# DUS 1855

# DRAFT UGANDA STANDARD

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# Motorcycle rubber wheel inner tubes — Specification



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# Foreword

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The committee responsible for this document is Technical Committee UNBS/TC 8, Transport and communication.

# Motorcycle rubber inner tubes — Specification

## 1 Scope

This Draft Uganda Standard specifies requirements, sampling and test methods for motorcycle inner tubes made of natural rubber (hereinafter referred to as inner tube).

## 2 Normative references

The following referenced documents 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.

US ISO 3877-3, Tyres, valves and tubes — List of equivalent terms — Part 3: Tubes

US ISO 4249-1, Motorcycle tyres and rims (Code-designated series) — Part 1: Tyres

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in US ISO 3877-3 apply.

#### 4 Requirements

#### 4.1 General properties

The inner tube shall be uniformly balanced in both shape and thickness, and be free from harmful defects such as cracks, visible foreign objects, among others. The valve shall be visually inspected ensuring that it is free from rust and easy to tighten and loosen.

#### 4.2 Designation

Inner tube designation shall conform to tyre designation specified in US ISO 4249-1.

#### 4.3 Composition

**4.3.1** The inner rubber shall be composed of rubber made into a ring-shaped tube with a valve reinforced by a rubber plate that acts as its base, which is firmly fixed to the inner tube. It shall be aged to form an integrated part.

**4.3.2** The valve shall be of one of the following types:

- a) rubber base valve (see Figure 1); and
- b) rubber covered valve (see Figure 2).



Figure 1 — Rubber base valve [Clause 4.3.2 a)]



Figure 2 — Rubber covered valve [Clause 4.3.2 b)]

Note Figures 1 and 2 are provided as recommendations.

**4.3.3** The valve shall be covered and the valve arrow end shall be at the same level as the valve nozzle, or shall not protrude over 0.5 mm or lower than 1.0 mm from the valve nozzle. A test shall be carried out by measuring with an appropriate device.

# 4.4 Compatibility

Inner tubes designated for motorcycle tyres shall be fully compatible with their intended use. A test shall be carried out in accordance with 8.1.

# 4.5 Mechanical properties

The mechanical properties shall be as specified in Table 1.

Property	Criteria for conformity	Test method			
Tensile strength in MPa shall not be less than	11.7	8.2			
Elongation (in percentage) shall not be less than	500	~ ~			
Tensile strength of joint (in MPa) shall not be less than	6.86				
Permanent elongation (as a percentage) shall not be over	25	8.3			
Tensile strength after ageing decrease shall not be less than	10	8.4			
The retaining strength between the valve and tube in the N shall not be less than	500	US ISO 4249-1			

Table	1 —	Mechanical	pro	perties	of	inner	tube
and	•	moonanioai	P. 0	po:	•		

## 4.6 Air leakage at valve

Air leakage at valve test shall be done in accordance with 8.5.

#### 4.7 Air leakage of inner tube

Air leakage of inner tube shall be carried out in accordance with 8.6.

# 5 Packaging

The tube shall be contained in a package or container that is capable of preventing any damage.

# 6 Marking and labelling

**6.1** Each inner tube and its package or container shall bear as a minimum a number, letter or mark that indicates the following information that shall legibly and indelibly be marked:

- a) Designation
- b) Manufacturing code and manufacturing date/Expiry
- c) Manufacturer's name or trademark
- d) Country of manufacture

**6.2** The inner tube shall be designated in a similar manner to motorcycle tyres under US ISO 4249-1, except for the ply rating.

6.3 The inner tube shall be designated by one of the two methods as follows:

- a) 2.25-17 is applicable to size 2.25-17 motorcycle tyres;
- b) 2.75/3.00-17 is applicable to sizes 2.75-17 and 3.00-17 motorcycle tyres.; and/or

c) If the marking is in a foreign language, its meaning shall correspond with the provisions in Thai that are specified above.

# 7 Sampling and criteria for conformity

**7.1** Sampling and acceptance for testing general properties and compatibility shall be done in accordance with 7.1.1 and 7.1.2.

**7.1.1** Samples shall be drawn at random from tubes under the same lot in the number specified in Column 2 of Table 2.

**7.1.2** If the number of samples that does not correspond with 4.1 and 4.4 does not exceed the number specified in Column 3 of Table 2, tubes under this lot shall be deemed to meet the requirements of this standard.

**7.2** Sampling and acceptance for valves, mechanical properties, and air leakage of the valve and inner tube shall be done in accordance with 7.2.1 and 7.2.2.

**7.2.1** Samples shall be drawn at random from tubes under the same lot in the number specified in Column 4 of Table 2.

**7.2.2** If the number of samples that does not correspond with 4.3.3, 4.5, 4.6 and 4.7 does not exceed the number specified in Column 5 of Table 2, tubes under this lot shall be deemed to meet the requirements of this standard.

## 7.3 Criteria for conformity

If the samples conforming to the requirements specified in 7.1.1 and 7.1.2 shall be declared conforming.

# Table 2 — Sampling plan for testing general properties, compatibility, valves, mechanical properties, and air leakage of the valve and inner tube

Lot designation	General properties	and compatibility	Valve, mechanical properties, air leakage of valve and inner tube		
	Sample size	Acceptable number	Sample size	Acceptable number	
Not exceeding 1200	8	1	3	0	
1201 to 3200	13	2	13	1	
Over 3201	20	3	20	2	

# 8 Test methods

# 8.1 Compatibility

An inner tube, tyre and rim of the same designation and dimension shall be assembled to ensure that the inner tube will not become too tense or too lax to the extent that it forms any folds. A visual inspection shall also be carried out.

# 8.2 Tensile strength, elongation, tensile strength of joint

#### 8.2.1 Apparatus

The test for tensile strength shall be able to provide a maximum reading with a tolerance of + 2% and the clamp shall move at a speed of 500 mm/min + 25 mm/min.

#### 8.2.2 Preparation of test piece

**8.2.2.1** Each sample shall be cut following the circumference, as shown in Figure 3, into a dumbbell shape to get one of the sizes or shapes in Figure 4. Four pieces shall be subjected to tensile strength and elongation tests and two pieces shall be tested for the tensile strength of the joint, which shall be cut as close to the centre of the test piece as possible.



Figure 3 — Cutting of test pieces for tensile strength and elongation test and test on the tensile strength of the joint

- **8.2.2.2** The thickness and width of the test piece shall be measured as follows:
  - a) An instrument for measuring the thickness shall have a scale of 0.01 mm and the flat faced loading disc shall be 5 mm in diameter. The pressure load that is applied by the instrument shall be 0.80 + 0.12 N.



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#### Units in millimeters

# Figure 4 — Sizes and shapes of test pieces are subjected to tensile strength and elongation tests as well as tests on the tensile strength of the joint

- b) The thickness shall be measured at several spots on the parallel portion of the test piece and the lowest measured value shall be the thickness of the test piece. However, the measurement should not be performed when the centre of the loading surface is outside the edge of the test piece.
- c) The thickness of the test piece that is prepared for testing the tensile strength of the joint shall be measured on the right and left sides of the joint at a minimum of two positions. The maximum and minimum values obtained from the measurement shall be deleted and the remaining values shall be averaged to obtain the thickness of the test piece.
- d) The width of the parallel portion of the gauge length shall be measured from the width of the cutting dye.
- e) The parallel length shall be correctly and clearly marked with indicators and the centre of the parallel portion shall be taken as the centre of the gauge length.
- f) The sectional area of the test piece shall be calculated as follows:

Sectional area = Thickness x Width of parallel portion

#### 8.2.3 Testing method

- 8.2.3.1 The test piece shall be firmly gripped by a clamp so that it cannot twist during the test.
- 8.2.3.1 The test piece shall be pulled at a speed of 500 mm + 25 mm/min until it breaks.

#### 8.2.4 Calculation

#### 8.2.4.1 Tensile strength

$$T_{a} = \frac{F_{a}}{A}$$

where

 $T_{\rm a}$  is the tensile strength in MPa; and

 $F_{a}$  is the maximum load in Newtons.

A = sectional area of the test piece prior to test (in mm2).

# 8.2.4.2 Elongation

$$E_{\rm b} = \frac{L_1 - L_0}{L_0} * 100$$

where

 $E_{\rm b}$  is the percentage elongation;

 $L_1$  is the length in millimetres between indicators at the time of breaking; and

 $L_{o}$  is the gauge length in millimetres.

#### 8.2.5 Test results

#### 8.5.2.1 General

The measured values of the tensile strength and elongation shall be arranged in order of decreasing numerical value, indicated respectively as  $T_{a1} \ge T_{a2} \ge T_{a3} \ge T_{a4}$  and  $E_{b1} \ge E_{b2} \ge E_{b3} \ge E_{b4}$  and the values shall be expressed as calculated by the following formulas.

8.2.5.2 In the case of four test pieces,

$$T_{a} = 0.5 * T_{a1} + 0.3 * T_{a2} + 0.1 * (T_{a3} + T_{a4})$$
$$E_{b} = 0.5 * E_{b1} + 0.3 * E_{b2} + 0.1 * (E_{b3} + E_{b4})$$

**8.2.5.3** In the case of two test pieces,

$$T_a = 0.9 * T_{a1} + 0.1 * T_{a2}$$

$$E_{h} = 0.9 * E_{h1} + 0.1 * E_{h2}$$

#### 8.3 Permanent elongation

#### 8.3.1 Apparatus

- 8.3.1.1 Apparatus capable of drawing and keeping the test piece at the specified length
- 8.3.1.2 Oven with a temperature control function to keep the temperature at 104 °C 110 °C

#### 8.3.2 Test piece preparation

The test piece shall be prepared in accordance with 8.2.2. It shall be cut to obtain the size and shape shown in Figure 5 by the cutting dye. Two test pieces shall be taken from a sample tube.



t is the thickness in millimetres of the test piece

#### Figure 5 — Size and shape of the test piece for the permanent elongation test

#### 8.3.3 Testing method

The test piece shall be firmly gripped by a clamp so that twisting cannot occur during the test. Draw the test piece to 1.5 times the gauge length and keep it at a temperature of 104 °C - 110 °C for five hours. Afterwards, allow it to cool down to room temperature for two hours. The test piece shall be rapidly released from the

clamps, and it should be left for at least eight hours. Measure the gauge length of the test piece and calculate the permanent elongation in a manner similar to 8.2.4.2.

#### 8.3.4 Test results

Test results shall be denoted as the average of permanent elongation values for each tube as specified in 8.2.5.

### 8.4 Tensile strength after ageing

#### 8.4.1 Apparatus

- 8.4.1.1 Testing apparatus for tensile strength according to 8.2.1
- 8.4.1.2 Oven with a temperature control function to keep the temperature at 70 °C + 1 °C.

#### 8.4.2 Test piece preparation

Test pieces shall be prepared in accordance with 8.2.2 by taking four test pieces from a sample.

#### 8.4.3 Testing method

**8.4.3.1** The test pieces shall be aged in the oven at a temperature of 70  $^{\circ}$ C + 1  $^{\circ}$ C so that stress will not occur during the test. The test pieces shall not touch each other or any part of the oven.

**8.4.3.2** Take the test pieces out of the oven and leave them at room temperature for at least 16 hours. They shall then be subjected to tests pursuant to 8.2.3. The test must be completed within 96 h after taking them out of the oven. The tensile strength shall be calculated in comparison with the value obtained prior to ageing.

#### 8.4.4 Test results

Test results shall be denoted as the average values of each tube.

#### 8.5 Air leakage of valve

Cut the valve from the inner tube sample. Install it on the air pressure equipment and apply approximately 0.85 MPa of pressure into the valve. Press down on the valve arrow several times (2-3 times) to ensure that it is not obstructed. Immerse the valve about 20 mm in water in a vertical position. Notice the bubbles and record the time when the bubbles first occur within five minutes after immersion.

### 8.6 Air leakage of inner rubber

Pump up the inner tube with 35 kPa of air pressure. Leave it at room temperature for at least 24 h and check for leakage by applying the same air pressure and immersing the tube in water for one minute. If the tube leaks, bubbles will emerge. There shall be no air leakage from any parts of the inner tube.

# Bibliography

[1] TIS 683-2530 (1987) Thai Industrial Standard for Motorcycle Rubber Inner Tubes

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