
**Respiratory protective devices —
Performance requirements —**

**Part 3:
Thread connection**

Appareils de protection respiratoire — Exigences de performances —

Partie 3: Raccord normalisé
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ISO 17420-3:2012

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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 2.

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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17420-3 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 15, *Respiratory protective devices*.

ISO 17420 consists of the following parts, under the general title *Respiratory protective devices — Performance requirements*:

— *Part 3: Thread connection*

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The following parts are under preparation:

- *Part 1: Supplied breathable gas devices* [ISO 17420-3:2012](https://standards.iteh.ai/catalog/standards/sist/17499a47-4454-4f1c-a970-ec3b55fb1fce/iso-17420-3-2012)
- *Part 2: Filtering devices*

Respiratory protective devices — Performance requirements —

Part 3: Thread connection

1 Scope

This part of ISO 17420 is applicable to an unassisted filtering device and specifies a standard thread connection between a filter and the respiratory interface as required in ISO 17420-2.

This part of ISO 17420 also includes the description of test simulators that are necessary for the assessment of some of the requirements.

2 Normative references

The following referenced documents are indispensable for the application 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 815-1, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

ISO 16972, *Respiratory protective devices — Terms, definitions, graphical symbols and units of measurement*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16972 and the following apply.

3.1.1

thread connection

shape and dimensions of the standard connection between filters with a male thread connector and respiratory interfaces with a female thread connector

3.2 Symbols

For the purposes of this document, the following symbols apply (see Figure 1 to Figure 20).

d_1	major diameter of male thread;
d_2	minor diameter of male thread;
d_3	inner dimension for gauge;
d_4	outer dimension for gauge;
D_1	major diameter of female thread;

D_2	minor diameter of female thread;
h	pitch;
t_1	thread height;
r	radius;
b	thickness of gauge (GO gauge or NO-GO gauge);
w	permissible surface degradation due to wear and tear for d_1 and d_2 ;
H_a	thickness of ring A;
H_b	thickness of ring B.

4 Requirements

4.1 Elements of thread connection

The thread connection shall consist of the following three elements.

- A male thread connector which forms the connecting element of the filter.
- A female thread connector which forms the connecting element of the respiratory interface. If a low pressure hose is included in the respiratory interface it shall either be permanently affixed or shall be connected by a non-standard connector.
- A sealing element which is retained within the female thread connector.

4.2 Sealing element

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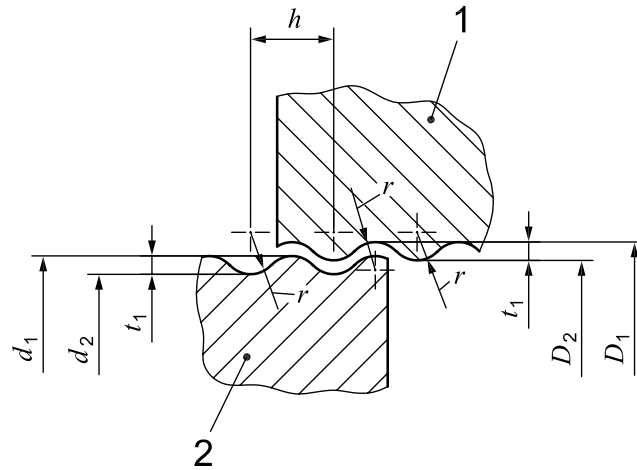
The sealing element shall be retained in place, correctly centred, and it shall not be possible to dislodge it during normal use.

It shall be easy to check that the sealing element is in place (e.g. sealing element of a different colour from the female thread connector).

Test in accordance with 5.1.

4.3 Geometry of thread profile

The profile of the thread shall be $\emptyset 40 \times 1/7$ as defined by the female and male threads profile geometry (Figure 1) and thread dimensions given in Table 1.



Key
 1 female thread
 2 male thread

Figure 1 — Geometry of thread profile

Table 1 — Thread dimensions for the mechanical connection interface

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Dimensions in millimetres

Thread	Male thread		Female thread				Pitch	No. of threads per 25,4 mm	Thread height	Radius
	Major diameter	Minor diameter	Major diameter	Minor diameter	Major diameter	Minor diameter				
	d_1	d_2	D_1	D_2	d_1	d_2	h	z	t_1	r
	max.	min.	max.	min.	min.	max.				
Ø 40x1/7	40,00	39,70	38,40	40,16	38,56	38,86	3,629	7	0,8	1,225

Test in accordance with 5.1, 5.3, 5.4 and 5.5.

4.3.1 Circularity of threads

4.3.1.1 General

The circularity tolerance of the threads shall be 0,15 mm referred to the major radius of the male thread and 0,15 mm referred to the minor radius of the female thread.

4.3.1.2 Circularity of the male thread

When approached perpendicular to the axis of the thread in any angular orientation, the limit snap gauge with single-ended jaws shall not pass over the thread (see Figure 7).

Test in accordance with 5.2.1.

4.3.1.3 Circularity of the female thread

When approached parallel to the axis of the thread in any angular orientation, the sector NO-GO gauge shall not enter the thread (see Figure 8).

Test in accordance with 5.2.2.

4.3.2 Male thread connector

4.3.2.1 General

The material used for the male thread connector and its thickness is left to the manufacturer's choice.

4.3.2.2 Sealing surface

The shape of the sealing surface of the male thread connector shown in Figure 2 with the enlarged detail of Figures 2 a, 2 b, 2 c, that interfaces with the sealing element, is left to the manufacturer's choice. For example, it can be flat (see Figure 2 a), rounded with a radius ≥ 2 mm (see Figure 2 b) or flat with a raised sealing ring (see Figure 2 c). If there is a raised sealing ring, it shall have a radius $\geq 0,3$ mm.

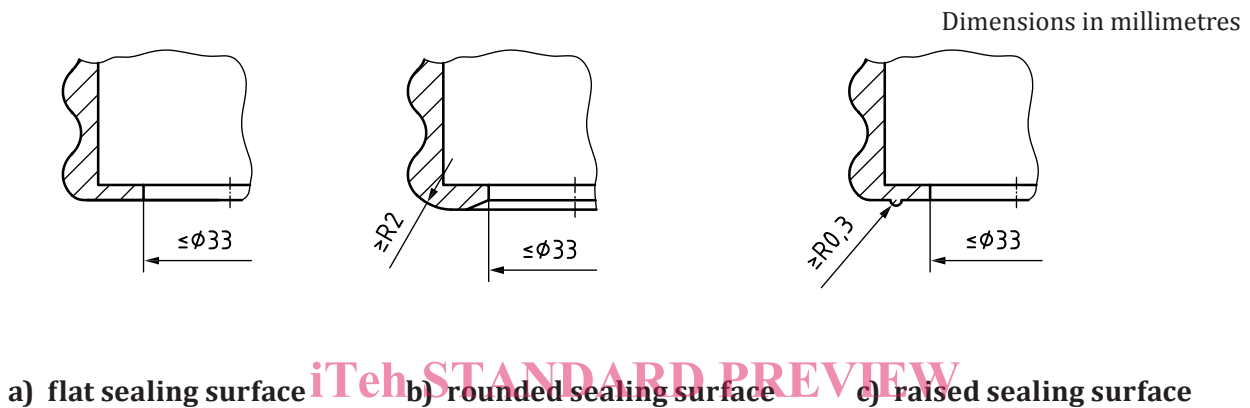


Figure 2 — Sealing surface of the male thread connector

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4.3.2.3 Dimensions

The axial dimensions of the male thread connector shall be measured starting from the most protruding part of the sealing surface (including raised sealing ring, if present).

The beginning of the thread, up to a maximum of 2 mm of length, is not considered as effective thread and it shall be left to the manufacturer's design choice. The initiation of the thread shall be smooth.

When the GO gauge is screwed by hand without excessive force onto the male thread connector, at least 2 mm of the connector shall extend from the surface of the gauge.

The effective length of thread shall be $\geq 14,5$ mm (see Figure 3).

When gauged with the effective length ring gauge, the distance from the top of the gauge to the top of the thread shall be ≥ 8 mm (see Figure 19 and 20).

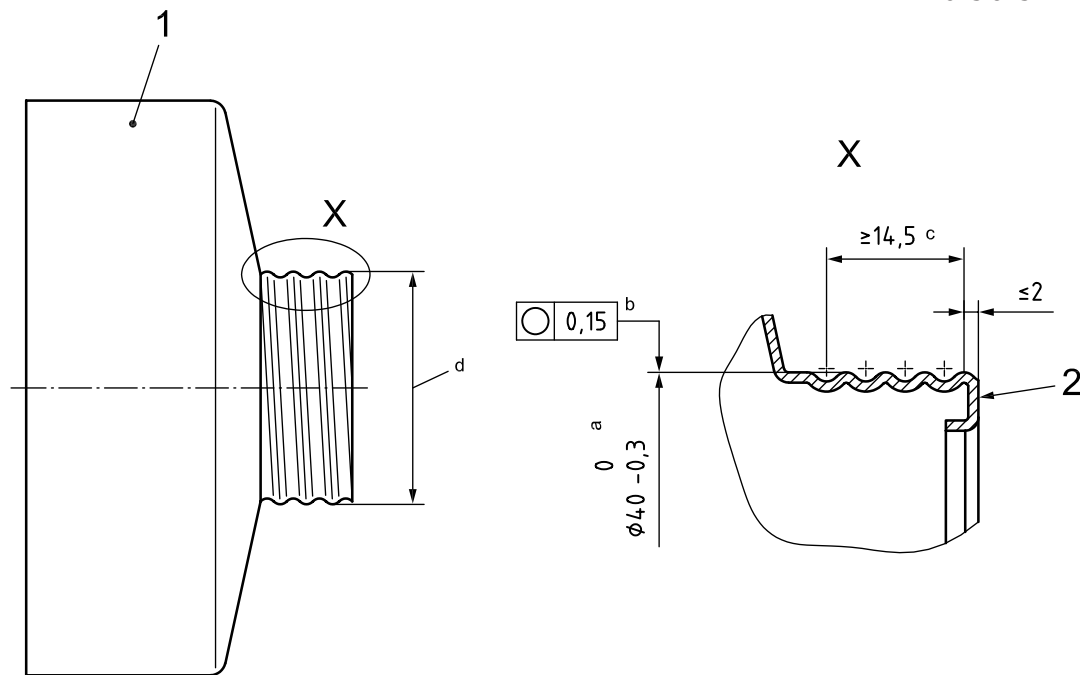
The internal diameter (minimum diameter of the sealing surface area) of the male thread connector shall be $\leq 33,0$ mm (see Figure 2).

It shall not be possible to fit the NO-GO gauge onto the male thread connector.

Without excessive force, the NO-GO gauge shall bind after initial engagement.

Test in accordance with 5.1, 5.3 and 5.5.

Dimensions in millimetres

**Key**

- 1 filter
2 sealing surface

- a Major diameter.
b Reference to radius.
c Effective thread.
d Thread $\text{Ø}40 \text{ mm} \times 1/7''$.

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Figure 3 — Male thread connector

4.3.3 Female thread connector

4.3.3.1 General

The material used for the female thread connector and its thickness is left to the manufacturer's choice.

4.3.3.2 Dimensions

The axial dimensions of the female thread connector shall be measured starting from the sealing surface of the sealing element.

The available length of the thread of the female thread connector shall be $(13,0 \pm 0,5)$ mm extended to the edge of the connector (see Figure 4).

When the GO side of the gauge, with ring A in place, is screwed by hand without excessive force into the female thread connector (with the sealing element correctly in place), ring A shall block.

When the GO side of the gauge, with ring B in place, is screwed by hand without excessive force into the female thread connector (with the sealing element correctly in place), ring B shall remain loose.

The internal diameter of the female thread connector (minimum diameter of the sealing area) shall be ≤ 30 mm (see Figure 4).

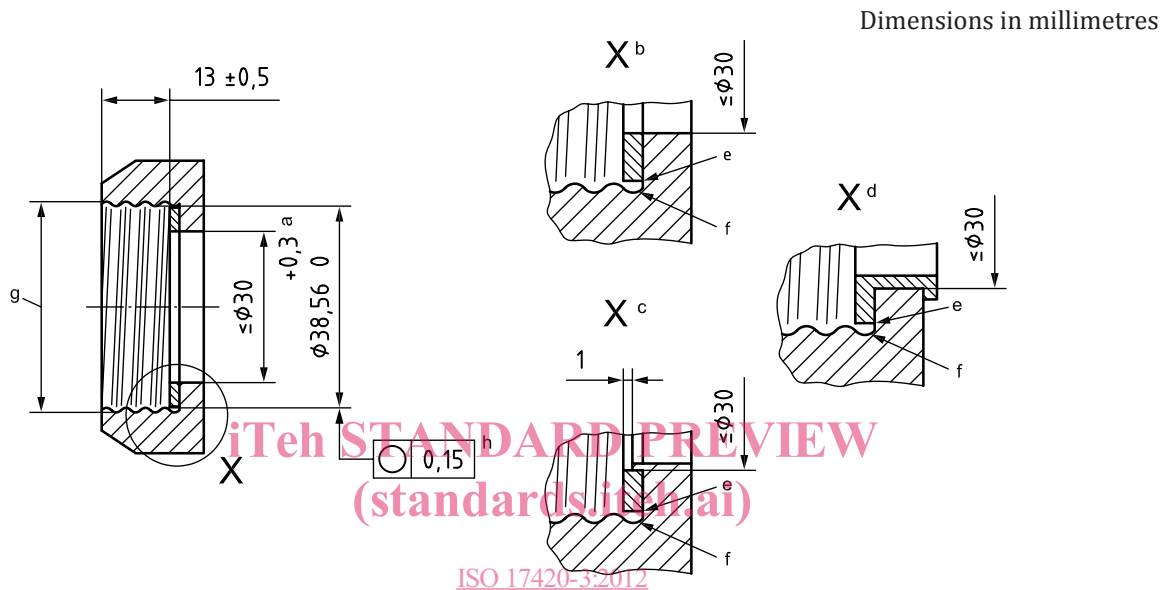
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It shall not be possible to fit the NO-GO side of the gauge into the female thread connector without excessive force. It shall bind after initial engagement.

If the central hole of the connector on the respiratory interface has a rim for retention and centring of the sealing element, it shall end at least 1 mm below the surface of the sealing element interfacing the filter.

The part of the female thread connector below the level of the upper surface of the sealing element shall not invade the surface defined by the extension of the thread towards the lower surface of the sealing element (see enlarged detail of Figure 4).

Test in accordance with 5.1 and 5.4.



- a Minor diameter.
 - b Example A.
 - c Example B.
 - d Example C.
 - e The external diameter of the sealing element shall be $\geq 37,5$ mm.
 - f The female thread connector shall not invade beyond the line.
 - g Thread $\text{\O}40$ mm x $1/7''$.
 - h Reference to radius.
- <https://standards.iteh.ai/catalog/standards/sist/17499a47-4454-4f1c-a970-ec3b55fb1fce/iso-17420-3-2012>

Figure 4 — Female thread connector

4.3.4 Sealing element

The sealing element shall be annular with a flat surface towards the filter.

The external diameter of the sealing element shall be $\geq 37,5$ mm.

The internal diameter of the sealing element shall be $\leq 30,0$ mm.

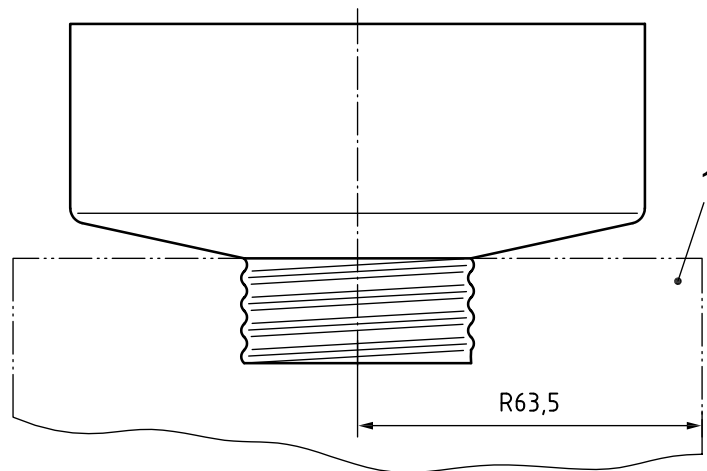
Its thickness shall be $(2,0 + 0,5)$ mm.

Test in accordance with 5.1.

4.3.5 Absence of geometric interference

The back face of the filter shall not protrude beyond the plane perpendicular to the axis of the filter, passing at the end of the effective length of the thread in a circular area of at least $63,5$ mm of radius.

Dimensions in millimetres

**Key**

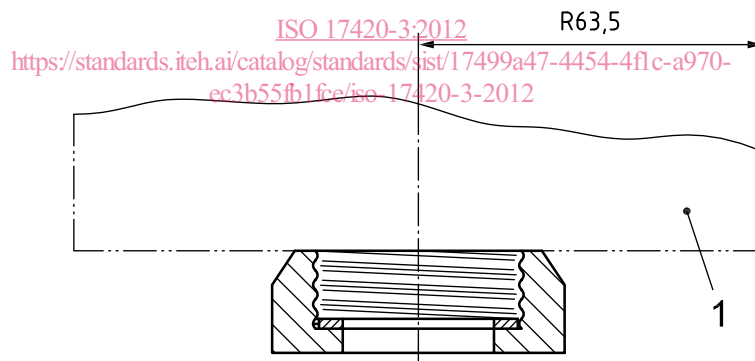
1 area, which shall not be invaded by the filter body

Figure 5 — Absence of geometric interference of the filter body

The front face of the female thread connector of the respiratory interface shall not protrude beyond the plane perpendicular to the axis of the female thread connector, passing at the end of the effective length of the connector in a circular area of at least 63,5 mm of radius.

Test in accordance with 5.1, 5.3 and 5.4.

Dimensions in millimetres

**Key**

1 area, which shall not be invaded by the female thread connector and the respiratory interface

Figure 6 — Absence of geometric interference of the female thread connector

4.4 Physical and mechanical requirements of the thread connection

4.4.1 Resistance of the connectors to pull forces

The male and the female thread connectors shall withstand an axial pull force of 100 N for 10 s.

No connection shall separate, break or be permanently deformed as a result of the applied forces.

Permanent deformation shall be assessed with the gauges in accordance with Figure 7, Figure 8 and Figure 10.

Test in accordance with 5.6.