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Draughting media for technical drawings — Draughting film with polyester base —

Part 2:

Determination of properties

Sample Document

*Supports de traçage pour dessins techniques — Films à dessin à base
de polyester —*

Partie 2: Détermination des propriétés



Reference number
ISO 9958-2:1992(E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9958-2 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation*, Sub-Committee SC 9, *Media and equipment for drawing and related documentation*.

ISO 9958 consists of the following parts, under the general title *Draughting media for technical drawings — Draughting film with polyester base*:

- *Part 1: Requirements and marking*
- *Part 2: Determination of properties*

Annex A of this part of ISO 9958 is for information only.

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Draughting media for technical drawings — Draughting film with polyester base —

Part 2: Determination of properties

1 Scope

This part of ISO 9958 specifies test methods for determining the properties of draughting film with a biaxially oriented polyethylene terephthalate base (commonly known as a polyester base), to be used as a medium for drawn and written information which it is possible to duplicate, revise and store.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9958. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9958 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5-2:1991, *Photography — Density measurements — Part 2: Geometric conditions for transmission density.*

ISO 5-3:1984, *Photography — Density measurements — Part 3: Spectral conditions.*

ISO 6221:1991, *Photography — Films and papers — Determination of dimensional change.*

ISO 9175-1:1988, *Tubular tips for hand-held technical pens using India ink on tracing paper — Part 1: Definitions, dimensions, designation and marking.*

ISO 9177-1:1989, *Mechanical pencils — Part 1: Classification, dimensions, performance requirements and testing.*

ISO 9177-2:1989, *Mechanical pencils — Part 2: Black leads — Classification and dimensions.*

ISO 9957-1:1992, *Fluid draughting media — Part 1: Water-based India ink for tracing paper — Requirements and test conditions.*

ISO 9958-1:1992, *Draughting media for technical drawings — Draughting film with polyester base — Part 1: Requirements and marking.*

IEC 93:1980, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials.*

3 Definitions

For the purposes of this part of ISO 9958, the definitions given in ISO 9958-1 apply.

4 Testing — General

The atmosphere for conditioning and testing shall be $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity. (Such an atmosphere is in conformity with ISO 554⁽¹⁾, normal tolerances.)

Film packages free from defects shall be used.

5 Testing of dimensional stability

Any method complying with ISO 6221 and giving sufficient accuracy may be used for determining the thermal and hygroscopic coefficients of expansion.

Precautions to be considered when determining dimensional changes are described in ISO 6221.

The measurements shall be made in the machine direction and in the cross direction.

6 Testing of permanent dimensional change

6.1 Principle

Measurement of the dimensions of the test specimens at 23 °C and 50 % relative humidity. Storage of the test specimens at low temperature, and then at high temperature and high relative humidity, and measurement of the dimensions.

6.2 Test specimens

For draughting film sheets of size A4, select two sheets as the test specimens.

For draughting film sheets of size larger than A4, select two sheets of the film and cut from the centre of each sheet a test specimen of size A4 with the long side in the machine direction.

6.3 Procedure

6.3.1 Condition the test specimens of the draughting film at (23 ± 2) °C and (50 ± 5) % relative humidity for at least 16 h.

Measure the dimensions in the machine direction and in the cross direction using a method giving sufficient accuracy. Repeat the measurements at least once so that each result is the mean of at least two separate measurements.

6.3.2 Store the film for 24 h at each of the following conditions:

- (-10 ± 2) °C (air of 23/50 cooled to -10 °C);
- ($+23 \pm 2$) °C and (50 ± 5) % relative humidity;
- ($+60 \pm 2$) °C and (80 ± 5) % relative humidity;
- ($+23 \pm 2$) °C and (50 ± 5) % relative humidity.

6.3.3 Measure the dimensions as described in 6.3.1.

6.3.4 Calculate the mean dimensional change in the two directions separately.

7 Testing of stability of form

7.1 Curling

7.1.1 Principle

Measurement of the curl, in accordance with ISO 9958-1:1992, figure 2, of a draughting film of size A4 placed on a flat surface.

NOTE 1 In general, sheets of sizes A4, A2 and A0 are cut in the machine direction whilst sheets of sizes A3 and A1 are cut in the cross direction.

7.1.2 Test specimens

For draughting film sheets of size A4, select two sheets as the test specimens.

For draughting film sheets of size larger than A4, select two sheets of the film and cut from the centre of each sheet a test specimen of size A4 with the long side in the machine direction.

7.1.3 Procedure

Label the upper and lower surfaces of the test specimens. Place the two sheets, with different surfaces facing down, on a flat surface and condition the sheets at (23 ± 2) °C and (50 ± 5) % relative humidity for at least 16 h.

Measure the curl, in millimetres, of the upward-curling sheet at the ends of the curled sides using a suitable measuring method. Calculate the mean value.

7.2 Bulging

7.2.1 Principle

Unrolling of a draughting film (of size in accordance with 7.2.3) on a flat surface and visual inspection for bulges.

7.2.2 Apparatus

7.2.2.1 Flat surface, larger than the draughting film, with a straightness tolerance of 0,5 mm per 0,5 m.

7.2.2.2 Cotton gloves, or similar.

7.2.3 Test specimens

For draughting film in the form of a roll, cut a minimum of four test specimens of at least 2 m in length from the full width of the roll.

For draughting film in the form of pre-cut sheets, select a minimum of four sheets as the test specimens.

7.2.4 Procedure

Condition the specimens at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity for at least 16 h.

Roll the film up carefully on the flat surface (7.2.2.1) with both hands, using cotton gloves or similar (7.2.2.2). Handle the film carefully. Do not apply any pressure on the film when rolling.

Unroll the film slowly on the flat surface, using both hands. Make sure that no air bubbles are trapped between the film and the flat surface.

Visually inspect the film for bulges between 2 min and 5 min after unrolling.

8 Tape stripping adhesion test

8.1 General test

8.1.1 Principle

Application of pressure-sensitive tape to the surface of the draughting film and rapid removal from the film at an angle of approximately 180° .

8.1.2 Apparatus

8.1.2.1 Apparatus for measuring maximum force, for example a tensile tester (see ISO 4624^[4]) or a maximum reading spring scale.

8.1.2.2 Pressure-sensitive tape, producing a maximum bonding force between the tape and the particular film surface under test of 3 N to 4 N per 10 mm of tape width. Tape with a thin, transparent, plastic backing is preferred.

8.1.3 Test specimens

Select four test specimens of the draughting film, two for testing each side of the film. The dimensions of the specimens are not critical, but one dimension shall be greater than 150 mm.

8.1.4 Procedure

Condition the specimens at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity for at least 16 h.

Apply a strip of pressure-sensitive tape (8.1.2.2), about 150 mm long, to the surface under test of each of the test specimens. Press the tape down with

thumb pressure to ensure adequate contact, leaving enough tape at one end to grasp. No portion of the tape shall extend to the edges of the test specimens.

Within 5 min after applying the tape, hold the test specimens firmly on a flat surface and remove the tape rapidly from the film surface. This shall be accomplished by pulling the end of the tape so that the complete length of tape is removed from the film at an angle of approximately 180° to the surface of the film.

The force required to remove the tape shall be 3 N to 4 N per 10 mm of tape width. Measurement of the force shall be made using for example a tensile tester or a maximum reading spring scale (8.1.2.1).

NOTE 2 The binding force is, to a certain extent, dependent on the application pressure and the contact time.

If the pressure and time cannot be adjusted so that the force is 3 N to 4 N, another tape should be chosen. However, further testing need not be performed if

- failure is observed with a force less than 3 N per 10 mm, or
- failure is not observed with a force greater than 4 N per 10 mm.

8.2 Testing of adhesion after immersion in water

Select four test specimens in accordance with 8.1.3.

Immerse the test specimens in distilled water at $(23 \pm 2) ^\circ\text{C}$ for 5 min. Hang up the samples and allow them to dry.

Carry out the tape stripping adhesion test in accordance with 8.1.4.

Examine the samples visually and note any loss of coating or any other defects.

8.3 Testing of adhesion after immersion in ammonia solution

Select four test specimens in accordance with 8.1.3.

Immerse the test specimens in 25 % ammonia solution at $(23 \pm 2) ^\circ\text{C}$ for 1 min. Hang up the samples and allow them to dry.

Carry out the tape stripping adhesion test in accordance with 8.1.4.

Examine the samples visually and note any loss of coating or any other defects.