UDC 621.9

Ref. No.: ISO/R 236 - 1961 (E)

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

Revised

ISO RECOMMENDATION
R 236

HAND REAMERS AND LONG FLUTED MACHINE REAMERS MORSE TAPER SHANK

1st EDITION
December 1961

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 236, *Hand Reamers and Long Fluted Machine Reamers, Morse Taper Shank*, 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. 302) was submitted to all the ISO Member Bodies for enquiry. It was approved, subject to some modifications, 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	

One Member Body opposed the approval of the Draft: 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 236 December 1961

HAND REAMERS AND LONG FLUTED MACHINE REAMERS MORSE TAPER SHANK

INTRODUCTION

I. SCOPE

This ISO Recommendation relates to reamers and deals with the following two types:

1. Hand reamers . . . . . Tables 1.1 to 1.3,
2. Long fluted machine reamers, Morse taper shank . . . . . Tables 2.1 to 2.3.

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

For each type of reamer mentioned above, this ISO Recommendation comprises three tables, giving respectively:

(1) the recommended dimensions in millimetres,

(2) the recommended dimensions in inches,

(3) the corresponding dimensions, in millimetres and in inches, set out as functions of diameter steps.

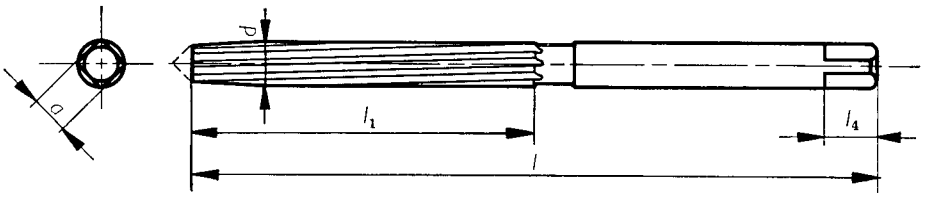
II. INTERCHANGEABILITY

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.

1. HAND REAMERS



1.1 Recommended dimensions in millimetres

d	l_1	l	a	l_4	d	l_1	l	a	l_4
(1.5)	20	41	1.12	4	22	107	215	18.00	22
1.6	21	44	1.25		(23)				
1.8	23	47	1.40		(24)	115	231	20.00	24
2.0	25	50	1.60		25				
2.2	27	54	1.80		(26)				
2.5	29	58	2.00		(27)	124	247	22.40	26
2.8	31	62	2.24	5	28				
3.0					(30)				
3.5	35	71	2.80		32	133	265	25.00	28
4.0	38	76	3.15	6	(34)	142	284	28.00	31
4.5	41	81	3.55		(35)				
5.0	44	87	4.00	7	36				
5.5	47	93	4.50		(38)	152	305	31.50	34
6.0					40				
7.0	54	107	5.60	8	(42)				
8.0	58	115	6.30	9	(44)	163	326	35.50	38
9.0	62	124	7.10	10	45				
10.0	66	133	8.00	11	(46)				
11.0	71	142	9.00	12	(48)	174	347	40.00	42
12.0	76	152	10.00	13	50				
(13.0)					(52)				
14.0	81	163	11.20	14	(55)	184	367	45.00	46
(15.0)					56				
16.0	87	175	12.50	16	(58)				
(17.0)					(60)				
18.0	93	188	14.00	18	(62)	194	387	50.00	51
(19.0)					63				
20.0	100	201	16.00	20	67				
(21.0)					71	203	406	56.00	56

Sizes in brackets should be avoided wherever possible.

1.2 Recommended dimensions in inches

d	l_1	l	a	l_4	d	l_1	l	a	l_4
$1/16$	$13/16$	$1\,3/4$	0.049	$5/32$	$3/4$	$3\,15/16$	$7\,15/16$	0.630	$25/32$
$3/32$	$1\,1/8$	$2\,1/4$	0.079		$(13/16)$				
$1/8$	$1\,5/16$	$2\,5/8$	0.098	$3/16$	$7/8$	$4\,3/16$	$8\,1/2$	0.709	$7/8$
$5/32$	$1\,1/2$	3	0.124	$1/4$	1	$4\,1/2$	$9\,1/16$	0.787	$15/16$
$3/16$	$1\,3/4$	$3\,7/16$	0.157	$9/32$	$(1\,1/16)$	$4\,7/8$	$9\,3/4$	0.882	$1\,1/32$
$7/32$	$1\,7/8$	$3\,11/16$	0.177		$1\,1/8$				
$1/4$	2	$3\,15/16$	0.197	$5/16$	$1\,1/4$	$5\,1/4$	$10\,7/16$	0.984	$1\,3/32$
$9/32$	$2\,1/8$	$4\,3/16$	0.220		$(1\,5/16)$				
$5/16$	$2\,1/4$	$4\,1/2$	0.248	$11/32$	$1\,3/8$	$5\,5/8$	$11\,3/16$	1.102	$1\,7/32$
$11/32$	$2\,7/16$	$4\,7/8$	0.280	$13/32$	$(1\,7/16)$				
$3/8$	$2\,5/8$	$5\,1/4$	0.315	$7/16$	$1\,1/2$	6	12	1.240	$1\,11/32$
$(13/32)$					$(1\,5/8)$				
$7/16$	$2\,13/16$	$5\,5/8$	0.354	$15/32$	$1\,3/4$	$6\,7/16$	$12\,13/16$	1.398	$1\,1/2$
$(15/32)$	3	6	0.394	$1/2$	$(1\,7/8)$	$6\,7/8$	$13\,11/16$	1.575	$1\,21/32$
$1/2$					2				
$9/16$	$3\,3/16$	$6\,7/16$	0.441	$9/16$	$2\,1/4$	$7\,1/4$	$14\,7/16$	1.772	$1\,13/16$
$5/8$	$3\,7/16$	$6\,7/8$	0.492	$5/8$	$2\,1/2$	$7\,5/8$	$15\,1/4$	1.968	2
$11/16$	$3\,11/16$	$7\,7/16$	0.551	$23/32$	3	$8\,3/8$	$16\,11/16$	2.480	$2\,7/16$

Sizes in brackets should be avoided wherever possible.

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 1.3.1 for the appropriate lengths.

2. *Cutting portion*

   Tolerance on diameter d measured immediately behind the lead: m6* (for reamers supplied from stock).
   For dimensions in inches, direct conversion into inches of the metric values of m6.

3. *Shanks*

   Diameter equal to d, with tolerance f8*.
   Driving squares in accordance with ISO Recommendation R 237.
   For dimensions in inches, direct conversion into inches of the metric values of f8.

4. *Tolerance on length*

   See General Table 1.3.1.

* ISO System of Limits and Fits.

1.3 Corresponding dimensions, in millimetres and in inches, set out as functions of diameter steps

1.3.1 *General Table: Lengths*

Diameter ranges d				Lengths		Lengths	
over	incl.	over	incl.	l_1	l	l_1	l
mm		in		mm		in	
1.32	1.50	0.052 0	0.059 1	20	41	$^{25}/_{32}$	$1^{5}/_{8}$
1.50	1.70	0.059 1	0.066 9	21	44	$^{13}/_{16}$	$1^{3}/_{4}$
1.70	1.90	0.066 9	0.074 8	23	47	$^{29}/_{32}$	$1^{7}/_{8}$
1.90	2.12	0.074 8	0.083 5	25	50	1	2
2.12	2.36	0.083 5	0.092 9	27	54	$1^{1}/_{16}$	$2^{1}/_{8}$
2.36	2.65	0.092 9	0.104 3	29	58	$1^{1}/_{8}$	$2^{1}/_{4}$
2.65	3.00	0.104 3	0.118 1	31	62	$1^{7}/_{32}$	$2^{7}/_{16}$
3.00	3.35	0.118 1	0.131 9	33	66	$1^{5}/_{16}$	$2^{5}/_{8}$
3.35	3.75	0.131 9	0.147 6	35	71	$1^{3}/_{8}$	$2^{13}/_{16}$
3.75	4.25	0.147 6	0.167 3	38	76	$1^{1}/_{2}$	3
4.25	4.75	0.167 3	0.187 0	41	81	$1^{5}/_{8}$	$3^{3}/_{16}$
4.75	5.30	0.187 0	0.208 7	44	87	$1^{3}/_{4}$	$3^{7}/_{16}$
5.30	6.00	0.208 7	0.236 2	47	93	$1^{7}/_{8}$	$3^{11}/_{16}$
6.00	6.70	0.236 2	0.263 8	50	100	2	$3^{15}/_{16}$
6.70	7.50	0.263 8	0.295 3	54	107	$2^{1}/_{8}$	$4^{3}/_{16}$
7.50	8.50	0.295 3	0.334 6	58	115	$2^{1}/_{4}$	$4^{1}/_{2}$
8.50	9.50	0.334 6	0.374 0	62	124	$2^{7}/_{16}$	$4^{7}/_{8}$
9.50	10.60	0.374 0	0.417 3	66	133	$2^{5}/_{8}$	$5^{1}/_{4}$
10.60	11.80	0.417 3	0.464 6	71	142	$2^{13}/_{16}$	$5^{5}/_{8}$
11.80	13.20	0.464 6	0.519 7	76	152	3	6
13.20	15.00	0.519 7	0.590 6	81	163	$3^{3}/_{16}$	$6^{7}/_{16}$
15.00	17.00	0.590 6	0.669 3	87	175	$3^{7}/_{16}$	$6^{7}/_{8}$
17.00	19.00	0.669 3	0.748 0	93	188	$3^{11}/_{16}$	$7^{7}/_{16}$
19.00	21.20	0.748 0	0.834 6	100	201	$3^{15}/_{16}$	$7^{15}/_{16}$
21.20	23.60	0.834 6	0.929 1	107	215	$4^{3}/_{16}$	$8^{1}/_{2}$
23.60	26.50	0.929 1	1.043 3	115	231	$4^{1}/_{2}$	$9^{1}/_{16}$
26.50	30.00	1.043 3	1.181 1	124	247	$4^{7}/_{8}$	$9^{3}/_{4}$
30.00	33.50	1.181 1	1.318 9	133	265	$5^{1}/_{4}$	$10^{7}/_{16}$
33.50	37.50	1.318 9	1.476 4	142	284	$5^{5}/_{8}$	$11^{3}/_{16}$
37.50	42.50	1.476 4	1.673 2	152	305	6	12
42.50	47.50	1.673 2	1.870 1	163	326	$6^{7}/_{16}$	$12^{13}/_{16}$
47.50	53.00	1.870 1	2.086 6	174	347	$6^{7}/_{8}$	$13^{11}/_{16}$
53.00	60.00	2.086 6	2.362 2	184	367	$7^{1}/_{4}$	$14^{7}/_{16}$
60.00	67.00	2.362 2	2.637 8	194	387	$7^{5}/_{8}$	$15^{1}/_{4}$
67.00	75.00	2.637 8	2.952 8	203	406	8	16
75.00	85.00	2.952 8	3.346 5	212	424	$8^{3}/_{8}$	$16^{11}/_{16}$

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 35 and 41 from the nominal value 38 mm, and length l may vary between 71 and 81 from the nominal value 76 mm.

2. *Preferred sizes*

   in millimetres and in inches: see Tables 1.1 and 1.2.

1.3.2 *General Table: Driving squares*

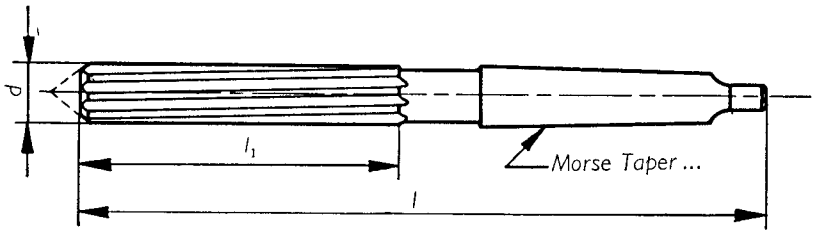
Diameter ranges d				Driving square		Driving square	
over	incl.	over	incl.	a	l_4	a	l_4
mm		in		mm		in	
1.32	1.50	0.052 0	0.059 1	1.12	4	0.044	$^5/_{32}$
1.50	1.70	0.059 1	0.066 9	1.25		0.049	
1.70	1.90	0.066 9	0.074 8	1.40		0.055	
1.90	2.12	0.074 8	0.083 5	1.60		0.063	
2.12	2.36	0.083 5	0.092 9	1.80		0.071	
2.36	2.65	0.092 9	0.104 3	2.00		0.079	
2.65	3.00	0.104 3	0.118 1	2.24	5	0.088	$^3/_{16}$
3.00	3.35	0.118 1	0.131 9	2.50		0.098	
3.35	3.75	0.131 9	0.147 6	2.80		0.110	
3.75	4.25	0.147 6	0.167 3	3.15	6	0.124	$^1/_4$
4.25	4.75	0.167 3	0.187 0	3.55		0.140	
4.75	5.30	0.187 0	0.208 7	4.00	7	0.157	$^9/_{32}$
5.30	6.00	0.208 7	0.236 2	4.50		0.177	
6.00	6.70	0.236 2	0.263 8	5.00	8	0.197	$^5/_{16}$
6.70	7.50	0.263 8	0.295 3	5.60		0.220	
7.50	8.50	0.295 3	0.334 6	6.30	9	0.248	$^{11}/_{32}$
8.50	9.50	0.334 6	0.374 0	7.10	10	0.280	$^{13}/_{32}$
9.50	10.60	0.374 0	0.417 3	8.00	11	0.315	$^7/_{16}$
10.60	11.80	0.417 3	0.464 6	9.00	12	0.354	$^{15}/_{32}$
11.80	13.20	0.464 6	0.519 7	10.00	13	0.394	$^1/_2$
13.20	15.00	0.519 7	0.590 6	11.20	14	0.441	$^9/_{16}$
15.00	17.00	0.590 6	0.669 3	12.50	16	0.492	$^5/_8$
17.00	19.00	0.669 3	0.748 0	14.00	18	0.551	$^{23}/_{32}$
19.00	21.20	0.748 0	0.834 6	16.00	20	0.630	$^{25}/_{32}$
21.20	23.60	0.834 6	0.929 1	18.00	22	0.709	$^7/_8$
23.60	26.50	0.929 1	1.043 3	20.00	24	0.787	$^{15}/_{16}$
26.50	30.00	1.043 3	1.181 1	22.40	26	0.882	$1^1/_{32}$
30.00	33.50	1.181 1	1.318 9	25.00	28	0.984	$1^3/_{32}$
33.50	37.50	1.318 9	1.476 4	28.00	31	1.102	$1^7/_{32}$
37.50	42.50	1.476 4	1.673 2	31.50	34	1.240	$1^{11}/_{32}$
42.50	47.50	1.673 2	1.870 1	35.50	38	1.398	$1^1/_2$
47.50	53.00	1.870 1	2.086 6	40.00	42	1.575	$1^{21}/_{32}$
53.00	60.00	2.086 6	2.362 2	45.00	46	1.772	$1^{13}/_{16}$
60.00	67.00	2.362 2	2.637 8	50.00	51	1.968	2
67.00	75.00	2.637 8	2.952 8	56.00	56	2.205	$2^7/_{32}$
75.00	85.00	2.952 8	3.346 5	63.00	62	2.480	$2^7/_{16}$

NOTE

Preferred sizes

in millimetres and in inches: See Tables 1.1 and 1.2.

2. LONG FLUTED MACHINE REAMERS
MORSE TAPER SHANK



2.1 Recommended dimensions in millimetres

d	l_1	l	M. T.	d	l_1	l	M. T.
7	54	134	1	32	133	293	4
8	58	138		(34)	142	302	
9	62	142		(35)			
10	66	146		36			
11	71	151		(38)	152	312	
12	76	156		40			
(13)				(42)			
14	81	161		(44)	163	323	
(15)		181	2	45			
16	87	187		(46)			
(17)				(48)	174	334	
18	93	193		50			
(19)				(52)		371	5
20	100	200		(55)	184	381	
(21)				56			
22	107	207		(58)			
(23)				(60)			
(24)	115	242	3	(62)	194	391	
25				63			
(26)				67			
(27)	124	251		71	203	400	
28							
(30)							

Sizes in brackets should be avoided wherever possible.

2.2 Recommended dimensions in inches

d	l_1	l	M. T.	d	l_1	l	M. T.
$^1/_4$	2	$5^1/_8$	1	1	$4^1/_2$	$9^1/_2$	3
$^9/_{32}$	$2^1/_8$	$5^1/_4$		$(1^1/_{16})$	$4^7/_8$	$9^7/_8$	
$^5/_{16}$	$2^1/_4$	$5^3/_8$		$1^1/_8$			
$^{11}/_{32}$	$2^7/_{16}$	$5^9/_{16}$		$1^1/_4$	$5^1/_4$	$10^1/_4$	
$^3/_8$	$2^5/_8$	$5^3/_4$		$(1^5/_{16})$		$11^9/_{16}$	4
$(^{13}/_{32})$				$1^3/_8$	$5^5/_8$	$11^{15}/_{16}$	
$^7/_{16}$	$2^{13}/_{16}$	$5^{15}/_{16}$		$(1^7/_{16})$			
$(^{15}/_{32})$	3	$6^1/_8$		$1^1/_2$	6	$12^5/_{16}$	
$^1/_2$				$(1^5/_8)$			
$^9/_{16}$	$3^3/_{16}$	$7^1/_8$	2	$1^3/_4$	$6^7/_{16}$	$12^3/_4$	
$^5/_8$	$3^7/_{16}$	$7^3/_8$		$(1^7/_8)$	$6^7/_8$	$13^3/_{16}$	
$^{11}/_{16}$	$3^{11}/_{16}$	$7^5/_8$		2			
$^3/_4$	$3^{15}/_{16}$	$7^7/_8$		$2^1/_4$	$7^1/_4$	15	5
$(^{13}/_{16})$				$2^1/_2$	$7^5/_8$	$15^3/_8$	
$^7/_8$	$4^3/_{16}$	$8^1/_8$		3	$8^3/_8$	$16^1/_8$	

Sizes in brackets should be avoided wherever possible.

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 2.3.1 for the appropriate lengths and taper shanks.

2. *Cutting portion*

   Tolerance on diameter d measured immediately behind the lead: m6* (for reamers supplied from stock).
   For dimensions in inches, direct conversion into inches of the metric values of m6.

3. *Shanks*

   Morse tapers are in accordance with ISO Recommendation R . . .** dealing with 5 per cent tapers for tool shanks.

4. *Tolerance on length*

   See General Table 2.3.

* ISO System of Limits and Fits.

** In course of preparation.