

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 0251 : 2008

(JMA)

**Limit gauges for metric screw
threads**

ICS 17.040.30; 21.040.10

Reference number : JIS B 0251 : 2008 (E)

PROTECTED BY COPYRIGHT

Date of Establishment: 1954-01-30

Date of Revision: 2008-03-20

Date of Public Notice in Official Gazette: 2008-03-21

Investigated by: Japanese Industrial Standards Committee
Standards Board

Technical Committee on Testing and Measurement
Technology

JIS B 0251 :2008, First English edition published in 2009-03

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

Contents

	Page
Introduction.....	1
1 Scope	1
2 Normative references	1
3 Symbols (including quantifier) and abbreviations	2
4 Types of gauges	4
4.1 Class and gauge symbol of limit gauges for screw threads	4
4.2 Class and gauge symbol of check gauges and setting gauges	4
5 Gauging of workpiece	5
5.0A General	5
5.1 Gauging of external threads	5
5.2 Gauging of internal threads.....	6
5.3 Inspection principle for gauging.....	6
6 Reference temperature	7
7 Function, control and use of gauges	7
7.0A General	7
7.1 Gauges for external threads of workpieces and their check plugs and setting plugs	7
7.2 Gauges for internal threads of workpieces	12
8 Tolerance zones for diameters of gauges (see figure 1 and figure 2).....	13
9 Tolerance zones for plain gauges (see figure 3 and figure 4).....	16
10 Thread profiles for gauges	17
10.1 Profiles with complete flanks and their application (see figure 5 and figure 6)	17
10.2 Profiles with truncated flanks and their application (see figure 7 and figure 8)	19
10.3 Displacement of the clearance groove for a profile with truncated flanks....	21
11 General features of screw gauges	22
11.1 Gauges for external threads of workpieces	22
11.2 Gauges for internal threads of workpieces	24
11.3 Removal and chamfering of incomplete threads	24
12 Tolerances and permissible wear for gauges (see table 8 to table 13)	24
13 Formulae for calculation of sizes and permissible deviations of gauges	26
13.1 Screw gauge for external thread of workpiece, and check plug and setting plug.....	26

13.2	Plain gauge for major diameter of external thread of workpiece	27
13.3	Screw gauge for internal thread of workpiece	27
13.4	Plain gauge for minor diameter of internal thread of workpiece	27
14	Shape, dimensions, permissible deviations and tolerances of gauges	31
15	Hardness and surface roughness	31
16	Test method	31
17	Inspection	31
18	Marking	31
Annex JA (normative)	Shape, dimension, permissible deviation and tolerance of gauges	32
Annex JB (informative)	Comparison table between JIS and corresponding International Standard	94

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Precision Measuring Instruments Manufactures Association (JMA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS B 0251** : 1998 is replaced with this Standard.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Limit gauges for metric screw threads

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of **ISO 1502** published in 1996 with some modifications of the technical contents.

The portions given sidelines or dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with the explanations is given in Annex JB.

1 Scope

This Standard specifies the limit gauges used for the dimensional inspection of metric screw threads specified in **JIS B 0205-2** (hereafter referred to as “limit gauges for screw threads”), and gauges used for checking and setting of them (hereafter referred to as “check gauges and setting gauges”) (The limit gauges for screw threads, the check gauges and the setting gauges are collectively referred to as “gauges” simply).

Other inspection methods, for example, the measurement by the indicating instrument may be used; however, the inspection using gauges specified in this Standard always takes precedence.

This Standard aims to specify the means to discriminate the workpiece threads within the permissible limit sizes from others.

The following principles shall apply to ensure the interchangeability of the workpiece threads and to avoid disputes between the manufacturer and the purchaser.

- a) The manufacturer shall not deliver any workpiece thread whose thread sizes (for example, the single pitch diameter and the virtual pitch diameter) are outside the permissible limit sizes.
- b) The purchaser shall not reject any workpiece thread whose thread sizes (for example, the single pitch diameter and the virtual pitch diameter) are within the permissible limit sizes.

To satisfy these two principles, this Standard specifies classes and sizes of gauges required for the inspection of screw threads, conditions for using these gauges, and the inspection for the workpiece threads.

NOTE : The International Standard corresponding to this Standard is as follows.

ISO 1502:1996 *ISO general-purpose metric screw threads—Gauges and gauging* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0205-2 *ISO general purpose metric screw threads—Part 2: General plan*

JIS B 0205-4 *ISO general purpose metric screw threads—Part 4: Basic dimensions*

JIS B 0209-1 *ISO general purpose metric screw threads—Tolerances—Part 1: Principles and basic data*

JIS B 0261 *Parallel screw thread gauges—Measuring method of gauges*

JIS B 0680 *Geometrical Product Specifications (GPS)—Standard reference temperature for geometrical product specification and verification*

NOTE : Corresponding International Standard: ISO 1 *Geometrical Product Specifications (GPS)—Standard reference temperature for geometrical product specification and verification* (IDT)

JIS B 3102 *Gauge blanks for screw threads limit gauges*

JIS B 7420 *Plain limit gauges*

NOTE : Corresponding International Standard: ISO/DIS 1938-1 : 1991 *Inspection of plain workpieces—Part 1: Plain limit gauges* (MOD)

3 Symbols (including quantifier) and abbreviations

Symbols (including quantifier) and abbreviations used in this Standard shall be in accordance with table 1.

Table 1 Symbols (including quantifier) and abbreviations

Symbols (including quantifier) and abbreviations	Definition
b_1	Width of the clearance groove at the major diameter of a gauge thread profile with complete flanks
b_2	Width of the clearance groove at the minor diameter of a gauge thread profile with complete flanks
b_3	Width of the clearance groove at the major and minor diameter, respectively, of a gauge thread profile with truncated flanks
d, D	Basic major diameter of a workpiece thread
D_1	Basic minor diameter of the internal thread of a workpiece
d_2, D_2	Basic pitch diameter of a workpiece thread
es	Fundamental deviation of the external thread of a workpiece (it is zero for tolerance position h)
EI	Fundamental deviation of the internal thread of a workpiece (it is zero for tolerance position H)
F_1	For thread profiles with truncated flanks, the radial distance between the pitch diameter line and the end of the straight part of the flank in the direction of the crest
F_2	For thread profiles with truncated flanks, the radial distance between the pitch diameter line and the end of the straight part of the flank in the direction of the root

Table 1 (concluded)

Symbols (including quantifier) and abbreviations	Definition
H	Height of the triangle of a thread profile
H_1	Tolerance on the diameter of plain plug gauges
H_2	Tolerance on plain ring gauges and the separation of the plain faces of calliper gauges
H_p	Tolerance on the size of check plug gauges for plain calliper gauges
LML	Least material limit
m	Distance between the middle of the tolerance zones of a screw ring gauge and that of a GO check plug
MML	Maximum material limit
P	Pitch
r_1	Radius of the clearance groove of the root profile of screw ring gauges or of screw calliper gauges
r_2	Radius of the clearance groove of the root profile of screw plug gauges
S	Displacement of the clearance groove from the centre of a thread profile with truncated flanks
$\frac{T_{\alpha 1}}{2}$	Tolerance for each flank angle of a profile with complete flanks
$\frac{T_{\alpha 2}}{2}$	Tolerance for each flank angle of a profile with truncated flanks
T_{CP}	Tolerance on the pitch diameter of GO screw check plugs, NOT GO screw check plugs, wear check plugs and setting plugs
T_d	Tolerance for the major diameter of the external thread of a workpiece
T_{d2}	Tolerance for the pitch diameter of the external thread of a workpiece
T_{D1}	Tolerance for the minor diameter of the internal thread of a workpiece
T_{D2}	Tolerance for the pitch diameter of the internal thread of a workpiece
T_P	Tolerance for the pitch of a gauge thread
T_{PL}	Tolerance for the pitch diameter of GO and NOT GO screw plug gauges
T_R	Tolerance for the pitch diameter of GO and NOT GO screw ring gauges
W_{GO}	Amount available for permissible wear of GO screw plug gauges and GO screw ring gauges
W_{NG}	Amount available for permissible wear of NOT GO screw plug gauges and NOT GO screw ring gauges
Z_1	Distance between the middle of the tolerance zone of a GO plug gauge and the lower limit of the minor diameter of a workpiece
Z_2	Distance between the middle of the tolerance zone of a GO calliper gauge or a GO ring gauge, and the upper limit of the major diameter of a workpiece
Z_{PL}	Distance between the middle of the tolerance zone of a GO screw plug gauge and the lower limit of an internal thread
Z_R	Distance between the middle of the tolerance zone of a GO screw ring gauge and the upper limit of an external thread

4 Types of gauges

4.1 Class and gauge symbol of limit gauges for screw threads

The class and gauge symbol of limit gauges for screw threads shall be in accordance with table 2.

Table 2 Class and gauge symbol of limit gauges for screw threads

Screw threads to be inspected	Items to be inspected	Class of limit gauges for screw threads	Gauge symbol ^{a)}
External threads	Pitch diameter	solid GO screw ring gauges	GR
		adjustable GO screw ring gauges	—
		GO screw calliper gauges	—
		solid NOT GO screw ring gauges	NR
		adjustable NOT GO screw ring gauges	—
		NOT GO screw calliper gauges	—
	Major diameter	plain GO ring gauges	PR ^{b)}
		plain GO calliper gauges	PC ^{b)}
		plain NOT GO ring gauges	PR ^{b)}
		plain NOT GO calliper gauges	PC ^{b)}
Internal threads	Pitch diameter	GO screw plug gauges	GP
		NOT GO screw plug gauges	NP
	Minor diameter	plain GO plug gauges	PP ^{b)}
		plain NOT GO plug gauges	PP ^{b)}
Notes ^{a)} The gauge symbols are not specified in ISO 1502 , but those conventionally used are specified for convenience.			
^{b)} When the GO side and the NOT GO side are separated, the characters of “GO” and “NOT GO” shall be affixed to the gauge symbols.			
Example: PP GO, PP NOT GO			

4.2 Class and gauge symbol of check gauges and setting gauges

The class and gauge symbol of check gauges and setting gauges shall be in accordance with table 3.

Table 3 Class and gauge symbol of check gauges and setting gauges

Limit gauges for screw threads for checking or for setting	Class of check gauges and setting gauges	Gauge symbol ^{a)}
Solid GO screw ring gauges	GO check plugs for new solid GO screw ring gauges	<u>GRGF</u>
	NOT GO check plugs for new solid GO screw ring gauges	<u>GRNF</u>
Adjustable GO screw ring gauges	Setting plugs for adjustable GO screw ring gauges	—
Solid or adjustable GO screw ring gauges	Wear check plugs for solid or adjustable GO screw ring gauges	<u>GW</u>
Solid NOT GO screw ring gauges	GO check plugs for new solid NOT GO screw ring gauges	<u>NRGF</u>
	NOT GO check plugs for new solid NOT GO screw ring gauges	<u>NRNF</u>
Adjustable NOT GO screw ring gauges	Setting plugs for adjustable NOT GO screw ring gauges	—
Solid or adjustable NOT GO screw ring gauges	Wear check plugs for solid or adjustable NOT GO screw ring gauges	<u>NW</u>
GO screw calliper gauges	Setting plugs for GO screw calliper gauges	—
NOT GO screw calliper gauges	Setting plugs for NOT GO screw calliper gauges	—
Plain GO calliper gauges	Reference disk for plain GO calliper gauges	—
	Wear reference disk for plain GO calliper gauges	—
Plain NOT GO calliper gauges	Reference disk for plain NOT GO calliper gauges	—
Note ^{a)} The gauge symbols are not specified in ISO 1502 , but those conventionally used are specified for convenience.		

5 Gauging of workpiece

5.0A General

It is not necessary to use all gauges specified in clause 4; however, in the gauging for permissible limit sizes, one of the GO screw gauges and one of the NOT GO screw gauges specified in 4.1 shall always be used for the inspection.

5.1 Gauging of external threads

Preferably a solid or an adjustable GO screw ring gauge should be used for gauging of external threads.

To save time, for convenience in inspection, or in cases where a GO screw ring gauge is not applicable, a GO screw calliper gauge may be used.

It is, however, recommended that gauging with GO screw calliper gauges should be supplemented by random sampling with a GO screw ring gauge, so that when a large number of workpiece threads are inspected with a GO screw calliper gauge, a certain percentage receives an additional inspection with a GO screw ring gauge, thus giving greater assurance of interchangeability between the workpiece threads.

A GO screw calliper gauge should not be used if the manufacturing process is likely to cause errors in the workpiece thread, which this gauge is not certain to detect, for example local pitch errors in milled threads or burrs at the start of the thread. Furthermore, a GO screw calliper gauge is not suitable for checking non-rigid workpieces, for example thin-walled workpieces which would be deformed by this gauge. In these cases, inspection should be carried out with a GO screw ring gauge.

Similarly, only solid or adjustable NOT GO screw ring gauges should be used for non-rigid workpieces, for example thin-walled workpieces which would be deformed by inspection with a NOT GO screw calliper gauge.

A NOT GO screw calliper gauge is used for the single pitch diameter inspection of an external thread.

Plain GO and plain NOT GO gauges are used for gauging the major diameter of an external thread of a workpiece. Whether a calliper or a ring gauge is used is determined by the form and rigidity of the workpiece. Plain ring gauges shall be used on non-rigid workpieces (see **JIS B 7420**).

5.2 Gauging of internal threads

GO and NOT GO screw plug gauges are used for gauging internal threads of workpieces and plain GO and plain NOT GO plug gauges are used for gauging the minor diameter of an internal thread of a workpiece (see **JIS B 7420**).

5.3 Inspection principle for gauging

5.3.1 By the manufacturer

In general, the inspection department that inspects the threads made in a workshop should use the same kind of gauges as are used in the workshop.

Disagreement between manufacturing and inspection can occur when products close to the permissible limit sizes are gauged.

When disputes do arise, it is recommended that the workpiece thread should be accepted if it is shown to be satisfactory by any gauge of the type concerned known to be within the requirements of this Standard (taking into consideration the admissible wear).

In cases of dispute, the inspection of screw ring gauges by check plugs is decisive if there is no other agreement between the manufacturer and the purchaser.

NOTE : The possibility of disputes can be reduced to a minimum by grading the gauges so that those used by manufacturers provide a more stringent inspection than those used on inspection. Generally, this can be achieved by issuing to the workshops new or only slightly worn GO gauges and slightly worn NOT GO gauges. Inspection should be made with GO gauges which are approaching the condition of maximum permissible wear and with new NOT GO gauges.

5.3.2 By the purchaser

There are three possible procedures, as listed below, for inspection of workpiece threads on behalf of the purchaser by an inspector who does not belong to the manufacturing plant concerned.

- a) The inspector gauges the workpiece threads with the manufacturer's gauges. In this case, the accuracy of the gauges used may be inspected by means of check plugs and setting plugs which belong either to the manufacturing plant (manufacturer) or to the inspector (purchaser) or, as far as screw plug gauges are concerned, by direct measurement.
- b) The inspector uses his own gauges for gauging the workpiece threads. In cases of dispute it is recommended that the workpiece thread should be accepted if it is shown to be satisfactory by any gauge of the class to be within the requirements of this Standard (taking into consideration the admissible wear).
- c) The inspector uses his own inspection gauges for gauging the workpiece threads.
The position of the tolerance zone for these gauges shall be such as to ensure that the purchaser does not reject threads whose actual size lies within the permissible limit size specified for the workpiece.

This Standard does not specify which gauges are to be used by the inspector; it only recommends that the purchaser inform the manufacturer when ordering what procedure will be employed for the inspection of the workpiece threads.

Worn gauges shall not be used for sample inspection.

6 Reference temperature

The dimensions of workpieces and gauges shall be those at the standard temperature 20 °C specified in **JIS B 0680**.

If the workpieces and gauges have the same coefficient of linear expansion (e.g. steel workpieces and steel gauges), the inspection temperature may deviate from 20 °C without detriment to the results, provided that the temperatures of both gauges and workpieces are the same.

If the workpieces and gauges have different coefficients of linear expansion (e.g. steel workpieces and carbide gauges or brass workpieces and gauges of steel or carbide), the temperature of both shall be 20 °C $\pm$ 2 °C at the time of gauging. Otherwise the difference between the thermal expansions of the workpiece and the gauge shall be taken into consideration.

7 Function, control and use of gauges

7.0A General

Throughout this clause, the designations of paragraphs are **a)** function; **b)** control; and **c)** use, but in the absence of **b)**, there is no specification for control.

7.1 Gauges for external threads of workpieces and their check plugs and setting plugs

7.1.1 Solid or adjustable GO screw ring gauges

The function, control and use of solid or adjustable GO screw ring gauges shall be as follows.

- a) **Function** A GO screw ring gauge inspects the virtual size of the external thread (gauging the virtual pitch diameter); i.e. it inspects the maximum material limit

(maximum permissible size) of the pitch diameter, taking into account pitch errors, errors in flank angles and deviations of form, which produce an apparent enlargement of the pitch diameter (virtual pitch diameter) of the workpiece. In addition, this gauge inspects whether the length of the straight flank is adequate, i.e. that the rounding at the root of the profile of the workpiece thread does not encroach too far upon the flank of the thread. The major diameter of the external thread shall not be inspected with this gauge.

Inspection with a GO screw ring gauge is essentially in accordance with the Taylor principle (see clause 11).

- b) **Control** A solid GO screw ring gauge manufactured according to the specified sizes shall be inspected by GO and NOT GO screw check plugs and shall be monitored regularly with a wear check plug.

If a NOT GO check plug is not used, other methods (e.g. direct measurement) shall be used to ensure that the maximum permissible size of the pitch diameter of a new GO screw ring gauge is not exceeded. Inspection of ring gauges with check plugs is preferable to all other methods of control.

An adjustable GO screw ring gauge shall be set to its setting plug and shall be monitored regularly with a wear check plug.

- c) **Use** A GO screw ring gauge, when screwed by hand without excessive force, shall pass over the whole length of the workpiece thread. If assembly is not possible, the workpiece thread does not comply with the specification.

7.1.2 GO or NOT GO check plugs for new solid GO screw ring gauges

The function and use of GO or NOT GO check plugs for new solid GO screw ring gauges shall be as follows.

- a) **Function** GO and NOT GO check plugs are used to inspect the limits of the pitch diameter of a new solid GO screw ring gauge.

A GO check plug inspects the maximum material limit of the total profile of a new solid GO screw ring gauge.

- c) **Use** A GO check plug, when screwed by hand without excessive force, shall pass over the whole length of the new solid GO screw ring gauge.

The NOT GO check plug, when screwed by hand without excessive force, may enter into both ends of a new solid GO screw ring gauge, but by not more than one turn of thread. The one turn of thread is determined when withdrawing the check plug.

7.1.3 Setting plugs for adjustable GO screw ring gauges

The function, control and use of setting plugs for adjustable GO screw ring gauges shall be as follows.

- a) **Function** A setting plug which comprises two successive portions, one with complete flanks and the other with truncated flanks, is used to set an adjustable GO screw ring gauge. It is not essential to use a double-length setting plug if a GO screw ring gauge is checked with a NOT GO check plug (see 7.1.2) after it has been adjusted.

- b) **Control** A GO screw ring gauge shall be set on the portion with complete flanks of the setting plug.
- c) **Use** The portion of the setting plug with truncated flanks, when screwed by hand without excessive force, shall pass over the GO screw ring gauge.

When the portion with truncated flanks of the setting plug is screwed through the screw ring gauge, there shall be no perceptible clearance between the setting plug and the screw ring gauge. If there is a clearance, the screw ring gauge shall be lapped and adjusted to the correct form and size in accordance with the manufacturer's instructions.

7.1.4 Wear check plug for solid or adjustable GO screw ring gauges

The function and use of wear check plugs for solid or adjustable GO screw ring gauges shall be as follows.

- a) **Function** A wear check plug is used to ascertain that the wear of the pitch diameter of a GO screw ring gauge has not exceeded the wear limit. It embodies the pitch diameter of a GO screw ring gauge at the specified wear limit.
- c) **Use** The wear check plug, when screwed by hand without excessive force, may enter into both ends of a GO screw ring gauge, but by not more than one turn of thread. The one turn of thread is determined when withdrawing the check plug. If the plug can be screwed in by more than one turn of thread, the GO screw ring gauge no longer meets the specification.

7.1.5 GO screw calliper gauges

The function, control and use of GO screw calliper gauges shall be as follows.

- a) **Function** A GO screw calliper gauge inspects the maximum permissible size of the pitch diameter in an axial plane, as apparently increased by pitch errors and errors in flank angle in the workpiece. In addition, it inspects whether the length of the straight flank is adequate, for example that the rounding at the root of the profile of the workpiece thread does not encroach too far upon the flank of the thread. The major diameter of the external thread shall not be inspected.

With regard to the embodiment of the virtual pitch diameter, a GO screw calliper gauge does not comply with the Taylor principle (e.g. periodic pitch errors and deviations of form are not detected).

- b) **Control** A GO screw calliper gauge shall be set with the setting plug specified.
- c) **Use** Workpiece threads are generally inspected with a GO screw calliper gauge under its own weight or under a fixed working load.

The GO screw calliper gauge shall inspect the workpiece thread at three positions at least, evenly distributed over the whole circumference of the thread. If the GO screw calliper gauge cannot pass over the workpiece thread, the workpiece thread does not comply with the specification.

When put on the workpiece, the GO screw calliper gauge may be moved slightly in order to minimize the effects of friction.

In cases of dispute, gauging with a GO screw ring gauge, preferably of the solid type, is decisive.

7.1.6 Setting plugs for GO screw calliper gauges

The function and use of setting plugs for GO screw calliper gauges shall be as follows.

- a) **Function** A GO anvils of a screw calliper gauge shall be set with a setting plug.
- c) **Use** A GO screw calliper gauge shall pass over the setting plug under its own weight or under a fixed working load. If this is not possible or if there is a clearance, the anvils of the GO screw calliper gauge shall be adjusted.

When put on the setting plug, the GO screw calliper gauge may be moved slightly.

7.1.7 NOT GO screw calliper gauges

The function, control and use of NOT GO screw calliper gauges shall be as follows.

- a) **Function** A NOT GO screw calliper gauge inspects the minimum permissible size of the pitch diameter of a workpiece. This inspection complies with the Taylor principle [see figure 10 a)].
- b) **Control** A NOT GO screw calliper gauge shall be set with the setting plug specified.
- c) **Use** The NOT GO screw calliper gauge shall not pass over the workpiece except for the first two threads of the workpiece thread. The inspection shall be carried out under the same conditions as the adjustment by means of the setting plug. It shall take place in at least three positions, evenly distributed over the circumference. If the gauge thread profile corresponds to figure 10 b), each gauging shall be repeated by displacing the gauge axially by one thread pitch.

7.1.8 Setting plugs for NOT GO screw calliper gauges

The function and use of setting plugs for NOT GO screw calliper gauges shall be as follows.

- a) **Function** A NOT GO anvils of a screw calliper gauge shall be set with a setting plug.
- c) **Use** The NOT GO screw calliper gauge shall pass over the setting plug under its own weight or under a fixed working load. If this is not possible or if there is a clearance, the anvils of NOT GO screw calliper gauge shall be adjusted.

When put on the setting plug, the NOT GO screw calliper gauge may be moved slightly.

7.1.9 Solid or adjustable NOT GO screw ring gauges

The function, control and use of solid or adjustable NOT GO screw ring gauges shall be as follows.

- a) **Function** A NOT GO screw ring gauge inspects whether the actual pitch diameter of a workpiece exceeds the specified minimum permissible size. Inspection with a NOT GO screw ring gauge does not correspond to the Taylor principle when inspecting rigid workpieces. In cases of non-rigid workpieces, departure from the Taylor principle is of less importance because of the flexibility of the workpieces.

- b) **Control** A solid NOT GO screw ring gauge manufactured according to the specified sizes shall be inspected by GO and NOT GO check plugs and shall be monitored regularly with a wear check plug. If a NOT GO check plug is not used, other methods shall be used to ensure that the maximum permissible size of the pitch diameter of a new NOT GO screw ring gauge is not exceeded.

An adjustable NOT GO screw ring gauge shall be set with the setting plug specified and shall be monitored regularly with a wear check plug.

- c) **Use** The NOT GO screw ring gauge, when screwed by hand without excessive force on the workpiece thread, may enter into both ends, but by not more than two turns of thread. The two turns of thread are determined when withdrawing the gauge. If the gauge can be screwed onto the workpiece by more than two turns of thread, the thread does not comply with the specification. The NOT GO screw ring gauge shall not pass completely over a workpiece with a length of thread of three threads or less.

7.1.10 GO or NOT GO check plugs for new solid NOT GO screw ring gauges

The function and use of GO or NOT GO check plugs for new solid NOT GO screw ring gauges shall be as follows.

- a) **Function** GO and NOT GO check plugs are used to inspect the limits of the pitch diameter of a new solid NOT GO screw ring gauge. A GO check plug shall ascertain that the clearing diameter of a new solid NOT GO screw ring gauge is not too small. If a wear check plug for a NOT GO screw ring gauge is provided, a NOT GO check plug may be dispensed with.
- c) **Use** The GO check plug, when screwed by hand without excessive force, shall pass over the corresponding new solid NOT GO screw ring gauge.

The NOT GO check plug, when screwed by hand without excessive force, may enter into both ends of the new solid NOT GO screw ring gauge, but by not more than one turn of thread. The one turn of thread is determined when withdrawing the check plug.

7.1.11 Setting plugs for adjustable NOT GO screw ring gauges

The function, control and use of setting plugs for adjustable NOT GO screw ring gauges shall be as follows.

- a) **Function** A setting plug which comprises two successive portions, one with complete flanks and the other with truncated flanks, is used to set an adjustable NOT GO screw ring gauge to the specified pitch diameter. It is not essential to use a double-length setting plug if a NOT GO screw ring gauge is inspected with a NOT GO check plug as described in 7.1.10 after it has been adjusted.
- b) **Control** A NOT GO screw ring gauge shall be set on the portion with complete flanks of the setting plug.
- c) **Use** The portion of the setting plug with complete flanks, when screwed by hand without excessive force, shall pass over the NOT GO screw ring gauge.

When the portion with truncated flanks of the setting plug is screwed through the NOT GO screw ring gauge, there shall be no perceptible clearance between the setting plug and the NOT GO screw ring gauge. If there is a clearance, the

screw ring gauge shall be lapped and adjusted to the correct form and size in accordance with the manufacturer's instructions.

7.1.12 Wear check plug for solid or adjustable NOT GO screw ring gauges

The function and use of wear check plugs for solid or adjustable NOT GO screw ring gauges shall be as follows.

- a) **Function** A wear check plug is used to ascertain that the wear of the pitch diameter of a NOT GO screw ring gauge has not exceeded the wear limit. It embodies the pitch diameter of a NOT GO screw ring gauge at the specified wear limit. If a NOT GO check plug for the NOT GO screw ring gauge is provided, the wear check plug may be dispensed with.
- c) **Use** The wear check plug, when screwed by hand without excessive force, may enter into both ends of a NOT GO screw ring gauge, but by not more than one turn of thread. The one turn of thread is determined when withdrawing the wear check plug. If the plug can be screwed in by more than one turn of thread, the NOT GO screw ring gauge no longer meets the specification.

7.1.13 Gauges for major diameter of workpieces

The function and use of gauges for the major diameter of workpieces shall be as follows.

- a) **Function** The major diameter of a workpiece thread is inspected with the plain calliper gauges or plain ring gauges. For the inspection of the maximum material limit of non-rigid workpieces, preference should be given to the use of a plain GO screw ring gauge; plain calliper gauges are recommended only if the workpieces have been manufactured by methods which do not involve the risk of errors in circularity.
- c) **Use** The plain GO calliper gauge shall pass over the workpiece thread under its own weight or under a fixed working load; the plain NOT GO calliper gauge may pass over the workpiece thread but only in a zone which has a distance of not more than two-pitch lengths from the start of the thread. Otherwise the workpiece thread does not comply with the specification.

7.2 Gauges for internal threads of workpieces

7.2.1 GO screw plug gauges

The function, control and use of GO screw plug gauges shall be as follows.

- a) **Function** A GO screw plug gauge inspects the virtual size of the internal thread (gauging the virtual pitch diameter). This inspects the maximum material limit (minimum permissible size) of the pitch diameter, taking into account pitch errors, errors in flank angles and deviations of form, which produce an apparent reduction of the pitch diameter (virtual pitch diameter) of the workpiece. In addition, it inspects whether the length of straight flank is adequate, i.e. that the rounding at the root of the profile does not encroach too far upon the flank of the thread. The minor diameter of the internal thread shall not be inspected with this gauge.

Inspection with a GO screw plug gauge is essentially in accordance with the Taylor principle.

- b) **Control** Wear of a GO screw plug gauge shall be monitored by re-measurement of the gauge at intervals of time according to the intensity of use. The admissible wear of the GO screw plug gauge is found by taking measurements. Instead of measuring, a wear check gauge (calliper gauge) with its setting plug may be used. However, in cases of dispute, sizes obtained by means of correctly performed measurements are decisive.
- c) **Use** The GO screw plug gauge, when screwed by hand without excessive force, shall pass over the whole length of the workpiece thread. If assembly is not possible, the workpiece thread does not comply with the specification.

7.2.2 NOT GO screw plug gauges

The function, control and use of NOT GO screw plug gauges shall be as follows.

- a) **Function** A NOT GO screw plug gauge inspects whether the actual pitch diameter exceeds the specified maximum permissible size. Inspection with the NOT GO screw plug gauge approximately corresponds to the Taylor principle.
- b) **Control** It is recommended that the NOT GO screw plug gauge should be inspected regularly for wear.
- c) **Use** The NOT GO screw plug gauge, when screwed by hand without excessive force on the workpiece thread, may enter into both ends, but by not more than two turns of thread. The two turns of thread are determined when withdrawing the gauge. If the gauge can be screwed on to the workpiece by more than two turns of thread, the workpiece thread does not comply with the specification.

The NOT GO screw plug gauge shall not pass completely over a workpiece with a length of thread of three threads or less.

7.2.3 Gauges for minor diameter

The function and use of gauges for the minor diameter shall be as follows.

- a) **Function** The minor diameter of a workpiece thread is inspected with the plain GO and NOT GO plug gauges. The use of spherical-ended gauges and rod gauges is not permissible.
- c) **Use** The plain GO plug gauge, when screwed by hand without excessive force, shall pass over the workpiece thread.

The plain NOT GO plug gauge may enter into both ends of the workpiece thread but only in a zone which has a distance of not more than one-pitch length from the start of the thread.

8 Tolerance zones for diameters of gauges (see figure 1 and figure 2)

A GO or NOT GO screw ring gauge that has pitch errors and/or errors of flank angle (the permissible deviations shown in clause 12) has a virtual pitch diameter which is smaller than the single pitch diameter. It can only be screwed onto a perfect GO check plug if the single pitch diameter of the latter is also smaller by a certain amount (the sum of the diametrical equivalents of the pitch errors and errors of flank angle of the screw thread concerned) than the single pitch diameter of the screw ring gauge. If the GO check plug also has pitch errors and/or errors of flank angle opposite in sign

to those of the gauge, its single pitch diameter shall be smaller by yet another amount to enable the screw ring gauge to be screwed onto the check plug. (The purchaser and the manufacturer shall agree whether the screw ring gauge should be measured or inspected by check plugs.)

The single pitch diameter of screw ring gauges may be measured directly, rather than inspected by check plugs. In order to ensure, as far as is practicable, that a screw ring gauge accepted as satisfactory by direct measurement is also acceptable as satisfactory by the GO check plug, it is necessary for the single pitch diameter tolerance zone of the GO check plug to be displaced downwards by an amount m in relation to the single pitch diameter tolerance zone of the screw ring gauge (see figure 1). The values of m given in table 8 correspond to the sum of the diametrical equivalents of the average errors to be expected in the pitch and flank angles of the check plug and the screw ring gauge.

In the same way, the single pitch diameter of the external thread of a workpiece (the thread which has pitch errors and/or errors of flank angle) shall be smaller than the single pitch diameter of the screw ring gauge, in order that the external thread can be screwed into this gauge.

When screwing a GO screw plug gauge into the internal thread of a workpiece, the same considerations are valid as are mentioned for screwing a GO screw ring gauge to the external thread of a workpiece. Deviations of pitch and flank angle cause errors of virtual pitch diameters which require in each case that a difference (equivalent) exists between the single pitch diameters of the screwed workpieces.

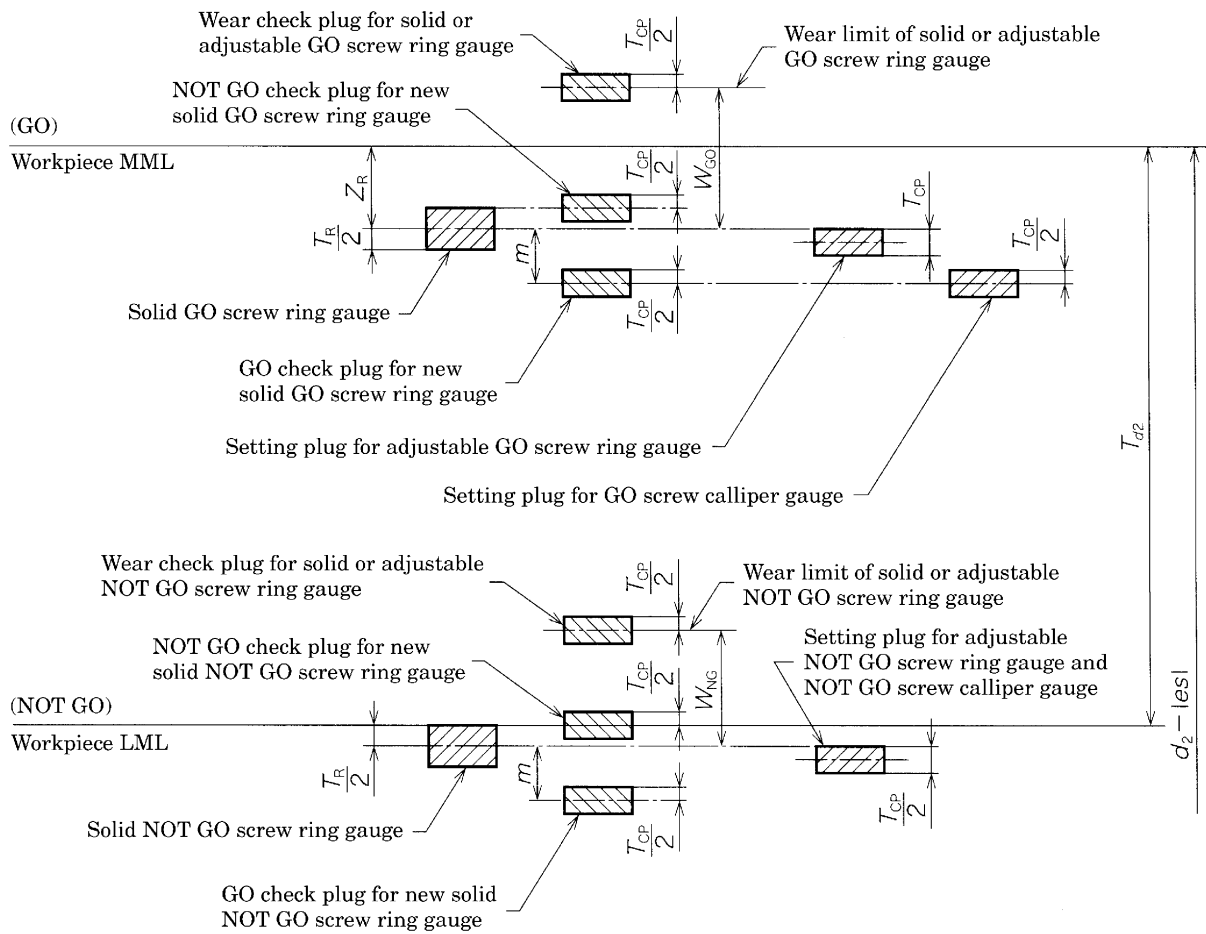


Figure 1 Tolerance zones for pitch diameter of gauges for external threads (diagram)

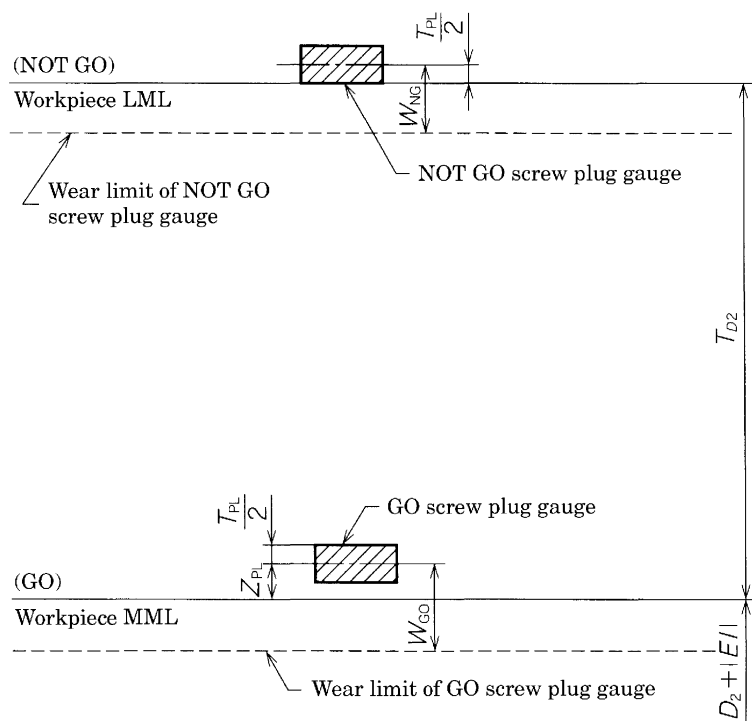


Figure 2 Tolerance zones for pitch diameter of gauges for internal threads (diagram)

9 Tolerance zones for plain gauges (see figure 3 and figure 4)

The tolerance zones for the reference disk for plain calliper gauges shall be selected in accordance with the requirements in **JIS B 7420**.

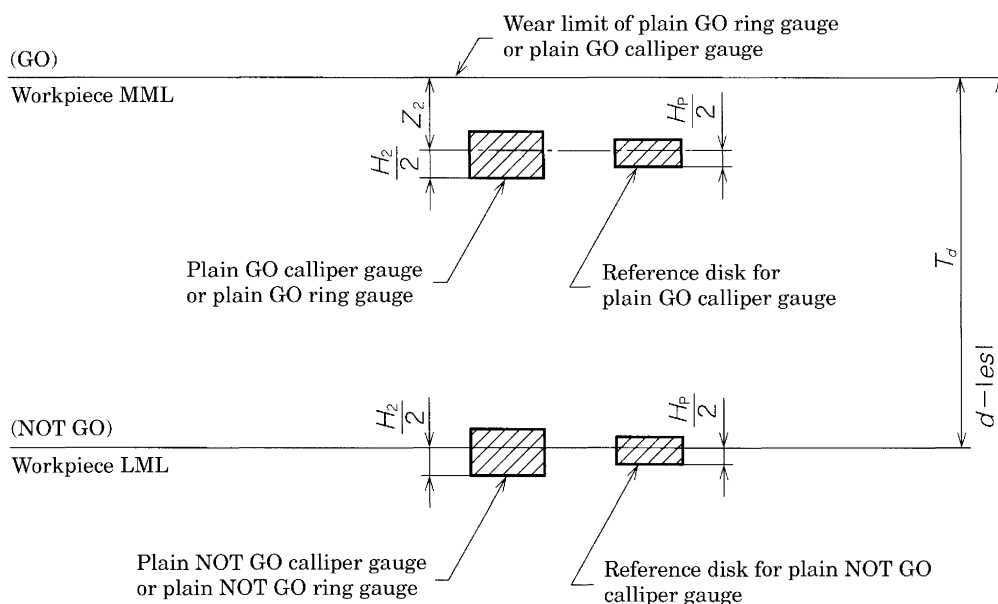


Figure 3 Tolerance zones for reference disk for plain gauges and for plain calliper gauges for major diameter of external threads (diagram)

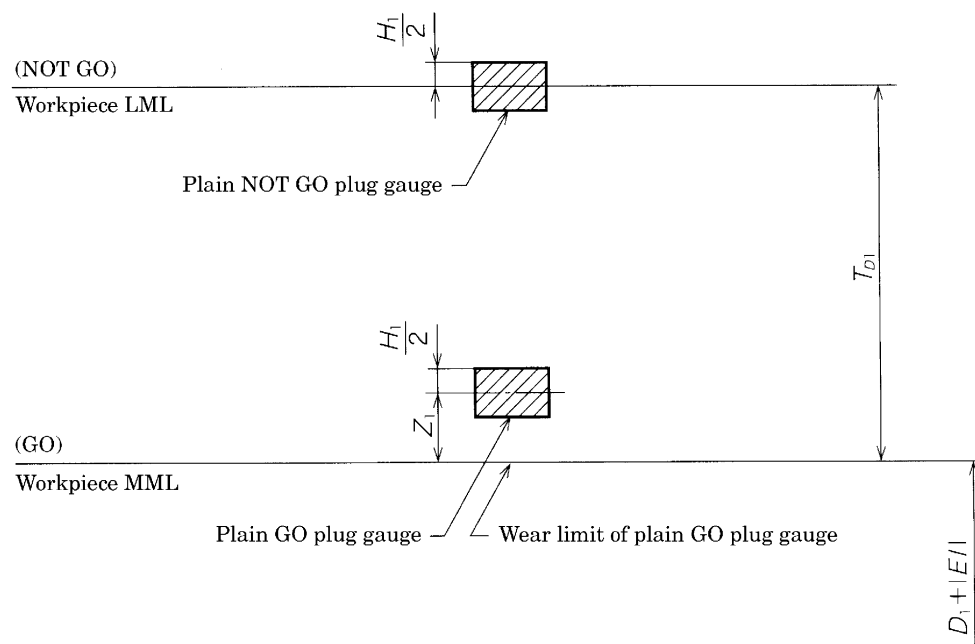


Figure 4 Tolerance zones for plain plug gauges for minor diameter of internal threads (diagram)

10 Thread profiles for gauges

10.1 Profiles with complete flanks and their application (see figure 5 and figure 6)

The gauges to which profiles with complete flanks are applied and the form thereof shall be in accordance with table 4.

Table 4 Profiles with complete flanks and their application

Applicable gauge	Form
GO check plugs for new solid GO screw ring gauges GO check plugs for new solid NOT GO screw ring gauges GO screw plug gauges Setting plugs for adjustable GO screw ring gauges (one portion) Setting plugs for adjustable NOT GO screw ring gauges (one portion) Setting plugs for adjustable GO screw calliper gauges NOT GO check plugs for new solid NOT GO screw ring gauges Setting plugs for NOT GO screw calliper gauges Wear check plugs for solid or adjustable NOT GO screw ring gauges	See figure 5 ^{a)} .
Solid or adjustable GO screw ring gauges Anvils of GO screw calliper gauges	See figure 6 ^{b)} .
Notes ^{a)} A profile with complete flanks according to figure 5 shall be made with a clearance groove of maximum b_2 (see table 5) or with a radius of maximum r_2 (see table 5) which contacts tangentially the straight part of the flank. The form of the clearance groove is not specified. ^{b)} A profile with complete flanks according to figure 6 shall be made with a clearance groove of maximum b_1 (see table 5) or with a radius of maximum r_1 (see table 5) which contacts tangentially the straight part of the flank. The form of the clearance groove is not specified.	

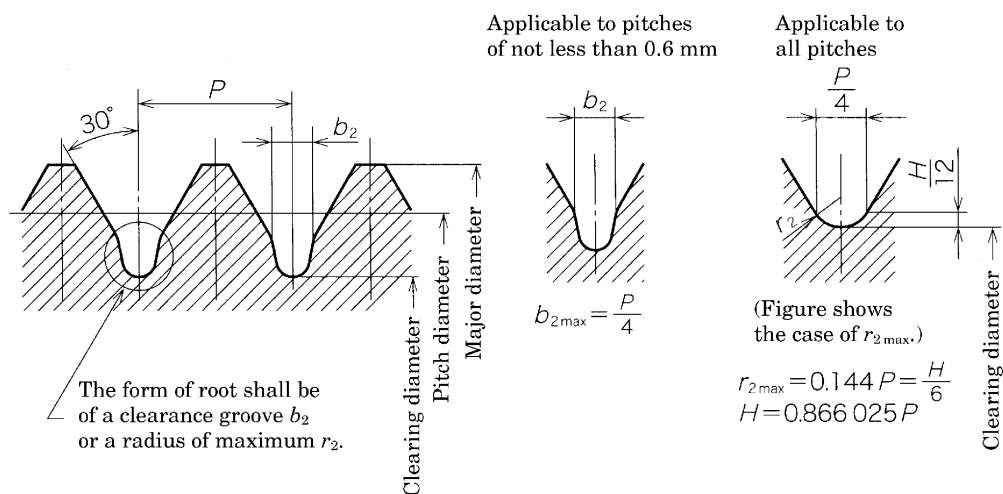


Figure 5 Profile with complete flanks (external thread)

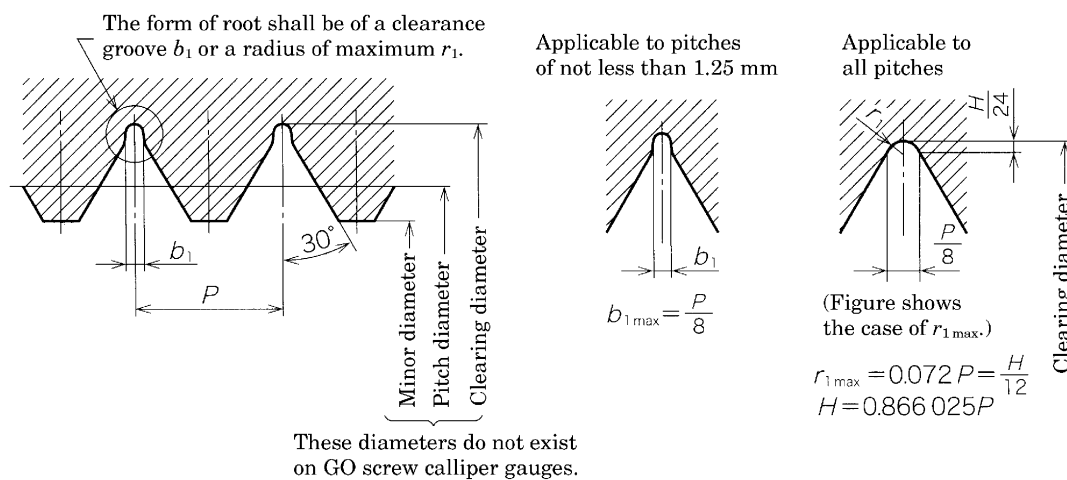


Figure 6 Profile with complete flanks (internal thread)

Table 5 Values for profiles with complete flanks (see figure 5 and figure 6)

Unit: mm

Pitch P	$b_{1\max} = \frac{P}{8}$	$r_{1\max} = 0.072P = \frac{H}{12}$	$b_{2\max} = \frac{P}{4}$	$r_{2\max} = 0.144P = \frac{H}{6}$	$\frac{H}{24}$
0.2	With radius of maximum r_1	0.014	With radius of maximum r_2	0.029	0.007
0.25		0.018		0.036	0.009
0.3		0.022		0.043	0.011
0.35		0.025		0.05	0.012
0.4		0.029		0.058	0.014
0.45		0.032		0.065	0.016
0.5		0.036		0.072	0.018
0.6		0.043	0.15	0.086	0.022
0.7		0.050	0.17	0.1	0.025
0.75		0.054	0.19	0.11	0.027
0.8		0.058	0.2	0.11	0.029
1		0.072	0.25	0.14	0.036
1.25	0.15	0.090	0.31	0.18	0.045
1.5	0.19	0.108	0.37	0.21	0.054
1.75	0.22	0.126	0.44	0.25	0.063
2	0.25	0.144	0.5	0.29	0.072
2.5	0.32	0.180	0.61	0.36	0.090
3	0.4	0.217	0.75	0.43	0.108
3.5	0.48	0.253	0.88	0.5	0.126
4	0.5	0.288	1	0.58	0.144
4.5	0.55	0.325	1.1	0.65	0.162
5	0.6	0.361	1.25	0.72	0.180
5.5	0.7	0.397	1.4	0.79	0.198
6	0.8	0.433	1.5	0.86	0.217
8	1	0.576	2	1.152	0.289

10.2 Profiles with truncated flanks and their application (see figure 7 and figure 8)

The gauges to which profiles with truncated flanks are applied and the form thereof shall be in accordance with table 6.

Table 6 Profiles with truncated flanks and their application

Applicable gauge	Forms
NOT GO check plugs for new solid GO screw ring gauges Setting plugs for adjustable GO screw ring gauges (a portion) Setting plugs for adjustable NOT GO screw ring gauges (a portion) Wear check plugs for solid or adjustable GO screw ring gauges NOT GO screw plug gauges	See figure 7 ^{a)} .
Solid or adjustable NOT GO screw ring gauges Anvils of NOT GO screw calliper gauges	See figure 8 ^{b)} .
Notes ^{a)} A profile with truncated flanks according to figure 7 shall be made for screw threads of $P = 1$ mm or under with a radius of maximum r_2 (see table 5) which contacts tangentially the straight part of the flank, and for screw threads with $P = 1.25$ mm or over with a clearance groove of b_3 (see table 7). The form of the clearance groove is not specified (see figure 7). For reasons of manufacturing facilities, the form and the sizes of the clearance groove for the portion with truncated flanks of the setting plugs can be the same as for that portion having complete flanks. ^{b)} A profile with truncated flanks according to figure 8 shall be made for screw threads of $P = 1$ mm or under with a radius of maximum r_1 (see table 5) which contacts tangentially the straight part of the flank, and for screw threads with $P = 1.25$ mm or over with a clearance groove of b_3 (see table 7). The form of the clearance groove is not specified (see figure 8).	

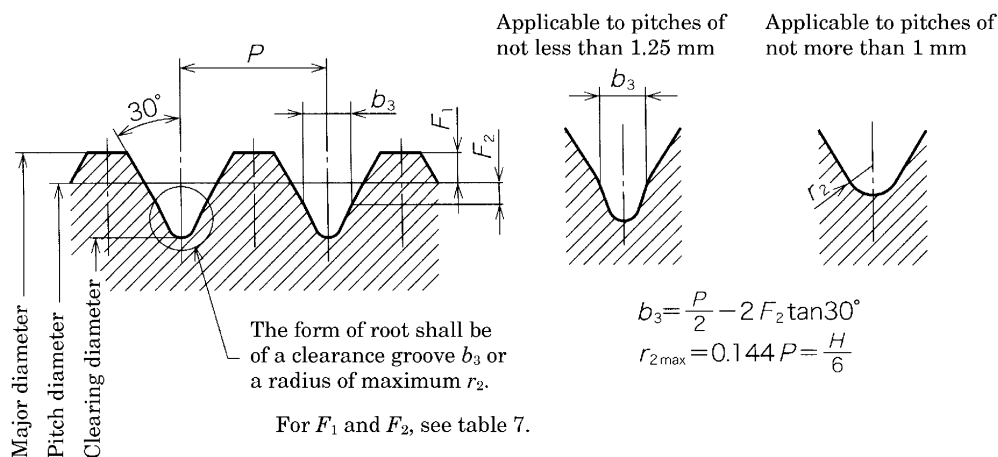


Figure 7 Profile with truncated flanks (external thread)

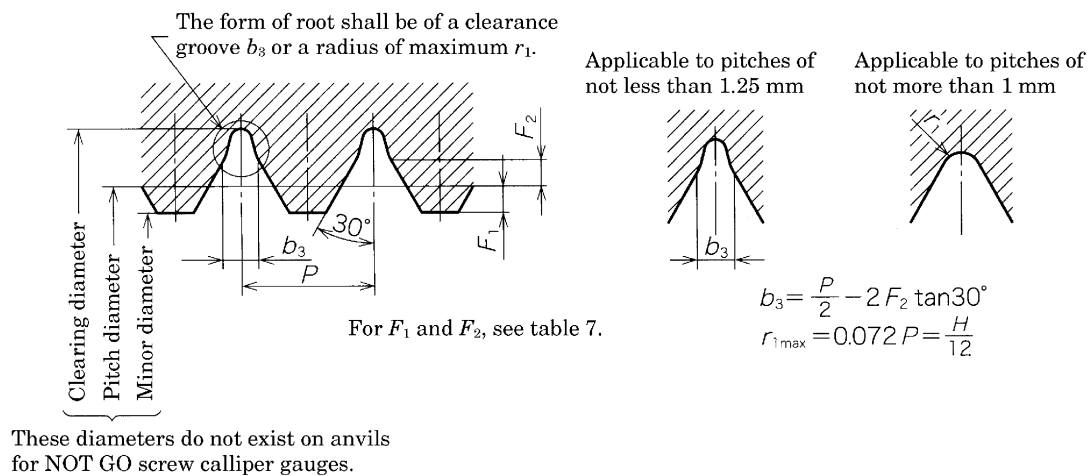


Figure 8 Profile with truncated flanks (internal thread)

10.3 Displacement of the clearance groove for a profile with truncated flanks

The centre of clearance groove may be displaced in relation to the centre of the profile of the thread by an amount S (see figure 9) which is equal to the permissible deviations of b_3 (see table 7).

The permissible deviation on b_3 can be increased by 2 ($S-X$) when the measured displacement X is smaller than S .

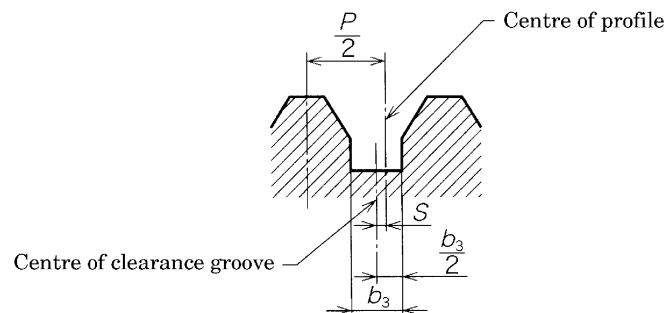


Figure 9 Displacement of clearance groove for a profile with truncated flanks

Table 7 Values for profiles with truncated flanks (see figure 7, figure 8 and figure 9)

Unit: mm

Pitch P	$F_1=0.1P$	F_2			b_3						
		$0.2P$	$0.15P$	$0.1P$	Basic dimensions	Permissible deviations					
0.2	0.02	—	—	—	With radius of maximum r_1 and r_2 , respectively, or clearance groove ^{a)}						
0.25	0.025										
0.3	0.03										
0.35	0.035										
0.4	0.04										
0.45	0.045										
0.5	0.05										
0.6	0.06										
0.7	0.07										
0.75	0.075										
0.8	0.08	0.25	—	—	0.3	± 0.04					
1	0.1										
1.25	0.125										
1.5	0.15										
1.75	0.175										
2	0.2										
2.5	0.25										
3	0.3										
3.5	0.35										
4	0.4						0.375	—	—	0.4	± 0.04
4.5	0.45										
5	0.5										
5.5	0.55										
6	0.6										
8	0.8										
1.25	0.125	0.35	—	—	0.45	± 0.05					
1.5	0.15										
1.75	0.175										
2	0.2										
2.5	0.25										
3	0.3										
3.5	0.35										
4	0.4										
4.5	0.45										
5	0.5						0.525	—	—	1.1	± 0.08
5.5	0.55										
6	0.6										
8	0.8										
1.25	0.125	0.6	—	—	1.3	± 0.1					
1.5	0.15										
1.75	0.175										
2	0.2										
2.5	0.25										
3	0.3										
3.5	0.35										
4	0.4										
4.5	0.45										
5	0.5						0.45	0.5	1.9	± 0.1	
5.5	0.55										
6	0.6										
8	0.8										
1.25	0.125	0.55	0.6	2.1	± 0.1						
1.5	0.15										
1.75	0.175										
2	0.2										
2.5	0.25										
3	0.3										
3.5	0.35										
4	0.4										
4.5	0.45										
5	0.5					0.6	0.8	3.1	± 0.1		
5.5	0.55										
6	0.6										
8	0.8										
1.25	0.125	—	—	—	—					—	
1.5	0.15										
1.75	0.175										
2	0.2										
2.5	0.25										
3	0.3										
3.5	0.35										
4	0.4										
4.5	0.45										
5	0.5										
5.5	0.55										
6	0.6										
8	0.8										

Note ^{a)} The forms of clearance grooves are optional.

11 General features of screw gauges

All gauges shall be designed to comply with the Taylor principle as far as possible. This applies not only to gauges for inspecting workpiece threads but also to gauges intended for checking or setting those gauges. Exceptions are only permissible where there is justification for them.

NOTE : The Taylor principle is a statement to the effect that the maximum material limits of as many related elements or dimensions as practical should be incorporated in a GO gauge, whereas the minimum material limit of each such related element or dimension may be gauged only by individual minimum material limit gauges or gauging methods.

11.1 Gauges for external threads of workpieces

11.1.1 Solid or adjustable GO screw ring gauges

The length of thread on a GO screw ring gauge shall be at least 80 % of the length of engagement of the workpiece thread (thread length of the nut).

11.1.2 Setting plugs for adjustable GO screw ring gauges

A setting plug with a thread length twice the GO screw ring gauge length is required for adjustable GO screw ring gauges.

One half of this setting plug has a thread profile with complete flanks and the other half has a profile with truncated flanks.

11.1.3 GO screw calliper gauges

On the anvils of a GO screw calliper gauge for fine pitches (up to 0.5 mm approximately), alternate thread profiles may be omitted.

11.1.4 Setting plugs for GO screw calliper gauges

The length of thread on a setting plug for GO screw calliper gauges corresponds to that of the anvil of the GO screw calliper gauge.

11.1.5 NOT GO screw calliper gauges

Each anvil of a NOT GO screw calliper gauge shall be so designed that it does not contact the workpiece thread on two flanks or more (see figure 10). On fine-pitch gauges, these flanks shall be situated three pitches apart or more. If the gauge corresponds to figure 10 **b**), each gauging shall be repeated by displacing the gauge from one pitch to the other.

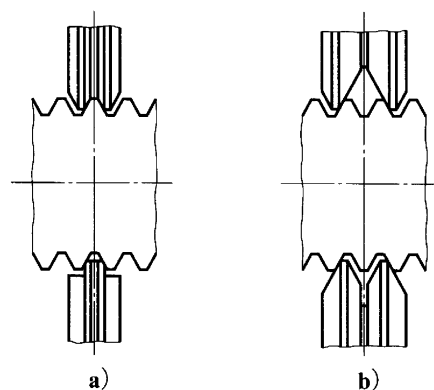


Figure 10 NOT GO screw calliper gauges

11.1.6 Setting plugs for NOT GO screw calliper gauges

This type of setting plug shall have at least three turns of complete thread. Three threads are necessary in order to use the measuring method with three wires.

11.1.7 Solid or adjustable NOT GO screw ring gauges

This type of gauge shall have a length of thread of at least three turns of thread.

11.1.8 Setting plugs for adjustable NOT GO screw ring gauges

This type of setting plug shall have at least six turns of complete thread.

11.2 Gauges for internal threads of workpieces

11.2.1 GO screw plug gauges

The length of thread on a GO screw plug gauge shall be at least 80 % of the length of engagement of the workpiece thread (thread length of the nut).

11.2.2 NOT GO screw plug gauges

A NOT GO screw plug gauge shall have a length of thread of at least three turns of thread.

11.3 Removal and chamfering of incomplete threads

Incomplete threads, even when they are chamfered, are still sharp enough to harm. It is therefore recommended that, so as not to prejudice inspection, any part of the thread that is incompletely formed should be removed (see figure 11) or, if this is not possible, a 30° chamfer should be provided (see figure 12).

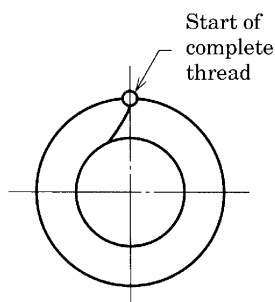


Figure 11 Start of complete thread

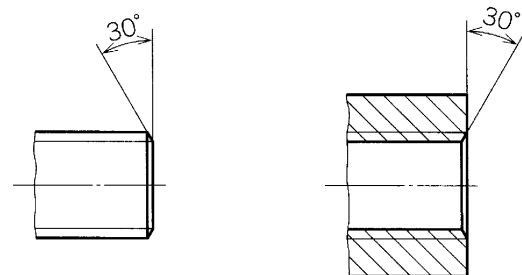


Figure 12 Chamfer of thread

12 Tolerances and permissible wear for gauges (see table 8 to table 13)

Tolerances and permissible wear for gauges shall be in accordance with table 8 to table 13.

NOTE : In order to limit the number of GO gauges for the same size of screw thread, it is recommended in **ISO 1502** that, for screw threads with workpiece tolerances of grade 6 and coarser, the values in table 8 should be chosen according to grade 6, and for screw threads with workpiece tolerances finer than grade 6, the values in table 8 should be chosen according to the lowest grade recommended in **JIS B 0209-1 (ISO 965-1)**, for each tolerance position.

Table 8 Tolerances (T_R , T_{PL} , T_{CP}) and values m , Z_R and Z_{PL} for pitch diameters of gauges (see figure 1 and figure 2)

Unit: μm

T_{d2} or T_{D2}		T_R	T_{PL}	T_{CP}	m	$Z_R^a)$	Z_{PL}
Over	Up to and incl.						
—	50	8	6	6	10	—4	0
50	80	10	7	7	12	—2	2
80	125	14	9	8	15	2	6
125	200	18	11	9	18	8	12
200	315	23	14	12	22	12	16
315	500	30	18	15	27	20	24
500	670	38	22	18	33	28	32

Note ^{a)} The values for Z_R are to be inserted into table 14 taking into consideration the sign. That is, the use of the minus values in the formula given in table 14 results in plus values. Minus values for Z_R mean that Z_R is situated outside the tolerance T_{d2} .

Table 9 Permissible wear on pitch diameters of gauges (see figure 1 and figure 2)

Unit: μm

T_{d2} or T_{D2}		W_{GO}		W_{NG}	
Over	Up to and incl.	GO screw ring gauge	GO screw plug gauge	NOT GO screw ring gauge	NOT GO screw plug gauge
—	50	10	8	7	6
50	80	12	9.5	9	7.5
80	125	16	12.5	12	9.5
125	200	21	17.5	15	11.5
200	315	25.5	21	19.5	15
315	500	33	27	25	19
500	670	41	33	31	23

Table 10 Permissible deviations for each flank angle

Unit: min

Pitch P (mm)	$\frac{T_{\alpha 1}}{2}$	$\frac{T_{\alpha 2}}{2}$	Pitch P (mm)	$\frac{T_{\alpha 1}}{2}$	$\frac{T_{\alpha 2}}{2}$
0.2	± 60	± 60	2	± 10	± 14
0.25	± 48	± 48	2.5	± 10	± 14
0.3	± 40	± 40	3	± 9	± 13
0.35	± 35	± 35	3.5	± 9	± 12
0.4	± 31	± 31	4	± 8	± 11
0.45	± 26	± 26	4.5	± 8	± 11
0.5	± 25	± 25	5	± 8	± 11
0.6	± 21	± 21	5.5	± 8	± 10
0.7	± 18	± 18	6	± 8	± 10
0.75	± 17	± 17	8	± 8	± 10
0.8	± 16	± 16			
1	± 15	± 16			
1.25	± 13	± 16			
1.5	± 12	± 16			
1.75	± 11	± 16			

Table 11 Maximum permissible deviations of pitch

Gauge thread length mm		T_p ^{a)} μm
Over	Up to and incl.	
—	32	5
32	50	6
50	80	7

Note a) T_p applies to a cumulative progressive error over the total length of thread or a single error of pitch. For a double-length setting plug, the thread length used when determining T_p is $\frac{1}{2}$ of the overall thread length of the setting plug, and it is the maximum permissible deviation between any two threads apart by not more than $\frac{1}{2}$ of the overall thread length of the setting plug.

Table 12 Tolerances for plain gauge for major diameter of external thread and reference disk for plain calliper gauge, and value of Z_2 (see figure 3)

Unit: μm

Tolerance for major diameter of external thread T_d		$\frac{H_2}{2}$	$\frac{H_p}{2}$	Z_2
Over	Up to and incl.			
—	85	4	1	8
85	140	5	1.5	20
140	335	8	2	38
335	850	15	3	54
850	950	21	4	60

Table 13 Tolerances for plain gauge for minor diameter of internal thread and value of Z_1 (see figure 4)

Unit: μm

Tolerance for minor diameter of internal thread T_{D1}		$\frac{H_1}{2}$	Z_1
Over	Up to and incl.		
—	100	4	9
100	180	5	22
180	375	8	38
375	710	13	52
710	1 250	23	65

13 Formulae for calculation of sizes and permissible deviations of gauges

13.1 Screw gauge for external thread of workpiece, and check plug and setting plug

For screw gauge for external thread of workpiece, and check plug and setting plug, see table 14.