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Plastics piping and ducting systems — Plastics pipes and fittings — Method for exposure to direct (natural) weathering

Systèmes de canalisations et de gaines en matières plastiques — Tubes et raccords en matières plastiques — Méthode pour l'exposition directe aux intempéries

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16871 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*.

Introduction

Outdoor exposure tests of the type specified in this International Standard are needed to evaluate the performance of plastics piping components or materials when exposed to direct sunlight. The results of such tests should be regarded only as an indication of the effect of exposure to direct weathering by the method described. Results obtained after exposure for a given time may not be comparable to those obtained after other exposures of equal time using the same method. When identical materials are exposed at different times for extended periods of several years, they generally show comparable behaviour after equal exposure intervals. However, even in long-term tests, the results may be affected by the season in which the tests are started.

The results of short-term direct-weathering tests can give an indication of the relative outdoor performance, but should not be used to predict the absolute long-term performance of a pipe, fitting or joint. Even results of tests carried out for longer than 24 months can show an effect of the season in which the exposure started. Comparisons of non-full-year exposures will exhibit seasonable effects.

The test method chosen is usually designed to expose the material to the most severe conditions associated with any particular climate. It should, therefore, be borne in mind that the severity of exposure in actual use is, in most cases, likely to be less than that specified in this International Standard, and allowance should be made accordingly when interpreting the results. For example, vertical exposure at 90° from the horizontal is considerably less severe in its effects on plastics than near-horizontal exposure, particularly in tropical regions, where the sun is most powerful at high zenith angles.

Surfaces facing away from the equator are much less likely to be degraded than equator-facing surfaces because they are less exposed to solar radiation. However, the fact that they may remain wet for longer periods may be of significance for materials affected by moisture.

Plastics piping and ducting systems — Plastics pipes and fittings — Method for exposure to direct (natural) weathering

1 Scope

This International Standard specifies a method for exposing plastics pipes and fittings, individually or assembled, or as pieces therefrom, to natural weathering in order to assess changes.

NOTE 1 The exposure is considered appropriate for evaluating components subject to yard storage prior to installation and use without further exposure to direct weathering, and is quantified to promote rationalization of exposure doses and comparability of data.

NOTE 2 For exposures appropriate to tropical or equatorial conditions, attention is drawn to ISO 877.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 105-A02, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour*

ISO 877:1994, *Plastics — Methods of exposure to direct weathering, to weathering using glass-filtered daylight, and to intensified weathering by daylight using Fresnel mirrors*

ISO 2818, *Plastics — Preparation of test specimens by machining*

ISO 4582, *Plastics — Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources*

3 Principle

Test pieces, comprising all or part of a pipe section, a fitting or a jointed assembly, are mounted on a rack under specified conditions and directly exposed to natural weathering until a given minimum total solar radiant exposure per unit area has been received.

Climatic conditions and incident radiation are monitored and reported during the exposure period in accordance with this International Standard or the referenced standards.

If necessary (see Note 1), additional, comparable, test pieces are tested to establish initial values for one or more properties and/or are stored under protected conditions before testing to enable comparison of the property or properties with and without weathering.

NOTE 1 Additional test pieces are unnecessary if the data required can be obtained only from exposed test pieces, e.g. by comparison of quantitative colour measurements before, during and/or after exposure or colour comparisons between masked and unmasked zones on the test piece.

NOTE 2 It is assumed that the following test parameters are set by the standard making reference to this International Standard:

a) if applicable, the ambient parameters to be recorded (see 4.2.2);

b) the size, shape and method of preparation of test pieces (see 5.1);

c) the number of test pieces to be exposed to weathering and, if applicable, to be stored as control test pieces (see 5.2 and 6.1);

d) if applicable, the sampling procedure to be used (see 5.3);

e) the solar energy per unit area (see 6.2);

f) the alignment of the pipe axes (see 6.2);

g) the frequency and method of cleaning (see 6.3);

h) if applicable, details of the property(ies) to be measured and the method of measurement, in accordance with the referring standard, and whether or not any shaped profiles (see 6.5) should be prepared before or after exposure (see 5.1 and 5.2).

4 Apparatus

4.1 Test piece support rack

The rack shall conform to ISO 877 for the construction requirements and location of a rack having the following characteristics selected from ISO 877:

a) it shall be constructed from inert materials which shall not affect the test results (see ISO 877:1994, Subclause 5.1);

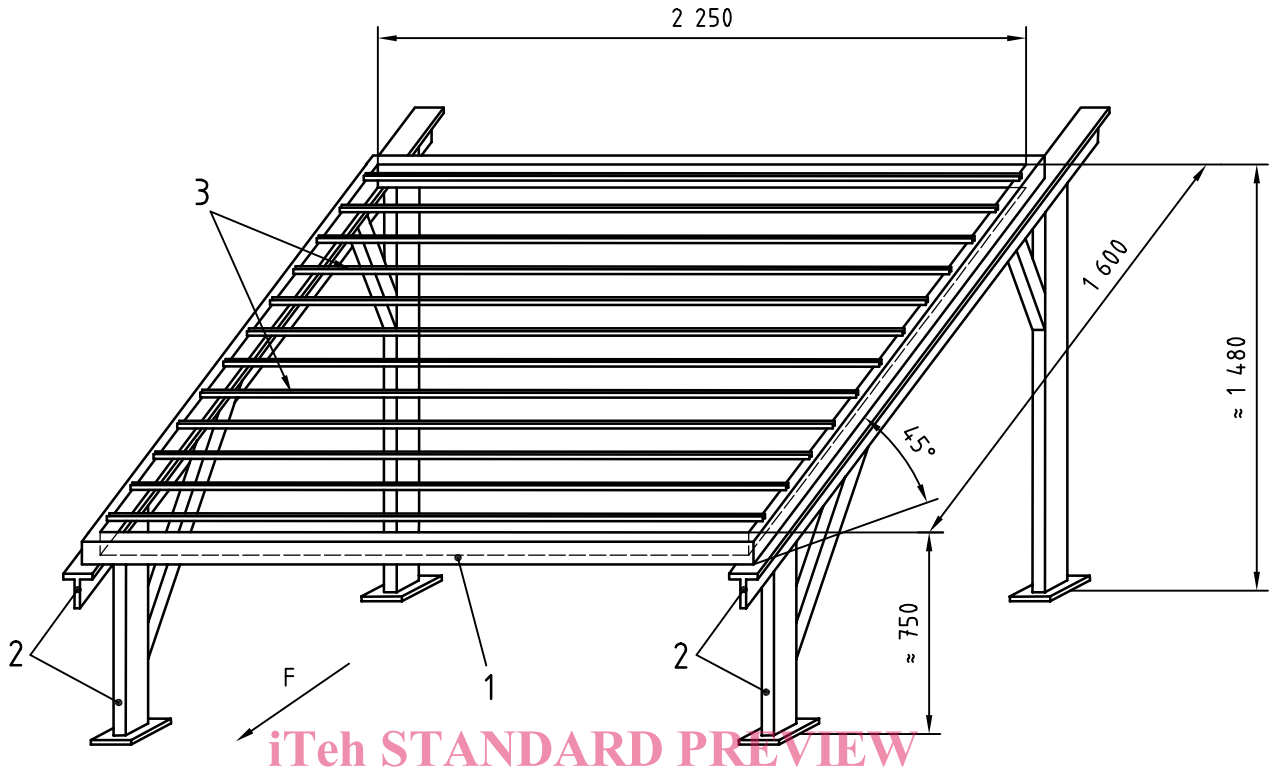
b) it shall be capable of supporting test pieces (see Clause 5) such that the exposed surface of the test piece is at 45° to the horizontal, facing the equator;

c) there shall be no obstructions, including adjacent racks, in an easterly, westerly or equatorial direction, subtending a vertical angle greater than 20°, or in a polar direction an angle greater than 45°;

d) it shall have mounting fixtures that are secure but apply as little stress as possible to the test pieces and permit shrinkage, expansion or warpage to occur without constraint greater than would apply in normal service or necessary to prevent sagging during exposure, at the same time preventing rotation of the test pieces.

An example of a rack for exposing pipe test pieces with typical dimensions is shown in Figures 1 to 3.

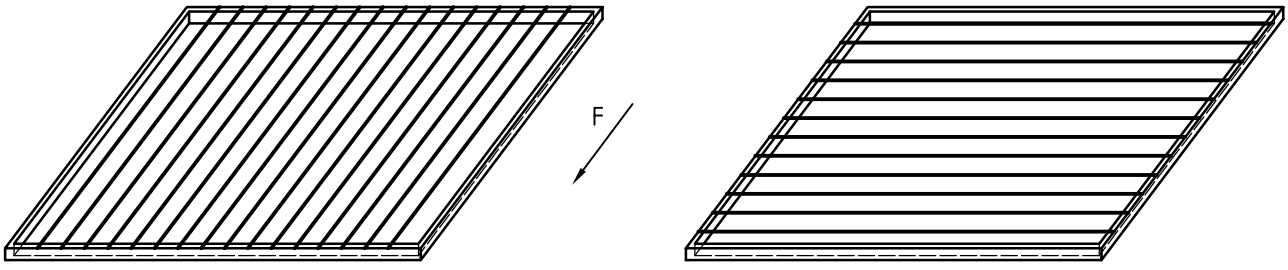
Dimensions in millimetres



Key

1 removable rack, 1 600 mm × 2 250 mm
2 support for rack
3 removable carrier bars
F to the equator

Figure 1 — Typical exposure rack for plastics pipes



a) North/South alignment **b) East/West alignment**

Key

1 removable rack, 1 600 mm × 2 250 mm
F to the equator

Figure 2 — Schematic test arrangements