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Injection-moulded unplasticized poly(vinyl chloride) (PVC-U) fittings — Oven test — Test method and basic specifications

iTeh STANDARD PREVIEW

*Raccords en poly(chlorure de vinyle) non plastifié (PVC-U) moulés par
injection — Essai à l'étuve — Méthode d'essai et spécifications de base*

ISO 580:1990

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

This second edition cancels and replaces the first edition (ISO 580:1973) and ISO 2043:1974, of which it constitutes a technical revision.

Annex A of this International Standard is for information only.

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Introduction

The oven test specified in this International Standard is applicable to distinguish between properly and improperly moulded poly(vinyl chloride) (PVC-U) fittings.

It can be used to

- determine whether cold slugs or unfused areas are present;

NOTE 1 A cold slug is a piece of material that enters the mould at a temperature significantly lower than that of the rest of the mass.

- determine the amount of moulded-in stress produced by the moulding process;

- reveal contamination;

- show the quality of the weld.

A stress-free part will generally have better properties and higher strength than parts with a higher degree of stress and will generally be less reactive when exposed to chemicals.

By placing PVC-U fittings in an oven at elevated temperature, for a period of time dependent on their wall thickness, it is possible to detect internal stress.

The curve of the variation in the temperature as a function of time at the heart of the wall of the test piece tends to become asymptotic as the temperature approaches the setting temperature of the oven, i.e. 150 °C. The necessary duration of the test is, therefore, extremely long, especially for wall thicknesses of a fitting greater than 5 mm. However, a temperature of 145 °C is achieved in a finite time which is acceptable in practice, irrespective of the wall thickness of the test piece.

Since the stresses start to be released as soon as the material passes to the rubbery state (at approximately 120 °C), it is only necessary to maintain the moulded pieces at a temperature of 145 °C for a defined period.

Further, in the case of a fitting with a wall thickness of 20 mm for example, 60 min are required to attain a temperature of 145 °C. This means that the test piece has already been subjected to a temperature of 140 °C for 20 min and of 135 °C for 20 min.

Table 1 gives the minimum duration for a moulded PVC-U fitting to be kept in air at 150 °C to attain a temperature of 145 °C in the middle of the wall, as a function of the wall thickness.

To obtain a temperature of 150 °C in the middle of the wall within a reasonable time, the temperature of the oven would have to be raised to 155 °C.

NOTE 2 Injection-moulded fittings can be made by a number of techniques, whereby the material is injected into the mould cavity. These include single or multipoint injection, diaphragm gating and ring gating. The technique used in the manufacture of mouldings will affect the way in which they are assessed according to the requirements specified in clause 3.

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Injection-moulded unplasticized poly(vinyl chloride) (PVC-U) fittings — Oven test — Test method and basic specifications

1 Scope

This International Standard specifies a method to establish the quality of injection-moulded unplasticized poly(vinyl chloride) (PVC-U) fittings using an oven.

It applies both to pressure fittings and to non-pressure fittings used for drainage applications, as well as to flanged fittings and fittings incorporating elastomeric sealing rings and to fittings consisting of the assembly of a number of moulded parts (e.g. union connectors).

2 Test method

2.1 Principle

Complete mouldings are subjected to a temperature of 150 °C in an air-circulating oven for a given time depending on the wall thickness of the fitting.

The surfaces of the moulding are examined before and after heating, and any cracks, blisters, delamination or weld opening is measured, expressed as a percentage of the wall thickness.

2.2 Apparatus

2.2.1 Air-circulating oven, thermo-controlled, equipped with a thermostat so that the temperature of the working zone can be maintained at 150 °C ± 2 °C throughout the test, and of sufficient heating capacity to enable the test temperature to be regained within 15 min of having inserted the test pieces.

It is also possible to carry out the test in a bath containing glycerine or a non-aromatic hydrocarbon

oil heated to 150 °C ± 2 °C (see annex A). In such a case, it will be necessary to check beforehand that the liquid chosen is stable at the test temperature and does not affect the product under test.

2.3 Test pieces

Take complete mouldings as test pieces.

NOTE 3 The moulding may be cut whilst hot to enable the dimensions of cracks, blisters, delamination, etc., to be measured.

Test at least three test pieces from each homogeneous production batch.

If the fitting incorporates an elastomeric sealing ring, this shall be removed before testing.

In the case of fittings assembled from more than one PVC-U moulding, the components shall be separated and tested out of contact with each other.

2.4 Procedure

NOTE 4 An alternative procedure using a liquid bath is described in annex A.

2.4.1 Set the oven temperature at 150 °C ± 2 °C.

2.4.2 Put the test pieces in the oven and arrange them so that they are standing on one of their sockets whenever possible, avoiding all contact with another test piece or the sides of the oven.

2.4.3 Leave the test pieces in the oven until it returns to a temperature of 150 °C ± 2 °C and for a further period t , dependent on the mean wall thickness e , as indicated in table 1.

Table 1

Mean wall thickness e	Period t
mm	min
$e \leq 3$	15
$3 < e \leq 10$	30
$10 < e \leq 20$	60
$20 < e \leq 30$	140
$30 < e \leq 40$	220
$e > 40$	240

2.4.4 Remove the test pieces from the oven, taking care not to deform or damage them.

2.4.5 Allow the test pieces to cool in air until they can be handled.

2.4.6 Examine each test piece for any surface changes such as cracking, delamination or opening of any weld, as well as changes inside the wall, such as blisters, and determine whether the dimensions of such defects are within the limits specified in clause 3.

2.5 Test report

The test report shall include the following information:

- a reference to this International Standard;
- identification of the fittings tested (diameter, wall thickness, type, etc.);
- the test temperature and tolerance;
- the test duration;
- the number of mouldings tested;

- details of visible differences from the original surface appearance, such as blisters, cracking or opening of welds;
- the maximum dimensions of cracks, delamination, blisters, etc., expressed as a percentage of the wall thickness.

3 Basic specifications

All the fittings in the test batch shall be examined for signs of cracks, delamination, blisters and weld opening, and shall satisfy the following requirements:

- around the injection point(s): within a radius of 15 times the wall thickness, the depth of cracks, delamination or blisters shall not be more than 50 % of the wall thickness at that point;
- for diaphragm-gated mouldings: any cracks, delamination or blisters shall be within a distance of 10 times the wall thickness from the diaphragm zone, and their depths shall not be more than 50 % of the wall thickness at that point;
- for ring-gated mouldings: the distance, from the ring gate, of any cracks in the wall of the mouldings shall not be more than 10 times the wall thickness, and, in the case of cracks running through the whole thickness of the wall at the ring gate, the crack length shall not be more than 0,5 times the wall thickness;
- for mouldings containing welds: no part of the weld shall be open by a distance more than 50 % of the wall thickness;
- for all other parts of the moulding surface: the depth of cracks and delamination shall not exceed 30 % of the wall thickness, and the length of blisters in the wall of the moulding shall not exceed 10 times the wall thickness.

For specific applications, more stringent specifications may be adopted if required by particular product standards.

Annex A (informative)

Alternative procedure using a liquid bath

A.1 General

The test using a liquid bath may be used in place of the oven test. However, in cases of disagreement, the oven test shall be used.

A.2 Procedure

A.2.1 Set the liquid bath (see sub-clause 2.2.1, second paragraph) to a temperature of 150 °C \pm 2 °C.

A.2.2 Put the test pieces in the liquid bath and arrange them so that they are not touching each other or the sides of the bath.

A.2.3 Leave the test pieces in the bath for

- 15 min for fittings of wall thickness equal to or less than 8 mm;
- 30 min for fittings of wall thickness greater than 8 mm.

A.2.4 Remove the test pieces from the bath, taking care not to deform or damage them.

A.2.5 Proceed as described in 2.4.5 and 2.4.6.

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