



International
Standard

ISO 24163-1

**Clamp-in tyre valves for tyre
pressure monitoring systems —**

**Part 1:
Definition, types, dimensions and
valve interface**

Valves à visser pour système de contrôle de la pression des pneus —

Partie 1: Définitions, types, dimensions et interface de valve

**First edition
2024-03**

STANDARDSISO.COM : Click to view the full PDF of ISO 24163-1:2024



COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Valve body dimensions.....	2
5 Sealing types.....	3
6 Valve core.....	5
7 Cap.....	6
8 Nut.....	7
9 Washer for nut.....	8
10 Retainer washer for sealing element.....	9
11 Marking.....	9
12 Rim interface.....	9
13 Installation procedure.....	10
14 Pressure rate.....	11
Bibliography.....	12

STANDARDSISO.COM : Click to view the full PDF of ISO 24163-1:2024

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Subcommittee SC 9, *Valves for tube and tubeless tyres*.

A list of all parts in the ISO 24163 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Clamp-in tyre valves for tyre pressure monitoring systems —

Part 1:

Definition, types, dimensions and valve interface

1 Scope

This document specifies types of clamp-in TPMS tubeless valves and associated requirements. It applies to the tyre valves assembled on a valve hole of rim with diameter 11,3 mm for passenger cars and light commercial vehicles (M1 and N1 categories). This document does not include the design, development or requirements of the TPMS housing or the interface between said housing and the valve.

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 9413, *Tyre valves — Dimensions and designation*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

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

3.1

clamp-in valve

valve for tubeless tyre, designed to be used with a valve core, a cap, an O-ring or a rubber grommet and to be fixed with a hex nut and potentially a ring washer

3.2

retainer washer

washer mounted on valve body that retains sealing element

3.3

tyre pressure monitoring system

TPMS

system which directly monitors the tyre pressure and which alert in case of under pressure

3.4

traceability

code referring to production date

3.5

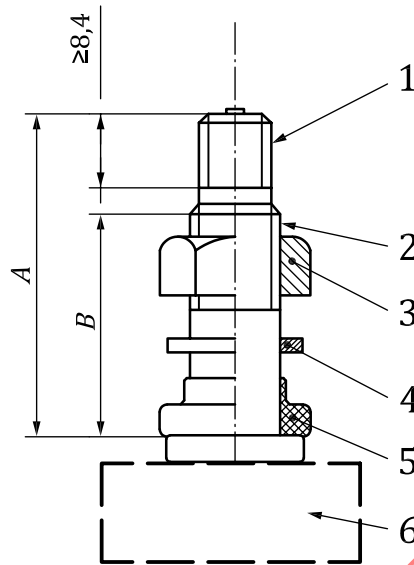
valve body

elongated part of valve usually with thread for nut and for cap in the external part and thread for inner core inside

4 Valve body dimensions

Main body dimensions are listed in [Table 1](#). Cap thread length should be a minimum of 8,4 mm but 5 mm as a minimum is also acceptable to improve nose resistance. See [Figures 1](#) and [2](#).

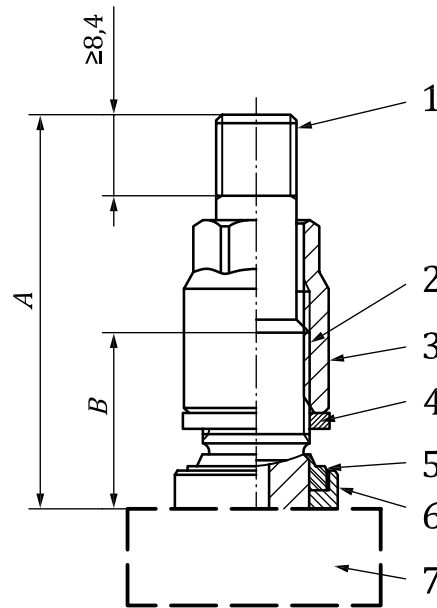
Dimensions in millimetres



Key

- 1 cap thread (8V1)
- 2 nut thread
- 3 nut (shape only illustrative)
- 4 nut washer (optional)
- 5 sealing (shape only illustrative)
- 6 TPMS housing

Figure 1 — Valve body scheme

**Key**

- 1 cap thread (8V1)
- 2 nut thread
- 3 nut (shape only illustrative)
- 4 nut washer (optional)
- 5 sealing (shape only illustrative)
- 6 retainer washer (shape only illustrative)
- 7 TPMS housing

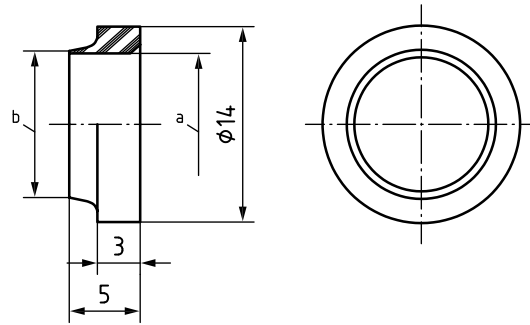
Figure 2 — Alternative valve body scheme**Table 1 — Valve body dimensions and threads**

Type	A mm	B mm	Thread for nut	Correspondence with ISO 9413
VB1	$33 \leq A < 37$	min. 14,5	10V2 or M11 × 0,75	CQ 09 ^a
VB2	$37 \leq A < 39$	min. 14,5	10V2 or M11 × 0,75	-
VB3	$39 \leq A < 43$	min. 14,5	10V2 or M11 × 0,75	CQ 10 ^a

^a The valve code names are specified in ISO 9413.

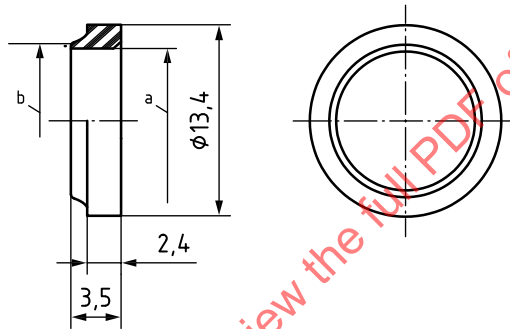
5 Sealing types

There are three types of rubber sealing: grommet, T-grommet and O-ring. Sealing type and dimensions (see [Table 2](#)) depend on valve manufacturer. See [Figures 3](#) to [7](#) for some examples of T-grommet and O-ring.



- a Fits to 10V2 thread.
- b Fits to 11,3 mm valve hole.

Figure 3 — T-grommet type GV1 (B05 range according to ISO 9413)



- a Fits to 10V2 thread.
- b Fits to 11,3 mm valve hole.

Figure 4 — T-grommet type GV2

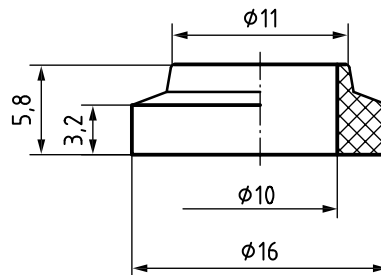


Figure 5 — T-grommet type GV3 (B05 range according to ISO 9413)

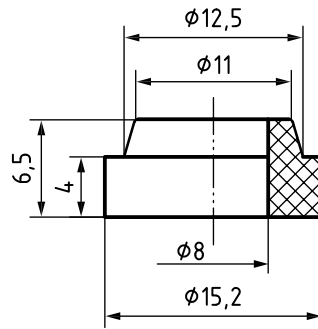


Figure 6 — T-grommet type GV4

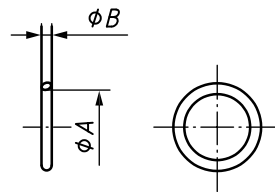


Figure 7 — O-ring

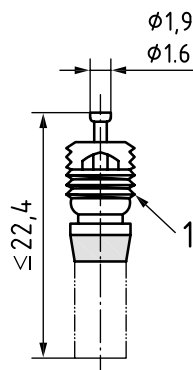
Table 2 — O-ring dimensions

Type	A mm	B mm
C 04 (ISO 9413)	11	2
ORV2	11	1,5

6 Valve core

The use of short core is recommended (type H 01 according to ISO 9413).

The use with inappropriate valve cores (e.g. plain brass valve core or similar in aluminium valves) may result in an electro-chemical reaction which can cause the valve core to fail: only use original replacement parts (nickel-plated valve cores). See [Figure 8](#).



Key

- 1 core thread (5V1)

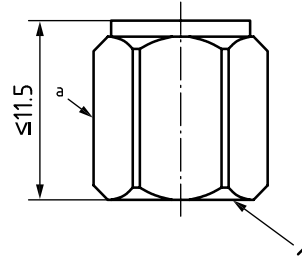
Figure 8 — Inner core sketch (ISO 9413)

7 Cap

Always make sure that caps are installed on valve stems. Valve caps help protect valve stem and core from contamination. Valve caps with gasket inside will help the sealing.

Valve caps can be made of metal or plastic. Plastic material is recommended against corrosion. Cap designs are only illustrative and may vary depending on manufacturer. See [Figures 9](#) to [11](#).

Dimensions in millimetres

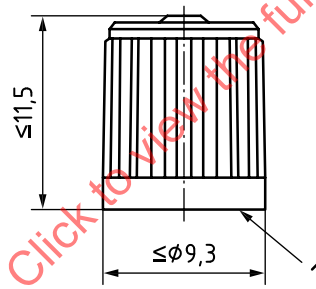


Key

- 1 cap thread (8V1)
- a HEX 9,5.

Figure 9 — Example of cap with hexagonal shape VC1

Dimensions in millimetres

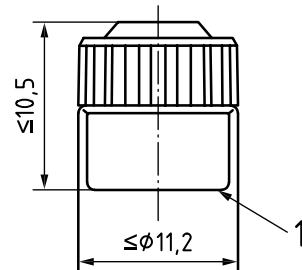


Key

- 1 cap thread (8V1)

Figure 10 — Example of slim cap VC2

Dimensions in millimetres



Key

- 1 cap thread (8V1)

Figure 11 — Example of cap with partial knurling VC3 (type I 02 according to ISO 9413)

8 Nut

A nut may have a complete or interrupted thread inside. Moreover, a washer may be used (attached to or separated from the nut). The usage of nut and washer shall not prevent cap usage in case of a short valve.

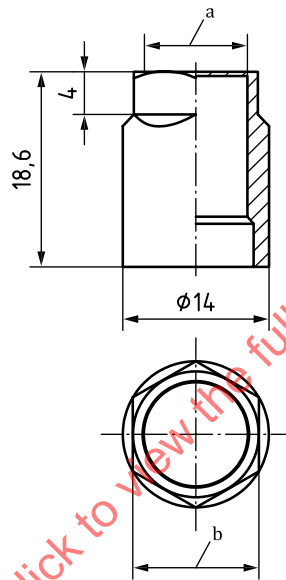
The nut shall be lubricated if the manufacturer recommends it.

See [Table 3](#) and [Figures 12](#) to [14](#) for examples of nuts.

Table 3 — Nut dimensions

Type nut	External diameter	Inner thread	Hexagon
VN1	max. 14 mm	10V2 or M11 × 0,75	HEX 11 or 12
VN2	max. 15 mm	10V2 or M11 × 0,75	HEX 11 or 12

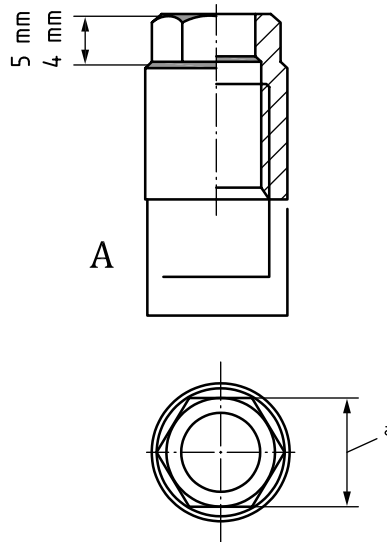
Dimensions in millimetres



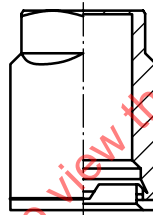
Key

- a nut thread (10V2, ISO 4570): 10,3 × 0,907.
- b HEX 12.

Figure 12 — Example of nut with partial counterbore on bottom

**Key**

- A inner thread
a HEX 11 or HEX 12.

Figure 13 — Example of nut with partial non-through thread on top**Figure 14 — Example of nut with washer****9 Washer for nut**

A washer can be made of metal or plastic, attached to a nut or separated. Washer design depends on the nut used and the manufacturer. See [Table 4](#) and the example in [Figure 15](#).

Table 4 — Dimensions of not-retained washer

Washer type	$\varnothing A$ mm	B mm	$\varnothing C$ mm
VW1 (D 04 according to ISO 9413)	14 to 15,2	1,2 to 1,8	10,4 to 10,7
VW2	15 to 16	1 to 1,2	10,4 to 10,7
VW3	15 to 16	1,5 to 2,5	10,4 to 11,5

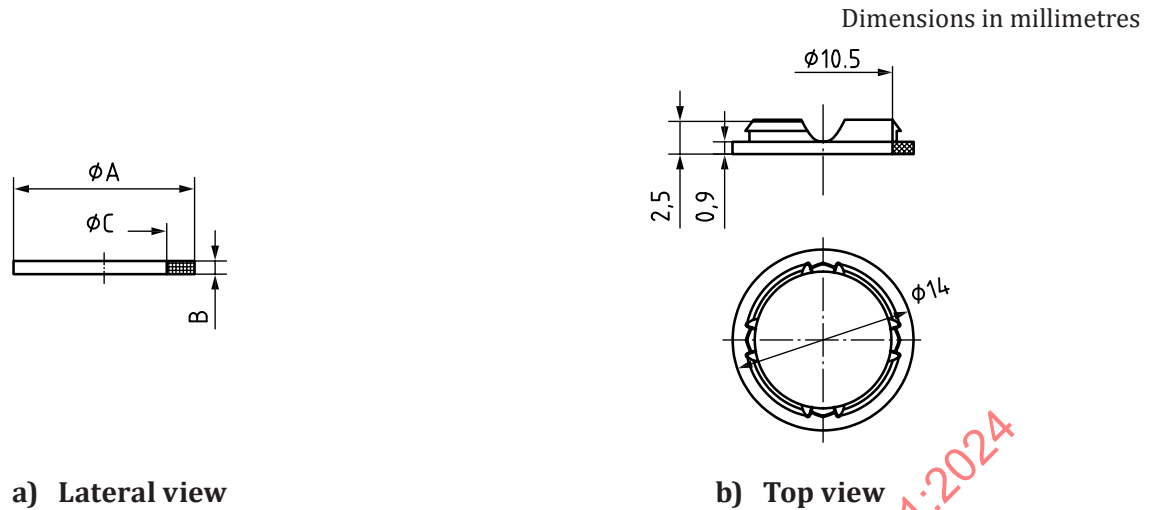


Figure 15 — Example of nut washer VW4 (attached to nut from inside)

10 Retainer washer for sealing element

Metal washer mounted on valve body to retain sealing element. Washer design depends on sealing element used and manufacturer. See example in [Figure 16](#).

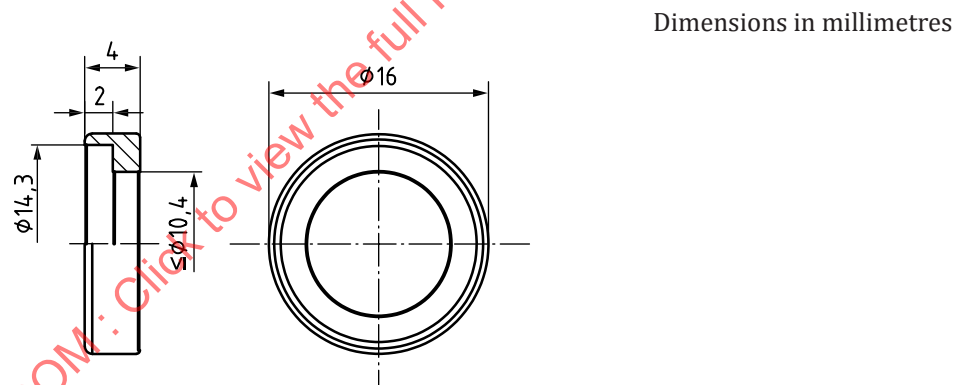


Figure 16 — Example of retainer washer

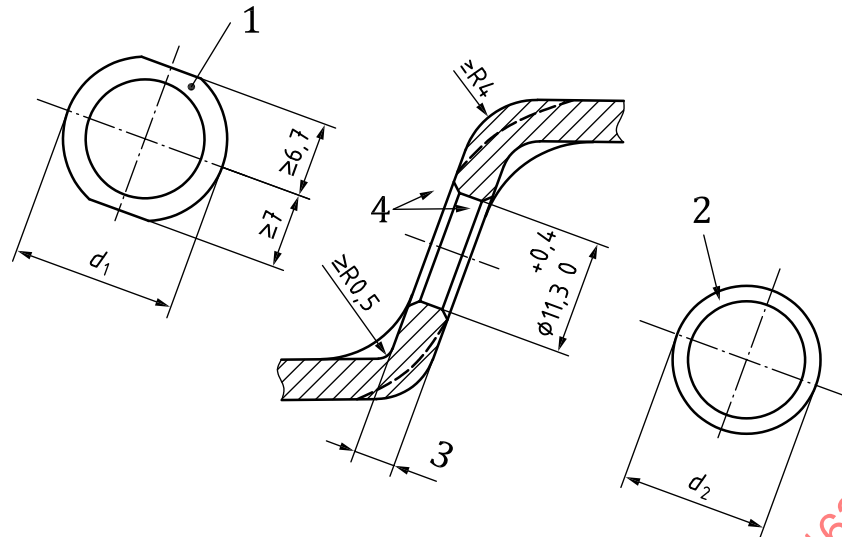
11 Marking

It is recommended to identify TPMS valves. The presence of a special marking on the valve (for example a circumferential device) or on the nut (for example an O-ring) can indicate the presence of a TPMS module inside the tyre.

A traceability marking, in according with manufacturer specifications, is recommended as well (for example production date code).

12 Rim interface

The edges of a main valve hole on the tyre side of rims shall be rounded or chamfered; valve hole edges shall be free from burrs that could damage the valve. There should be no radial striations on the flat area around the valve hole. The flatness of surfaces on both internal and external sides grants proper clamping and sealing. See the rim hole scheme suitable for clamp-in valves shown in [Figure 17](#). Dimensions are detailed in [Table 5](#), which is based on ISO 4000-2:2021.

**Key**

- 1 flat surface with no radial striations for clamp-in valves (tyre side)
- 2 flat surface with no radial striations for clamp-in valves (external side)
- 3 wall thickness (1,5 mm – 4 mm)
- 4 valve hole rounded or chamfered (max 0,5 mm)

NOTE Parallelism of max 0,2 mm between internal and external flat surfaces is recommended. Figure from ISO 4000-2:2021.

Figure 17 — Rim hole scheme**Table 5 — Diameter dimension**

Valve	d_1 mm	d_2 mm
All valves except for CQ 07 ^a and CQ 08 ^a	min. 15	min. 14
CQ 07 ^a	min. 18	min. 16
CQ 08 ^a	min. 19,5	min. 16
Key d_1 : valve hole flat diameter (tyre side) d_2 : valve hole flat diameter (external side) ^a The valve code names are specified in ISO 9413. NOTE See Figure 5 .		

13 Installation procedure

The mounting into the rim shall be done in according to manufacturer's recommendation by skilled operators. It is mandatory to use TPMS valves with the manufacturer's approved sensor. Also tyre removal shall be done by skilled operators taking care of the sensor.

Valve wheel surface shall be clean, flat and without damages or scratches to allow proper support of nut and sealing. Apply the nut torque recommended by the manufacturer manual using a calibrated wrench. Use carefully screwdrivers and other hard tools to avoid damage on valve/nut coating.

In case of tyre renewal, it is strongly recommended to substitute worn parts (for example sealing grommets and cores) following TPMS kit manual.