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Rubber bands — General requirements and test methods

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Rubber bands — General requirements and test methods

1 Scope

This document specifies general requirements and relevant test methods for rubber bands made of dry natural rubber used for general purposes such as for daily wrapping or packaging.

This document is not applicable for cover rubber bands made of blend and synthetic rubbers. This document is not applicable for rubber bands used for engineering applications, for food contact, nor for medical uses.

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 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 188, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 2781, *Rubber, vulcanized or thermoplastic — Determination of density*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
rubber band
elastic circular band used for holding things together

3.2
lay flat length
half of the inner circumference of the *rubber band* (3.1)

Note 1 to entry: See Figure 1.

3.3
cut-width
distance between the two cut surfaces of the *rubber band* (3.1)

Note 1 to entry: See Figure 1.

3.4
thickness
half the difference between the inside diameter and outside diameter of the *rubber band* (3.1)

Note 1 to entry: See Figure 1.

5.3 Physical properties

Physical properties of rubber bands shall comply with the requirements given in Table 2.

Table 2 — Required physical properties

Physical properties	Requirements			Test method
	Type 1	Type 2	Type 3	
Modulus at 300 % elongation, MPa	≤2,0	>2,0	Not required	6.3
Tensile strength, MPa, min.				
— tube sample	17,0	15,5	10,0	6.3.1
— ring sample	17,0	15,5	10,0	6.3.2
Elongation at break, %, min.				
— tube sample	700	650	500	6.3.1
— ring sample	600	550	450	6.3.2
Tension set, %, max.	7	10	13	6.4
Density, g/cm^3, max.	1,0	1,1	1,3	6.5
After accelerated-ageing test				6.6
Change in tensile strength, %, max.	20	20	20	
Change in elongation at break, %, max.	20	20	20	

6 Test methods

6.1 General

All measurements shall be made at standard laboratory temperature after conditioning in accordance with ISO 23529 for at least 3 h.

6.2 Dimensions

Only perform the dimension measurement on the finish rubber band products, not on the uncut rubber tube.

6.2.1 For each dimension, a minimum of three pieces of rubber bands shall be measured and the average value shall be reported.

6.2.2 For lay flat length, cut a rubber band test piece to open its loop and place a strip on flat surface. The measurement shall be made on the inner side of the strip to the nearest 0,1 mm using appropriated measuring devices e.g. vernier caliper, calibrated tape and ruler. The lay flat length shall be reported as half the measured length of the strip.

Alternatively, an assisting tool may be employed to measure the lay flat length providing that its accuracy is appropriate. The example of the assisting tool is shown in Figure 2.

Key

a Direction of extrusion.

b Dumb-bell cutting direction.

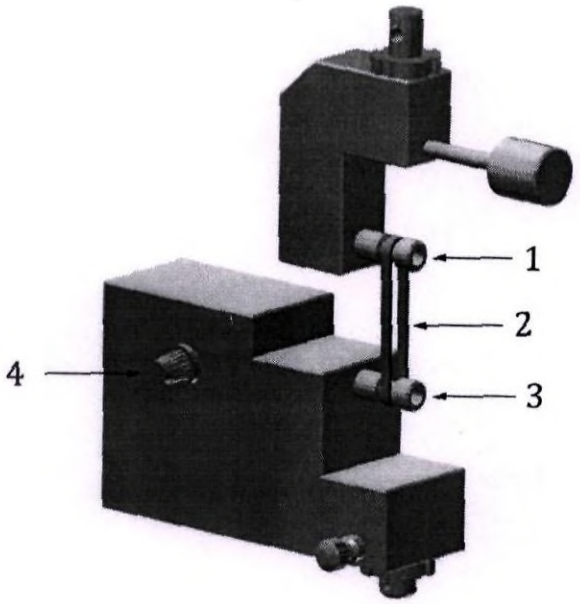
Figure 3 — An uncut tube sample and cutting direction for dumb-bell test pieces

In case of a small tube sample, dumb-bell cutting across the direction of extrusion cannot be conducted, test method B shall be performed.

6.3.2 Test method B: Ring sample

6.3.2.1 An example of a rig for tensile property tests on ring samples is shown in Figure 4. An upper and a lower roller grips shall have a flat surface with diameter (C_p) suitable to the ring sample sizes. The upper roller grip shall be free to turn with very low friction and the lower roller grip shall be driven to rotate the ring with speed between 10 rpm and 15 rpm.

6.3.2.2 Measure the cut-width and the thickness of test pieces as described in 6.2.3 and 6.2.4, respectively. The minimum value of each set of measurements shall be used for calculation.



Key

1 upper roller grip

2 rubber band

3 lower roller grip

4 rolling speed adjusting knob

Figure 4 — Example of rig for tensile property test on ring samples

6.3.2.3 Adjust the initial distance between the upper and the lower roller grips. The distance between the two rollers should be enough to hold the samples with a minimum stress. Set the load to zero before

ΔL is the increasing length, in mm;

L_0 is the reference length, in mm;

6.5 Density

The density of the sample shall be measured in accordance with ISO 2781. A minimum of three test pieces shall be taken and the average value shall be reported.

6.6 Accelerated-ageing test

The accelerated-ageing test of the sample shall be performed in accordance with ISO 188 method A using a cabinet or a cell-type oven at (70 ± 2) °C for (168 ± 2) h.

The tensile strength and elongation at break shall be measured in procedure described in 6.3. Change in tensile properties, expressed in %, is calculated by using the formula:

$$\frac{X_a - X_0}{X_0} \times 100$$

where

X_0 is the value of the property before accelerated-ageing;

X_a is the value of the property after accelerated-ageing.

7 Packaging

The material shall be packed to facilitate safe transport and storage.

8 Marking

The packages shall be clearly marked the following items:

a) product name;

b) type;

c) size: lay flat length, cut-width and thickness;

d) weight or number of pieces;

e) manufacturer or supplier identification;

f) date of manufacture and/or manufacturer's identifying lot number.