INTERNATIONAL STANDARD 263

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

ISO inch screw threads — General plan and selection for screws, bolts and nuts — Diameter range 0,06 to 6 in

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, International Standard ISO 263 replaces ISO Recommendation R 263-1962 drawn up by Technical Committee ISO/TC 1, *Screw threads.*

The Member Bodies of the following countries approved the Recommendation :

Argentina
Australia
Austria
Canada
Chile
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Czechoslovakia
Denmark
Finland
France
Germany
Greece
Hungary
India
Israel
Italy
Japan
Netherlands
New Zealand
Norway
Poland
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United Kingdom
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The Member Bodies of the following countries expressed disapproval of the Recommendation on technical grounds :

Bulgaria
Sweden
U.S.S.R.

Printed in Switzerland

ISO inch screw threads — General plan and selection for screws, bolts and nuts — Diameter range 0.06 to 6 in

1 SCOPE AND FIELD OF APPLICATION

This International Standard tabulates ISO inch screw threads (except for pipe threads) having the basic profile for triangular screw threads specified in ISO 68, *ISO general purpose screw threads — Basic profile.*

It comprises both a general plan of the ISO inch screw threads and the ISO inch screw threads for screws, bolts and nuts, the latter being a selection from the former.

It contains sizes in the diameter range 0.06 to 6 in, comprising a number of series of diameter/pitch combinations, together with a system of thread designations.

It remains for each industry to choose for itself, by means of selection among the screw threads of this International Standard, the diameter/pitch combinations appropriate to its own needs.

2 THREADS SERIES

The general plan is characterized by a number of thread series, i.e. groups of diameter/pitch combinations distinguished from each other by the number of threads per inch associated with specific diameters of threads. These thread series are shown in Table 1.

2.1 Diameters

Columns 1 and 2 of Table 1 give primary and secondary sizes which should suffice to meet the common needs of design. Column 3 gives the decimal equivalents of these sizes.

2.2 Number of threads per inch

Columns 4 to 14 (inclusive) of Table 1 give the number of threads per inch which are recommended for association with the sizes in columns 1 and 2. These columns of threads per inch are divided into two groups :

- series with graded pitches : columns 4, 5 and 6;
- series with constant (uniform) pitches : columns 7 to 14.

2.2.1 *Series with graded pitches*

There are three series with graded pitches. They are headed "coarse", "fine" and "extra-fine", in compliance with present practice.

These terms denote the relative magnitudes of the pitches of the three series for any given diameter of thread and do not imply any difference in the quality of the threads in the series.

The coarse and fine thread series shall be the first choice for general engineering applications, and they form the selected series for the commercial production of screws, bolts and nuts.

2.2.2 *Series with constant (uniform) pitches*

In addition to the three series of graded pitches, Table 1 includes columns of constant pitches which have been selected from the range 4 to 32 threads per inch. Each of these series is limited to an appropriate range of diameters.

3 DESIGNATIONS

The screw threads in this general plan are designated as shown in the column headings of Table 1, i.e. as follows :

3.1 Series with graded pitches

Coarse thread series : designation UNC;
for example : 1/4-20 UNC, No. 4-40 UNC

Fine thread series : designation UNF;
for example : 1/4-28 UNF, No. 4-48 UNF

Extra-fine thread series : designation UNEF;
for example : 1/4-32 UNEF.

3.2 Series with constant (uniform) pitches

All of the diameter/pitch combinations of the threads in these constant-pitch series are designated UN; for example 1-16 UN.

4 DIAMETER/PITCH COMBINATIONS

TABLE 1 — Diameter/pitch

Sizes		Basic Major diameter	Number of threads per inch										
			Series with graded pitches			Series with constant (uniform) pitches							
			Coarse thread series *	Fine thread series *	Extra-fine thread series	4-thread series	6-thread series	8-thread series	12-thread series	16-thread series	20-thread series	28-thread series	32-thread series
Primary	Secondary	in	UNC	UNF	UNEF	UN	UN	UN	UN	UN	UN	UN	UN
1	2	3	4	5	6	7	8	9	10	11	12	13	14
No.0		0.060 0		80									
	No. 1	0.073 0	64	72									
No.2		0.086 0	56	64									
	No. 3	0.099 0	48	56									
No.4		0.112 0	40	48									
No.5		0.125 0	40	44									
No.6		0.138 0	32	40									UNC
No.8		0.164 0	32	36									UNC
No.10		0.190 0	24	32									UNF
	No.12	0.216 0	24	28	32							UNF	UNEF
1/4		0.250 0	20	28	32						UNC	UNF	UNEF
5/16		0.312 5	18	24	32						20	28	UNEF
3/8		0.375 0	16	24	32					UNC	20	28	UNEF
7/16		0.437 5	14	20	28					16	UNF	UNEF	32
1/2		0.500 0	13	20	28					16	UNF	UNEF	32
9/16		0.562 5	12	18	24				UNC	16	20	28	32
5/8		0.625 0	11	18	24				12	16	20	28	32
	11/16	0.687 5			24				12	16	20	28	32
3/4		0.750 0	10	16	20				12	UNF	UNEF	28	32
	13/16	0.812 5			20				12	16	UNEF	28	32
7/8		0.875 0	9	14	20				12	16	UNEF	28	32
	15/16	0.937 5			20				12	16	UNEF	28	32
1		1.000 0	8	12	20			UNC	UNF	16	UNEF	28	32
	1 1/16	1.062 5			18			8	12	16	20	28	
1 1/8		1.125 0	7	12	18			8	UNF	16	20	28	
	1 3/16	1.187 5			18			8	12	16	20	28	
1 1/4		1.250 0	7	12	18			8	UNF	16	20	28	
	1 5/16	1.312 5			18			8	12	16	20	28	
1 3/8		1.375 0	6	12	18		UNC	8	UNF	16	20	28	
	1 7/16	1.437 5			18		6	8	12	16	20	28	
1 1/2		1.500 0	6	12	18		UNC	8	UNF	16	20	28	
	1 9/16	1.562 5			18		6	8	12	16	20		
1 5/8		1.625 0			18		6	8	12	16	20		
	1 11/16	1.687 5			18		6	8	12	16	20		
1 3/4		1.750 0	5				6	8	12	16	20		
	1 13/16	1.812 5					6	8	12	16	20		
1 7/8		1.875 0					6	8	12	16	20		

* Selected series for screws, bolts and nuts, and first choice for general engineering applications.

TABLE 1 — (*concluded*)

Sizes		Basic major diameter	Number of threads per inch										
			Series with graded pitches			Series with constant (uniform) pitches							
Primary	Secondary		Coarse thread series *	Fine thread series *	Extra-fine thread series	4-thread series	6-thread series	8-thread series	12-thread series	16-thread series	20-thread series	28-thread series	32-thread series
		in	UNC	UNF	UNEF	UN	UN	UN	UN	UN	UN	UN	UN
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	$1\frac{15}{16}$	1.937 5					6	8	12	16	20		
2		2.000 0	$4\frac{1}{2}$				6	8	12	16	20		
	$2\frac{1}{8}$	2.125 0					6	8	12	16	20		
$2\frac{1}{4}$		2.250 0	$4\frac{1}{2}$				6	8	12	16	20		
	$2\frac{3}{8}$	2.375 0					6	8	12	16	20		
$2\frac{1}{2}$		2.500 0	4			UNC	6	8	12	16	20		
	$2\frac{5}{8}$	2.625 0				4	6	8	12	16	20		
$2\frac{3}{4}$		2.750 0	4			UNC	6	8	12	16	20		
	$2\frac{7}{8}$	2.875 0				4	6	8	12	16	20		
3		3.000 0	4			UNC	6	8	12	16	20		
	$3\frac{1}{8}$	3.125 0				4	6	8	12	16			
$3\frac{1}{4}$		3.250 0	4			UNC	6	8	12	16			
	$3\frac{3}{8}$	3.375 0				4	6	8	12	16			
$3\frac{1}{2}$		3.500 0	4			UNC	6	8	12	16			
	$3\frac{5}{8}$	3.625 0				4	6	8	12	16			
$3\frac{3}{4}$		3.750 0	4			UNC	6	8	12	16			
	$3\frac{7}{8}$	3.875 0				4	6	8	12	16			
4		4.000 0	4			UNC	6	8	12	16			
	$4\frac{1}{8}$	4.125 0				4	6	8	12	16			
$4\frac{1}{4}$		4.250 0				4	6	8	12	16			
	$4\frac{3}{8}$	4.375 0				4	6	8	12	16			
$4\frac{1}{2}$		4.500 0				4	6	8	12	16			
	$4\frac{5}{8}$	4.625 0				4	6	8	12	16			
$4\frac{3}{4}$		4.750 0				4	6	8	12	16			
	$4\frac{7}{8}$	4.875 0				4	6	8	12	16			
5		5.000 0				4	6	8	12	16			
	$5\frac{1}{8}$	5.125 0				4	6	8	12	16			
$5\frac{1}{4}$		5.250 0				4	6	8	12	16			
	$5\frac{3}{8}$	5.375 0				4	6	8	12	16			
$5\frac{1}{2}$		5.500 0				4	6	8	12	16			
	$5\frac{5}{8}$	5.625 0				4	6	8	12	16			
$5\frac{3}{4}$		5.750 0				4	6	8	12	16			
	$5\frac{7}{8}$	5.875 0				4	6	8	12	16			
6		6.000 0				4	6	8	12	16			

* Selected series for screws, bolts and nuts, and first choice for general engineering applications.

ANNEX

A.1 APPLICATION OF THREAD SERIES

A.1.1 Coarse thread series

This series, which extends up to 4 in diameter, is generally utilized for the bulk production of bolts, screws and nuts and for other general engineering applications. It is used in general applications for threading into lower tensile strength materials, such as cast iron, mild steel and soft materials, to obtain the optimum resistance to stripping of the internal thread. It is applicable for rapid assembly or disassembly, or if corrosion or slight damage is possible.

A.1.2 Fine thread series

This series, which extends up to 1 1/2 in diameter, is suitable for the production of bolts, screws and nuts and for other applications where the coarse series is not applicable. External threads of this series have greater tensile stress area than comparable sizes of the coarse series. The fine series is suitable when the resistance to stripping of both external and mating internal threads equals or exceeds the tensile load-carrying capacity of the externally threaded member. It is also used where the length of engagement is short, where a smaller lead angle is desired, or where the wall thickness demands a fine pitch. It may also be used for threading into lower-strength materials where maximum strength of the external thread is not required; otherwise the length of engagement must be selected to meet the above-required strength conditions.

A.1.3 Extra-fine thread series

This series, which extends up to 1 11/16 in diameter, is applicable where even finer pitches of threads are desirable for short lengths of engagement and for thin-walled tubes, nuts, ferrules or couplings. It is also generally applicable under the conditions stated above for the fine thread series.

A.1.4 Constant-pitch series

The various constant-pitch series with 4, 6, 8, 12, 16, 20, 28 and 32 threads per inch, given in Table 1, offer a comprehensive range of diameter/pitch combinations for those purposes where the threads in the coarse, fine and extra-fine series do not meet the particular requirements of the design.

When selecting threads from these constant-pitch series, preference should be given, wherever possible, to those tabulated in the 8, 12 or 16 thread series.

A.2 CORRESPONDING INCH-MILLIMETRE VALUES

Tables 2 and 3 give, for the ISO inch screw threads, the corresponding values in millimetres of

a) basic major diameters (Table 2) and

b) pitches (Table 3).

TABLE 2 — **Basic major diameters**

Sizes	Basic major diameter		Sizes	Basic major diameter	
	in	mm		in	mm
No. 0	0.060 0	1,524	2	2.000 0	50,800
No. 1	0.073 0	1,854	$2\frac{1}{8}$	2.125 0	53,975
No. 2	0.086 0	2,184	$2\frac{1}{4}$	2.250 0	57,150
No. 3	0.099 0	2,515	$2\frac{3}{8}$	2.375 0	60,325
No. 4	0.112 0	2,845	$2\frac{1}{2}$	2.500 0	63,500
No. 5	0.125 0	3,175	$2\frac{5}{8}$	2.625 0	66,675
No. 6	0.138 0	3,505	$2\frac{3}{4}$	2.750 0	69,850
No. 8	0.164 0	4,166	$2\frac{7}{8}$	2.875 0	73,025
No. 10	0.190 0	4,826	3	3.000 0	76,200
No. 12	0.216 0	5,486	$3\frac{1}{8}$	3.125 0	79,375
$\frac{1}{4}$	0.250 0	6,350	$3\frac{1}{4}$	3.250 0	82,550
$\frac{5}{16}$	0.312 5	7,938	$3\frac{3}{8}$	3.375 0	85,725
$\frac{3}{8}$	0.375 0	9,525	$3\frac{1}{2}$	3.500 0	88,900
$\frac{7}{16}$	0.437 5	11,112	$3\frac{5}{8}$	3.625 0	92,075
$\frac{1}{2}$	0.500 0	12,700	$3\frac{3}{4}$	3.750 0	95,250
$\frac{9}{16}$	0.562 5	14,288	$3\frac{7}{8}$	3.875 0	98,425
$\frac{5}{8}$	0.625 0	15,875	4	4.000 0	101,600
$\frac{11}{16}$	0.687 5	17,462	$4\frac{1}{8}$	4.125 0	104,775
$\frac{3}{4}$	0.750 0	19,050	$4\frac{1}{4}$	4.250 0	107,950
$\frac{13}{16}$	0.812 5	20,638	$4\frac{3}{8}$	4.375 0	111,125
$\frac{7}{8}$	0.875 0	22,225	$4\frac{1}{2}$	4.500 0	114,300
$\frac{15}{16}$	0.937 5	23,812	$4\frac{5}{8}$	4.625 0	117,475
1	1.000 0	25,400	$4\frac{3}{4}$	4.750 0	120,650
$1\frac{1}{16}$	1.062 5	26,988	$4\frac{7}{8}$	4.875 0	123,825
$1\frac{1}{8}$	1.125 0	28,575	5	5.000 0	127,000
$1\frac{3}{16}$	1.187 5	30,162	$5\frac{1}{8}$	5.125 0	130,175
$1\frac{1}{4}$	1.250 0	31,750	$5\frac{1}{4}$	5.250 0	133,350
$1\frac{5}{16}$	1.312 5	33,338	$5\frac{3}{8}$	5.375 0	136,525
$1\frac{3}{8}$	1.375 0	34,925	$5\frac{1}{2}$	5.500 0	139,700
$1\frac{7}{16}$	1.437 5	36,512	$5\frac{5}{8}$	5.625 0	142,875
$1\frac{1}{2}$	1.500 0	38,100	$5\frac{3}{4}$	5.750 0	146,050
$1\frac{9}{16}$	1.562 5	39,688	$5\frac{7}{8}$	5.875 0	149,225
$1\frac{5}{8}$	1.625 0	41,275	6	6.000 0	152,400
$1\frac{11}{16}$	1.687 5	42,862			
$1\frac{3}{4}$	1.750 0	44,450			
$1\frac{13}{16}$	1.812 5	46,038			
$1\frac{7}{8}$	1.875 0	47,625			
$1\frac{15}{16}$	1.937 5	49,212			

TABLE 3 — **Pitches**

Number of threads per inch	Pitch	
	in	mm
80	0.012 500	0,317 5
72	0.013 889	0,352 8
64	0.015 625	0,396 9
56	0.017 857	0,453 6
48	0.020 833	0,529 2
44	0.022 727	0,577 3
40	0.025 000	0,635 0
36	0.027 778	0,705 6
32	0.031 250	0,793 8
28	0.035 714	0,907 1
24	0.041 667	1,058 3
20	0.050 000	1,270 0
18	0.055 556	1,411 1
16	0.062 500	1,587 5
14	0.071 429	1,814 3
13	0.076 923	1,953 8
12	0.083 333	2,116 7
11	0.090 909	2,309 1
10	0.100 000	2,540 0
9	0.111 111	2,822 2
8	0.125 000	3,175 0
7	0.142 857	3,628 6
6	0.166 667	4,233 3
5	0.200 000	5,080 0
$4\frac{1}{2}$	0.222 222	5,644 4
4	0.250 000	6,350 0