INTERNATIONAL STANDARD

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Polyethylene (PE) 25 pipes for irrigation laterals — Susceptibility to environmental stress-cracking induced by insert-type fittings — Test method and specification

Tubes en polyéthylène (PE) 25 pour branchements d'irrigation — Sensibilité à la fissuration sous contrainte produite par les raccords à insert — Méthode d'essai et spécifications

Reference number
ISO 8796 : 1989 (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 approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8796 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids.*

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Introduction

With modern methods of low-pressure irrigation (for example drip irrigation), a simpler and more economical type of fitting has become very popular: one which grips the pipe only from the inside, by means of several circumferential saw-teeth (see figure 1).

This type of joint, however, exposes the pipe to the phenomenon of stress-cracking, due to multi-axial stresses continuously exerted on it by the gripping teeth (in fact, by any insert which increases the diameter of the pipe). The pipe may exhibit longitudinal cracks, initiated at the tips of the teeth, which may further propagate, leading to complete failure of the joint. Such cracks may sometimes develop soon after installation, but in other cases they appear only after several weeks or even months of service (the period depending mainly on the environmental conditions).

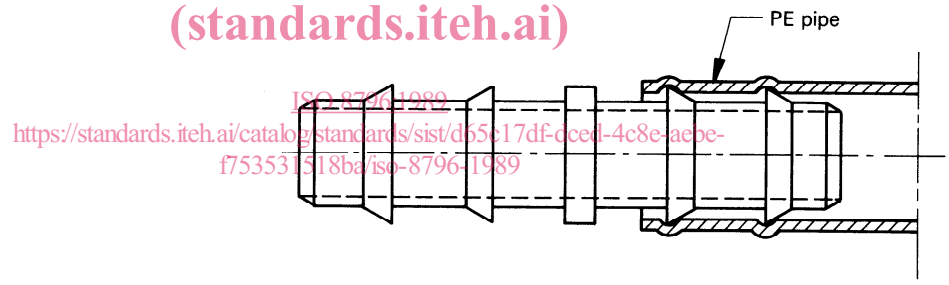

Figure 1 — In-line connector

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Polyethylene (PE) 25 pipes for irrigation laterals — Susceptibility to environmental stress-cracking induced by insert-type fittings — Test method and specification

1 Scope

This International Standard specifies a test method used to detect, in a very short time, pipes which are potentially susceptible to environmental stress-cracking (ESC) and thus cannot be used reliably with insert-type fittings.

This test applies to pipes made of polyethylene PE 25[1], if they are to be used with insert-type fittings (e.g. PE pipes for irrigation laterals in accordance with ISO 8779, table 1, PE 25).

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was 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 edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8779 : —[2], *Polyethylene (PE) pipes for irrigation laterals — Specifications.*

3 Definition

For the purposes of this International Standard, the following definition applies.

insert-type fitting: A fitting which grips the pipe only around its inner surface and which also increases the diameter of the pipe.

4 Test method

4.1 Reagent

An undiluted surface-active agent of the nonylphenoxy poly(ethyleneoxy)ethanol type[3], kept in a closed container and used fresh for each test.

If used in a bath, the reagent shall be replaced once a week owing to its hygroscopic nature.

4.2 Apparatus

Forced-air-circulation oven, maintained at 70 °C ± 2 °C, capable of re-establishing that temperature within five minutes after insertion of test pieces.

NOTE — A constant-temperature bath may be used instead of the oven, provided it has the same thermal capabilities as specified for the oven.

4.3 Test pieces

Five sections of the pipe, preferably taken from different coils, shall constitute the test pieces. Each section shall be about 20d long (d = nominal diameter of the pipe).

NOTE — Shorter lengths may also be used, but are less convenient.

The test pieces shall not initially contain any cracks.

4.4 Procedure

4.4.1 Bend each test piece sharply at two places, forming two U-bends in two different planes perpendicular to each other (see figure 2). The bends shall be located at least 3d away from the ends of the test piece. Each bend is folded back through 180° until both sides of the fold meet, then properly secured to maintain the deformation throughout the test (see figure 2).

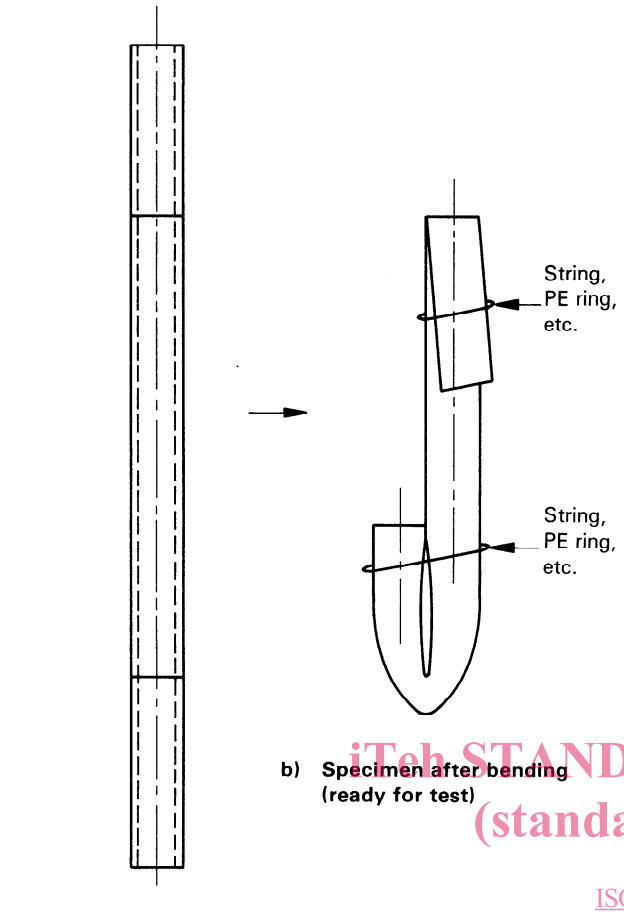
4.4.2 Completely coat each bend with the reagent (e.g. by brushing or dipping) and then place all the test pieces in the oven (or immerse them in the bath), taking care not to impose any additional stresses on them.

4.4.3 60 min after the temperature of the oven (bath) has returned to 70 °C ± 2 °C, remove all the test pieces and wipe the bends free of the reagent.

1) PE with a nominal design stress σ = 2,5 N/mm^2.

2) To be published.

3) Antarox CO-630 made by GAF Corp. may be used for reference purposes. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.



b) Specimen after bending (ready for test)

a) Specimen before bending

Figure 2 — Preparing the U-bends

4.4.4 Thoroughly inspect each bend, with the unaided eye, for any visible cracks originating at the area of the fold.

4.5 Expression of results

Classify as "failed" each bend which exhibits at least one visible crack (excluding any crack induced by the object used to secure the bend).

Note the total number of bends which failed according to above definition, evaluating and counting the two bends of each test piece independently.

5 Retest

If one bend failed while nine others did not, repeat the whole procedure with five further test pieces (i.e. ten further bends).

6 Requirements

The pipe is considered to have passed the test if not more than 10 % of the bends tested (i.e. 0 out of 10 or a maximum of 2 out of 20) have failed.

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