INTERNATIONAL STANDARD

ISO 8361-1

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Thermoplastics pipes and fittings — Water absorption —

Part 1:
General test method

Tubes et raccords en matières thermoplastiques — Absorption d'eau —
Partie 1: Méthode générale d'essai

Reference number
ISO 8361-1:1991(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 8361-1 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids.*

ISO 8361 consists of the following parts, under the general title *Thermoplastics pipes and fittings — Water absorption*:

— *Part 1: General test method*

— *Part 2: Test conditions for unplasticized poly(vinyl chloride) (PVC-U) pipes and fittings*

— *Part 3: Test conditions for acrylonitrile/butadiene/styrene (ABS) pipes and fittings*

NOTE — Pipes and fittings made of other materials, i.e. chlorinated poyly(vinyl chloride) (PVC-C), high-impact poly(vinyl chloride) (PVC-HI), and acrylonitrile/styrene/acrylate (ASA), will be dealt with later in additional parts.

Annex A of this part of ISO 8361 is for information only.

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Thermoplastics pipes and fittings — Water absorption —

Part 1:
General test method

1 Scope

This part of ISO 8361 specifies a general test method for determining the water absorption of thermoplastics pipes and fittings.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8361. 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 8361 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 3126:1974, *Plastics pipes — Measurement of dimensions.*

ISO 8361-2:1991, *Thermoplastics pipes and fittings — Water absorption — Part 2: Test conditions for unplasticized poly(vinyl chloride) (PVC-U) pipes and fittings.*

ISO 8361-3:1991, *Thermoplastics pipes and fittings — Water absorption — Part 3: Test conditions for acrylonitrile/butadiene/styrene (ABS) pipes and fittings.*

3 Principle

Test pieces are first conditioned and their mass and total surface area (sum of the internal and external surface areas plus the surface areas of the cut ends) determined.

The conditioned test pieces are then immersed for 24 h in distilled water at a specified temperature (which depends on the material from which the pipe or fitting is made).

The mass of each test piece is determined again, and the change in mass per unit area calculated.

4 Immersion fluids

4.1 Distilled water, at a temperature of 23 °C ± 2 °C.

4.2 Distilled water (hot), at a temperature specific to the type of pipe or fitting under test (see ISO 8361-2 and ISO 8361-3)[1].

4.3 Acetic acid, between 98 % (*m*/*m*) and 100 % (*m*/*m*) and at a temperature of 23 °C ± 2 °C.

5 Apparatus

5.1 Balance, accurate to 0,1 mg.

5.2 Desiccator, containing silica gel.

5.3 Thermostatic baths, capable of maintaining the distilled water (4.1 and 4.2) at respective temperatures of 23 °C ± 2 °C and the temperature specific to the type of pipe or fitting concerned (see ISO 8361-2 and ISO 8361-3)[1].

5.4 Forced-air oven, capable of being maintained at the temperature specific to the type of pipe or fitting concerned (see ISO 8361-2 and ISO 8361-3)[1].

1) See note in foreword.

5.5 Containers, of a suitable size for holding the test pieces.

5.6 Means of measuring test piece dimensions.

See ISO 3126.

6 Test pieces

6.1 Sampling

The sampling requirements shall be as specified in the relevant product standard.

6.2 Pipes

6.2.1 Pipes of outside diameter greater than 32 mm

Cut off a portion of pipe of approximately 50 mm in length. Then cut this portion of pipe along its length so that the part of the circumference remaining is 50 mm in length.

6.2.2 Pipes of outside diameter less than or equal to 32 mm

Cut a length of pipe such that the sum of the internal and external surface areas is at least 50×10^{-4} m².

6.3 Fittings

Cut, from a hollow section of the fitting, a ring or a ring segment such that the sum of the internal and external surface areas is at least 50×10^{-4} m².

6.4 Finish

Polish the cut surfaces of the test pieces so that they are smooth.

6.5 Number

The number of test pieces shall be as specified in the relevant product standard.

NOTE 1 It is recommended that three test pieces be prepared for each type of pipe or fitting.

7 Procedure

7.1 Measure the inside and outside diameters, or the lengths of the internal and external arcs, of each test piece to the nearest 0,5 mm. Measure the other dimensions of each test piece to the nearest 0,1 mm.

Calculate the total surface area A (sum of the internal and external surface areas and of the surface areas of the cut ends).

7.2 Condition the test pieces in accordance with the instructions specific to the type of pipe and fitting concerned (see ISO 8361-2 and ISO 8361-3)[1].

7.3 Determine the mass m_0 of each test piece to the nearest 0,1 mg.

7.4 Immerse the conditioned test pieces for 24 h in hot distilled water (4.2) in a bath (5.3) kept at the temperature specific to the type of pipe or fitting concerned (see ISO 8361-2 and ISO 8361-3)[1].

7.5 Remove the test pieces and then leave them for 15 min ± 1 min to cool in the distilled water (4.1) in the other bath (5.3) maintained at 23 °C ± 2 °C.

7.6 Remove the test pieces from the bath and wipe them with filter paper.

7.7 If specified for the product under test (see ISO 8361-2 and ISO 8361-3)[1], proceed with a second conditioning (see 7.2).

7.8 Determine the mass m_1 of each test piece to the nearest 0,1 mg.

8 Expression of results

8.1 For each test piece, calculate the water absorption, in grams per square metre, using the formula:

$$\frac{m_1 - m_0}{A}$$

where

m_0 is the mass, in grams, of the test piece before immersion (see 7.3);

m_1 is the mass, in grams, of the test piece after immersion (see 7.8);

A is the initial total surface area, in square metres, of the test piece (see 7.1).

8.2 Calculate the arithmetic mean of the water absorption values obtained for the specified number (see 6.5) of test pieces of the pipe or fitting under test.

9 Test report

The test report shall include the following information:

a) a reference to this part of ISO 8361;

b) all details necessary for the complete identification of the pipe or fitting tested;

c) the dimensions of the test pieces;

d) the water absorption of each of the test pieces, calculated as described in 8.1;

e) details of any alteration in the appearance of the test pieces noted during or immediately after testing;

f) the water absorption of the pipe or fitting, calculated as described in 8.2;

g) details of any operations not specified in this part of ISO 8361, together with details of any events likely to have had an effect on the results.

Annex A
(informative)

Bibliography

[1] ISO 62:1980, *Plastics — Determination of water absorption.*

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Descriptors: thermoplastic resins, plastics products, plastic tubes, pipe fittings, tests, water absorption tests.

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