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**Gas cylinders — Outlet connections  
for gas cylinder valves for compressed  
breathable air**

*Bouteilles à gaz — Raccords de sortie pour robinets de bouteilles à  
gaz pour air comprimé respirable*

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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 12209 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*, Subcommittee SC 2, *Cylinder fittings*, in collaboration with Technical Committee CEN/TC 23, *Transportable gas cylinders*.

This first edition of ISO 12209 cancels and replaces the first editions of the ISO 12209 series (ISO 12209-1:2000, ISO 12209-2:2000, ISO 12209-3:2000), which have been technically revised.

The main changes are:

- combination of former three parts of ISO 12209 into a single ISO 12209;
- modification of valve outlet, adaptor and o-ring dimensions; and
- addition of an outlet connection type test procedure in [Annex A](#).

# Gas cylinders — Outlet connections for gas cylinder valves for compressed breathable air

## 1 Scope

This International Standard specifies the characteristics of outlet connections for gas cylinder valves for compressed breathable air gas cylinders. It states the fundamental requirements for both; the connection and its components and includes basic dimensions. Included in this International Standard are the following connections:

- yoke type outlet connection for SCUBA use up to a maximum cylinder working pressure of 232 bar;
- threaded type outlet connections up to a maximum cylinder working pressure of 232 bar and 300 bar; and
- threaded type outlet connection for SCUBA use up to a maximum cylinder working pressure of 232 bar including adaptor for users to convert into a yoke type outlet.

[Annex A](#) gives the outlet connection type test procedures.

Requirements for cylinder valves (see ISO 10297) are not covered by this International Standard.

Requirements for material specifications and gas/material compatibility (see ISO 11114-1 and ISO 11114-2) are not covered by this International Standard.

## 2 Normative references

ISO 12209:2013

<https://standards.iteh.ai/catalog/standards/sist/0a1ce370-5d1d-4e7f-b6ff-daaa3f6bfc4d/iso-12209-2013>

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **working pressure**

settled pressure of a compressed gas at a uniform reference temperature of 15 °C in a full gas cylinder

[SOURCE: ISO 10286:2007, definition A.2.8]

### 3.2

#### **SCUBA**

self-contained underwater breathing apparatus

### 3.3

#### **compressed breathable air**

gas which has the nominal composition of atmospheric air and is subject to purity level controls

### 4 Yoke type outlet connection for SCUBA use up to a maximum cylinder working pressure of 232 bar

Figure 1 shows an example of the yoke type outlet connection in the assembled state.

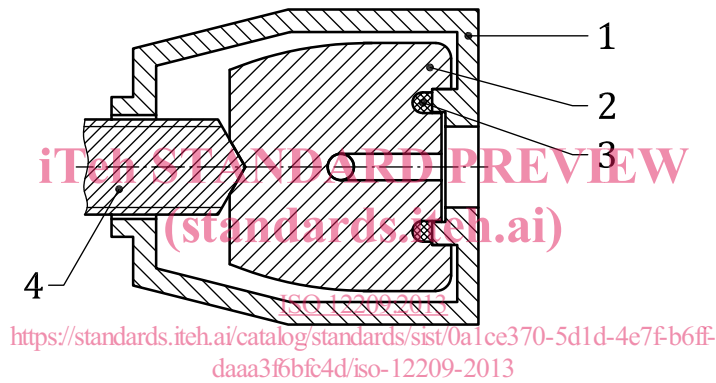
The valve outlet and o-ring dimensions including minimum shore hardness (HS) are shown in Figure 2 and given in Table 1 and Table 2.

The exact form of the o-ring groove is the responsibility of the manufacturer providing the connection passes the outlet connection type test according to Annex A using an o-ring specified in Table 2.

In order to ensure that the yoke does fit over the valve, minimum dimensions are given for the yoke (see Figure 3 and Table 3).

No outer dimensions are given for the yoke. However, the dimensions shall be chosen such that the yoke can resist a torque applied via the screw of 20 Nm without visible permanent deformation of the thread and/or the yoke. In addition, the tests described in Annex A shall be carried out.

Unless otherwise specified, the general tolerances for linear and angular dimensions shall be in accordance with class m of ISO 2768-1.



- Key**
- 1 yoke
  - 2 valve outlet
  - 3 o-ring
  - 4 screw

Figure 1 — Yoke type connection — Assembly drawing

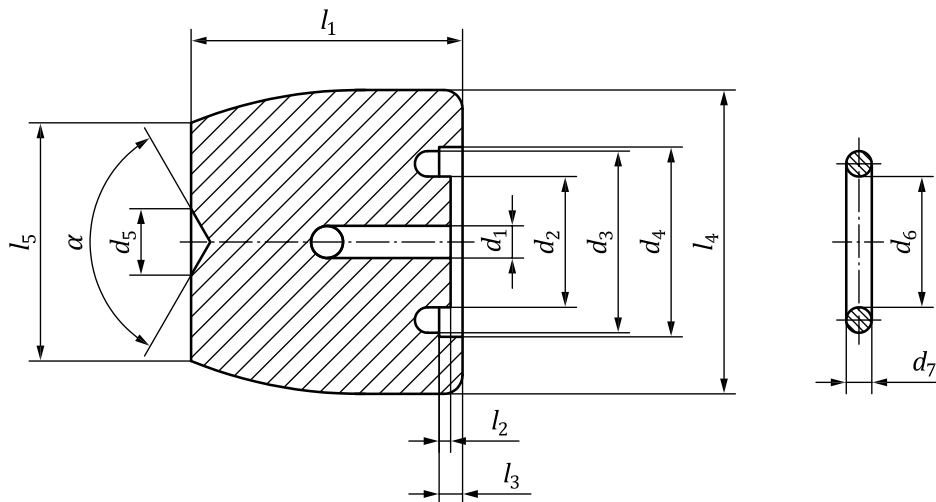


Figure 2 — Valve outlet dimensions

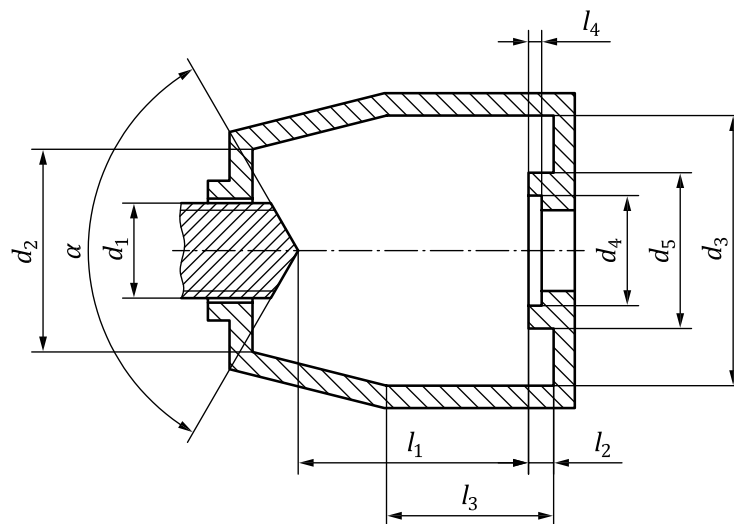
**Table 1 – Valve outlet dimensions**

Symbol	Dimension mm	Tolerance mm	Concentricity mm
$d_1$	to be specified by the manufacturer		
$d_2$	12,67 max.	—	0,1
$d_3$	17,45 max.	—	0,1
$d_4$	18,16	$\pm 0,08$	0,1
$d_5$	6,3	$\pm 0,08$	0,3
$l_1$	25,5 max.	—	not applicable
$l_2$	1,0 max.	—	not applicable
$l_3$	1,98	$\pm 0,35$	not applicable
$l_4$	28,58 max.	—	not applicable
$l_5$	22,5 max.	—	not applicable
$\alpha$	120 °	—	not applicable

**Table 2 – O-ring dimensions and properties**

Symbol/Property	“Small type”		“Large type”	
	Dimension mm	Tolerance mm	Dimension mm	Tolerance mm
$d_6$	12,42	$\pm 0,13$	12,37	$\pm 0,13$
$d_7$	1,78	$\pm 0,08$	2,62	$\pm 0,08$
HS	ISO 12209:2013 (90 $\pm$ 5) Shore A			

NOTE 1 The o-ring dimensions are taken from ISO 3601-1 (same as ASTM D2240) and the hardness is defined in ASTM D2240.  
NOTE 2 The “small type” o-ring is commonly referred to as “-014” by most o-ring manufacturers. The “large type” o-ring is commonly referred to as “-112” by most o-ring manufacturers.



**Figure 3 – Yoke dimensions**

Table 3 — Yoke dimensions

Symbol	Dimension mm	Tolerance mm	Symbol	Dimension mm	Tolerance mm
$l_1$	26 min.	—	$d_1$	10 min	—
$l_2$	2,8 min.	—	$d_2$	23 min	—
$l_3$	18,8 min.	—	$d_3$	31 min	—
$l_4$	1,52 min.	—	$d_4$	12,8	+0,20 -0,05
$\alpha$	110°	± 5°	$d_5$	17,9	± 0,05

## 5 Threaded type outlet connections up to a maximum cylinder working pressure of 232 bar and 300 bar

### 5.1 General requirements

The two outlet connections specified in this clause consist each of a valve outlet, a filling connector and a gas withdrawal connector. Use of the specified filling connectors is essential to ensure the safe use of each connection at its intended working pressure.

Basic dimensions for the valve outlet, connectors and its components are shown on [Figures 4, 6, 8, 9, 11](#) and [13](#) and are specified in [Tables 4, 5, 6, 7, 8](#) and [9](#) respectively.

Unless otherwise specified, the general tolerances for linear and angular dimensions shall be in accordance with class m of ISO 2768-1.

### 5.2 232 bar threaded outlet connection

#### 5.2.1 General

The outlet connection specified here is intended for use at cylinder working pressures not exceeding 232 bar.

#### 5.2.2 232 bar valve outlet

[Figure 4](#) shows the valve outlet to be used for cylinders with a maximum working pressure of 232 bar and [Table 4](#) specifies its dimensions.



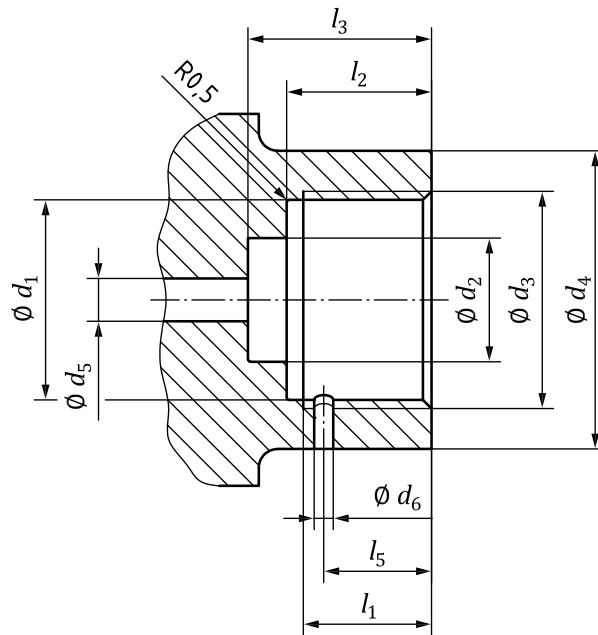


Figure 4 — 232 bar valve outlet

Table 4 — Dimensions of 232 bar valve outlet

Symbol	Dimension mm	Tolerance mm	Symbol	Dimension mm	Tolerance mm
$l_1$	10 min.	ISO 12209:2013	$d_2$	13	+0,3 0
$l_2$	15	0 -0,5	$d_3$	G 5/8 <sup>a</sup>	—
$l_3$	19	+0,5 -0,2	$d_4$	30 min.	—
$l_5$	12	—	$d_5$	5 max.	—
$d_1$	20,5 min.	—	$d_6$	2	+1 0

<sup>a</sup> For dimensions of pipe threads, see ISO 228-1.

### 5.2.3 232 bar filling connection

Figure 5 is an assembly drawing of the filling connection to be used for filling cylinders up to a maximum working pressure of 232 bar.

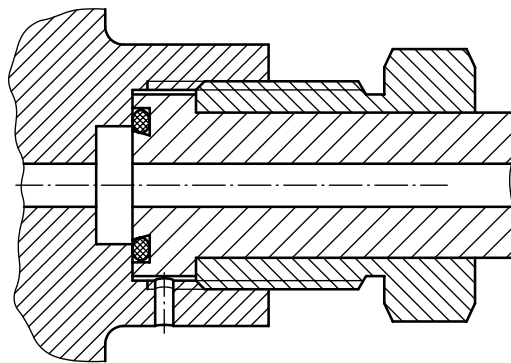
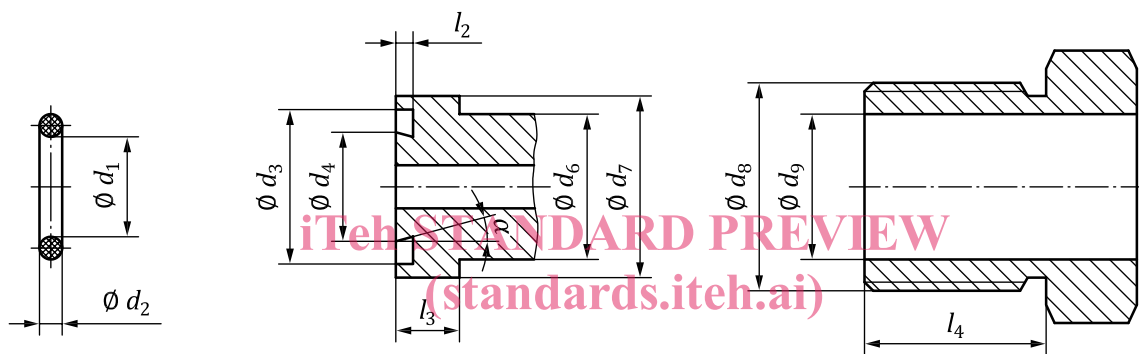


Figure 5 — 232 bar filling connection — Assembly drawing

Figure 6 shows the individual parts of the filling connector and Table 5 specifies their basic dimensions. The valve outlet is shown in Figure 4.



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 Figure 6 — 232 bar filling connector — Components

Table 5 — Dimensions of 232 bar filling connector

Symbol	Dimension mm	Tolerance mm	Symbol	Dimension mm	Tolerance mm
$l_2$	1,9	0 -0,1	$d_3$	17	—
$l_3$	7	0 -2	$d_4$	12	—
$l_4$	20	—	$d_6$	16	-0,05 <sup>b</sup> -0,16
$\alpha$	15°	—	$d_7$	20 max.	—
$d_1$	11,2	—	$d_8$	G 5/8 <sup>a</sup>	—
$d_2$	2,65	—	$d_9$	16	+0,25 <sup>c</sup> +0,15

NOTE The o-ring dimensions are taken from ISO 3601-1 (same as ASTM D2240).

<sup>a</sup> For dimensions of pipe threads, see ISO 228-1.

<sup>b</sup> The tolerance is taken from ISO 286 where it is defined as “d11”.

<sup>c</sup> The tolerance is taken from ISO 286 where it is defined as “B11”.

### 5.2.4 232 bar gas withdrawal connection

Figure 7 is an assembly drawing of the gas withdrawal connection for valves for use with cylinders with a maximum working pressure of 232 bar.

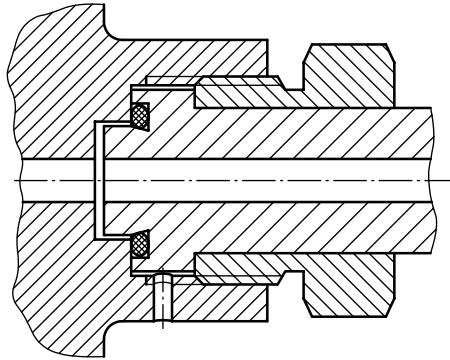


Figure 7 — 232 bar gas withdrawal connection — Assembly drawing

Figure 8 shows the individual components of the gas withdrawal connector and Table 6 specifies their basic dimensions. Figure 4 shows the valve outlet.

Table 6 — Basic dimensions of 232 bar gas withdrawal connector

Symbol	Dimension mm	Tolerance mm	Symbol	Dimension mm	Tolerance mm
$l_1$	3	—	$d_3$	17	—
$l_2$	1,9	ISO 12209:2013 -0,1	$d_4$	12	+0,1 0
$l_3$	7	0 -2	$d_6$	16	-0,05 <sup>b</sup> -0,16
$l_4$	12	± 0,3	$d_7$	20 max.	—
$a$	15°	—	$d_8$	G 5/8 <sup>a</sup>	—
$d_1$	11,2	—	$d_9$	16	+0,25 <sup>c</sup> +0,15
$d_2$	2,65	—	—	—	—

NOTE The o-ring dimensions are taken from ISO 3601-1 (same as ASTM D2240).

<sup>a</sup> For dimensions of pipe threads, see ISO 228-1.

<sup>b</sup> The tolerance is taken from ISO 286 where it is defined as “d11”.

<sup>c</sup> The tolerance is taken from ISO 286 where it is defined as “B11”.