

# INTERNATIONAL STANDARD

**ISO**  
**6698**

Second edition  
1989-12-01

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## Cycles — Screw threads used to assemble freewheels on bicycle hubs

*Cycles — Filetages utilisés pour l'assemblage des roues libres sur les moyeux de  
bicyclettes*

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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 6698 was prepared by Technical Committee ISO/TC 149, *Cycles*.

This second edition cancels and replaces the first edition (ISO 6698 : 1981), of which it constitutes a minor revision.

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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 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.

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# Cycles — Screw threads used to assemble freewheels on bicycle hubs

## 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 tables 2 and 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.

## 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

Flank angle tolerance

=  $\pm 0^\circ 15'$  for profiles with complete flanks;=  $\pm 0^\circ 16'$  for profiles with truncated flanks.

## 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 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

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

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 grade 6 pitch diameter tolerance differs from the grade 6 major diameter tolerance.

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.

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

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 freewheel thread that just clears the crest of a maximum hub thread, assuming no clearance between the flanks of the assembled threads.