INTERNATIONAL STANDARD

ISO 3353-1

First edition
2002-07-15

Aerospace — Lead and runout threads —

Part 1: Rolled external threads

Aéronautique et espace — Filets incomplets, débuts et fins de filets —

Partie 1: Filetages extérieurs roulés

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.

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

The main task of technical committees is to prepare International Standards. 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 3353 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 3353-1 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 4, *Aerospace fastener systems*.

This first edition of ISO 3353-1 cancels and replaces ISO 3353:1992, which has been technically revised.

ISO 3353 consists of the following parts, under the general title *Aerospace — Lead and runout threads*:

— *Part 1: Rolled external threads*

— *Part 2: Internal threads*

Annex A of this part of ISO 3353 is for information only.

Aerospace — Lead and runout threads —

Part 1:
Rolled external threads

1 Scope

This part of ISO 3353 specifies the lead and runout requirements for rolled external threads for aerospace construction, and the inspection method to be used in case of dispute.

It is applicable whenever it is referenced in a definition document.

2 Terms and definitions

For the purposes of this part of ISO 3353, the following terms and definitions apply.

2.1
lead threads
part of screw threads consisting of threads incompletely formed during rolling, beginning at the entering chamfer of the thread

2.2
runout threads
part of screw threads in which are located threads incompletely formed during rolling, between the completely formed threads and the part which has not been rolled

2.3
completely formed thread
thread, the profile of which (ABC) is located, over an axial distance of 1P, within the limits specified in the definition document for the thread

See Figure 1.

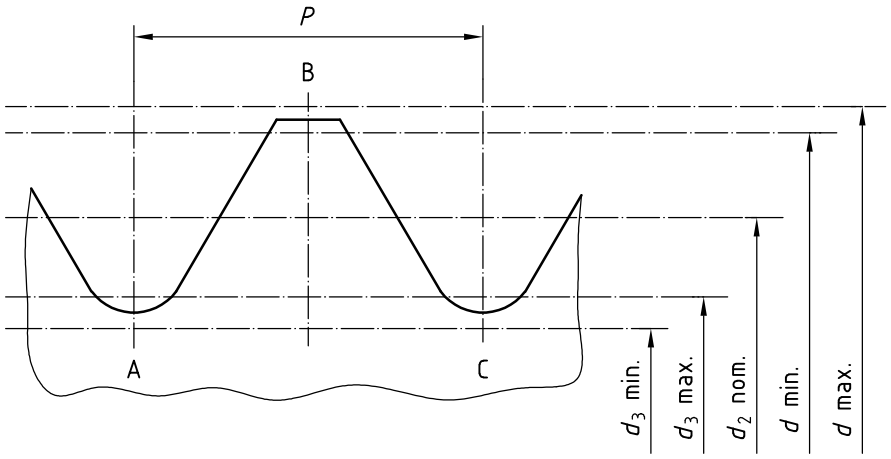


Figure 1

3 Symbols for threads

d is the major diameter of the thread.

d_2 is the pitch diameter of the thread.

d_3 is the minor diameter of the thread.

P is the thread pitch.

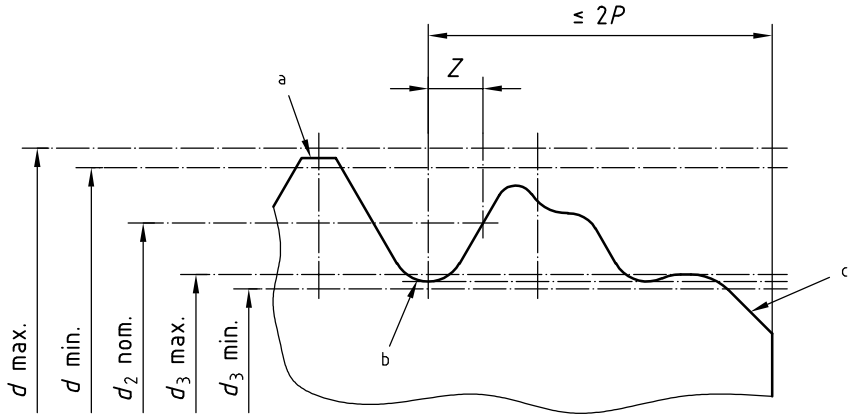
4 Requirements

4.1 General requirements

The flanks at the root of the incompletely formed threads shall be joined by a radius or by two radii and a flat, that are smooth and devoid of abrupt tool marks. This radius, or these radii and the radius r (see Figures 3 to 9) shall be greater than or equal to the minimum root radius specified for the complete threads in the definition document for the thread.

4.2 Lead threads

See Figure 2.



Over the area *Z*, the thread shall lie within the limits specified in the definition document for the thread.

a Crest of first completely formed thread.

b Root of first completely formed thread.

c Chamfer.

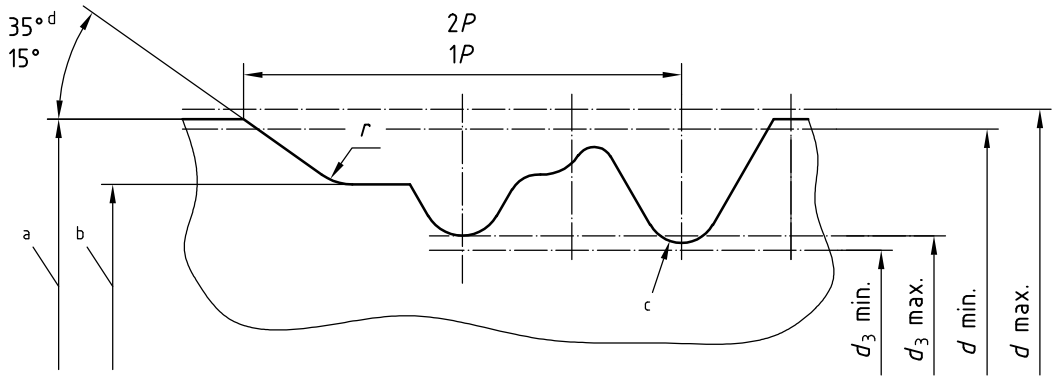
Figure 2

The possible profile projection comparator inspection shall be carried out using a chart drawn in accordance with Figure 10.

4.3 Runout threads

4.3.1 Normal shank

See Figures 3 and 4.



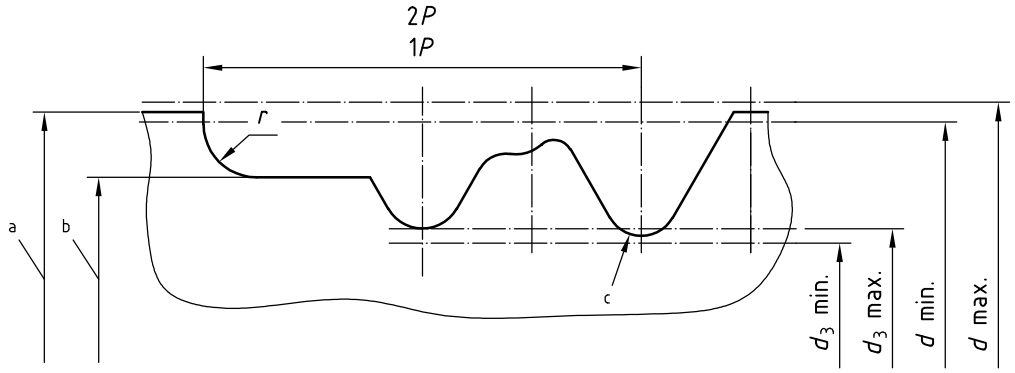
a Shank diameter having a nominal value equal to the nominal diameter of the thread = δ.

b Blank diameter.

c Root of last completely formed thread.

d Angle before rolling. The shape is optional within these limits.

Figure 3



a Shank diameter having a nominal value equal to the nominal diameter of the thread = δ.

b Blank diameter.

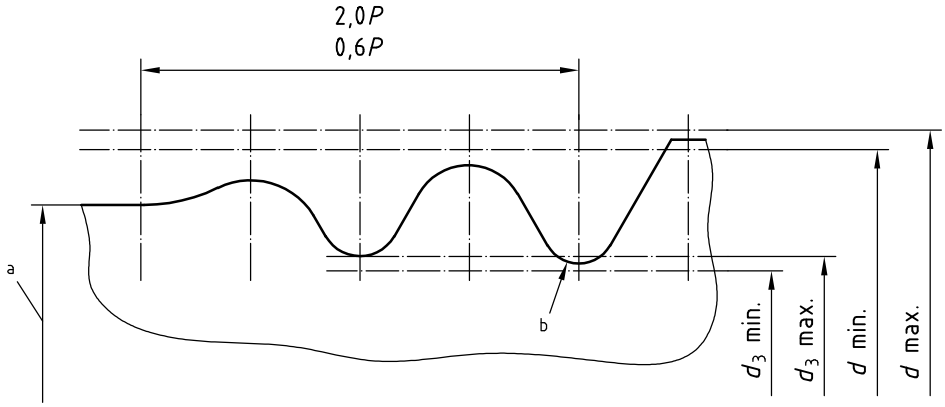
c Root of last completely formed thread.

Figure 4

The possible profile projection comparator inspection shall be carried out using a chart drawn in accordance with Figure 11.

4.3.2 Pitch diameter shank

See Figure 5.



a Shank diameter having a nominal value equal to the maximum pitch diameter = δ.

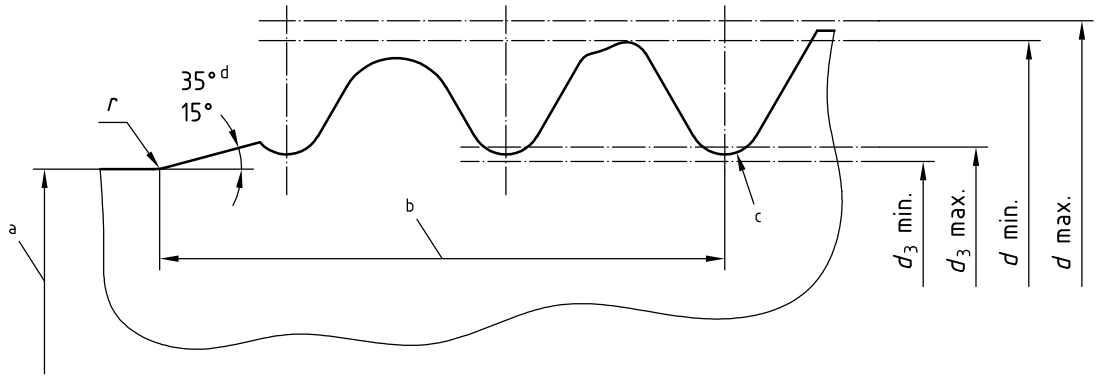
b Root of last completely formed thread.

Figure 5

The possible profile projection comparator inspection shall be carried out using a chart drawn in accordance with Figure 12.

4.3.3 Stepped shank

See Figure 6.



a Diameter of stepped shank, having a nominal value equal to d_3 min. – 0,1 mm = δ.

b $\left[1P + \frac{(d\,\text{max.} - \delta\,\text{nom.})}{2\tan 35°}\right]$ to $\left[2P + \frac{(d\,\text{max.} - \delta\,\text{nom.})}{2\tan 15°}\right]$

c Root of last completely formed thread.

d Angle before rolling. The shape is optional within these limits.

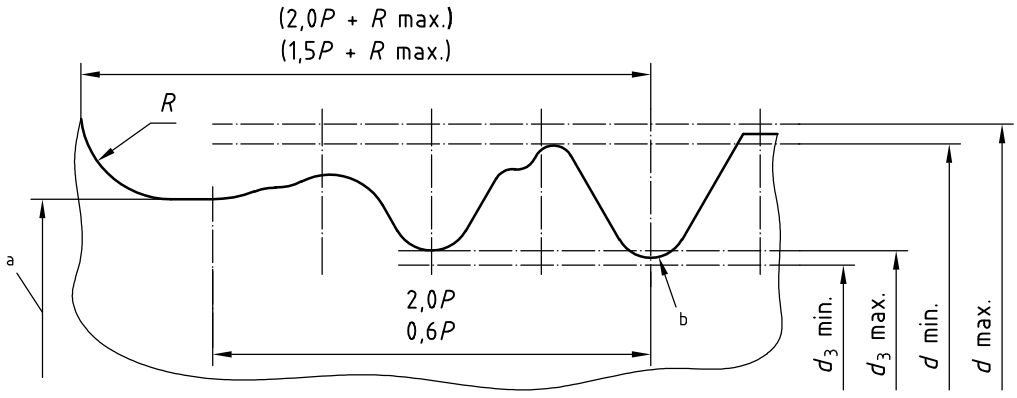
Figure 6

The possible profile projection comparator inspection shall be carried out using a chart drawn in accordance with Figure 13.

4.3.4 Screws threaded to the head and bolts threaded to a shoulder

4.3.4.1 Protruding head

See Figure 7.



The beginning of the first thread shall not encroach on the radius R.

a Blank diameter.

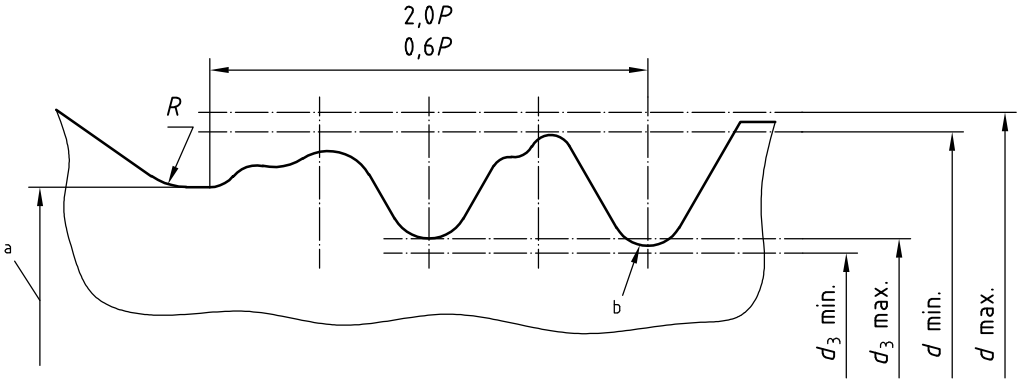
b Root of last completely formed thread.

Figure 7

The possible profile projection comparator inspection shall be carried out using a chart drawn in accordance with Figure 12.

4.3.4.2 Flush head

See Figure 8.



The beginning of the first thread shall not encroach on the radius R.

a Blank diameter.

b Root of last completely formed thread.

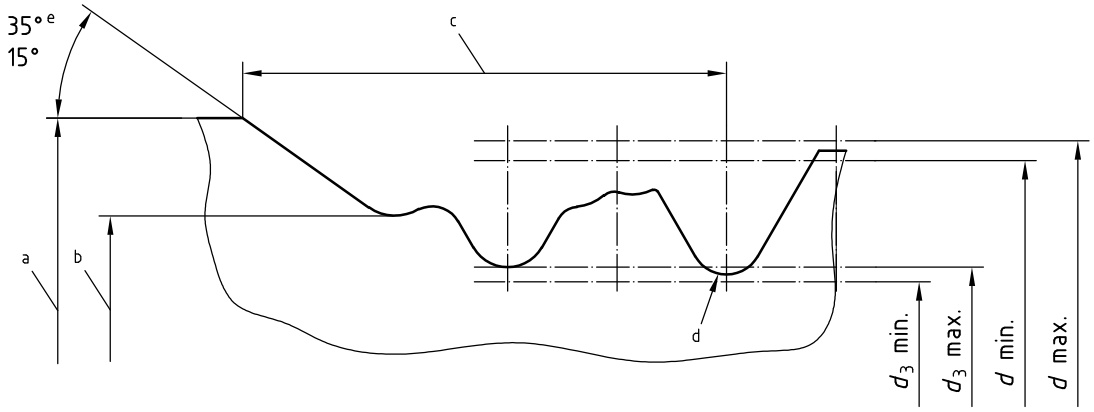
Figure 8

The possible profile projection comparator inspection shall be carried out using a chart drawn in accordance with Figure 12.

4.3.5 Oversized bolts

EXAMPLE Bolts for repairs.

See Figure 9.



a Diameter of oversized shank = δ.

b Blank diameter.

c $\left[1P + \frac{(\delta\text{nom.} - d\,\text{max.})}{2\tan 35°}\right]$ to $\left[2P + \frac{(\delta\text{nom.} - d\,\text{max.})}{2\tan 15°}\right]$

d Root of last completely formed thread.

e Angle before rolling. The shape is optional within these limits.

Figure 9

The possible profile projection comparator inspection shall be carried out using a chart drawn in accordance with Figure 14.

5 Inspection method

5.1 General

The method is left to the discretion of the manufacturer, provided that it ensures conformity with the requirements given in clause 4.

In case of dispute, the method by optical projection, defined hereafter, shall be used. See comments in annex A (informative).

5.2 Use of the charts

The charts shall be used in conjunction with a profile projection comparator having a magnifying power equal to or greater than × 20.

5.3 Procedure

5.3.1 For lead threads

The inspection shall be carried out using a chart drawn in accordance with Figure 10.

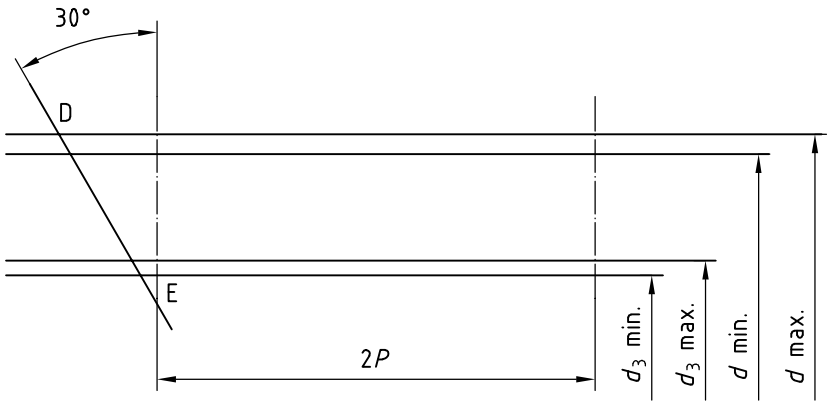


Figure 10

Rotate the bolt to find the first complete thread (see Figure 1) nearest to the end of the shank which has the thread crest and root not extending beyond the limits defined by the horizontal lines.

Then move the bolt horizontally until the right flank of the above thread coincides with line DE.

5.3.2 For runout threads

The inspection shall be carried out using a chart drawn in accordance with Figures 11 to 14.

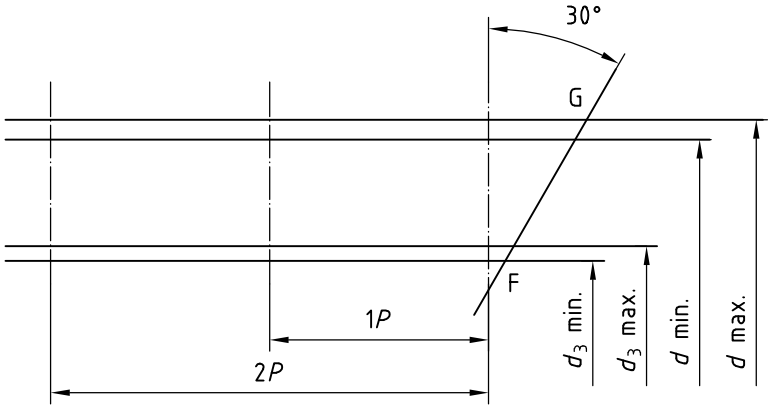


Figure 11

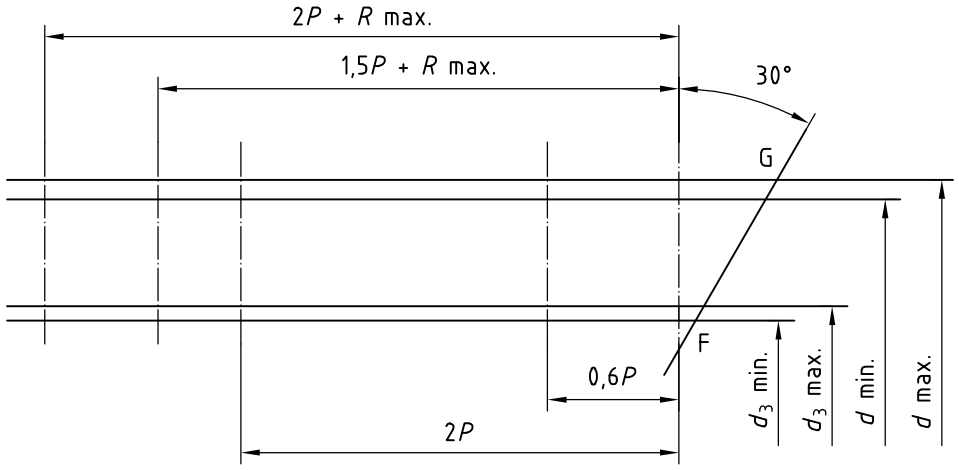
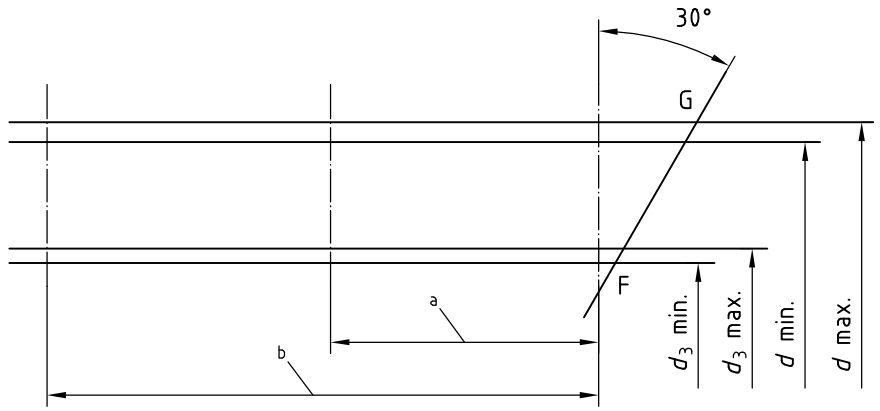


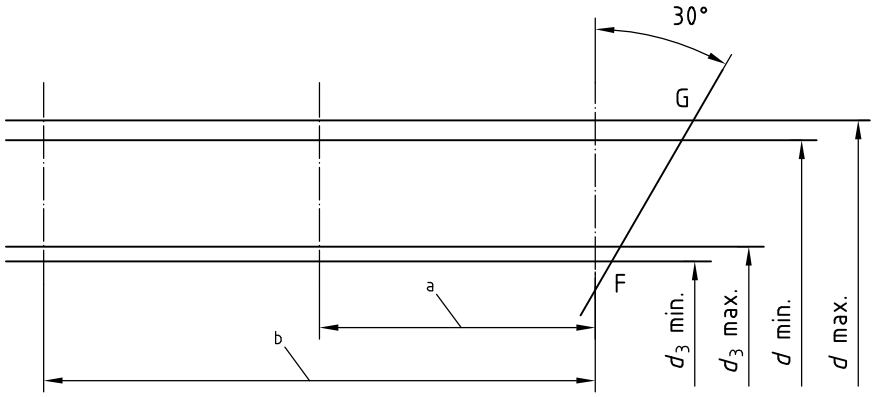
Figure 12



a $\left[1P + \frac{(d\,\text{max.} - \delta\text{nom.})}{2\tan 35°}\right]$

b $\left[2P + \frac{(d\,\text{max.} - \delta\text{nom.})}{2\tan 15°}\right]$

Figure 13



a $\left[1P + \frac{(\delta\text{nom.} - d\,\text{max.})}{2\tan 35°}\right]$

b $\left[2P + \frac{(\delta\text{nom.} - d\,\text{max.})}{2\tan 15°}\right]$

Figure 14

Rotate the bolt to find the last complete thread (see Figure 1) nearest to the plain shank of the bolt which has the thread crest and root not extending beyond the limits defined by the horizontal lines.

Then move the bolt horizontally until the left flank of the above thread coincides with line FG.

Annex A
(informative)

Comments on inspection method

Assembling the bolt to be checked with a GO screw ring gauge, without entering chamfer, is the preferred method for checking lead and runout threads and produces consistent results.

Alternatively, the profile projection comparator method, while theoretically more accurate, takes considerably longer and depends on the skill of the operator.

ICS 49.030.10

Price based on 11 pages