INTERNATIONAL STANDARD

ISO
2505-1

Thermoplastics pipes — Longitudinal reversion —

Part 1:
Determination methods

Tubes en matières thermoplastiques — Retrait longitudinal à chaud —

Partie 1: Méthodes de détermination

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 2505-1 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 5, *General properties of pipes, fittings and valves of plastic materials and their accessories — Test methods and basic specifications*.

This first edition of ISO 2505-1, along with ISO 2505-2:1994, cancels and replaces ISO 2505:1981, ISO 2506:1981 and ISO 3478:1975, of which it constitutes a technical revision.

ISO 2505 consists of the following parts, under the general title *Thermoplastics pipes — Longitudinal reversion*:

— *Part 1: Determination methods*

— *Part 2: Determination parameters*

Thermoplastics pipes — Longitudinal reversion —

Part 1:
Determination methods

1 Scope

This part of ISO 2505 specifies two methods for determining the longitudinal reversion of thermoplastics pipes, to be carried out in liquid (method A) or in air (method B). In case of disagreement, method A is to be used as the reference method.

It applies to all thermoplastics pipes with smooth internal and external walls of constant cross-section. It does not apply to non-smooth structured-wall thermoplastics pipes (ringed, for instance).

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 2505. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 2505 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2505-2:1994, *Thermoplastics pipes — Longitudinal reversion — Part 2: Determination parameters.*

3 Principle

A pipe of given length is placed in a heating medium at a specified temperature for a specified period.

A marked length of this portion of pipe is measured, under identical conditions, before and after heating.

The reversion is calculated as a percentage of the change in length in relation to the initial length.

The appearance of the test piece shall not be changed after heating.

4 Method A — Determination using a liquid bath

4.1 Apparatus

4.1.1 Heating bath, thermostatically controlled at the temperature specified in ISO 2505-2, T_R, unless otherwise specified.

The volume and agitation of the bath shall be such that the temperature remains within the specified temperature range when the test piece is immersed.

The liquid chosen shall be stable at the specified temperature and shall not otherwise affect the plastics material.

NOTE 1 Glycerine, glycol, mineral oil free from aromatic hydrocarbons, or a solution of calcium chloride are suitable but any other liquid meeting the requirements specified above may be used.

4.1.2 Device, to hold the test piece(s) within the heating bath (see 4.4.3).

4.1.3 Thermometer, graduated in 0,5 °C.

4.2 Test pieces

4.2.1 Take as a test piece a pipe 200 mm ± 20 mm long.

4.2.2 Using, for example, a scriber, trace on this test piece two circumferential marks 100 mm apart, corresponding to the test area, at equal distances from the two ends.

4.2.3 Prepare a total of three similar test pieces per pipe.

Pipes of diameter 400 mm or larger may be cut into four even segments for testing.

4.3 Conditioning

Condition the test pieces for at least 2 h at 23 °C ± 2 °C.

4.4 Procedure

4.4.1 At a temperature of 23 °C ± 2 °C, measure the distance between the marks to within 0,25 mm.

4.4.2 Set the temperature of the heating bath to the temperature specified in ISO 2505-2, T_R, unless otherwise specified.

4.4.3 Place the test pieces in the heating bath so that they touch neither the walls nor the base of the bath and so that there is a minimum distance of 30 mm between the upper boundary of the test area (see 4.2.2) and the fluid/air interface.

4.4.4 Leave the test pieces immersed for the duration specified in ISO 2505-2, unless otherwise specified.

4.4.5 Remove the test pieces from the bath, and after complete cooling to 23 °C ± 2 °C, measure, under the same conditions as those used in 4.4.1, the distance between marks along the maximum and minimum generatrices (diametrically opposed), following any curvature of the marked surfaces, as applicable.

4.5 Expression of results

4.5.1 For each test piece, calculate the longitudinal reversion, $R_{L,i}$, as a percentage, using the following equation:

$$R_{L,i} = \frac{\Delta L}{L_0} \times 100$$

where

$\Delta L = L_0 - L$;

L_0 is the distance between the marks before the immersion, in millimetres;

L is the distance between the marks after the immersion, measured along the generatrices, in millimetres.

Choose those measurements of L which give the greatest value of ΔL, ΔL being either positive or negative.

4.5.2 Calculate, as the value for the longitudinal reversion of the pipe, R_L, the arithmetic mean of the values obtained for each of the three test pieces.

4.6 Test report

The test report shall include the following information:

a) reference to this part of ISO 2505;

b) full identification of the pipe;

c) the nature of the heating medium used;

d) a reference to method A and the temperature of the bath, T_R;

e) the change in length of each test pipe, ΔL, together with its sign (+ or –);

f) any change in the appearance of the test pieces during the immersion, or immediately afterwards;

g) the value of the longitudinal reversion of the pipe, R_L, calculated in accordance with 4.5.2;

h) all operating details not specified in this part of ISO 2505, as well as any incidents likely to have influenced the results;

i) the date of the test.

5 Method B — Determination using an air oven

5.1 Apparatus

5.1.1 Air oven, thermostatically controlled, of a heating power such that it operates at the temperature specified in ISO 2505-2, T_R, unless otherwise specified, and is capable of reestablishing this temperature within 15 min after the introduction of the test pieces.

The oven shall be equipped with a thermostat capable of maintaining T_R to a permissible deviation of ± 2 °C.

5.1.2 Thermometer, graduated in 0,5 °C.

5.2 Test pieces

5.2.1 Take as a test piece a pipe 200 mm long.

5.2.2 Using, for example, a scriber, trace on this test piece two circumferential marks 100 mm apart so that one of them is approximately 10 mm from one end of the test piece.

5.2.3 Prepare three such test pieces per pipe.

5.3 Conditioning

Condition the test pieces for at least 2 h at 23 °C ± 2 °C.

5.4 Procedure

5.4.1 At a temperature of 23 °C ± 2 °C, measure the distance L_0 between the two marks to within 0,25 mm.

5.4.2 Set the oven temperature at the temperature specified in ISO 2505-2, T_R, unless otherwise specified.

5.4.3 Place the test pieces in the oven so that they do not touch the sides of the bottom of the oven.

If the test pieces are suspended, choose a suspension point at the end furthest from the reference marks.

If the test pieces are placed horizontally on a support, rest them on a bed of talc or other support that does not inhibit the reversion.

5.4.4 Maintain the test pieces in the oven for the duration specified in ISO 2505-2, unless otherwise specified.

This duration(s) shall be measured from the time when the temperature of the oven has returned to the specified temperature (see 5.1.1).

5.4.5 Remove the test pieces from the oven and after complete cooling to 23 °C ± 2 °C, by exposure to the air, measure, under the same conditions as in 5.4.1, the distance between the marks along the maximum and minimum generatrices (diametrically opposed), following any curvature of the marked surface.

5.5 Expression of results

5.5.1 For each test piece, calculate the longitudinal reversion, $R_{L,i}$, as a percentage, using the following equation:

$$R_{L,i} = \frac{\Delta L}{L_0} \times 100$$

where

$\Delta L = L_0 - L$;

L_0 is the distance between the marks before exposure to the oven temperature test, in millimetres;

L is the distance between the marks after exposure to the oven temperature, measured along the generatrices, in millimetres.

Choose those measurements of L which give the greatest value of ΔL, ΔL being either positive or negative.

5.5.2 Calculate, as the value for the longitudinal reversion of the pipe, R_L, the arithmetic mean of the values obtained for each of the three test pieces.

5.6 Test report

The test report shall include the following information:

a) reference to this part of ISO 2505;

b) full identification of the pipe;

c) a reference to method B and the oven temperature, T_R;

d) the change in length of each test piece, ΔL, together with its sign (+ or –);

e) any change in the appearance of the test pieces during the exposure to the oven temperature, or immediately afterwards;

f) the value for the longitudinal reversion of the pipe, calculated in accordance with 5.5.2;

g) all operating details not specified in this part of ISO 2505, as well as any incidents likely to have influenced the results;

h) the date of the test.

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ICS 23.040.20

Descriptors: pipes (tubes), thermoplastic resins, plastic tubes, tests, dimensional stability tests, high temperature tests, determination, shrinkage.

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