

**Thai Industrial Standard  
for  
Motorcycle Rubber Inner Tubes**

**1. Scope**

- 1.1 This standard specifies designations, composition, general requirements, packaging, marking and labelling, sampling, and criteria for conformity and testing for motorcycle inner tubes made of natural rubber (hereinafter referred to as “inner tube”).

**2. Designation**

- 2.1 Inner tube designation must correspond to tyre designation under TIS 682: Thai industrial standard for motorcycle tyres.

**3. Composition**

- 3.1 The inner tube is 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.

3.2 The valve should be one of the following types.

3.2.1 Rubber base valve (see Figure 1)

3.2.2 Rubber covered valve (see Figure 2)

Note: Figures 1 and 2 are provided as recommendations.

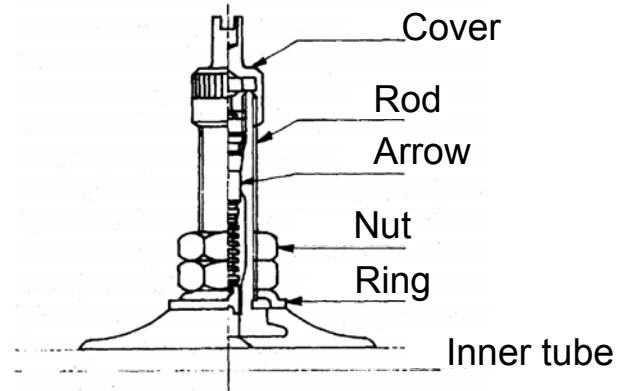


Figure 1 – Rubber base valve  
(Clause 3.2.1)

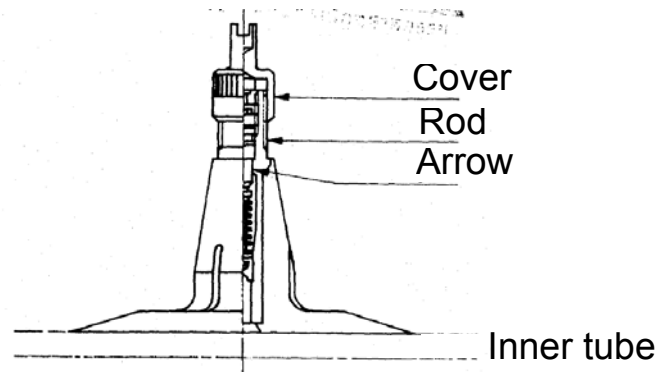


Figure 2 – Rubber covered valve  
(Clause 3.2.2)

- 3.3 The valve must be covered and the valve arrow end must be at the same level as the valve nozzle, or must 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. 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, etc. The valve shall be free from rust and easy to tighten and loosen.

A test shall be carried out by visual inspection.

4.2 Compatibility

Inner tubes designated for motorcycle tyres shall be fully compatible with their intended use.

A test shall be carried out in accordance with Clause 8.1.

4.3 Mechanical properties

The mechanical properties shall be specified in Table 1.

4.4 Air leakage at valve

After testing in accordance with Clause 8.5, there shall be no air leakage at the valve for 5 minutes.

4.5 Air leakage of inner tube

After testing under Clause 8.6, there shall be no air leakage from any parts of the inner tube.

Table 1 – Mechanical properties of the inner tube  
(Clause 4.3)

No.	Property	Criteria for conformity	Testing method
1	Tensile strength in MPa shall not be less than	11.7	Clause 8.2
2	Elongation (in percentage) shall not be less than	500	
3	Tensile strength of joint (in MPa) shall not be less than	6.86	
4	Permanent elongation (as a percentage) shall not be over	25	Clause 8.3
5	Tensile strength after ageing decrease (as a percentage) shall not be less than	10	Clause 8.4
6	The retaining strength between the valve and tube in N shall not be less than	500	TIS 652

### 5. Packaging

5.1 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 details visibly, clearly and permanently.

- (1) Designation
- (2) Manufacturing code
- (3) Manufacturer's name or trademark
- (4) Country of manufacture

Note 1. The inner tube shall be designated in a similar manner to motorcycle tyres under TIS 682, except for the ply rating.

2. The inner tube may be designated by one of 2 methods as follows:

2.25-17 is applicable to size 2.25-17 motorcycle tyres.

2.75/3.00-17 is applicable to sizes 2.75-17 and 3.00-17 motorcycle tyres.

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

- 6.2 The manufacturer of the product under this standard shall be able to display the relevant industrial standards mark on receipt of approval from the Industrial Product Standards Council.

### **7. Sampling and criteria for conformity**

- 7.1 "Lot" means inner tubes with the same designation, made of the same materials under the same procedures, which are made, sold or delivered during the same period.
- 7.2 Sampling and acceptance shall conform to the following sampling plan or an equivalent plan.
- 7.2.1 Sampling and acceptance for testing general properties and compatibility.
- 7.2.1.1 Samples shall be drawn at random from tubes under the same lot in the number specified in Column 2 of Table 2.
- 7.2.1.2 If the number of samples that does not correspond with Clauses 4.1 and 4.2 does not exceed the number specified in Column 3 of Table 2, tubes under this lot shall be deemed to meet the requirements.

7.2.2 Sampling and acceptance for valves, mechanical properties, and air leakage of the valve and inner tube.

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

7.2.2.2 If the number of samples that does not correspond with Clauses 3.3, 4.3, 4.4 and 4.5 does not exceed the number specified in Column 5 of Table 2, tubes under this lot shall be deemed to meet the requirements.

### 7.3 Criteria for conformity

If the samples conform to both Clauses 7.2.1.2 and 7.2.2.2, they shall be deemed to meet the requirements of this standard.



Table 2 – Sampling plan for testing general properties, compatibility, valves, mechanical properties, and air leakage of the valve and inner tube  
(Clauses 7.2.1 and 7.2.2)

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. Testing

### 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  $\pm 2\%$  and the clamp must move at a speed of  $500 \pm 25$  mm per minute.

#### 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.

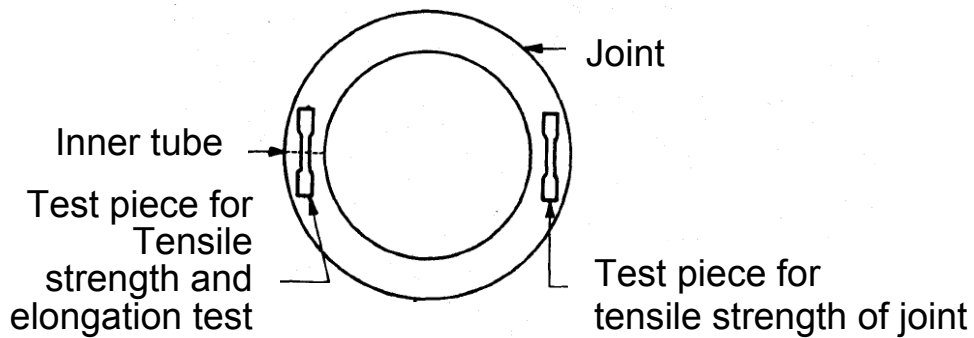
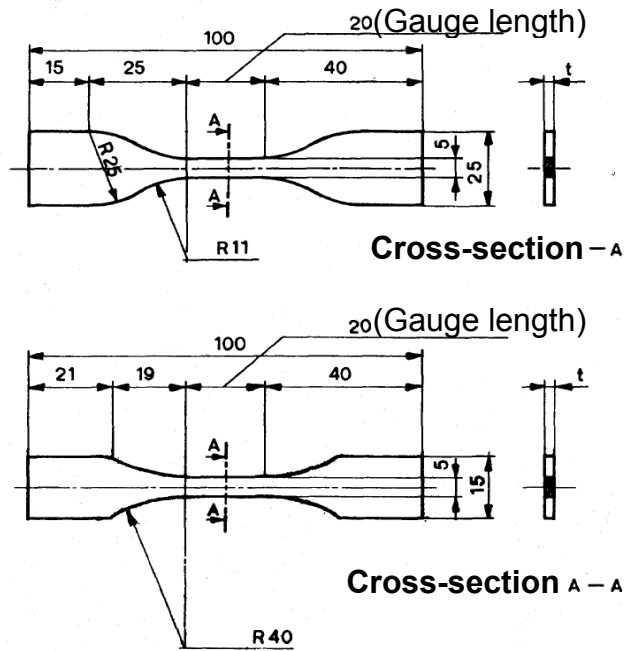


Figure 3 Cutting of test pieces for the tensile strength and elongation test and the test on the tensile strength of the joint  
(Clause 8.2.2.1)

8.2.2.2 The thickness and width of the test piece shall be measured as follows:

- (1) 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  $0.80 \pm 0.12$  N.



t is the thickness of the test piece.

Units in millimetres

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 (Clause 8.2.2.1)

(2) 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.

(3) 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.

(4) The width of the parallel portion of the gauge length shall be measured from the width of the cutting dye.

(5) 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.

(6) The sectional area of the test piece shall be calculated as follows:

$$\begin{aligned} & \text{Sectional area} \\ & = \text{Thickness} \times \text{Width of parallel portion} \end{aligned}$$

## 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  $500 \pm 25$  mm/minute until it breaks.

## 8.2.4 Calculating method

The tensile strength and elongation shall be calculated by the following formula:

## 8.2.4.1 Tensile strength

$$T_B = \frac{F_B}{A}$$

Where  $T_a$  = tensile strength (in MPa).

$F_a$  = maximum load (in N).

$A$  = sectional area of the test piece prior to test (in  $\text{mm}^2$ ).

## 8.2.4.2 Elongation

$$E_B = \frac{L_1 - L_0}{L_0} \times 100$$

Where  $E_b$  = elongation (in %)  
 $L_1$  = length between indicators at the time of cutting (in mm).  
 $L_0$  = gauge length (in mm).

### 8.2.5 Test results

The measured values of the tensile strength and elongation shall be arranged in order of decreasing numerical value, indicated respectively as  $T_{B1} \gg T_{B2} \gg T_{B3} \gg T_{B4}$  and  $E_{B1} \gg E_{B2} \gg E_{B3} \gg E_{B4}$ , and the values shall be expressed as calculated by the following formulas.

#### 8.2.5.1 In the case of four test pieces,

$$T_B = 0.5T_{B1} + 0.3T_{B2} + 0.1(T_{B3} + T_{B4})$$

$$E_B = 0.5E_{B1} + 0.3E_{B2} + 0.1(E_{B3} + E_{B4})$$

#### 8.2.5.2 In the case of two test pieces,

$$T_B = 0.9T_{B1} + 0.1T_{B2}$$

$$E_B = 0.9E_{B1} + 0.1E_{B2}$$

## 8.3 Permanent elongation

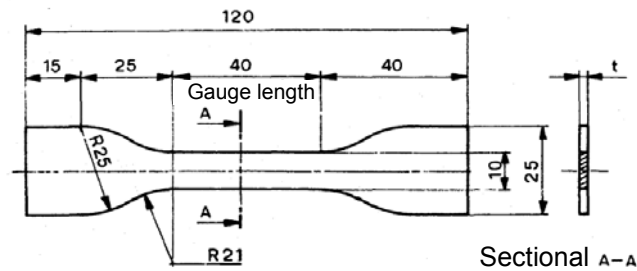
### 8.3.1 Apparatus

#### 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 104-110 degrees Celsius.

### 8.3.2 Test piece preparation

The test piece shall be prepared in accordance with Clause 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 of the test piece.

Units in millimetres

Figure 5 Size and shape of the test piece for the permanent elongation test (Clause 8.3.2)

### 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 104-110 degrees Celsius for 5 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 Clause 8.2.4.2.

### 8.3.4 Test results

Test results shall be denoted as the average of permanent elongation values for each tube according to Clause 8.2.5.

## 8.4 Tensile strength after ageing

### 8.4.1 Apparatus

#### 8.4.1.1 Testing apparatus for tensile strength according to Clause 8.2.1

#### 8.4.1.2 Oven with a temperature control function to keep the temperature at $70 \pm 1$ degrees Celsius.

### 8.4.2 Test piece preparation

Test pieces shall be prepared in accordance with Clause 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  $70 \pm 1$  degrees Celsius 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 Clause 8.2.3. The test must be completed within 96 hours 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 5 minutes after immersion.

8.6 Air leakage of inner tube

Pump up the inner tube with 35 kPa of air pressure. Leave it at room temperature for at least 24 hours 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.

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