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Unplasticized poly(vinyl chloride) (PVC-U) pipes — Dichloromethane test

Tubes en poly(chlorure de vinyle) non plastifié (PVC-U) — Essai au dichlorométhane

Reference number
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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 7676 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids.*

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Introduction

The test method specified in this International Standard is applicable only for quality control during the manufacture of unplasticized poly(vinyl chloride) (PVC-U) pipes.

In the future, this test method will be replaced by a more accurate and faster method, namely the dichloromethane temperature test (DCMT). The DCMT method is at present being developed by ISO/TC 138.

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Unplasticized poly(vinyl chloride) (PVC-U) pipes — Dichloromethane test

1 Scope

This International Standard specifies a dichloromethane immersion test which allows a judgement to be made as to whether an unplasticized poly(vinyl chloride) (PVC-U) pipe has been made correctly. This method, designed for quality control during manufacture, gives an indication of the level of gelation in the pipe and of the uniformity of that gelation.

This method is applicable to all unplasticized poly(vinyl chloride) (PVC-U) pipes whatever their application, subject to the applicable product specification, if any.

2 Principle

Partial immersion of a length of unplasticized poly(vinyl chloride) (PVC-U) pipe in dichloromethane, for a specified time and at a specified temperature.

Examination and recording of the surface quality of the pipe on the basis of the severity of attack.

NOTE — Since this test method is sensitive to changes in material composition, it should be noted that the system of classification given in clause 7 is designed to help the manufacturer to observe changes in the quality of production.

3 Reagent and materials

3.1 Dichloromethane, analytical grade.

WARNING — Dichloromethane can be toxic by absorption through the skin and eyes. It is therefore necessary to take precautions when handling liquid dichloromethane or test pieces which have been immersed in it. Furthermore, the boiling point of dichloromethane is low (40 °C). Consequently, it has a high vapour pressure at ambient temperatures. Ventilation of the room or area in which the container is kept and where the test pieces are dried is therefore essential.

NOTE — The constancy of colour and purity of the dichloromethane should be checked regularly, for example by measuring the refractive index. Whenever the value of this refractive index differs by ± 0,002 from the original value, the dichloromethane should be changed. (Any alternative checking procedure which gives the same result is acceptable.)

3.2 Distilled water.

3.3 Abrasive strip.

4 Apparatus

4.1 Bath, made of glass or stainless steel, and of capacity suitable to contain both the dichloromethane and the test piece.

It shall be fitted with

— either a fine mesh grille on which the test pipe can be placed;

— or equipment suitable for suspending the test piece.

4.2 Device for temperature control, capable of maintaining the temperature of the dichloromethane at 20 °C ± 0,5 °C.

4.3 Sanding machine.

4.4 Ventilation hood.

5 Test pieces

Remove a test piece at least 100 mm long from the pipe which is to be tested for resistance to dichloromethane.

Grind the cut surface by applying the test piece with a force of 10 N to 20 N to the abrasive strip of a sanding machine operating at a running speed of between 5 m/s and 8 m/s.

Continue the grinding without heating the material until a thickness of approximately 0,5 mm has been removed.

If necessary, cut the test piece into segments.

Carefully clean, with a dry cloth, the internal and external surfaces of the test piece.

6 Procedure

a) Pour the dichloromethane into the bath to a depth such that the test piece can be immersed to a length of at least 30 mm.

b) Cover the dichloromethane with a layer of water approximately 20 mm deep.

NOTE — The water layer is for the purpose of reducing evaporation [normally 0,6 l/(m^2·h)] of the dichloromethane and to protect the operator from any harmful effects of the vapour.

c) Set the bath temperature to 20 °C ± 0,5 °C.

d) When the dichloromethane has attained a temperature of 20 °C ± 0,5 °C, place the test piece in the bath, either allowing it to rest on the grille or suspending it, in such a way that it is immersed in the dichloromethane to a depth of at least 30 mm.

Ensure that the ground surface of the test piece is the surface being immersed.

If the test piece has been cut into segments, immerse all the segments in the bath.

e) Leave the test piece (or segments) immersed for 20 min.

f) Remove the test piece from the bath and allow it to dry in air for 15 min, without touching the section which has been immersed.

g) Examine the test piece with the naked eye.

7 Expression of results

Examine both the internal surface and the external surface, and the cross-section of the test piece and record any changes.

Classify the test piece according to the following system.

a) Nature of the changes

In order to assess the changes in surface quality of the test piece, the following scale should be used:

N = no change or very slight change

L = slight change

M = surfaces fully attacked

S = flocculation, disaggregation, blisters

Examples of these changes are shown in figures 1 to 4.

b) Size of the changes

— For both the internal and external surfaces, a value is assigned which corresponds to the percentage of the circumference which has been attacked (see figure 5).

— For the cross-section, a double value is assigned which corresponds on the one hand to the percentage of the circumference which has been attacked and on the other hand to the percentage of the wall thickness attacked (see figure 6).

In order to quantify the size of these changes, the following scale shall be used:

0 = from 0 % to 5 %
1 = from 6 % to 25 %
2 = from 26 % to 50 %
3 = from 51 % to 75 %
4 = greater than 75 %

c) Systematic assessement

Each surface is to be assessed separately in the following order:

— internal surface
— cross-section:
  around the circumference
  across the wall
— external surface

An example of the notation is shown in figure 7.

8 Test report

The test report shall contain the following information:

a) reference to this International Standard;

b) full identification of the pipe test piece;

c) a systematic assessment of the test piece determined according to clause 7;

d) any procedures not stated in this International Standard, as well as any incidents which may have affected the results.