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Tubeless tyres — Valves and components — Test methods

Pneumatiques sans chambre — Valves et composants — Méthodes d'essai

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Foreword

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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.

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International Standard ISO 14960 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Subcommittee SC 9, *Valves for tube and tubeless tyres*.

Tubeless tyres — Valves and components — Test methods

1 Scope

This standard specifies test methods for snap-in tubeless tyre valves intended for, but not limited to highway applications.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3877-2, *Tyres, valves, and tubes – List of equivalent terms*.

ISO 4000-2, *Passenger car tyres and rims – Part 2 : Rims*.

ISO 4209-2, *Truck and bus tyres and rims (metric series) – Part 2 : Rims amendment 1*.

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 3877-2 and the following apply.

3.1
snap-in valve
tyre valve having a rigid housing adhered to a resilient body designed to retain and seal the valve in the rim hole

4 Methods for testing tubeless tyres snap-in valves

4.1 Description of a snap-in valve

A snap-in valve is a unit free of rubber in the air passage, no rubber or cement above the second thread on the housing and without flow cracks, blisters, voids, or other molding defects. Mold parting line flash should not exceed 1,3 min in height and 0,15 mm thickness at the outer edge.

4.2 Test fixtures

Break both edges on both sides of the valve hole either by a 45° chamfer of a radius from 0,3 mm to 0,4 mm. Emery cloth or suitable tooling is recommended. It is recommended that material of the test fixture be representative of the material of the actual rim.

The primary external seal of a "snap-in" valve in a valve hole is obtained from the rubber compression of the valve body onto the internal surface of the valve hole. Secondary external sealing may be present by the contact of the remainder of the valve body exterior to the surface of the material around the valve hole. Either of both of these seals may be affected by the compound curvatures in the wheel rims and by stock thickness.

Table 1 – Test Fixtures

Nominal hole	diameter 11,3 mm		diameter 15,7 mm	
Test (dimensions in millimetres)	Test hole	Plate thickness	Test hole	Plate thickness
Valve to rim seal test low and high temperature test (see 5.3.1 and 5.3.2)	$11{,}7^{+0}_{-0{,}05}$	1,8 ± 0,05	$16{,}1^{+0}_{-0{,}05}$	1,8 ± 0,05
Burst or unseating (see 5.5) flexing resistance (see 5.7)	$11{,}7^{+0}_{-0{,}05}$	1,8 ± 0,05	$16{,}1^{+0}_{-0{,}05}$	1,8 ± 0,05
Installation tests (see 5.4.1 and 5.4.2)	$11{,}3^{+0{,}05}_{-0}$	3,5 ± 0,05	$15{,}7^{+0{,}05}_{-0}$	3,5 ± 0,05
Ozone resistance (see 5.6)	$11{,}3^{+0{,}05}_{-0}$	3,5 ± 0,05	$15{,}7^{+0{,}05}_{-0}$	3,5 ± 0,05

4.3 Installation

All valves, while wet with clean water as a lubricant, shall be installed in a proper test fixture by applying valve insertion force to the end of the valve metal insert or by applying valve traction force to the mouth of the valve, perpendicular to the plane of the valve mounting hole and directly through the centre of the valve mounting hole. No valve assembly, however, shall be tested which has damage resulting from installation.

A valve shall be considered properly seated when all of the indicator ring is observed to be through the rim or valve mounting hole fixture.

After installation, valve assemblies must be thoroughly dried in the sealing area before continuing tests.

4.4 Limit case for valves

4.4.1 Unused valves are those that have completed final manufacturing processing at least 24 h previously, have not been subjected to any test or service and have been stored for no longer than 4 months in the dark at ambient temperature, in optimal and non aggressive environment. Rubber compounds may change characteristics during their life expectancy.

4.4.2 For the purpose of this testing method, aged valves are those unused valves that have been subjected to 100 ± 3 °C for 4h in circulating hot air and cooled at 20 °C – 26 °C for a minimum of 4 h.

5 Test methods and performances requirements

This paragraph is split in three columns : Valve holes, test methods and performances

5.1 Adhesion

5.1.1 Test methods

— Make two axial, parallel cuts 180° apart through the full thickness of the rubber cover down the entire length of the valve.

— Pull each side of the button base away from the insert towards the cap thread end at 150 ± 15 mm per minute with a traction machine

The test shall be conducted at 23 ± 5 °C.

An alternative to the traction machine is to use pliers

5.1.2 Performances

Any separation between brass and rubber, brass and cement or cement and rubber in excess of **41 mm^2,** on each valve, shall be considered as a failure.

Any separation that made a strip along the complete valve axis direction shall be considered as a failure.

5.2 Valve Core Seal

Valve cores installed in snap-in valve assemblies (Figure 1)

— Pin height tolerance: + 0,25 – 0,90 mm (reference to valve mouth)

— Standard torque:

  — 0,40 to 0,50 Nm with metallic sealing ;

  — 0,17 to 0,34 Nm for non metallic gasket.

5.2.1 Room Temperature Test

5.2.1.1 Test methods

Immerse valve assembly in clean water at 23 ± 5 °C with mouth down vertically and not more than 100 mm below the surface of the water (see following Figure.1).

Check for leakage with test pressures as follows:

a) Cup gasket seal – Apply 35 kPa air pressure.

b) Barrel seal – Apply 475 kPa air pressure.

5.2.1.2 Performances

Leakage at a rate less than 0,2 cc/min or no bubble detaching during the test time of 1 min is considered acceptable.

5.2.2 Low Temperature Test

5.2.2.1 Test methods

a) Depress and release valve core pin once after a 24 h minimum exposure at – 40 ± 3 °C, and assembly pressure shall be maintained to 180 ± 15 kPa (see following Figure1).

b) Check for leakage with – 40 ± 3 °C ethanol or methanol 25 mm above valve mouth, with assembly still pressurised to 180 kPa.

c) Begin leak detection after 1 min soak period.

5.2.2.2 Performances

Leakage at a rate less than 0,2 cc/min, or No bubble detaching during the test time of 1 min is considered acceptable.

5.2.3 High Temperature Test

5.2.3.1 Test methods

(see following Figure 1).

a) Depress and release valve core pin once after 48 h minimum soak period at 100 ± 3 °C, and assembly pressure shall be maintained to 600 ± 15 kPa.

b) Check for leakage with 66± 3 °C clean water not more than 50 mm above mouth of valve with assembly still pressurised to 600 kPa.

5.2.3.2 Performances

Leakage at a rate less than 0,2 cc/min or no bubble detaching during the test time of 1 min is considered acceptable.

5.3 Valve cap seal (Optional, for sealing caps only)

Room Temperature Test with Cap

5.3.1.1 Test methods

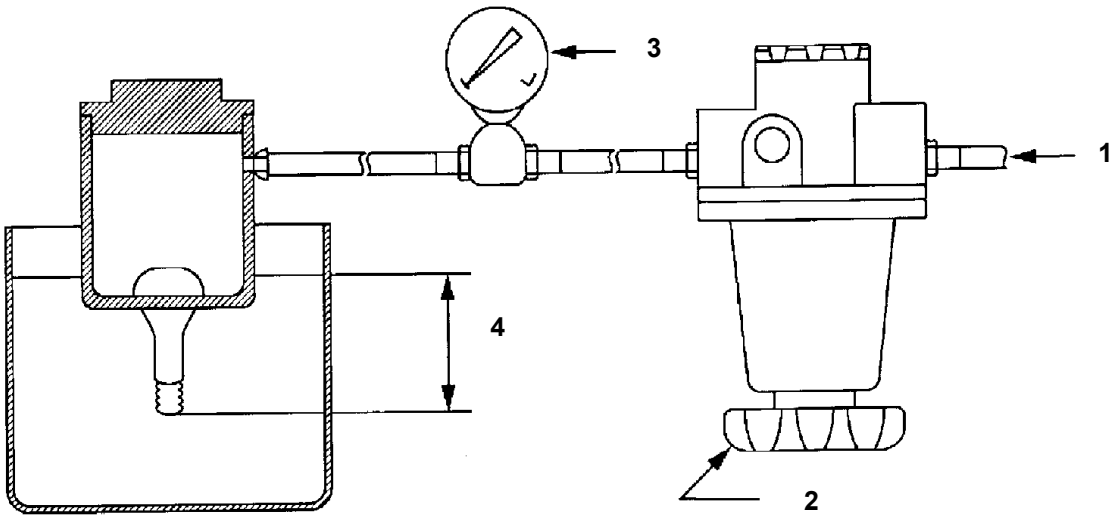
a) Screw the cap with sealing gasket at 0,15-0.20 Nm torque on valve without core.

b) Immerse valve assembly in clean water at 23 ± 5 °C with mouth down vertically and not more than 100 mm below the surface of the water (see following Figure1).

c) Check for leakage with 475 kPa test pressure.

5.3.1.2 Performances

Leakage at a rate less than 0,2 cc/min or no bubble detaching during the test time of 1 min is considered acceptable.



Key

1 Air supply
2 Regulator
3 Gauge
4 Liquid level (100 mm max)

Figure 1 – Valve seal test description

5.4 Valve to Rim Seal

Temperature tests are performed to subject the valves to extremes in temperature. Flexing of valves simulates possible operational conditions.

The same valves and assemblies as shown may be used for both tests provided the low temperature test is conducted first (See Figure 2).

5.4.1 Low temperature

5.4.1.1 Test holes

— Ø$11{,}7^{+0\,/\,-0.05}$, $1{,}8^{\pm\,0.05}$ thick

— Ø$16{,}1^{+0\,/\,-0{,}05}$, $1{,}8^{\pm\,0.05}$ thick

5.4.1.2 Test methods

a) Test valves shall be mounted in a test plate as per paragraph 4.2 and 4.3.

b) Assembly shall then be exposed to a temperature of – 40 ± 3 °C for 24 h minimum to insure the valve seal area is at the test temperature, and pressure shall be maintained to 180 ± 15 kPa

c) The valve assembly, still pressurised to 180 ± 15 kPa shall then be immersed valve mouth up in ethanol or methanol at – 40 ± 3 °C, valve button not more than 100 mm below the surface of the liquid.