INTERNATIONAL STANDARD

ISO 6696

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Cycles — Screw threads used in bottom bracket assemblies

Cycles — Filetages utilisés dans les ensembles boîtes de pédalier

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6696 was prepared by Technical Committee ISO/TC 149, *Cycles*.

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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 bottom bracket cups to bottom brackets on bicycles: 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 × 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 × 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 × 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 cup thread made towards its upper limit is assembled with a B.S.C. shell 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 cup and positive on the shell) and the usual practice of using high-crested screwing taps.

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Cycles — Screw threads used in bottom bracket assemblies

1 Scope

This International Standard specifies the thread profile and limits and tolerances for the screw threads used to assemble bottom bracket cups to bottom brackets on bicycles (adjustable cups with right-hand thread, fixed cups with left-hand thread). 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 thread on the cups the fundamental (upper) deviations are negative and correspond to tolerance position "g" on the pitch and minor diameters, and to tolerance position "e" on the major diameter.

For the threads on the shell the fundamental (lower) deviations are zero and correspond to tolerance position "H" on the major, pitch and minor diameters.

NOTE — A fundamental deviation of position "e" on the major diameter of the cups is necessary on thin-walled components to be able to form the thread by rolling, without the removal of metal.

4.2 Tolerance grades, tolerances and limits of size

The application of tolerances to the maximum material limits, negative tolerances for the thread on the shell and positive tolerances for the threads on the cups determines the minimum material limits of size.

The tolerances and limits of size are given in tables 2 and 3 respectively for the cups and the shell. The tolerances are grade 6 except for the major diameter of the cups where it is grade 8, in accordance with ISO 965-1.

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

5 Designation

Screw threads made to this International Standard are designated by

a) the nominal diameter of the thread in inches;

b) the pitch of the thread in t.p.i.;

c) the respective tolerance classes of the cup and shell threads;

d) the direction: right- or left-hand.

EXAMPLE

— Adjustable cup and side of the shell away from the chainwheel:

1,375 — 24 6H/6g 8e right-hand

— Fixed cup and side of the shell towards the chainwheel:

1,375 — 24 6H/6g 8e left-hand

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 shell and cup in this International Standard, and these limits are given in tables 4 to 7. It should be noted that the pitch diameter limits given in tables 4 to 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

= ± 0° 15′ for profiles with complete flanks;

= ± 0° 16′ for profiles with truncated flanks.

Table 2 — Limits and tolerances for screw threads on cups

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	34,865	0,280	34,585	34,212	0,125	34,087	33,639
1	2	3	4	5	6	7	8

NOTES

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.

2 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.

3 The adjustable cup has a right-hand thread, and the fixed cup a left-hand thread.

Table 3 — Limits and tolerances for screw threads on bottom bracket shell

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

NOTES

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.

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

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

4 Note that the bottom bracket shell of a bicycle incorporates two threads in accordance with table 3, one a right-hand thread (on the opposite side to the chainwheel) the other a left-hand thread (on the side next to the chainwheel).

Table 4 — Cup — 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 — Cup — 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 sizes 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 — Shell — Limits of size for GO and NOT GO screw plug gauges

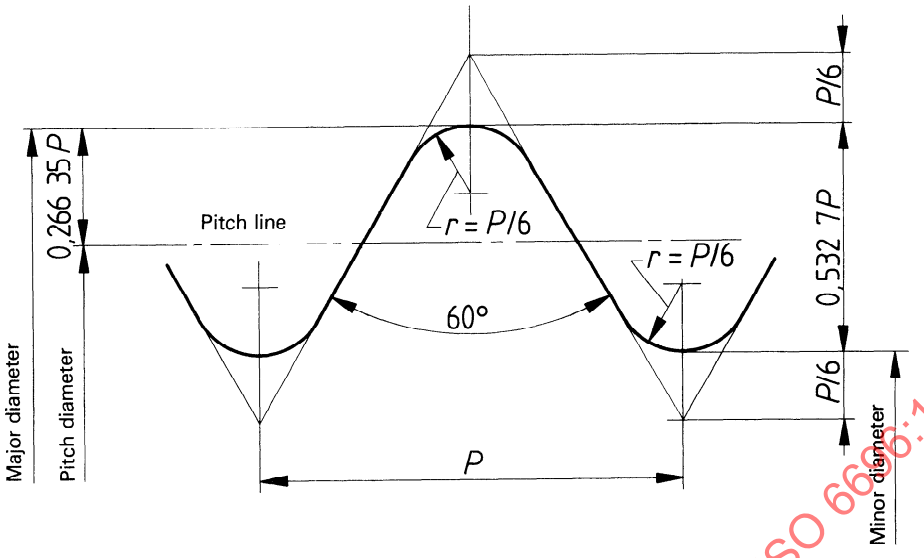
Dimensions in millimetres

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

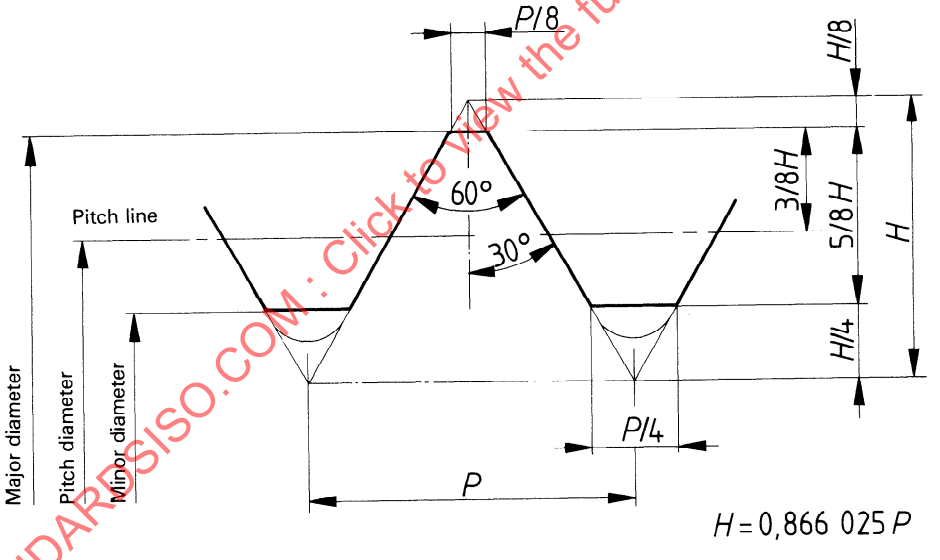
Table 7 — Cup and shell — Limits of size for GO and NOT GO plain ring or calliper gauges for cup major diameter, and GO and NOT GO plain plug gauges for shell minor diameter

Dimensions in millimetres

Type of gauge	GO gauge			NOT GO gauge	
	New gauge		Worn gauge		
	max.	min.		max.	min.
Plain ring or calliper gauge	34,835	34,819	34,865 max.	34,593	34,577
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