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Pneumatic Tubes for Automotive Vehicles — Technical Requirements and Test Methods

Chambres à air pneumatiques pour véhicules automobiles — Exigences techniques et méthodes d'essai

ICS: 83.160.01

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Foreword

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IS) nnn-n was prepared by Technical Committee ISO/TC 31, Tyres, rims and valves.

AUTOMOTIVE VEHICLES – TUBES FOR PNEUMATIC TYRES – TECHNICAL REQUIREMENTS AND TEST METHODS**1 Scope**

This standard specifies the technical requirements and test methods for tubes for pneumatic tyres for automotive vehicles.

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 reference, the latest edition of the referenced document (including any amendments) applies.

ISO 37, Rubber, Vulcanized or Thermoplastic -- Determination of Tensile Stress-Strain Properties

ISO 188, Rubber, Vulcanized or Thermoplastic -- Accelerated Ageing and Heat Resistance Tests

ISO 9413, Tyre Valves -- Dimensions and Designation

ISO 3877/III, Tyres, Valves and Tubes -- List of Equivalent Terms -- Part 3: Tubes

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 3877/III shall apply.

4 Materials, Form and Fit

4.1 The tubes shall be manufactured from an appropriate rubber compound and vulcanized to an endless annular ring shape and shall be with a valve or spud conforming to ISO 9413.

4.2 The tubes shall be classified into the following two classes:

- a) Class A Natural Rubber and its derivatives and blends
- b) Class B – Butyl Rubber / Halo-butyl Rubber and its derivative and blends

4.2.1 A blend shall be named after prime rubber whose percentage by volume is more than 60% in the compound.

4.3 The tube shall be uniform in thickness, free from flaws and designed to fit in a tyre of the corresponding nominal size.

4.3.1 Thickness Uniformity

Except for the region at or near lap or splice, the thickness of the tube when measured along the longitudinal direction of the tube shall not vary from the arithmetic mean of the readings by ± 17.5 percent at any point.

4.3.2 The arithmetic mean of the tube thickness shall be determined for the points which lie in the same circumferential line or the length of the tube (see Fig. 1). The thickness variation shall be determined for each of the four circumferential lines, that is crown centre, base centre, right side wall centre and left side wall centre.

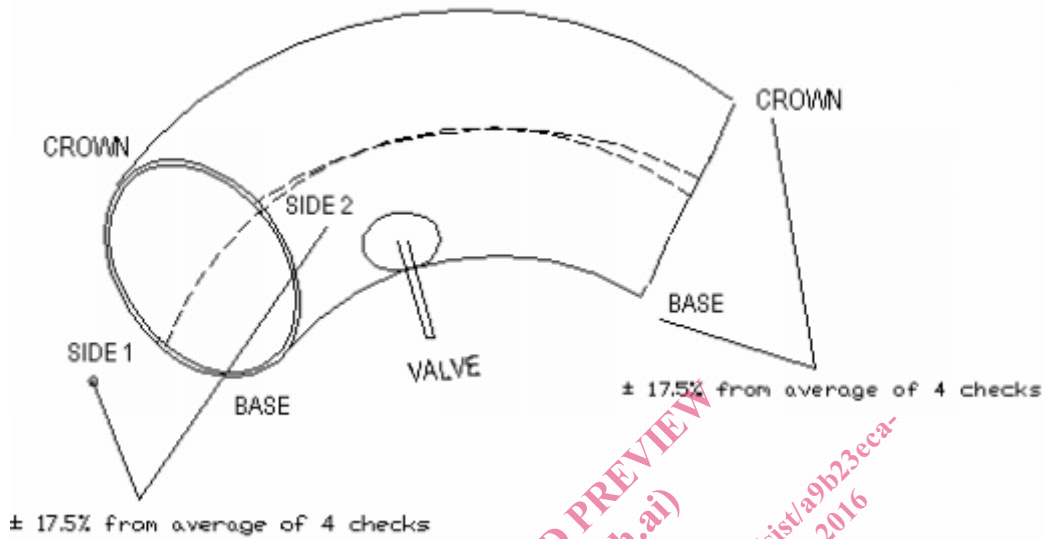


Fig. 1 Measurement of Tube Thickness Uniformity

5 Test requirements

5.1 Each type of tube shall conform to the following requirements

5.1.1 Elongation

Dumb bell test pieces punched out in circumferential direction of the tube when tested in accordance ISO 37 and Annex A shall have elongation at break not less than 450% for 'Class A' tubes and not less than 500% for 'Class B' tubes.

5.1.2 Strength of Splice

Tensile strength of splice determined on dumbbell in accordance with ISO 37 and Annex A shall not be less than 35 kgf/cm² for 'Class A' tubes and 85 kgf/cm² for 'Class B' tubes.

5.1.3 Set after Ageing

Dumb bell test pieces punched out in circumferential direction of the tube when subjected to test conditions and test procedure in accordance with Annex B shall have set after aging not more than 35% for 'Class A' tubes and not more than 25% for 'Class B' tubes.

5.1.4 Accelerated Aging

Dumb bell test pieces punched out in circumferential direction of the tube body when subjected to accelerated aging test at 100 ± 2 ° C for 48 hrs and tested in accordance with ISO 37, ISO 188 and Annex C shall not have drop in elongation at break more than 35% from original, for both 'Class A' and 'Class B' tubes.

6 Air Tightness

Each type of tube with valves attached shall be inflated to just round out and tested in water for the evidence of any leakage. Alternatively, vacuum leak or pressure-less detection method may be used as per the manufacturers' practice in lieu of the water test method. The tube shall not show any leakage.

7 Marking

7.1 Tubes shall be permanently and legibly marked on the outside with the following.

- a) Manufacturer's name or trade name.
- b) Tyre size designation or designations for which the tube is applicable. The size designation description shall contain:
 - i) Nominal tyre section width code;
 - ii) Nominal rim diameter code;
 - iii) Nominal aspect ratio, if applicable;
 - iv) 'R' to identify Radial tyre application; and
 - v) The character '–' or the letter 'D' to identify Bias tyre application.
- c) Manufacturing Month and Year shall be indicated clearly with the appropriate method, and one scheme example is given in ANNEX D.
- d) The word 'BUTYL' and or blue line of 2.0mm Min. width to identify tube of class A Standard.

8 Sampling

The scale of sampling and the criteria of acceptance shall be as agreed to between the manufacturer and the purchaser.

ANNEX A
(Clauses 5.1.1 and 5.1.2)

PREPARATION OF DUMB-BELL TEST SPECIMEN FROM TUBE

A-1 PREPARATION OF TEST PIECES

A-1.1 Test pieces shall be in dumb bell shape and to be taken in the circumferential direction of a tube, from portion except the splice joint for the elongation test. For testing strength of joint splice, dumb bell shall be punched out from the splice joint at the centre as shown in the Fig. 2.

A-1.2 The number of test pieces shall be 4 each from a tube. Size of test pieces shall be 6mm (or 13mm) dumb bell test pieces, for measurement of tensile strength of splice and elongation of body.

A-1.3 The mean value of both ends of parallel parts shall be used as the thickness of test pieces for calculating the tensile strength of splice joints.

A-1.4 For elongation and tensile strength of joints, measured median value of 4 test pieces shall be used.

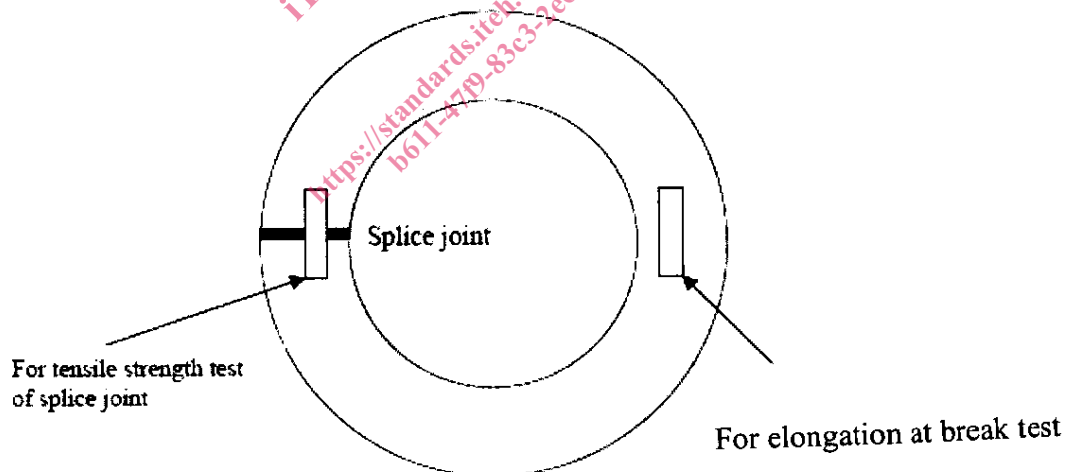


Fig.2 Method of Taking Test Pieces

ANNEX B
(Clause 5.1.3)

TEST CONDITIONS AND TEST PROCEDURE FOR SET AFTER AGEING

B-1 TEST CONDITIONS FOR AGEING

Type of Oven	: Air Oven
Temperature	: 104°C to 110°C
Time to be kept in oven	: 5 Hours
Dimensions of test piece	: 6 mm wide 25 mm long measured on 6 mm dumbbell
Stretch of test piece during ageing	: 50 percent

B-2 DETERMINATION OF THE SET

The test piece shall be removed from oven and allowed to cool under tension for 2 hours. The tension shall be released and percentage set measured after a rest of not less than 8 hours or more than 24 hours.

The tension set (set after ageing) shall be expressed as the extension remaining after a specimen has been stretched and allowed to retract in a specified manner and the same shall be expressed as a percentage of the original length. The formula to be used to calculate percentage tension set is mentioned below:-

$$\text{Tension Set} = 100 \times \frac{l_1 - l_0}{l_0}$$

Where

l_1 = Reference length after recovery

l_0 = Unstrained reference length