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# INTERNATIONAL STANDARD



# 2690

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## Unrecorded magnetic tapes for instrumentation applications — Physical properties and test methods

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## FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2690 was drawn up by Technical Committee ISO/TC 97, *Computers and information processing*.

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It was approved in August 1972 by the Member Bodies of the following countries :

Australia	Germany	Spain
Belgium	Italy	Sweden
Brazil	Japan	Switzerland
Czechoslovakia	Netherlands	Thailand
Denmark	New Zealand	United Kingdom
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No Member Body expressed disapproval of the document.

# Unrecorded magnetic tapes for instrumentation applications — Physical properties and test methods

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the physical properties and test methods for tapes as defined in ISO/R 1859, *Unrecorded magnetic tapes for interchange instrumentation applications — General dimensional requirements*.

## 2 COMBUSTIBILITY

Flammable materials which will ignite from a match flame and when so ignited will continue to burn in a still carbon dioxide atmosphere shall not be used.

## 3 TEST ENVIRONMENT

Unless otherwise stated, all measurements made on a tape to check the requirements and all tests prescribed for a tape in this International Standard will be carried out under the following environmental conditions :

- temperature :  $23 \pm 2$  °C ( $73 \pm 5$  °F);
- relative humidity : 40 to 60 %.

Moreover, tapes shall have been conditioned in this atmosphere for at least 24 h prior to measurement or testing.

## 4 ELASTOPLASTIC PROPERTIES

**4.1** The elastoplastic properties of the tape shall be such that, when a sample tape of 12,7 mm (1/2 in) width is subjected to a tension of 10 N (2.25 lbf) for a period of 3 min under any combination of temperature and relative humidity (R.H.) within the ranges 10 to 50 °C (50 to 122 °F) and 20 to 80 % R.H., the permanent elongation measured with negligible tension after a second interval of 3 min shall be less than 0,5 %.

**4.2** The modulus of elasticity for a single smooth application of tension in 3 min or less, down to the time set by the inertia of the tape itself, shall be such that the elongation is less than 0,5 % under a tension of 4,5 N (1 lbf) for a tape of 12,7 mm (1/2 in) width. For convenience of testing, the measurement may be performed with a tension applied for 3 min.

## 5 LONGITUDINAL CURVATURE

There shall be a minimum radius of curvature for the edge of the tape defined and tested by allowing a 1 m length of tape or a 36 in length of tape to unroll and assume its natural curvature on a flat surface. The minimum radius shall be 33 m (108 ft), which, if measured over an arc of a circle, corresponds to a deviation of a 3,8 mm from a 1 m chord or a deviation of 0.125 in from a 36 in chord.

## 6 LAYER TO LAYER ADHESION

### 6.1 Apparatus

The apparatus consists of a tube of non-oxidizable metal, 100 mm (3.90 in) in length and 12 mm (0.47 in) diameter, capable of being mounted on a bearing and rotating freely around its horizontal axis.

### 6.2 Procedure

**6.2.1** A 1 m (36 in) test specimen length of tape is to be fastened at one end, magnetic side down, to the hollow tube with an adhesive material. The tube shall then be mounted on a bearing (see 6.1).

Attached to the free end of the tape shall be a 1 kg (2.2 lb) weight for each 6,25 mm (1/4 in) width of tape.

At a distance of some centimetres from the fixation of the weight, a strip of double-coated adhesive tape shall be affixed to the magnetic side of the tape in order to fix the roll and prevent its unwinding during later operations.

**6.2.2** The tube shall then be slowly rotated, so that the tape, held in tension by the weight, winds uniformly around the axis into a compact and regular roll.

**6.2.3** The weight is to be removed and it must be verified that the adhesive strip is well affixed to the last layer of the roll; then the tube supporting the rolled tape is to be placed in an oven and left there for 20 h.

During the first 16 h, the temperature shall be  $55 \pm 2$  °C and the relative humidity shall be between 80 and 100 %.

6.2.4 During the last 4 h, and without recovery time, the relative humidity shall be less than 5 %, while the temperature is maintained at  $55 \pm 2^\circ\text{C}$ .

6.2.5 After the dry heat cycle, the tape is to be removed and placed in the normal conditions of recovery for a period between 1 and 2 h.

6.2.6 The adhesive strip, which maintains the free end of the wound tape, is then to be removed. This end of the tape shall unwind under its own weight. If the first two or three layers unwind freely the test is finished.

6.2.7 If the layers stick together, a 25 cm (10 in) length of the free end is to be unwound by hand. The tube is then to be rotated through a quarter revolution in the direction of tape unwind, in order to verify that, under the weight of free tape, the outside layer unwinds from the following one.

6.2.8 Any tape which will not self-unwind after the test described above, or which shows any delamination of the magnetic side, shall be considered as having failed this test.

**7 ANCHORAGE**

The anchorage of the active coating on its backing is to be verified by visual examination after the tape has been tested according to section 6.

**8 RESISTANCE OF COATING**

The electrical resistance of the coating surface shall not exceed  $5 \times 10^8 \Omega/\text{square}$ .

**9 TRANSVERSE CURL (CUPPING)**

9.1 The sample to be tested shall be carefully cut into 6,25 mm (1/4 in) long sections. At least five sections shall be used for the test. Each section shall be placed concave side down on a smooth, flat surface.

NOTE – Care must be taken in cutting of the specimens to avoid any distortion of the tape’s natural transverse curl characteristics.

9.2 Conditioning in the test environment specified in section 3 is required before performing any measurements.

9.3 The distance from the flat surface to the highest point along the section shall be measured to the nearest 0,025 mm (0.001 in). The average distance of the five samples shall be reported as transverse curl.

9.4 Maximum allowable transverse curl is specified in the following table.

Tape width	Maximum allowable transverse curl	
	Base thickness	
	0,038 mm (0.0015 in)	0,025 mm (0.0010 in)
6,25 mm (1/4 in)	0,15 mm (0.006 in)	0,20 mm (0.008 in)
12,7 mm (1/2 in)	0,25 mm (0.010 in)	0,50 mm (0.020 in)
25,4 mm (1 in)	For future consideration <sup>1)</sup>	
50,8 mm (2 in)		

1) Until specific values are adopted for tapes greater than 12,7 mm (1/2 in) in width, samples shall be cut in 6,25 mm (1/4 in) lengths and then to 12,7 mm (1/2 in) widths, and all segments shall be measured.

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