INTERNATIONAL STANDARD

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Polyethylene pipes — Resistance to slow crack growth — Cone test method

Tubes en polyéthylène — Résistance à la propagation lente des fissures — Méthode d'essai avec le cône

Reference number
ISO 13480:1997(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 13480 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.*

Annex A of this International Standard is for information only.

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Polyethylene pipes — Resistance to slow crack growth — Cone test method

1 Scope

This International Standard specifies a method of test for determining the resistance to slow crack growth of polyethylene pipe expressed in terms of the rate of crack growth in a notched pipe ring subject to a constant hoop strain and immersed in a surface active solution held at an elevated temperature.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 13479:1997, *Polyolefin pipes for the conveyance of fluids — Determination of resistance to crack propagation — Test method for slow crack growth on notched pipes (notch test).*

3 Principle

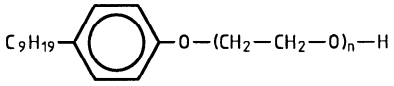
Rings cut from pipe to a specified length are held at a constant strain by insertion of a mandrel and a single notch is made at one end of the pipe ring. The assembly is immersed in a specified surface-active solution held at a temperature of 80 °C ± 1 °C. The rate of growth of the crack propagating from the notch is measured. The test is applicable to pipe of wall thickness up to and including 5 mm.

NOTE 1 For wall thickness greater than 5 mm, ISO 13479 is applicable.

4 Materials

4.1 Surface active solution

A nonyl-phenoxy(ethyleneoxy)ethanol neutral type detergent shall be used with 11 ethyleneoxide molecules as shown below:



where n is 11.

Prepare a sufficient quantity of a solution of a concentration equivalent to 5 % by weight of the detergent with deionised water to ensure complete immersion of the range of sizes to be tested.

This solution will age with time at 80 °C. Therefore the solution shall be used for no more than 100 days.

5 Apparatus

5.1 Thermostatically controlled tank

Thermostatically controlled tank to contain the surface active solution of dimensions to ensure full immersion of the range of specimen sizes to be tested. The tank shall be constructed from materials which shall not affect the surface active solution. It shall have a lid or cover to prevent evaporation and a means of stirring the solution,

NOTE 2 The object of stirring is to prevent separation or layering of the solution.

5.2 Cone

A mandrel of dimensions specified below with a conical end is required for insertion into the pipe ring to maintain a constant strain, see figure 1. At the end of the mandrel is a longitudinal groove of dimensions 20 mm ± 1 mm by 1 mm ± 0,2 mm and depth (e) 2 mm ± 0,2 mm. The material used for manufacture of the mandrel shall not affect the surface active solution, brass for example.

D = 1,12 x the nominal internal diameter of the pipe (± 0,1 mm).

$H = D$ for nominal outer diameters not exceeding 40 mm, and D/2 for nominal diameters above 40 mm (± 1 mm).

R = 4 x the specified internal diameter of the pipe of nominal size of less than or equal to 40 mm, and equal to the nominal internal diameter of pipe of nominal size above 40 mm (± 2 mm).

The nominal internal diameter is equal to the nominal pipe size less twice the specified minimum wall thickness.

5.3 Press or vice

A press to drive the mandrel into the pipe ring at a rate which will not cause damage or distort the end or edges of the ring. Alternatively a vice with retaining and guiding jaws can be used.

5.4 Notching device

A notching device is required which is capable of inserting a razor blade into the end of the pipe to create a notch, as shown in figure 2. Alternatively a mechanised means of performing this operation, such as using a specialised jig or a machine with a moving table, is acceptable.

Dimensions in millimetres

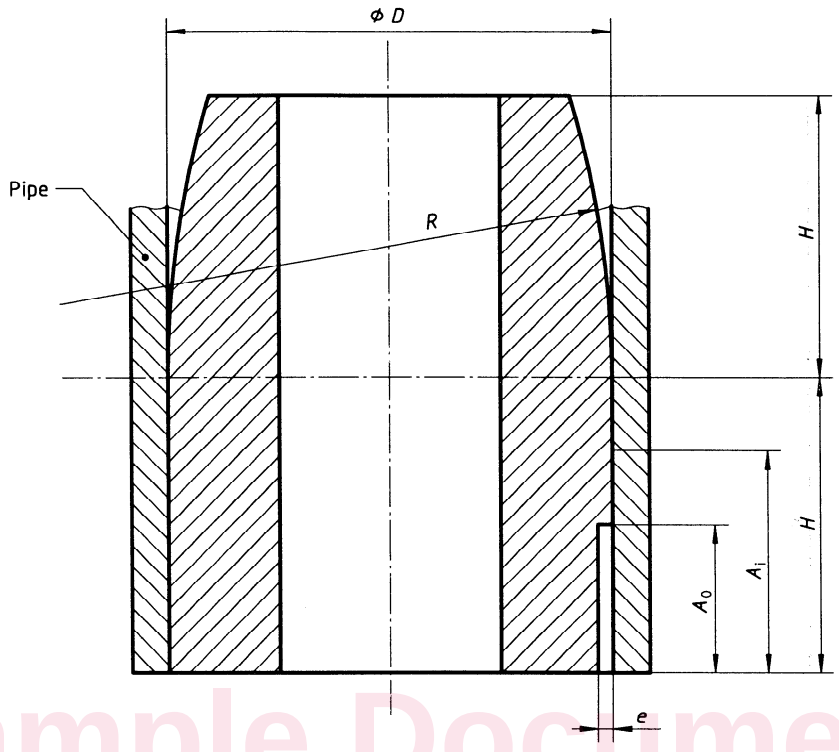


Figure 1 — Virole or cone

A commercial razor blade shall be used for this operation which shall be changed after no more than 20 notching operations.

A blade penetration speed of around 10 mm/min has been found to be satisfactory.

6 Test pieces

Prepare three ring test pieces of $\left(100\ ^{+5}_{0}\right)$ mm length from a sample of pipe of nominal outer diameter ≤ 40 mm, or of $\left(150\ ^{+5}_{0}\right)$ mm in length for pipe or nominal diameter > 40 mm, ensuring that the ends of the ring are cut square.