00		
6.80			15.75			24.75			35.50		
7.00	34	74	16.00			25.00			36.00		
7.20			16.25			25.25			36.50	96	193
7.50			16.50	60	119	25.50			37.00		
7.80			16.75			25.75	78	156	37.50		
8.00	37	79	17.00			26.00			38.00		
8.20			17.25			26.25			38.50		
8.50			17.50			26.50			39.00	100	200
8.80			17.75	62	123	26.75			39.50		
9.00	40	84	18.00			27.00	81	162	40.00		
9.20			18.25	64	127	27.25					

1.2 Recommended dimensions in inches

d	l_1	l	d	l_1	l	d	l_1	l
$1/32$	$3/16$	$15/16$	$17/32$	$2^1/8$	$4^7/32$	$1^1/32$	$3^1/16$	$6^1/8$
$3/64$	$5/16$	$1^3/16$	$35/64$			$1^3/64$		
$1/16$	$13/32$	$1^11/32$	$9/16$	$2^7/32$	$4^8/8$	$1^1/16$	$3^3/16$	$6^3/8$
$5/64$	$15/32$	$1^1/2$	$37/64$			$1^5/64$		
$3/32$	$9/16$	$1^11/16$	$19/32$	$2^9/32$	$4^17/32$	$1^3/32$	$3^5/16$	$6^5/8$
$7/64$	$5/8$	$1^13/16$	$39/64$			$1^7/64$		
$1/8$	$11/16$	$1^15/16$	$5/8$	$2^8/8$	$4^11/16$	$1^1/8$	$3^7/16$	$6^27/32$
$9/64$	$25/32$	$2^1/16$	$41/64$			$1^9/64$		
$5/32$	$7/8$	$2^5/32$	$21/32$	$2^1/2$	5	$1^5/32$	$3^17/32$	$7^3/32$
$11/64$	$15/16$	$2^9/32$	$43/64$			$1^11/64$		
$3/16$	$1^1/32$	$2^7/16$	$11/16$	$2^7/16$	$4^27/32$	$1^3/16$	$3^17/32$	$7^3/32$
$13/64$			$45/64$			$1^13/64$		
$7/32$	$1^1/8$	$2^19/32$	$23/32$	$2^1/2$	5	$1^7/32$	$3^17/32$	$7^3/32$
$15/64$			$47/64$			$1^15/64$		
$1/4$	$1^7/32$	$2^3/4$	$3/4$	$2^19/32$	$5^5/32$	$1^1/4$	$3^17/32$	$7^3/32$
$17/64$	$1^5/16$	$2^29/32$	$49/64$			$1^17/64$		
$9/32$			$1^7/16$	$3^1/8$	$25/32$	$2^11/16$	$5^11/32$	$1^9/32$
$19/64$	$51/64$	$1^15/64$						
$5/16$	$1^9/16$	$3^5/16$	$13/16$	$2^3/4$	$5^9/16$	$1^5/16$	$3^21/32$	$7^5/16$
$21/64$			$53/64$			$1^21/64$		
$11/32$	$1^11/16$	$3^1/2$	$27/32$	$2^27/32$	$5^3/4$	$1^11/32$	$3^25/32$	$7^19/32$
$23/64$			$55/64$			$1^23/64$		
$3/8$	$1^11/16$	$3^1/2$	$7/8$	$2^15/16$	$5^15/16$	$1^3/8$	$3^15/16$	$7^7/8$
$25/64$			$57/64$			$1^25/64$		
$13/32$	$1^27/32$	$3^3/4$	$29/32$	$2^15/16$	$5^15/16$	$1^13/32$	$3^15/16$	$7^7/8$
$27/64$			$59/64$			$1^27/64$		
$7/16$	2	4	$15/16$	1	$3^1/16$	$1^7/16$	$3^15/16$	$7^7/8$
$29/64$			$61/64$			$1^29/64$		
$15/32$	2	4	$31/32$	1	$3^1/16$	$1^15/32$	$3^15/16$	$7^7/8$
$31/64$			$63/64$			$1^31/64$		
$1/2$	2	4	1	1	$3^1/16$	$1^1/2$	$3^15/16$	$7^7/8$
$33/64$			$1^1/64$			$1^1/2$		

NOTES relating to Tables 1.1 and 1.2

1. Intermediate sizes

When intermediate sizes are specially required, reference should be made to the General Table 1.3 for the corresponding lengths.

2. Cutting portion

- Tolerance on diameter d measured near the point: $h8^*$.
For dimensions in inches, direct conversion into inches of the metric values of $h8$.
- Back taper: at the manufacturer's discretion.
- Hand of cutting, unless otherwise specified: right.

3. Shank

These drills are normally made without driving tenon.

4. Tolerance on lengths

See General Table 1.3.

* ISO System of Limits and Fits.

1.3 General Table: Corresponding lengths, in millimetres and in inches, set out as functions of diameter steps

Diameter ranges d				Corresponding lengths			
over	incl.	over	incl.	l_1	l	l_1	l
mm		in		mm		in	
0.19	0.24	0.007 5	0.009 4	1.5	19	$1/16$	$3/4$
0.24	0.30	0.009 4	0.011 8				
0.30	0.38	0.011 8	0.015 0	2.0	20	$3/32$	$25/32$
0.38	0.48	0.015 0	0.018 9				
0.48	0.53	0.018 9	0.020 9	3.0	21	$1/8$	$13/16$
0.53	0.60	0.020 9	0.023 6	4.0	22	$5/32$	$7/8$
0.60	0.67	0.023 6	0.026 4	4.5	23	$3/16$	$29/32$
0.67	0.75	0.026 4	0.029 5	5.0	24	$3/16$	$15/16$
0.75	0.85	0.029 5	0.033 5	5.5	25	$7/32$	$31/32$
0.85	0.95	0.033 5	0.037 4	6.0	26	$1/4$	$11/32$
0.95	1.06	0.037 4	0.041 7	7.0	28	$9/32$	$13/32$
1.06	1.18	0.041 7	0.046 4	8.0	30	$5/16$	$13/16$
1.18	1.32	0.046 4	0.052 0	9.0	32	$11/32$	$11/4$
1.32	1.50	0.052 0	0.059 1	10	34	$13/32$	$111/32$
1.50	1.70	0.059 1	0.066 9	11	36	$7/16$	$17/16$
1.70	1.90	0.066 9	0.074 8	12	38	$15/32$	$11/2$
1.90	2.12	0.074 8	0.083 5	13	40	$1/2$	$19/16$
2.12	2.36	0.083 5	0.092 9	14	43	$9/16$	$111/16$
2.36	2.65	0.092 9	0.104 3	16	46	$5/8$	$113/16$
2.65	3.00	0.104 3	0.118 1	18	49	$11/16$	$115/16$
3.00	3.35	0.118 1	0.131 9	20	52	$25/32$	$21/16$
3.35	3.75	0.131 9	0.147 6	22	55	$7/8$	$25/32$
3.75	4.25	0.147 6	0.167 3	24	58	$15/16$	$29/32$
4.25	4.75	0.167 3	0.187 0	26	62	$1/32$	$27/16$
4.75	5.30	0.187 0	0.208 7	28	66	$1/8$	$219/32$
5.30	6.00	0.208 7	0.236 2	31	70	$17/32$	$23/4$
6.00	6.70	0.236 2	0.263 8	34	74	$15/16$	$229/32$
6.70	7.50	0.263 8	0.295 3	37	79	$17/16$	$31/8$
7.50	8.50	0.295 3	0.334 6	40	84	$19/16$	$35/16$
8.50	9.50	0.334 6	0.374 0	43	89	$111/16$	$31/2$
9.50	10.60	0.374 0	0.417 3	47	95	$127/32$	$33/4$
10.60	11.80	0.417 3	0.464 6	51	102	2	4
11.80	13.20	0.464 6	0.519 7	54	107	$21/8$	$47/32$
13.20	14.00	0.519 7	0.551 2	56	111	$27/32$	$43/8$
14.00	15.00	0.551 2	0.590 6	58	115	$29/32$	$417/32$
15.00	16.00	0.590 6	0.629 9	60	119	$23/8$	$411/16$
16.00	17.00	0.629 9	0.669 3	62	123	$27/16$	$427/32$
17.00	18.00	0.669 3	0.708 7	64	127	$21/2$	5
18.00	19.00	0.708 7	0.748 0	66	131	$219/32$	$55/32$
19.00	20.00	0.748 0	0.787 4	68	136	$211/16$	$511/32$
20.00	21.20	0.787 4	0.834 6	70	141	$23/4$	$59/16$
21.20	22.40	0.834 6	0.881 9	72	146	$227/32$	$53/4$
22.40	23.60	0.881 9	0.929 1	75	151	$215/16$	$515/16$
23.60	25.00	0.929 1	0.984 2	78	156	$31/16$	$61/8$
25.00	26.50	0.984 2	1.043 3	81	162	$33/16$	$63/8$
26.50	28.00	1.043 3	1.102 4	84	168	$35/16$	$65/8$
28.00	30.00	1.102 4	1.181 1	87	174	$37/16$	$627/32$
30.00	31.50	1.181 1	1.240 2	90	180	$317/32$	$73/32$
31.50	33.50	1.240 2	1.318 9	93	186	$321/32$	$75/16$
33.50	35.50	1.318 9	1.397 6	96	193	$325/32$	$719/32$
35.50	37.50	1.397 6	1.476 4	100	200	$315/16$	$77/8$

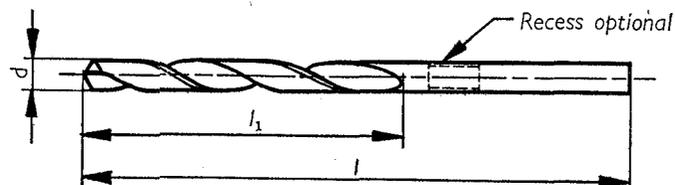
NOTES

1. Tolerance on lengths

Lengths l and l_1 may vary, within one diameter step, between the minimum and maximum limits corresponding respectively to the figures given for the nearest lower or upper step. (See as examples note 1, pages 9 and 15.)

2. Recommended diameters in millimetres and in inches: see Tables 1.1 and 1.2.

2. PARALLEL SHANK TWIST DRILLS, JOBBER SERIES



2.1 Recommended dimensions in millimetres

d	l ₁	l	d	l ₁	l	d	l ₁	l	d	l ₁	l	d	l ₁	l
0.20	2.5	19	1.35	18	40	3.50	39	70	7.30	69	109	11.10	94	142
0.22			1.40			3.60			7.40			11.20		
0.25	3	19	1.45	20	43	3.70	43	75	7.50	75	117	11.30	101	151
0.28			1.50			3.80			7.60			11.40		
0.30	4	20	1.55	22	46	3.90	47	80	7.70	81	125	11.50	108	160
0.32			1.60			4.00			7.80			11.60		
0.35	5	22	1.65	24	49	4.10	52	86	7.90	87	133	11.70	114	169
0.38			1.70			4.20			8.00			11.80		
0.40	6	24	1.75	27	53	4.30	57	93	8.10	87	133	11.90	120	178
0.42			1.80			4.40			8.20			12.00		
0.45	7	26	1.85	30	57	4.50	63	101	8.30	94	142	12.10	120	178
0.48			1.90			4.60			8.40			12.20		
0.50	8	28	1.95	33	61	4.70	69	109	8.50	94	142	12.30	120	178
0.52			2.00			4.80			8.60			12.40		
0.55	9	30	2.05	36	65	4.90	70	110	8.70	94	142	12.50	120	178
0.58			2.10			5.00			8.80			12.60		
0.60	10	32	2.15	39	70	5.10	75	117	8.90	94	142	12.70	120	178
0.62			2.20			5.20			9.00			12.80		
0.65	11	34	2.25	43	75	5.30	81	125	9.10	94	142	12.90	120	178
0.68			2.30			5.40			9.20			13.00		
0.70	12	36	2.35	46	78	5.50	87	133	9.30	94	142	13.10	120	178
0.72			2.40			5.50			9.40			13.20		
0.75	13	38	2.45	49	81	5.60	90	136	9.50	94	142	13.30	120	178
0.78			2.50			5.60			9.60			13.40		
0.80	14	40	2.55	52	84	5.70	94	142	9.70	94	142	13.50	120	178
0.82			2.60			5.70			9.80			13.60		
0.85	15	42	2.65	55	87	5.80	97	145	9.90	94	142	13.70	120	178
0.88			2.70			5.80			10.00			13.80		
0.90	16	44	2.75	58	90	5.90	100	148	10.10	94	142	13.90	120	178
0.92			2.80			5.90			10.20			14.00		
0.95	17	46	2.85	61	93	6.00	103	151	10.30	94	142	14.25	120	178
0.98			2.90			6.00			10.40			14.50		
1.00	18	48	2.95	64	96	6.10	106	154	10.50	94	142	14.75	120	178
1.05			3.00			6.10			10.60			15.00		
1.10	19	50	3.10	67	99	6.20	109	157	10.70	94	142	15.25	120	178
1.15			3.20			6.20			10.80			15.50		
1.20	20	52	3.30	70	102	6.30	112	160	10.90	94	142	15.75	120	178
1.25			3.40			6.30			11.00			16.00		
1.30	21	54	3.40	73	105	6.40	115	163	11.00	94	142	16.00	120	178

2.2 Recommended dimensions in inches

d	l_1	l
$\frac{1}{64}$	$\frac{3}{16}$	$\frac{13}{16}$
$\frac{1}{32}$	$\frac{13}{32}$	$\frac{13}{16}$
$\frac{3}{64}$	$\frac{5}{8}$	$1\frac{1}{2}$
$\frac{1}{16}$	$\frac{25}{32}$	$1\frac{11}{16}$
$\frac{5}{64}$	$\frac{15}{16}$	$1\frac{15}{16}$
$\frac{3}{32}$	$1\frac{3}{16}$	$2\frac{1}{4}$
$\frac{7}{64}$	$1\frac{5}{16}$	$2\frac{13}{32}$
$\frac{1}{8}$	$1\frac{7}{16}$	$2\frac{9}{16}$
$\frac{9}{64}$	$1\frac{17}{32}$	$2\frac{3}{4}$
$\frac{5}{32}$	$1\frac{11}{16}$	$2\frac{15}{16}$
$\frac{11}{64}$	$1\frac{27}{32}$	$3\frac{5}{32}$
$\frac{3}{16}$	$2\frac{1}{16}$	$3\frac{3}{8}$
$\frac{13}{64}$		
$\frac{7}{32}$	$2\frac{1}{4}$	$3\frac{21}{32}$
$\frac{15}{64}$		
$\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{31}{32}$
$\frac{17}{64}$	$2\frac{23}{32}$	$4\frac{9}{32}$
$\frac{9}{32}$		
$\frac{19}{64}$	$2\frac{15}{16}$	$4\frac{19}{32}$
$\frac{5}{16}$		
$\frac{21}{64}$		
$\frac{11}{32}$	$3\frac{3}{16}$	$4\frac{29}{32}$
$\frac{23}{64}$		
$\frac{3}{8}$	$3\frac{7}{16}$	$5\frac{1}{4}$
$\frac{25}{64}$		
$\frac{13}{32}$		
$\frac{27}{64}$	$3\frac{11}{16}$	$5\frac{19}{32}$
$\frac{7}{16}$		
$\frac{29}{64}$		
$\frac{15}{32}$	$3\frac{31}{32}$	$5\frac{15}{16}$
$\frac{31}{64}$		
$\frac{1}{2}$		

NOTES relating to Tables 2.1 and 2.2

1. Intermediate sizes

When intermediate sizes are specially required, reference should be made to the General Table 2.3 for the corresponding lengths.

2. Cutting portion

- Tolerance on diameter d measured near the point: h8*.
- For dimensions in inches, direct conversion into inches of the metric values of h8.
- Back taper: at the manufacturer's discretion.
- Hand of cutting, unless otherwise specified: right.

3. Shank

These drills are normally made without driving tenon.

4. Tolerance on lengths

See General Table 2.3.

* ISO System of Limits and Fits.

2.3 General Table: Corresponding lengths, in millimetres and in inches, set out as functions of diameter steps

Diameter ranges d				Corresponding lengths			
over	incl.	over	incl.	l_1	l	l_1	l
mm		in		mm		in	
0.19	0.24	0.007 5	0.009 4	2.5		$\frac{3}{32}$	
0.24	0.30	0.009 4	0.011 8	3	19	$\frac{1}{8}$	$\frac{3}{4}$
0.30	0.38	0.011 8	0.015 0	4		$\frac{5}{32}$	
0.38	0.48	0.015 0	0.018 9	5	20	$\frac{3}{16}$	$\frac{13}{16}$
0.48	0.53	0.018 9	0.020 9	6	22	$\frac{1}{4}$	$\frac{7}{8}$
0.53	0.60	0.020 9	0.023 6	7	24	$\frac{9}{32}$	$\frac{15}{16}$
0.60	0.67	0.023 6	0.026 4	8	26	$\frac{5}{16}$	1
0.67	0.75	0.026 4	0.029 5	9	28	$\frac{11}{32}$	$1\frac{1}{8}$
0.75	0.85	0.029 5	0.033 5	10	30	$\frac{13}{32}$	$1\frac{3}{16}$
0.85	0.95	0.033 5	0.037 4	11	32	$\frac{7}{16}$	$1\frac{1}{4}$
0.95	1.06	0.037 4	0.041 7	12	34	$\frac{15}{32}$	$1\frac{5}{16}$
1.06	1.18	0.041 7	0.046 4	14	36	$\frac{9}{16}$	$1\frac{7}{16}$
1.18	1.32	0.046 4	0.052 0	16	38	$\frac{5}{8}$	$1\frac{1}{2}$
1.32	1.50	0.052 0	0.059 1	18	40	$\frac{11}{16}$	$1\frac{9}{16}$
1.50	1.70	0.059 1	0.066 9	20	43	$\frac{25}{32}$	$1\frac{11}{16}$
1.70	1.90	0.066 9	0.074 8	22	46	$\frac{7}{8}$	$1\frac{13}{16}$
1.90	2.12	0.074 8	0.083 5	24	49	$\frac{15}{16}$	$1\frac{15}{16}$
2.12	2.36	0.083 5	0.092 9	27	53	$1\frac{1}{16}$	$2\frac{3}{32}$
2.36	2.65	0.092 9	0.104 3	30	57	$1\frac{3}{16}$	$2\frac{1}{4}$
2.65	3.00	0.104 3	0.118 1	33	61	$1\frac{5}{16}$	$2\frac{13}{32}$
3.00	3.35	0.118 1	0.131 9	36	65	$1\frac{7}{16}$	$2\frac{9}{16}$
3.35	3.75	0.131 9	0.147 6	39	70	$1\frac{17}{32}$	$2\frac{3}{4}$
3.75	4.25	0.147 6	0.167 3	43	75	$1\frac{11}{16}$	$2\frac{15}{16}$
4.25	4.75	0.167 3	0.187 0	47	80	$1\frac{27}{32}$	$3\frac{5}{32}$
4.75	5.30	0.187 0	0.208 7	52	86	$2\frac{1}{16}$	$3\frac{3}{8}$
5.30	6.00	0.208 7	0.236 2	57	93	$2\frac{1}{4}$	$3\frac{21}{32}$
6.00	6.70	0.236 2	0.263 8	63	101	$2\frac{1}{2}$	$3\frac{31}{32}$
6.70	7.50	0.263 8	0.295 3	69	109	$2\frac{23}{32}$	$4\frac{9}{32}$
7.50	8.50	0.295 3	0.334 6	75	117	$2\frac{15}{16}$	$4\frac{19}{32}$
8.50	9.50	0.334 6	0.374 0	81	125	$3\frac{3}{16}$	$4\frac{29}{32}$
9.50	10.60	0.374 0	0.417 3	87	133	$3\frac{7}{16}$	$5\frac{1}{4}$
10.60	11.80	0.417 3	0.464 6	94	142	$3\frac{11}{16}$	$5\frac{19}{32}$
11.80	13.20	0.464 6	0.519 7	101	151	$3\frac{31}{32}$	$5\frac{15}{16}$
13.20	14.00	0.519 7	0.551 2	108	160	$4\frac{1}{4}$	$6\frac{5}{16}$
14.00	15.00	0.551 2	0.590 6	114	169	$4\frac{1}{2}$	$6\frac{5}{8}$
15.00	16.00	0.590 6	0.629 9	120	178	$4\frac{3}{4}$	7

NOTES

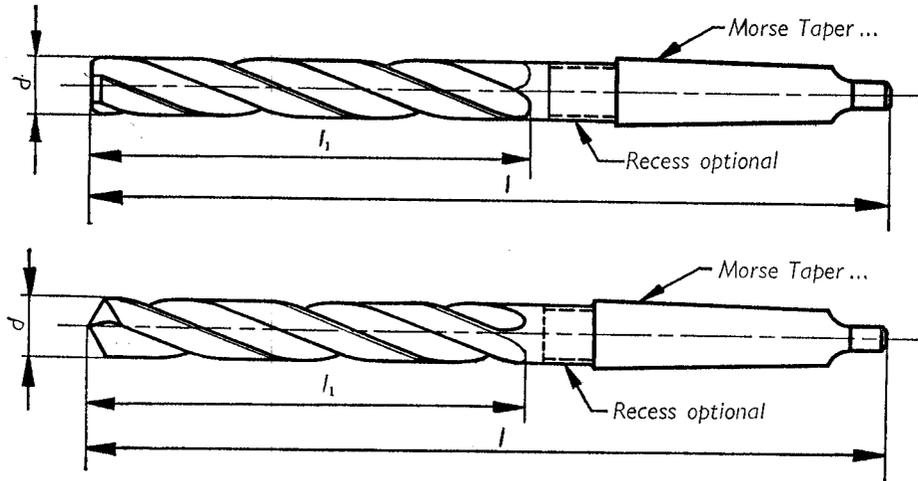
1. Tolerance on lengths

Lengths l and l_1 may vary, within one diameter step, between the minimum and maximum limits corresponding respectively to the figures given for the nearest lower or upper step.

Example: For the diameter 4 mm, length l_1 may vary between 39 and 47 from the nominal value 43 mm, and length l may vary between 70 and 80 from the nominal value 75 mm.

2. Recommended diameters in millimetres and in inches: see Tables 2.1 and 2.2.

3. MORSE TAPER SHANK TWIST DRILLS AND CORE DRILLS



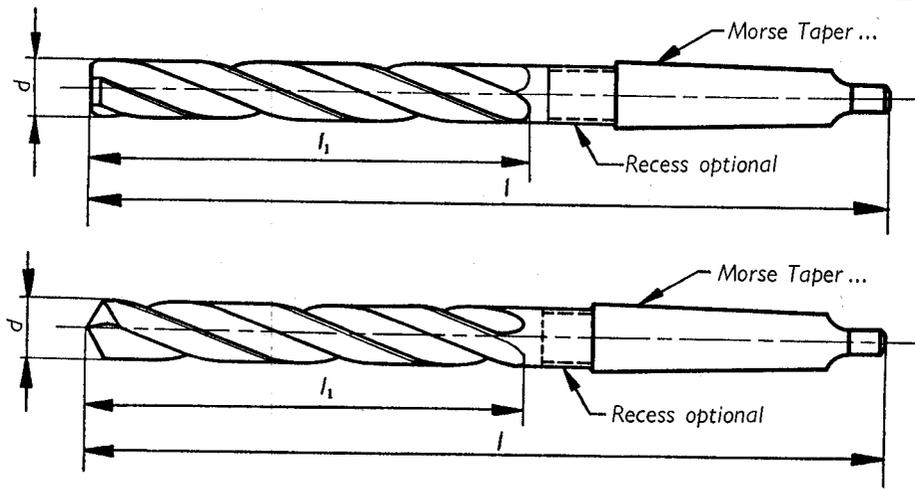
3.1 Recommended dimensions in millimetres

d	l_1	Standard shank		Oversize shank		d	l_1	Standard shank		Oversize shank	
		l	M. T.	l	M. T.			l	M. T.	l	M. T.
3.00	33	114				12.00					
3.20	36	117				12.20					
3.50	39	120				12.50					
3.80						12.80	101	182		199	
4.00	43	124				13.00		1		2	
4.20						13.20					
4.50	47	128				13.50					
4.80						13.80	108	189		206	
5.00	52	133				14.00					
5.20						14.25					
5.50						14.50	114	212			
5.80	57	138				14.75					
6.00						15.00					
6.20						15.25					
6.50	63	144				15.50					
6.80						15.75	120	218			
7.00	69	150				16.00					
7.20						16.25					
7.50						16.50	125	223			
7.80						16.75					
8.00						17.00					
8.20	75	156				17.25					
8.50						17.50					
8.80						17.75	130	228			
9.00						18.00			2		
9.20	81	162				18.25					
9.50						18.50				256	
9.80						18.75	135	233			
10.00						19.00					
10.20	87	168				19.25					
10.50						19.50					
10.80						19.75	140	238		261	3
11.00						20.00					
11.20	94	175				20.25					
11.50						20.50					
11.80						20.75	145	243		266	
						21.00					

(continued)

3.1 Recommended dimensions in millimetres (end)

d	l ₁	Standard shank		Oversize shank		d	l	Standard shank		Oversize shank		d	l ₁	Standard shank		Oversize shank	
		l	M.T.	l	M.T.			l	M.T.	l	M.T.			l	M.T.		
21.25						32.50						58					
21.50						33.00	185	334				59	235	422			
21.75	150	248			271	33.50						60					
22.00			2		3	34.00						61					
22.25						34.50	190	339				62	240	427			
22.50						35.00						63					
22.75		253			276	35.50						64					
23.00	155					36.00						65	245	432			
23.25						36.50	195	344				66				499	
23.50		276				37.00						67			5		
23.75						37.50						68					
24.00						38.00						69	250	437		504	
24.25	160	281				38.50						70					6
24.50						39.00	200	349				71					
24.75						39.50						72					
25.00						40.00						73	255	442		509	
25.25						40.50						74					
25.50						41.00						75					
25.75	165	286				41.50	205	354	4	392		76		447		514	
26.00						42.00						77					
26.25						42.50						78	260	514			
26.50						43.00						79					
26.75						43.50						80					
27.00						44.00	210	359		397		81					
27.25	170	291			319	44.50						82					
27.50			3			45.00						83	265	519			
27.75						45.50					5	84					
28.00						46.00						85					
28.25						46.50	215	364		402		86					
28.50						47.00						87					
28.75						47.50						88	270	524			
29.00						48.00						89			6		
29.25	175	296			324	48.50						90					
29.50						49.00	220	369		407		91					
29.75						49.50						92					
30.00						50.00						93	275	529			
30.25						50.50		374		412		94					
30.50						51	225					95					
30.75	180	301			329	52		412				96					
31.00						53						97					
31.25						54			5			98	280	534			
31.50						55	230	417				99					
31.75	185	306			334	56						100					
32.00		334	4			57	235	422									



3.2 Recommended dimensions in inches

d	l ₁	Standard shank		Oversize shank		d	l ₁	Standard shank		Oversize shank	
		l	M. T.	l	M. T.			l	M. T.	l	M. T.
1/8	1 ⁷ / ₁₆	4 ⁵ / ₈				23/32	5 ¹ / ₄	9 ¹ / ₈		10	
9/64	1 ¹⁷ / ₃₂	4 ³ / ₄				47/64					
5/32	1 ¹¹ / ₁₆	4 ²⁷ / ₃₂				3/4					
11/64	1 ²⁷ / ₃₂	5 ¹ / ₃₂				49/64	5 ¹ / ₂	9 ³ / ₈		10 ¹ / ₄	
3/16	2 ¹ / ₁₆	5 ¹ / ₄				25/32					
13/64						51/64					
7/32	2 ¹ / ₄	5 ⁷ / ₁₆				13/16	5 ³ / ₄	9 ⁵ / ₈	2	10 ¹ / ₂	3
15/64						53/64					
1/4	2 ¹ / ₂	5 ¹¹ / ₁₆				27/32					
17/64	2 ²³ / ₃₂	5 ²⁹ / ₃₂				55/64	5 ⁷ / ₈	9 ³ / ₄		10 ⁵ / ₈	
9/32						1/8					
19/64						57/64					
5/16	2 ¹⁵ / ₁₆	6 ¹ / ₈				29/32	6 ¹ / ₈	10		10 ⁷ / ₈	
21/64			1			59/64		10 ⁷ / ₈			
11/32	3 ³ / ₁₆	6 ³ / ₈				15/16					
23/64						61/64	6 ¹ / ₄	11			
3/8						31/32					
25/64	3 ⁷ / ₁₆	6 ⁵ / ₈				63/64					
13/32						1					
27/64						1 ¹ / ₆₄	6 ¹ / ₂	11 ¹ / ₄			
7/16	3 ¹¹ / ₁₆	6 ⁷ / ₈				1 ¹ / ₃₂					
29/64						1 ³ / ₆₄	6 ⁵ / ₈	11 ³ / ₈		12 ¹ / ₂	
15/32						1 ¹ / ₁₆					
31/64	3 ³¹ / ₃₂	7 ⁵ / ₃₂		7 ²⁷ / ₃₂		1 ⁵ / ₆₄			3		
1/2						1 ³ / ₃₂					
33/64						1 ⁷ / ₆₄					
17/32	4 ¹ / ₄	7 ⁷ / ₁₆		8 ¹ / ₈	2	1 ¹ / ₈	6 ⁷ / ₈	11 ⁵ / ₈		12 ³ / ₄	
35/64						1 ⁹ / ₆₄					4
9/16	4 ¹ / ₂	8 ³ / ₈				1 ⁵ / ₃₂					
37/64						1 ¹¹ / ₆₄					
19/32						1 ³ / ₁₆					
39/64	4 ³ / ₄	8 ⁵ / ₈				1 ¹³ / ₆₄	7 ¹ / ₈	11 ⁷ / ₈		13	
5/8						1 ⁷ / ₃₂					
41/64	4 ⁷ / ₈	8 ³ / ₄				1 ¹⁵ / ₆₄					
21/32			2			1 ¹ / ₄		12		13 ¹ / ₈	
43/64						1 ¹⁷ / ₆₄					
11/16	5 ¹ / ₈	9				1 ⁹ / ₃₂	7 ¹ / ₄	13 ¹ / ₈	4		
45/64						1 ¹⁹ / ₆₄					
						1 ⁵ / ₁₆					

(continued)