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Clamp-in tyre valves for tyre pressure monitoring systems —

Part 2:
Test methods and performance

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Foreword

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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~~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~~the following URL:~~.

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 2:
Test methods and performance

1 Scope

This document specifies test methods for clamp-in tyre valves for tyre pressure monitoring systems (TPMS) clamp-in tyre valves.TPMSs).

These methods are defined to determine the minimum level of performance requested.

This document applies to the tyre valve assembled on the rim hole with diameter of 11.3 mm for passenger cars or for light duty vehicles.

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 3877-2, *Tyres, valves and tubes — List of equivalent terms — Part 2: Tyre valves*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 9413, *Tyre valves — Dimensions and designation*

ISO 14960-2, *Tubeless tyres — Valves and components — Part 2: Clamp-in tubeless tyre valve-test method*

ISO 24163-1, *Tyre valves — Clamp-in Tyre Valves For Tyre Pressure Monitoring Systemstyre valves for tyre pressure monitoring systems — Part 1: Definition, types, dimensions and valve interface*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3877-2, ISO 9413, ISO 24163-1, ISO 14960-2 and the following apply.

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

— IEC Electropedia: available at

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
clamp-in tyre valve
clamp-in type 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 ana hex nut and eventuallypotentially a ring washer

3.2
tyre pressure monitoring system
TPMS
system which directly monitors the tyre pressure and which ~~alert~~alerts in case of under pressure

3.3
valve assembly
clamp-in *tyre pressure monitoring system (TPMS)* (3.2) valve (with a valve core, a cap, a nut, an O-ring or a rubber grommet and ~~eventually~~potentially a washer) fixed on the test fixture

4 Test fixture and valve hole dimensions

For each test, the material and the test fixture should be representative of the actual rim.

Break both edges on both sides of the valve hole either by a 45° chamfer or a radius from 0,3 mm to 0,4 mm. Emery cloth or suitable tooling is recommended. The material of rim or fixture ~~have to~~shall be aluminium alloy or steel.

Unless otherwise stated, for all the tests, the ~~below~~ conditions in Table 1~~Table 1~~ shall be applied for the installation of the valve.

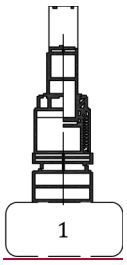
Table 1 — Test Fixture

Test	Nominal hole diameter 11,3 mm	
	Test hole diameter mm	Test plate thickness mm
Valve to rim seal leakage tests (see 5.5 ~~5.5~~)	Specific fixture, see 5.5 ~~5.5~~	
Over torque nut test (see 5.6.1 ~~5.6.1~~)	$11,7^{+0}_{-0,05}$	3,5 ± 0,05
High pressure test (see 5.6.2 ~~5.6.2~~)	$11,7^{+0}_{-0,05}$	3,5 ± 0,05
Radial force resistance (see 5.6.3 ~~5.6.3~~)	$11,3^{+0,05}_{-0}$	3,5 ± 0,05
Ozone test (see 5.7.1 ~~5.7.1~~)	Ozone test on seal alone: Specific fixture, see 5.7.1 ~~5.7.1~~ Ozone test on complete valve assembly ~~valve~~: $11,3^{+0,05}_{-0}$	Ozone test on seal alone: Specific fixture, see 5.7.1 ~~5.7.1~~ Ozone test on complete valve assembly ~~valve~~: 3,5 ± 0,05
Neutral salt spray test (see 5.7.2 ~~5.7.2~~)	$11,3^{+0,05}_{-0}$	3,5 ± 0,05

As described in ISO 9413 and ISO 24163-1, several ~~type~~types of ~~Clamp~~clamp-in ~~valve~~valves exist.

Furthermore, several ~~type~~types of tyre pressure monitoring ~~system (TPMS~~systems (TPMSs) exist and this ~~docuemnt~~document does not consider the attachment system between valve and sensor housing.

In ~~order to simplify the illustrations, in~~ this document~~,~~ a simplified illustration of a TPMS clamp-in valve is used (Figure 1~~will be illustrated as below, whatever its actual design (see Figure 1)~~.).



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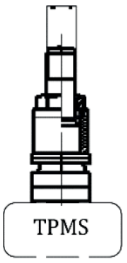

1 TPMS

Figure 1 — Simplified representation of a TPMS clamp-in valve

5 Test methods and performance requirements

5.1 General

5.1.1 Appearance

If not otherwise defined between customer and supplier:

— ~~—~~Valve external aspect: no visible valve crack, spot or scratch is allowed. No visible defect of the anodizing layer is allowed. No deep marks coming from shocks or machining are allowed. All these defects ~~might~~can be judged with naked eye at 1 m distance in final configuration (valve assembled on rim~~);~~).

— ~~—~~Sealing element aspect~~:~~ shall be uniform~~,~~ no bubble, no rubber lack, no ~~crack~~ visible crack or any other defect that will affect the performance~~;~~ is allowed.

— ~~—~~No oil, grease, corrosion or other substance that will affect the performance is allowed.

Prior to performing any test, check the quality of the samples.

5.1.2 Operating pressure

All ~~pressure~~pressures mentioned in this ~~standard~~ document are gauge ~~pressure~~pressures.

Nominal operating pressure: 0 kPa to 830 kPa (~~Refer~~refer to the valve manufacturer indication).

Maximal operating pressure: 1 400 kPa. This maximal operating pressure ~~could~~can be replaced for each test by the real maximal operating pressure according to the valve's specification pressure.

5.1.3 Installation procedure

Unless otherwise stated, for all the tests, the installation procedures and torques of the components (valve core, nut, cap) defined in ISO 24163-1 are applicable ~~to this standard document~~.

Each of the following tests shall be ~~considered~~performed on unused valve assembly.

5.1.4 Samples

It is recommended to test the minimum quantity to be representative of the design (~~for example~~usually at least 5 samples).

5.2 Leakage test method

For each required leakage test in this document:

a) ~~a)~~ Immerse the valve assembly vertically not more than 100 mm below the surface of the water. The valve mouth should be positioned down to test for valve core ~~leak testing~~leakage (see Figure 2~~Figure 2),~~), and the valve mouth should be positioned up to test for valve to rim ~~leak testing~~leakage (see Figure 3~~Figure 3).~~).

b) ~~b)~~ Use the liquid, temperature, pressure and time described in each test procedure.

c) ~~c)~~ Before ~~checking~~starting the test to check for leakage, twist the test fixture several times in the water bath to remove bubbles stuck on valve and nut ~~before starting the test~~ (wait for surface stabilization).

d) ~~d)~~ During the test, observe the bubbles in order to evaluate the leakage:

   — ~~— For information, the~~The leakage limit ~~of~~is 0,2 cm^3/min, which is equivalent to around 14 bubbles/min with a diameter of about 3 mm or to one bubble/min with a diameter of approximatively 7 mm.

   — ~~—~~No bubbles during 1 min is also considered as acceptable.

e) ~~e)~~ If the leakage exceeds the limit, perform ~~again~~ the test ~~24 h~~again to confirm the defect. Perform the test a minimum of 24 h after seal assembly onto the valve in order to take in account the seal relaxation effect ~~in order to confirm the defect~~.

Dimensions in millimetres