
Aerospace — UNJ threads — Gauging

Aéronautique et espace — Filetage UNJ — Vérification par calibres

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 4, *Aerospace fastener systems*.

This second edition cancels and replaces the first edition (ISO 15872:2002), which has been technically revised and includes the following changes:

- unused symbols have been removed from [Table 1](#): WGO, WNG, Z1, ZPL, and ZR.
- Figures have been changed to align with [8.1](#).
- Normative references have been updated.
- Terminology has been updated.
- The document has been editorially revised.

Aerospace — UNJ threads — Gauging

1 Scope

This document provides methods for the gauging of ISO UNJ threads complying with ISO 3161.

Other methods of ensuring that the product is within the specified limits can be used, provided that correlation with the specified gauges is established.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1, *Geometrical product specifications (GPS) — Standard reference temperature for the specification of geometrical and dimensional properties*

ISO 3161, *Aerospace — UNJ threads — General requirements and limit dimensions*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5408 and the following apply. ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

best wire size

cylinder or sphere which has a radius so that it will contact the thread flanks at the pitch cylinder intersection

Note 1 to entry: The radius of the best wire or sphere is theoretically equal to $0,288\ 68P$.

3.1.2

indicating gauge

device having contacts which will precisely compare the size of a work piece thread to a setting standard of known dimensions

Note 1 to entry: The value for the indicated characteristic thus established is the dimensional value attributed to the work piece. An indicating gauge can have contacts designed to measure any thread characteristic. This document specifies the characteristics and designs for ISO UNJ threads.

3.1.3

simple pitch diameter

diameter of an imaginary cylinder intersecting an actual thread over the width of one groove where that width is equal to one half of the basic pitch

3.1.4

virtual pitch diameter

pitch diameter of the smallest (for external threads) or largest (for internal threads) perfect thread form with GO gauge profile which can engage the product threads for a distance equal to the GO gauge thread engagement

3.2 Symbols and abbreviated terms

See [Table 1](#).

Table 1 — Symbols, abbreviated terms and definitions

Symbol or abbreviated term	Definition	Symbol or abbreviated term	Definition
D_1	Basic minor diameter of the internal thread of a workpiece	$T_{\alpha 1/2}$	Tolerance for each flank angle of a profile with complete flanks
d_2	Basic pitch diameter of the external thread of a workpiece	$T_{\alpha 2/2}$	Tolerance for each flank angle of a profile with truncated flanks
es	Fundamental deviation of the external thread of a workpiece	T_{CP}	Tolerance on the pitch diameter of GO and NOT GO screw check plugs, wear check plugs and setting plugs
EI	Fundamental deviation of the internal thread of a workpiece	T_d	Tolerance for the major diameter of the external thread of a workpiece
H	Height of the triangle of a thread profile	T_{d2}	Tolerance for the pitch diameter of the external thread of a workpiece
H_1	Tolerance for the diameter of plain plug gauges	T_{d3}	Tolerance for the minor diameter of the external thread of a workpiece
H_P	Tolerance on the size of check plug gauges for plain calliper gauges	T_{D1}	Tolerance for the minor diameter of the internal thread of a workpiece
(LSL)	Lower specification limit	T_P	Pitch tolerance
m	Distance between the middle of the tolerance zones TR of a screw ring gauge and TCP of a GO check plug	T_{D2}	Tolerance for the pitch diameter of the internal thread of a workpiece
(USL)	Upper specification limit	T_{PL}	Tolerance for the pitch diameter of GO and NOT GO screw plug gauges
P	Pitch	T_R	Tolerance for the pitch diameter of GO and NOT GO screw ring gauges

4 Types of gauges

4.1 Gauges and setting plugs for external threaded products

The function, design and use of gauges and setting plugs for external threads are explained in the following subclauses.

Gauge type	Subclause
a) GO screw ring gauges	6.1.2
b) Setting plug for adjustable GO screw ring and indicating thread gauges	7.1.1
c) Virtual pitch diameter indicating thread gauges	6.1.1
d) Simple pitch diameter indicating thread gauges	6.1.3
e) Flat contact gauges for major diameter	6.1.4
f) Point contact indicating thread gauges for minor diameter	6.1.5
g) Optical comparator for root radius and minor diameter	6.1.6

4.2 Gauges for internal threaded products

The function, design and use of gauges for internal threads are explained in the following subclauses.

Gauge type	Subclause
a) GO screw plug gauges	6.2.1
b) NOT GO screw plug gauges	6.2.2
c) Plain gauges for minor diameter (plug gauge)	6.2.3.1
d) GO full form screw plug gauges	6.2.3.2
e) Virtual pitch diameter indicating thread gauges	6.2.4
f) Simple pitch diameter indicating thread gauges	6.2.5
g) Setting ring gauge for indicating thread gauges (solid type)	7.2

5 Reference temperature

In accordance with ISO 1, the dimensions of the gauge and the product shall be checked at the temperature of 20 °C.

If the product and the gauge have the same coefficients of linear expansion, the temperature may deviate from 20 °C, provided the temperature of the product and the gauge are the same.

If the product and the gauge have different coefficients of linear expansion, the temperature of both, at the time of gauging, shall be:

- a) 20 °C ± 2 °C for sizes 1,000 UNJ and smaller;
- b) 20 °C ± 1 °C for larger threads.