INTERNATIONAL STANDARD

ISO 7-2

Second edition
2000-09-15

Pipe threads where pressure-tight joints are made on the threads —

Part 2: Verification by means of limit gauges

Filetages de tuyauterie pour raccordement avec étanchéité dans le filet — Partie 2: Vérification par calibres à limites

Reference number
ISO 7-2:2000(E)

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Printed in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 7 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 7-2 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*, Subcommittee SC 5, *Threaded or plain end butt-welding fittings, gauging of threads*.

This second edition cancels and replaces the first edition (ISO 7-2:1982), which has been technically revised.

ISO 7 consists of the following parts, under the general title *Pipe threads where pressure-tight joints are made on the threads*:

— *Part 1: Dimensions, tolerances and designation*

— *Part 2: Verification by means of limit gauges*

Annex A forms a normative part of this part of ISO 7.

Introduction

This revision of ISO 7-2 has been undertaken with the aim of providing a unified gauging system which could be adopted worldwide and thus eliminate the differing gauging results obtained with the use of gauges in accordance with ISO 7-2:1982 and existing national practices. This revision also includes details of plain ring gauges to provide additional means of checking ISO 7-1 external threads and a parallel modified thread form check ring gauge for checking taper full form threaded plug gauges.

Pipe threads where pressure-tight joints are made on the threads —

Part 2: Verification by means of limit gauges

1 Scope

This part of ISO 7 specifies a process using limit gauges, for the validation of taper internal and external threads and parallel internal threads on piping systems components and other products, the dimensions and tolerances of which are detailed in ISO 7-1.

The gauging system described may not be suitable, without special precautions, for gauging of threads on injection moulded plastic workpieces.

This part of ISO 7 does not cover completely all the requirements necessary for full control of thread quality and dimensions. Additional control of tools and equipment and visual inspection during production are required to ensure complete compliance with ISO 7-1, for example the length of useful thread on internally threaded workpieces should be checked by direct measurement.

Annex A gives a summary of the gauges included in this part of ISO 7, together with details of the thread elements controlled by each gauge and gauge identification numbers.

In the event of a dispute over compliance with the requirements of ISO 7-1, the gauges in this part of ISO 7 are to be considered as decisive for the thread elements which they control on the workpiece.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 7. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 7 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation.*

3 Terms and definitions

For the purposes of this part of ISO 7, the terms and definitions given in ISO 7-1 and the following apply.

3.1
accommodation length
distance from the face of an internally threaded workpiece to the first obstruction which the externally threaded workpiece will encounter on assembly

See Figure 3.

4 Symbols

The symbols used and their explanations are given in Table 1.

Table 1 — Symbols

Symbol	Explanation
b_1	Width of clearance groove at major diameter of parallel full form threaded ring gauges and minor diameter of taper full form threaded plug gauges
b_2	Width of clearance groove at major diameter of parallel modified thread form check ring gauges and at minor diameter of taper modified thread form check plug gauges
c	Height of tolerance step on plug gauges
D	Major diameter of internal thread at gauge plane
D_1	Minor diameter of internal thread at gauge plane
D_2	Pitch diameter of internal thread at gauge plane
D_4	Counterbore diameter of parallel full form threaded ring gauge and taper plain ring gauge
d	Major diameter of external thread at gauge plane
d_1	Minor diameter of external thread at gauge plane
d_2	Pitch diameter of external thread at gauge plane
F	Radial distance from the pitch diameter to the truncated crest, along the centreline of the thread profile
l_0	Overall length of taper full form threaded plug gauge and taper modified thread form check plug gauge
l_1	Length from end face to the gauge plane on taper full form threaded plug gauge
l_2	Length of tolerance step on plug gauges
l_3	Overall length of parallel full form threaded ring gauge, parallel modified thread form check ring gauge and length from gauge plane to small end of taper plain ring gauge
l_4	Length of tolerance step on ring gauges
l_5	Depth of counterbore on parallel full form threaded ring gauge
l_6	Overall length of taper full form threaded plug gauge with relief
l_7	Width of relief on taper full form threaded plug gauge with relief
l_8	Length from relief on taper full form threaded plug gauge with relief to large end of gauge
l_9	Overall length of taper plain ring gauge
l_{10}	Depth of counterbore on taper plain ring gauge
l_{11}	Distance from step on gauge Nos. 1 and 2 to face of gauge No. 6 when verifying pitch diameter of new gauge Nos. 1 and 2
l_{12}	Distance from step on gauge No. 5 to face of gauge No. 6 when verifying pitch diameter of new gauge No. 6
l_{13}	Distance from step on gauge Nos. 1 and 2 to face of gauge No. 6 when checking pitch diameter of gauge Nos. 1 and 2 for wear

Table 1 (*concluded*)

Symbol	Explanation
l_{14}	Distance from step on gauge No. 5 to face of gauge No. 3 when checking pitch diameter of gauge No. 3 for wear
P	Pitch
$T_{\alpha 1}/2$	Tolerance on flank angle of full form threads
$T_{\alpha 2}/2$	Tolerance on flank angle of modified form threads
T_{CP}	Tolerance on pitch diameter for taper modified thread form check plug gauge and parallel modified thread form check ring gauge
T_P	Tolerance on pitch
T_{PL}	Tolerance on pitch diameter and wear allowance for taper full form threaded plug gauges
T_R	Tolerance on pitch diameter and wear allowance for parallel full form threaded ring gauge and tolerance on diameter and wear allowance for taper plain ring gauge
T_1	Tolerance on the gauge length of an external thread
T_2	Tolerance on position of gauge plane on an internal thread
W	Permissible wear on diameter of all gauges except taper modified thread form check plug gauges
NOTE The values of D, D_1, D_2, d, d_1 and d_2 shown in Table 2 to Table 7 are basic values and are subject to the manufacturing tolerances specified in clause 7.	

5 Design of gauges

5.1 General

The taper full form threaded plug gauges and parallel full form threaded ring gauges (see 5.2 and 5.3) together with the taper plain ring gauges (see 5.4) have been chosen as representing the requirements for mating components or products within the tolerances of ISO 7-1.

Because of the 1:16 taper of the gauge and/or the threaded workpiece, it is possible to represent the maximum and minimum limits of diameter by means of tolerance steps within the axial length of the gauges.

The plain ring gauges included in this part of ISO 7, allow a combined check of the major diameter and the length of useful thread of externally threaded workpieces.

The taper modified thread form check plug gauge (see 5.5) and parallel modified thread form check ring gauge (see 5.6) for checking the manufacturing tolerances and wear allowances for the parallel full form threaded ring gauges and taper full form threaded plug gauges respectively, are made to a modified thread form.

Some dimensions given in this part of ISO 7 are more precise than the equivalent dimensions given in ISO 7-1. This greater precision is only intended to assist the gauge manufacturing process and is of no practical significance when using the gauges.

NOTE The expression "full form" has been used to describe those threaded plug and ring gauges which may be full form or alternatively have thread form relief at the discretion of the manufacturer, so as to differentiate from those threaded check plug and check ring gauges which are always of modified thread form.

5.2 Taper full form threaded plug gauges (gauges No. 1 and No. 2)

5.2.1 Taper full form threaded plug gauge (gauge No. 1)

This gauge is a 1:16 taper full form threaded plug gauge (see Figure 1) and is suitable for checking the major diameter (D) and pitch diameter (D_2) at the gauge plane of internal parallel (Rp) threads and internal taper (Rc) threads.

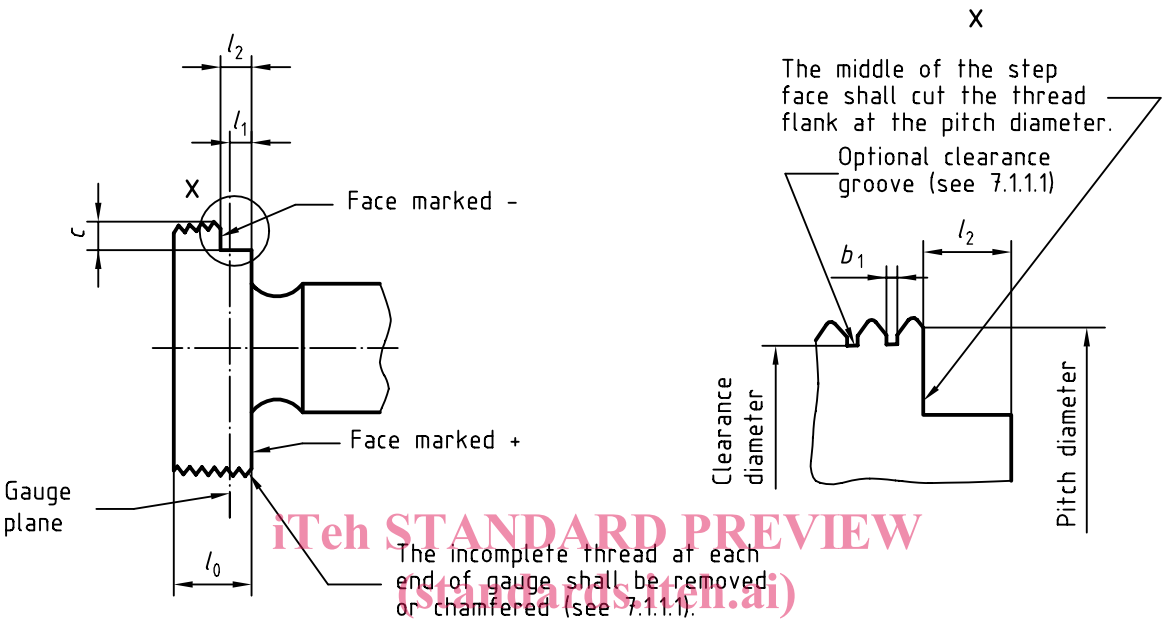


Figure 1 — Taper full form threaded plug gauge (gauge No. 1)

The dimensions of this gauge are given in Table 2 and manufacturing tolerances are given in 7.1.1.2.

The gauge incorporates a step equal in length to the total tolerance T_2 on the position of the gauge plane of the internal thread specified in ISO 7-1. To allow for the chamfer on the internal thread, the step is displaced by 0,5P relative to the gauge plane, such that the internally threaded workpiece can be verified with reference to its face.

The large diameter end face of the gauge is marked '+' (positive) and the face of the tolerance step is marked '–' (negative).

NOTE For sizes smaller than 1/2, the '+' and '–' markings may be omitted if not practicable.

Table 2 — Dimensions of taper full form threaded plug gauge (gauge No. 1)

Dimensions in millimetres

Designation of thread	Pitch	Diameters at gauge plane			Overall length of gauge	Length from end face to the gauge plane	Length of tolerance step	Width of clearance groove	Height of step
		major	Pitch	minor					
	P	d, D	d_2, D_2	d_1, D_1	l_0	l_1	l_2	b_1 max.	c
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1/16	0,907	7,723	7,142	6,561	5,6	1,588	2,268	0,3	1,8
1/8	0,907	9,728	9,147	8,566	5,6	1,588	2,268	0,3	1,8
1/4	1,337	13,157	12,301	11,445	8,4	2,339	3,342	0,4	2,4
3/8	1,337	16,662	15,806	14,950	8,8	2,339	3,342	0,4	2,4
1/2	1,814	20,955	19,793	18,631	11,4	3,175	4,536	0,5	3,3
3/4	1,814	26,441	25,279	24,117	12,7	3,175	4,536	0,5	4,5
1	2,309	33,249	31,770	30,291	14,5	4,041	5,773	0,6	5,8
1 1/4	2,309	41,910	40,431	38,952	14,5	4,041	5,773	0,6	5,8
1 1/2	2,309	47,803	46,324	44,845	14,5	4,041	5,773	0,6	5,8
2	2,309	59,614	58,135	56,656	15	4,041	5,773	0,6	5,8
2 1/2	2,309	75,184	73,705	72,226	17,5	4,618	6,927	0,6	6,9
3	2,309	87,884	86,405	84,926	18,5	4,618	6,927	0,6	6,9
4	2,309	113,030	111,551	110,072	20	4,618	6,927	0,6	6,9
5	2,309	138,430	136,951	135,472	24	4,618	6,927	0,6	10
6	2,309	163,830	162,351	160,872	24	4,618	6,927	0,6	10

NOTE The values given in columns 3, 4 and 5 are basic values intended for the calculation of diameters at the gauge plane in accordance with 7.1.1.

5.2.2 Taper full form threaded plug gauge with relief (gauge No. 2)

This gauge is a 1:16 taper full form threaded plug gauge with relief of threads (see Figure 2) and is suitable for checking the major diameter (D) and pitch diameter (D_2) at the gauge plane, and the accommodation length (see Figure 3) of internal parallel (Rp) threads and internal taper (Rc) threads.

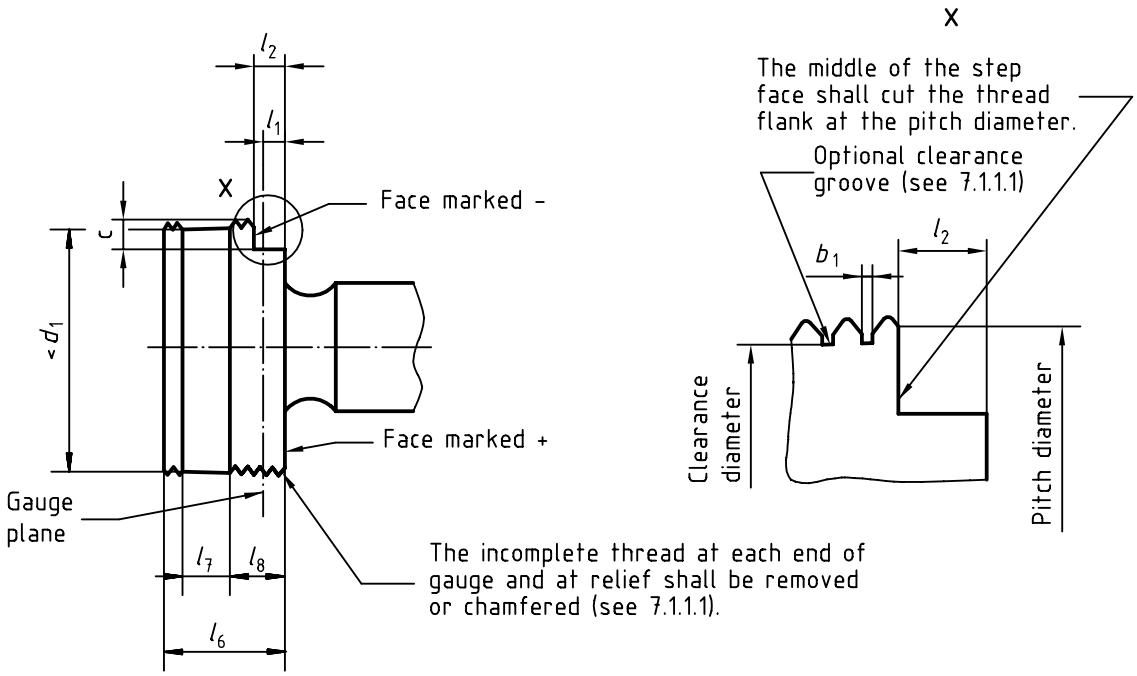
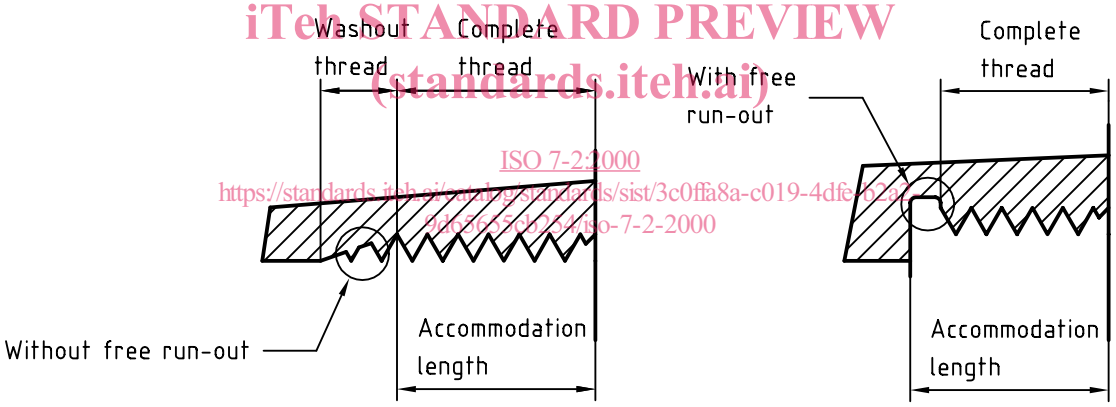


Figure 2 — Taper full form threaded plug gauge with relief (gauge No. 2)



NOTE Figure 3 is applicable to internal parallel (Rp) threads and internal taper (Rc) threads.

Figure 3 — Accommodation length

The dimensions of this gauge are given in Table 3 and manufacturing tolerances are given in 7.1.1.2.

The gauge incorporates a step equal in length to the total tolerance T_2 on the position of the gauge plane of the internal thread specified in ISO 7-1. To allow for the chamfer on the internal thread, the step is displaced by 0,5P relative to the gauge plane, such that the internally threaded workpiece can be checked with reference to its face. On sizes 1/4 and larger, a thread relief is provided part way along the gauge, thereby reducing the number of threads and consequential friction in contact with the internally threaded workpiece.

The overall length (l_6) of the gauge is equal to the length of useful thread for maximum gauge length plus 0,5P.

The large diameter end face of the gauge is marked '+' (positive) and the face of the tolerance step is marked '–' (negative).

NOTE For sizes smaller than 1/2, the '+' and '–' markings may be omitted if not practicable.