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SPECIFICATION FOR ISO METRIC SCREW THREADS

Part I — Basic and Design Profiles

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BUREAU OF CEYLON STANDARDS

SPECIFICATION FOR ISO METRIC SCREW THREADS

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S. L. S. 268 : 1974

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BUREAU OF CEYLON STANDARDS
53, DHARMAPALA MAWATHA,
COLOMBO-3.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This Standard does not purport to include all the necessary provisions of a contract.

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SRI LANKA STANDARD SPECIFICATION FOR ISO METRIC SCREW THREADS

Part I—Basic and Design Profiles

FOREWORD

This Sri Lanka Standard Specification was prepared by the Drafting Committee on Metric Screw Threads. It was approved by the Mechanical Engineering Divisional Committee of the Bureau of Ceylon Standards and was authorised for adoption and publication by the Council of the Bureau on 21st May 1974.

Although this standard is not a revision of the C.S. 96: "Specification for Dimensions of Parallel Coarse Screw Thread of Whitworth form", this standard will replace it in due course.

This standard is being issued in different parts as under:

Part	I	—	Basic and Design profiles
Part	II	—	Pitch/Diameter Combination
Part	III	—	Basic Dimensions
Part	IV	—	Tolerancing system
Part	V	—	Tolerances
Part	VI	—	Limits of sizes for commercial Bolts and Nuts

This standard (Part I) is based on ISO/R 68: 1969 "ISO General Purpose Screw Threads, Basic Profile" issued by the International Organisation for Standardisation. In the preparation of this standard the assistance derived from the publications of the Indian Standards Institution is acknowledged.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with C.S. 102. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

This standard (Part I) deals with basic and design profiles for ISO metric screw threads.

2. SYMBOLS

2.1 The various symbols used in this standard shall denote the quantities mentioned below against each:

D	=	basic major diameter of internal thread
D_1	=	basic minor diameter of internal thread
D_2	=	basic pitch diameter of internal thread
d	=	basic major diameter of external thread
d_2	=	basic pitch diameter of external thread
d_1	=	basic minor diameter of external thread
H	=	height of the fundamental triangles
d_3	=	design minor diameter of external thread
h_3	=	basic depth of external thread
p	=	pitch
r	=	root radius of external thread

3. THREAD PROFILE

3.1 Basic Profile

The basic profile of the ISO Metric Screw Threads is shown by the heavy outline in Fig. 1.

3.2 Design Profiles of Internal and External Threads (Maximum material conditions)

The design profiles of the internal and external screw threads are shown in Fig. 2. These represent the profiles of the threads in their maximum material condition.

3.2.1 Design Profile of External Threads

The design profile of an external thread in its maximum material condition is the same as the basic profile except that the root of the thread (at the minor diameter) is rounded to a theoretical radius equal to 0.14434 P below the flat of width P/4.

3.2.2 Design Profile of Internal Threads

The design profile of an internal thread in its maximum material condition is the same as the basic profile. In practice, in order to avoid sharp corners at the root of threads (major diameter), the roots are rounded as shown in Fig. 2 and cleared beyond a width of P/8.

3.3 Basic Numerical Thread Data

The basic numerical thread data for the various standard pitches of ISO metric screw threads are given in Table 1.

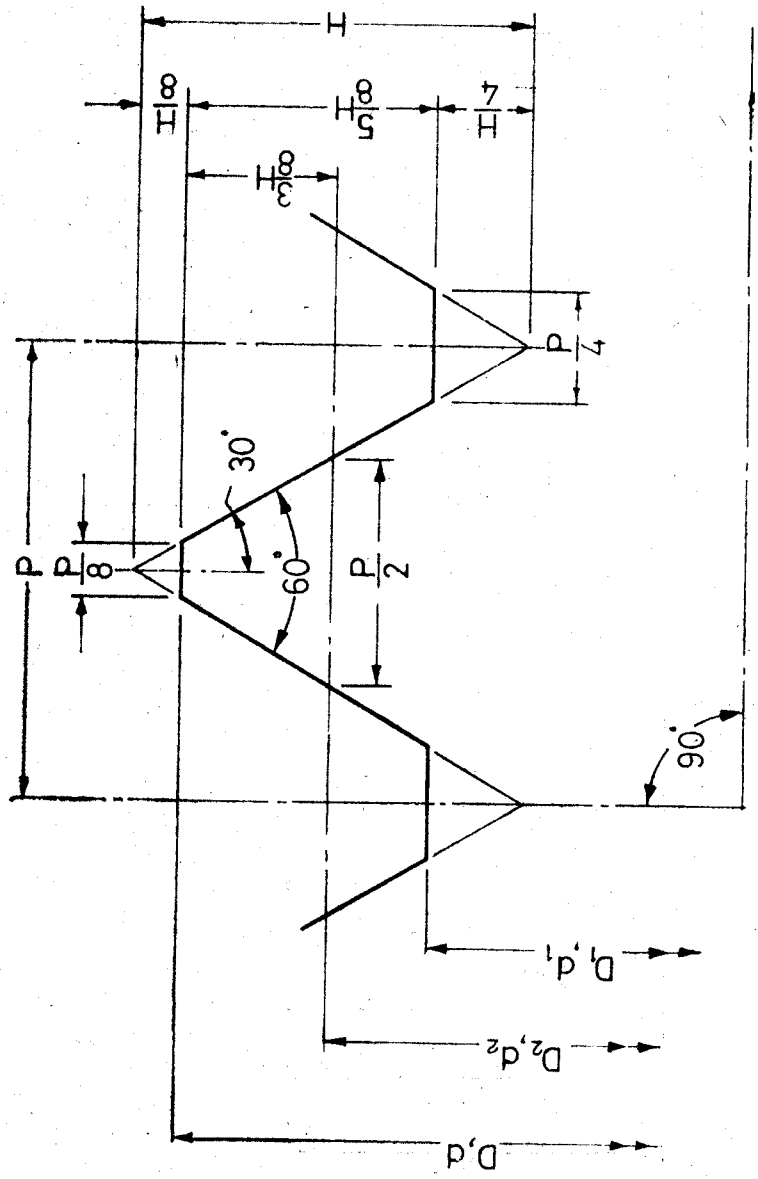


Fig. 1—Basic Profile

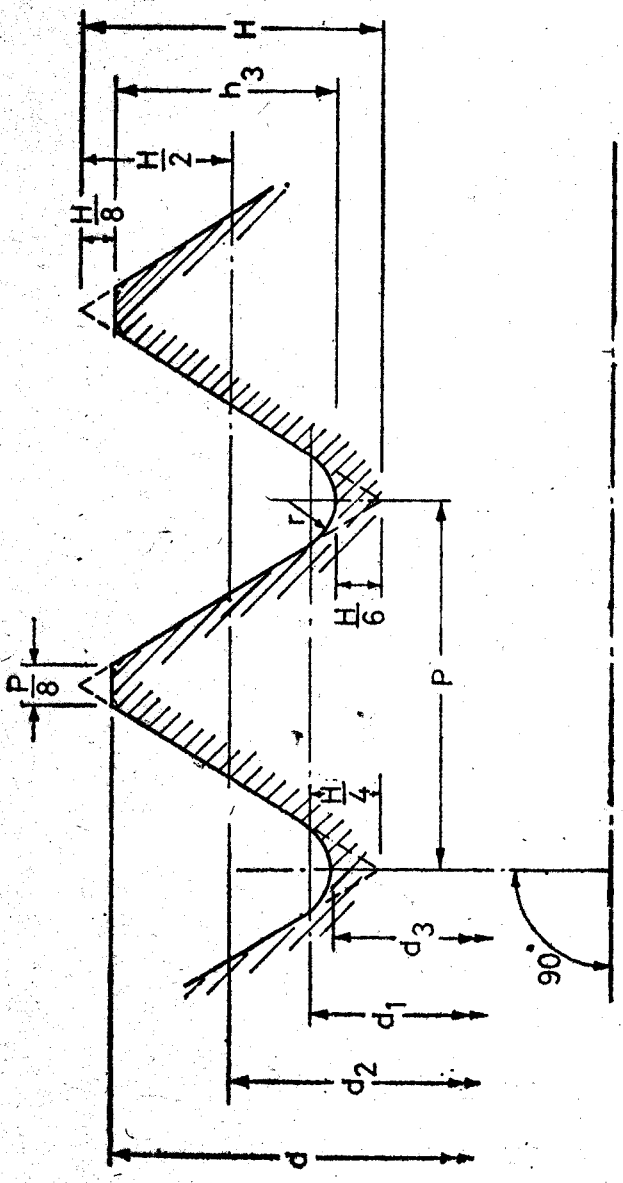


Fig. 2—Design Profiles

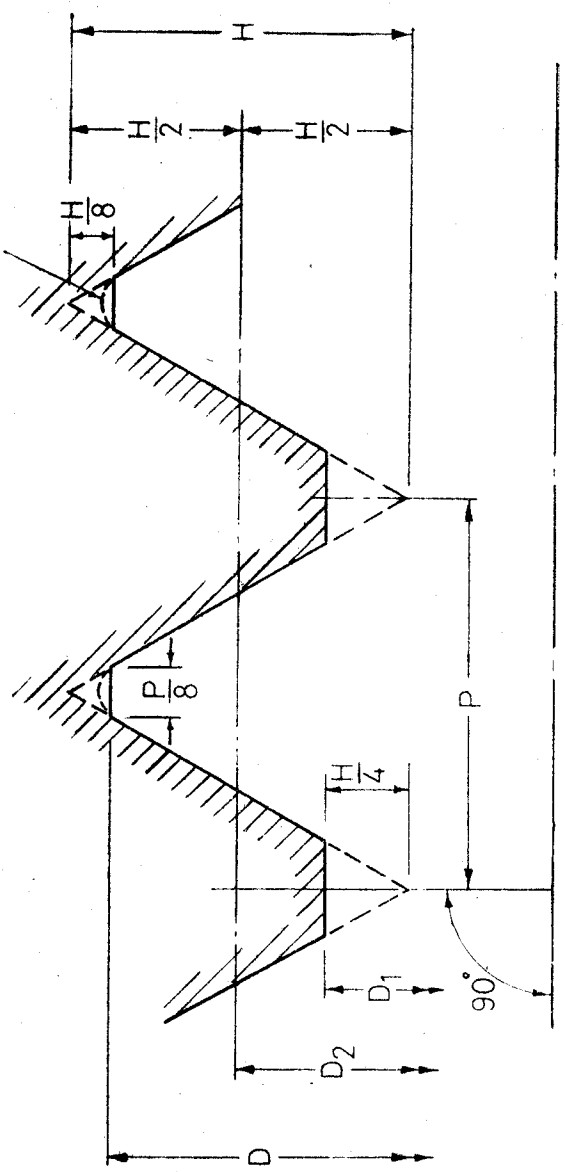


Fig. 2—Design Profiles

In practice the root is rounded and cleared beyond a width of P/8.

APPENDIX—A

Notes on Design Profile

A. 1 **Maximum Depth of Engagement**

The design profiles of external and internal threads as shown in Fig. 2, are such that if a pair of screw threads of the same basic size (each in maximum material condition) is assembled, contact between the two threads will be at the flanks over the radial depth of 5/8 H which is the maximum depth of engagement.

A. 2 **Roots of External and Internal Threads**

A. 2.1 To provide resistance to fatigue and shock loads, the roots of the external threads shall be rounded off within P/4 at the minor diameter of the internal thread. The root of the internal thread shall be rounded off and cleared beyond a flat of width P/8 at the major diameter of the external thread.

A. 2.2 The crests of the threads of GO screw ring and plug gauges are made flat of P/4 and P/8 width respectively. They may not, therefore, be used to inspect the form of the rounding at the roots of external and internal threads. Optical methods may however, be used to inspect them.

A. 3 **Crests of External Threads**

A. 3.1 The basic and design profiles of ISO metric external thread (see Fig. 1 and 2) show the crest as flat but modern methods of manufacture result in large quantities of external threads with crests partially or even completely rounded. The departure from flat crest is not detrimental. While the limiting profile within which the form of the crests of external threads should lie are represented by two full lines shown in Fig. 3, the minimum limiting profile shall, in practice, be taken as rounded at the crest as shown by the dotted arc.

A. 3.2 In some cases, the external thread may be required to have rounded crest. This should be stated following the appropriate designation. The normal radius of such rounding is 0.108 25 P.

APPENDIX—B

Notes on the Production of External Threads

B. 1 The actual profile of the crest of an ISO metric external thread depends on the method of manufacture.

B. 1.1 The limiting profiles permit the use of a new form tool having a minimum crest radius of 0.108 25 P. This tool may be retained in service until its crest radius wears to 0.14434P. However, if due care is taken of the tool wear, the rounded crest should rarely reach the dotted profile shown in Fig. 3.

B. 1.2 A single ribbed grinding wheel or a single point cutting tool produces a flat crest as shown in Fig. 5.

B. 1.3 The crest profile produced by the thread rolling process is shown in Fig. 6. The crests of external threads resulting from this process will normally fall above the minimum limiting profile shown in Fig. 3.

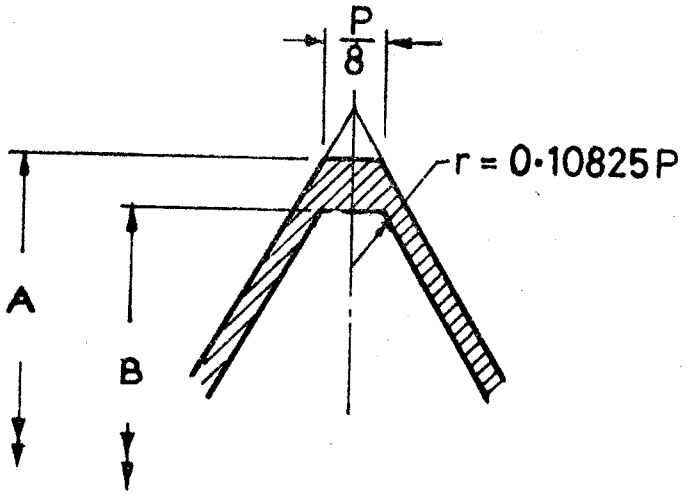
B. 1.4 A thread cutting die having root radius of 0.108 25P produces a crest as shown in Fig. 7. With a correctly formed tool there will be no serious loss of straight flank even when it cuts a thread of minimum pitch diameter as shown in Fig. 7.

B. 2 The following advantages are associated with external threads with rounded crests:

(a) External threads with rounded crests are less susceptible to damage by burring in handling and transport than those having flat crests, which result in sharp or semi-sharp edges at the major diameter of the external threads.

(b) Troubles associated with plating are far less serious if the crests of the external threads are rounded. In the plating of external threads by the usual barrel plating process, the burring of flat-crested threads may be quite serious and in still-vat process the plating tends to build up round the two edges at the major diameter and encroaches upon the flanks.

(c) The threads on thread rolling dies are stronger, less subject to fatigue failure and easier to grind if their roots are rounded rather than sharp-cornered.



A - Major Dia. Max.
B - Major Dia. Min.

Fig. 3—Limiting Profiles at Crests of External Threads

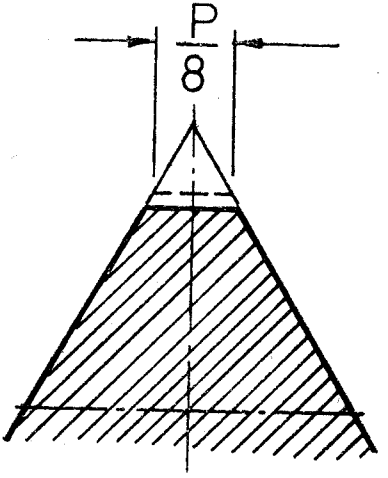


Fig. 4—Crest produced by grinding with a single-ribbed wheel or cutting with a single point tool.

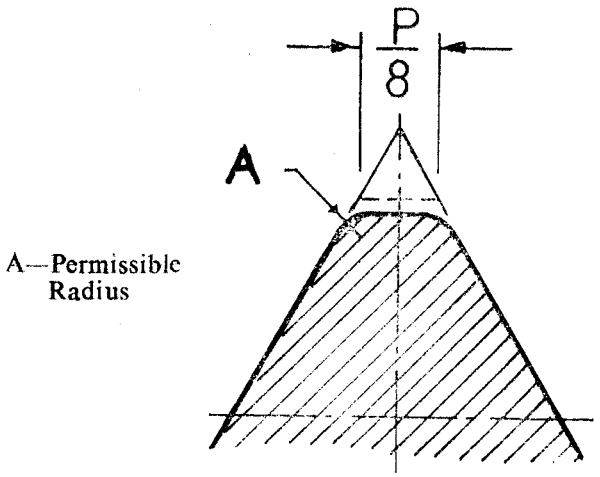


Fig. 5— Crest produced by grinding with a crushed multiribbed wheel.

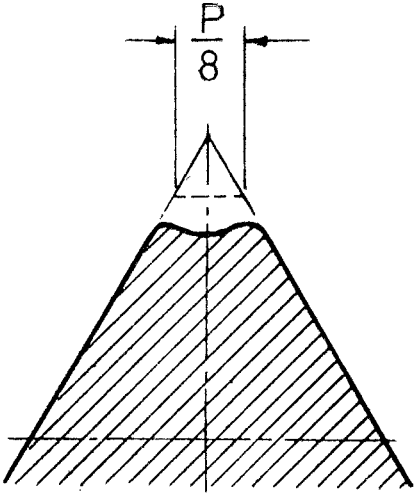
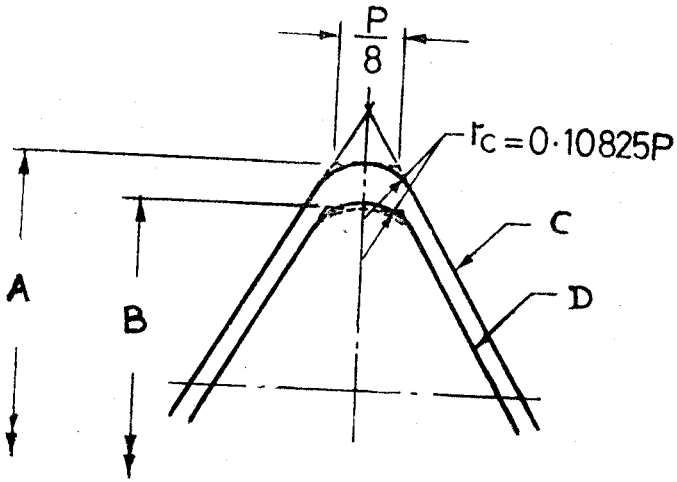


Fig. 6—Crest Produced by Thread Rolling



A—Major Dia. Max.
B—Major Dia. Min.
C—Limiting Profile, Max.
D—Limiting Profile, Min.

Fig. 7 Crest Produced by Thread Cutting Die

TABLE 1

BASIC PROFILE DIMENSIONS

$$H=\frac{\sqrt{3}}{2}P=0{,}866\ 025\ 404P$$

$$\tfrac{5}{8}H=0{,}541\ 265\ 877\ P$$

$$\tfrac{3}{8}H=0{,}324\ 759\ 526\ P$$

$$\frac{H}{4}=0{,}216\ 506\ 351\ P$$

$$\frac{H}{8}=0{,}108\ 253\ 175\ P$$

Values in millimetres

Pitch P	H	$\frac{5}{8}H$	$\frac{3}{8}H$	$\frac{H}{4}$	$\frac{H}{8}$
0,2	0,173 205	0,108 253	0,064 952	0,043 301	0,021 651
0,25	0,216 506	0,135 316	0,081 190	0,054 127	0,027 063
0,3	0,259 808	0,162 380	0,097 428	0,064 952	0,032 476
0,35	0,303 109	0,189 443	0,113 666	0,075 777	0,037 889
0,4	0,346 410	0,216 506	0,129 904	0,086 603	0,043 301
0,45	0,389 711	0,243 570	0,146 142	0,097 428	0,048 714
0,5	0,433 013	0,270 633	0,162 380	0,108 253	0,054 127
0,6	0,519 615	0,324 760	0,194 856	0,129 904	0,064 952
0,7	0,606 218	0,378 886	0,227 332	0,151 554	0,075 777
0,75	0,649 519	0,405 949	0,243 570	0,162 380	0,081 190
0,8	0,692 820	0,433 013	0,259 808	0,173 205	0,086 603
1	0,866 025	0,541 266	0,324 760	0,216 506	0,108 253
1,25	1,082 532	0,676 582	0,405 949	0,270 633	0,135 316
1,5	1,299 038	0,811 899	0,487 139	0,324 760	0,162 380
1,75	1,515 544	0,947 215	0,568 329	0,378 886	0,189 443
2	1,732 051	1,082 532	0,649 519	0,433 013	0,216 506
2,5	2,165 063	1,353 165	0,811 899	0,541 266	0,270 633
3	2,598 076	1,623 798	0,974 279	0,649 519	0,324 760
3,5	3,031 089	1,894 431	1,136 658	0,757 772	0,378 886
4	3,464 102	2,165 063	1,299 038	0,866 025	0,433 013
4,5	3,897 114	2,435 696	1,461 418	0,974 279	0,487 139
5	4,330 127	2,706 329	1,623 798	1,082 532	0,541 266
5,5	4,763 140	2,976 962	1,786 177	1,190 785	0,595 392
6	5,196 152	3,247 595	1,948 557	1,299 038	0,649 519
8	6,928 203	4,330 127	2,598 076	1,732 051	0,866 025

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