

Cycles —

Part 8: Specification for screw threads used to assemble freewheels on bicycle hubs

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Mechanical Engineering Standards Policy Committee (GME/-) to Technical Committee GME/25, upon which the following bodies were represented:

- Association for Consumer Research
- Association of Cycle Traders
- Bicycle Association of Great Britain
- British Battery Manufacturers' Association
- British Cycling Federation
- British Rubber Manufacturers' Association
- Consumer Policy Committee of BSI
- Cyclists' Touring Club
- Department of Trade and Industry
- Department of Transport
- Institute of Trading Standards Administration
- British Society for the Prevention of Accidents
- Small Electrical Appliances Marketing Association
- Individual manufacturers of cycles

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National foreword

This part of BS 6102 has been prepared under the direction of the General Mechanical Engineering Standards Policy Committee and forms Part of a series implementing corresponding international standards in the development of which the United Kingdom has played an active part. This Part of BS 6102 supersedes BS 6102-8:1982 which is withdrawn.

This standard is identical with ISO 6698:1989. "*Cycles — Screw threads used to assemble freewheels on bicycle hubs*", which was prepared by Technical Committee ISO/TC149 of the International Organization for Standardization (ISO).

Cross-references

International standard	Corresponding British Standard
	BS 3643 ISO metric screw threads
ISO 68:1973	Part 1:1981 Principles and basic data
ISO 965-1:1980	(Technically equivalent)
ISO 1502:1978	BS 919 Specification for screw gauge limits and tolerances
	Part 3:1968 Gauges for ISO metric screw threads
	(Technically equivalent)

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 6, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Introduction

Inch screw threads of British Standard Cycle (B.S.C.) thread profile are used extensively throughout the world for various applications on bicycle components, and have been standardized in national standards. The purpose of this document is to provide an International Standard for the particular screw thread used to assemble freewheels on bicycle hubs: it is based on the use of the ISO basic thread profile and complies as far as is practicable with existing International Standards for general purpose screw threads.

The change to an ISO system of screw threads will inevitably take a long time to complete in view of the millions of bicycles now in use which employ B.S.C. thread profile inch screw threads and for which replacement spare parts will be required. For this reason, in order to minimize changes in production methods during the change to the International Standard, and also to secure satisfactory interchangeability with the B.S.C. screw threads now used, the ISO screw thread in this International Standard has the same pitch as that of the 1,37 in \times 24 t.p.i. B.S.C. screw thread it is intended to replace; this means that the pitch is in inch units (turns per inch or t.p.i.) but all other dimensions are specified in metric units.

A 1 3/8 (1,375) in \times 24 t.p.i screw thread of ISO basic profile has been adopted in this International Standard. The basic pitch diameter of this thread differs by only 0,003 mm from that of the 1,37 in \times 24 t.p.i. B.S.C. thread, but, due to the smaller crest truncation of the ISO profile (see Figure 1) interference may occur at the major diameter when an ISO hub thread made towards its upper limit is assembled with a B.S.C. freewheel thread made towards its lower limit on major diameter. The possibility of interference occurring in this manner is considered to be unlikely in practice because of the effect of the manufacturing tolerances (negative on the hub and positive on the freewheel) and the usual practice of using high-crested screwing taps. However, a practical investigation has been carried out and has confirmed that there is little possibility of any interference arising in practice.

1 Scope

This International Standard specifies the thread profile and limits and tolerances for the screw threads used to assemble freewheels on bicycle hubs. It is based on

- a) the use of the ISO basic thread profile given in ISO 68;

- b) satisfactory interchangeability with the corresponding British Standard Cycle (B.S.C.) thread; this has required the use of an inch pitch (t.p.i.);
- c) the use of screw thread tolerance grades and tolerance positions given in ISO 965-1;
- d) the use of gauges made to ISO 1502.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards. ISO 68:1973, *ISO general purpose screw threads — Basic profile*.

ISO 965-1:1980, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data*.

ISO 1502:1978, *ISO general purpose metric screw threads — Gauging*.

3 Basic ISO thread profile and basic sizes

3.1 Basic profile

The basic profile is that given in ISO 68 and is shown in Figure 1. It is the theoretical profile associated with the basic sizes of the major, pitch and minor diameters of the screw thread.

3.2 Basic sizes

The basic major diameter, and the basic pitch and minor diameters determined from the basic profile, are given in Table 1.

Table 1 — Basic dimensions

Nominal diameter of thread in	t.p.i.	Basic sizes, mm		
		Major diameter	Pitch diameter	Minor diameter
1,375	24	34,925	34,238	33,779

4 Limits and tolerances

4.1 Fundamental deviations and maximum material limits

The fundamental deviations are applied to the basic diameters and establish the maximum material limits.

For the hub thread the fundamental (upper) deviations are negative and correspond to tolerance position “g” on the major, pitch and minor diameters.

For the freewheel thread the fundamental (lower) deviations are zero and correspond to tolerance position “H” on the major, pitch and minor diameters.

4.2 Tolerance grades, tolerances and limits of size

The application of tolerances to the maximum material limits, negative tolerances for the hub thread, and positive tolerances for the freewheel thread, determines the minimum material limits of size.

The tolerances and limits of size are given in Table 2 and Table 3 respectively for the hub and the freewheel. The tolerances are grade 6 in accordance with ISO 965-1.

The fundamental deviations and tolerance zones are shown in Figure 2.

Table 2 — Limits and tolerances for screw threads on hubs

t.p.i.	Major diameter d mm			Pitch diameter d_2 mm			Minor diameter d_1 mm
	max.	tol.	min.	max.	tol.	min.	max.
24	34,899	0,180	34,719	34,212	0,125	34,087	33,639
1	2	3	4	5	6	7	8

NOTE 1 The tolerances given in columns 3 and 6 are those recommended in ISO 965-1 for the nearest metric pitch corresponding to the t.p.i. given in column 1.

NOTE 2 The grade 6 pitch diameter tolerance differs from the grade 6 major diameter tolerance.

NOTE 3 The limit for the maximum minor diameter corresponds to a maximum truncation of $3H/16$: this conforms to the specifications for the root contour of external threads given in ISO 965-1.

5 Designation

Screw threads made to this International Standard are designated by

- a) the nominal diameter of the thread in inch units,
- b) the pitch of the thread in t.p.i.,
- c) the tolerance classes of the freewheel and hub thread respectively.

EXAMPLE

1,375 – 24 6H/6g

6 Gauging system

The gauging system is that laid down in ISO 1502 to which reference should be made for details of the thread profiles of the screw gauges and the method of gauge application.

ISO 1502 gives formulae for the calculation of the gauge limits. These formulae have been used to calculate the gauge limits for the freewheel and hub in this International Standard, and these limits are given in Table 4 to Table 7. It should be noted that the pitch diameter limits given in Table 4 to Table 6 relate to the simple pitch diameter, and separate tolerances are given in ISO 1502 for the pitch and flank angles of these gauges.

These tolerances are

Pitch tolerance = 0,005 mm

Flank angle tolerance

= $\pm 0^\circ 15'$ for profiles with complete flanks;

= $\pm 0^\circ 16'$ for profiles with truncated flanks.

Table 3 — Limits and tolerances for screw threads on freewheels

t.p.i.	Major diameter, D mm		Pitch diameter, D_2 mm			Minor diameter, D_1 mm		
	D_3 min.	D min.	max.	tol.	min.	max.	tol.	min.
24	35,001	34,925	34,408	0,170	34,238	34,015	0,236	33,779
1	2	3	4	5	6	7	8	9

NOTE 1 The tolerances given in columns 5 and 8 are those recommended in ISO 965-1 for the nearest metric pitch corresponding to the t.p.i. given in column 1.

NOTE 2 The grade 6 pitch diameter tolerance differs from the grade 6 minor diameter tolerance.

NOTE 3 D_3 min. is the diameter to the radiused root of the freewheel thread that just clears the crest of a maximum hub thread, assuming no clearance between the flanks of the assembled threads.

Table 4 — Hub — Limits of size for GO screw ring and calliper gauges, and associated screw check, wear and setting plugs

Dimensions in millimetres

Type of gauge	Major diameter		Pitch diameter		Minor diameter	
	max.	min.	max.	min.	max.	min.
Solid GO screw ring gauge	—	34,984	34,217	34,203	33,760	33,746
Adjustable GO screw ring gauge	—	34,984	Set on setting plug		33,760	33,746
GO screw calliper gauge	Cleared		Distance from pitch line to crest is 0,229 5			
GO screw check plug for new solid GO screw ring gauge	34,908	34,890	34,199	34,191	33,583	—
NOT GO screw check plug for new solid GO screw ring gauge	34,433 5	34,424 5	34,221	34,213	33,593	—
Wear check plug for solid or adjustable GO screw ring gauge	34,442 5	34,433 5	34,230	34,222	33,593	—
Setting plug for GO screw calliper gauge	34,908	34,890	34,199	34,191	33,583	—
Full profile setting plug for adjustable GO screw ring gauge	34,908	34,890	34,210	34,202	33,593	—
Truncated profile setting plug for adjustable GO screw ring gauge	34,422 5	34,413 5	34,210	34,202	33,593	—

Table 5 — Hub — Limits of size for NOT GO screw ring and calliper gauges, and associated screw check, wear and setting plugs

Dimensions in millimetres

Type of gauge	Major diameter		Pitch diameter		Minor diameter	
	max.	min.	max.	min.	max.	min.
Solid NOT GO screw ring gauge	Cleared	34,908	34,087	34,073	33,882	33,854
Adjustable NOT GO screw ring gauge	Cleared	34,908	Set on setting plug		33,882	33,854
NOT GO screw calliper gauge	Thread profile size as for NOT GO screw ring gauge					
GO screw check plug for new solid NOT GO screw ring gauge	34,908	34,890	34,069	34,061	33,453	—
NOT GO screw check plug for new solid NOT GO screw ring gauge	34,783	34,765	34,091	34,083	33,475	—
Wear check plug for solid or adjustable NOT GO screw ring gauge	34,788	34,770	34,096	34,088	33,475	—
Setting plug for NOT GO screw calliper gauge	34,783	34,765	34,080	34,072	33,453	—
Full profile setting plug for adjustable NOT GO screw ring gauge	34,776	34,758	34,080	34,072	33,475	—
Truncated profile setting plug for adjustable NOT GO screw ring gauge	34,297	34,279	34,080	34,072	33,475	—

Table 6 — Freewheel — Limits of size for GO and NOT GO screw plug gauges

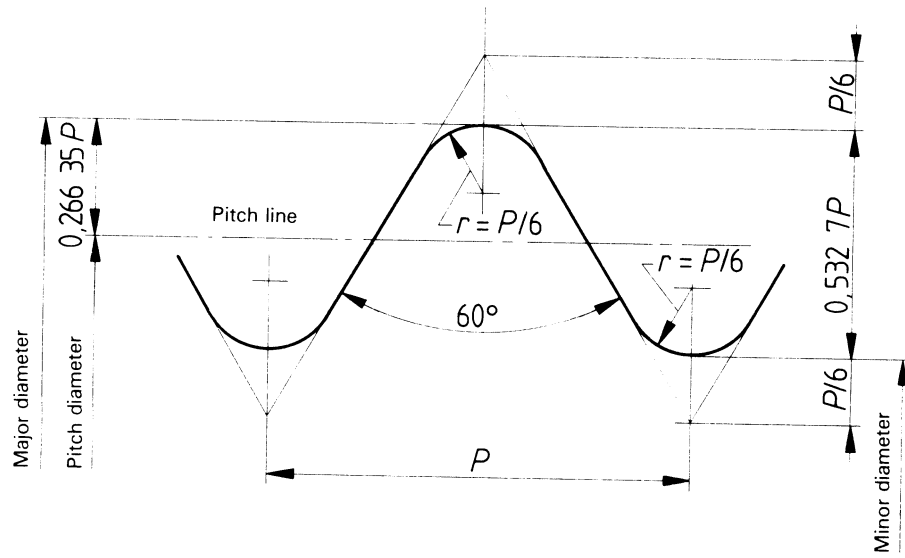
Dimensions in millimetres

Type of gauge	Major diameter		Pitch diameter			Minor diameter
			New gauge		Worn gauge	
	max.	min.	max.	min.	min.	max.
GO screw plug gauge	34,948	34,926	34,255 5	34,244 5	34,232 5	33,626
NOT GO screw plug gauge	34,636 5	34,614 5	34,419	34,408	34,402	33,626

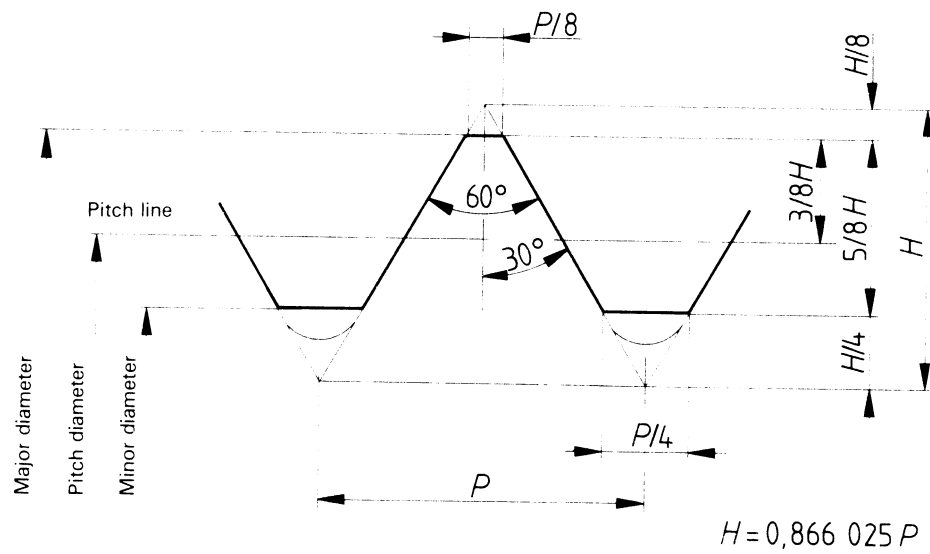
Table 7 — Hub and freewheel — Limits of size for GO and NOT GO plain ring or calliper gauges for hub major diameter, and GO and NOT GO plain plug gauges for freewheel minor diameter

Dimensions in millimetres

Type of gauge	GO gauge			NOT GO gauge	
	New gauge		Worn gauge	max.	min.
	max.	min.			
Plain ring or calliper gauge	34,869	34,853	34,899 max.	34,727	34,711
Plain plug gauge	33,825	33,809	33,779 min.	34,023	34,007



a) Basic profile of British Standard Cycle thread



b) Basic profile of ISO thread

Figure 1 — Basic profiles of British Standard Cycle and ISO threads

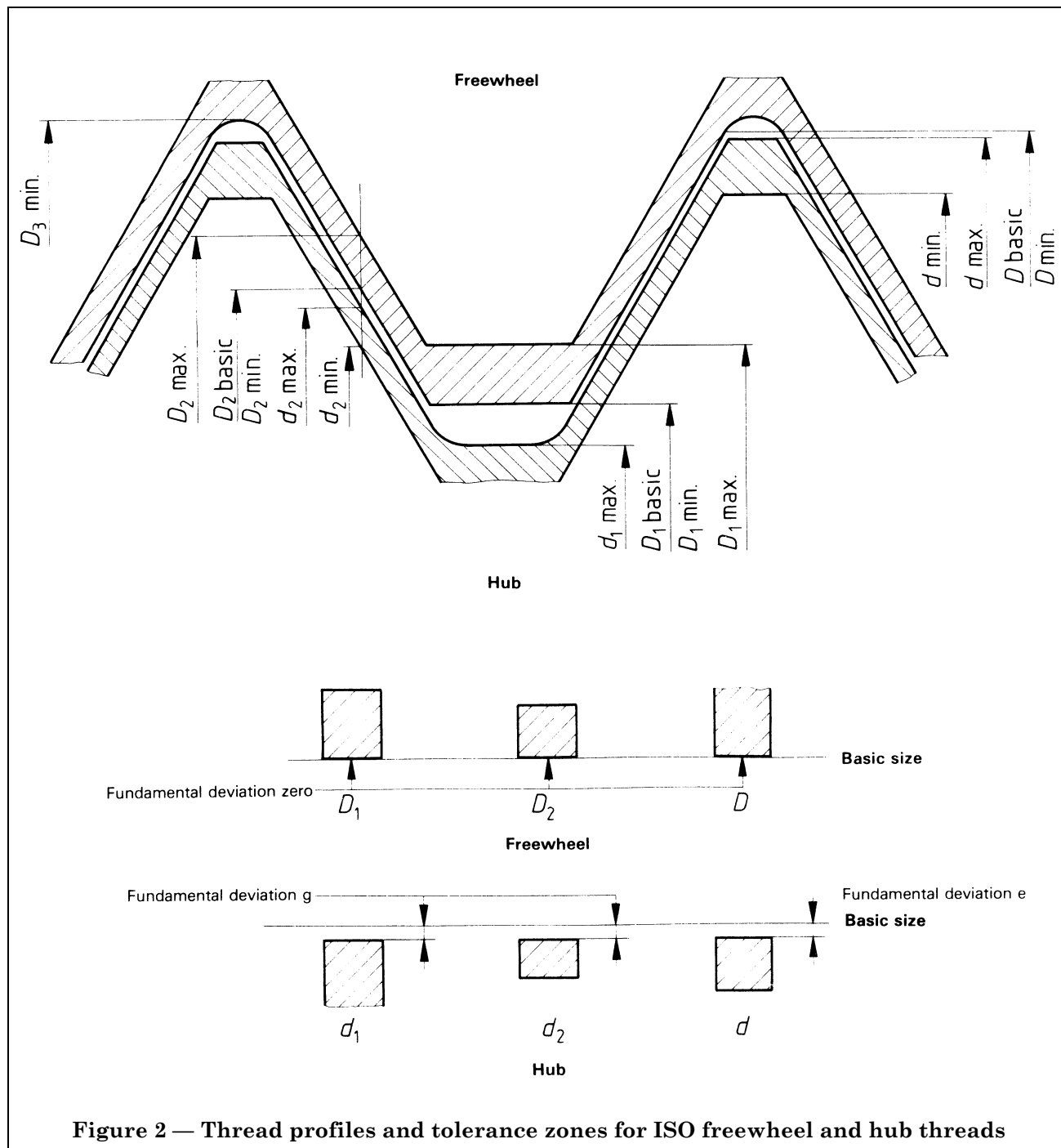


Figure 2 — Thread profiles and tolerance zones for ISO freewheel and hub threads

Publication(s) referred to

See national foreword.

BS 6102-8:
1990
ISO 6698:1989

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