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Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure —

Part 4: Preparation of assemblies

Tubes, raccords et assemblages en matières thermoplastiques pour le transport des fluides — Détermination de la résistance à la pression interne —

Partie 4: Préparation des assemblages

Reference number
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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 1167-3 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*.

ISO 1167 consists of the following parts, under the general title *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure*:

— *Part 1: General method*

— *Part 2: Preparation of pipe test pieces*

— *Part 3: Preparation of components*

— *Part 4: Preparation of assemblies*

Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure —

Part 4: Preparation of assemblies

1 Scope

This part of ISO 1167 specifies the procedure for the preparation of both end-load-bearing and non-end-load-bearing assemblies, for the determination of their resistance to internal hydrostatic pressure according to ISO 1167-1.

NOTE The assemblies consist of a selection of pipes, fittings, valves, fusion joints or adhesively bonded joints.

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 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 11413, *Plastics pipes and fittings — Preparation of test piece assemblies between polyethylene (PE) pipe and electrofusion fitting*

ISO 11414, *Plastics pipes and fittings — Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion*

EN 1066, *Adhesives — Sampling*

EN 1067, *Adhesives — Examination and preparation of samples for testing*

3 Principle

Test pieces comprising a selection of pipes, fittings, valves, fusion joints or adhesively bonded joints connected to form a pressure-resistant assembly are conditioned at the specified test temperature and then subjected to the internal hydrostatic pressure according to ISO 1167-1 for a specified period of time, or until the test piece(s) fail(s).

The number of test pieces, conditioning and details of the test report are as given in ISO 1167-1.

NOTE It is assumed that the following test parameters are set by the standard making reference to this part of ISO 1167 and, respectively, to ISO 1167-1:

a) the sampling requirements (see 4.1);

b) the joining conditions (see 4.2.4);

c) the temperature at which the test piece is to be assembled, as appropriate (see 4.3.1);

d) diametrical clearance (difference in diameter between mean inside diameter of the socket and mean outside diameter of the pipe) (see 4.4.1);

e) setting time (time between the application of the adhesive and the start of the test) (see 4.4.1 and 4.4.3);

f) curing conditions (temperature, air humidity) (see 4.4.1);

g) machining of components to simulate assembly tolerance variations, if necessary (see 4.7).

4 Test pieces

4.1 Sampling

The sampling requirements shall be as specified in the relevant product standards.

The period of time between the date of production of the parts and the tests, which will depend on the type of material, shall be as given in the general specifications for the material. For materials where no general specifications are available, the minimum time between production and testing shall be as specified in the conditioning requirements.

A test piece may consist of several types of assembly, e.g. fused, mechanical or adhesively bonded assemblies. In such cases, the specific requirements of each assembly type shall be complied with.

4.2 Fused assemblies

4.2.1 Constitution of fused assemblies

A test piece may comprise any of the following three configurations:

a) two pipes assembled directly together by butt fusion;

b) a component and pipes, assembled by fusing a pipe to each end of the component;

c) an assembly of pipes and several components assembled by fusion (test tree).

The evaluation of the component in configuration c) shall only be performed on that part of the component where the free length of the attached pipes conforms to the requirements of 4.6.

4.2.2 Pipes

Wherever possible, pipes in accordance with the relevant standards shall be used and shall be

— cut in such a way that their ends are perpendicular to the axis of the pipe,

— free from grooving, cavities or the presence of impurities, and

— clean, free of grease and dry.

4.2.3 Components

The component to be tested shall be clean, free of grease and dry.

4.2.4 Fusion of pipes and components

Pipes and components shall be jointed according to the manufacturer's instructions and under the conditions given in the product standard. For PE assemblies, the conditions given in ISO 11413 for electrofusion or ISO 11414 for butt fusion shall be taken into account.

NOTE Specifications for appropriated equipment can be found in ISO 12176-1 for butt fusion and in ISO 12176-2 for electrofusion.

4.3 Mechanical end-load-bearing assemblies

4.3.1 General

Unless otherwise specified in the referring standard, mechanical test piece assemblies shall be constructed at ambient temperature.

Test piece assembly shall be carried out in accordance with written instructions supplied by the component manufacturer. The assembly method shall form part of the test report.

Preheating of pipes to facilitate assembly shall be carried out with care in accordance with the component manufacturer's instructions. Care shall also be taken to avoid thermal degradation.

Assembly lubricants shall not be applied unless specified by the component manufacturer. Lubrication shall only be applied in accordance with the manufacturer's assembly instructions.

Components designed for machine-assisted assembly shall not be assembled by hand. Only assembly tools and associated instructions specified by the component manufacturer shall be utilized.

4.3.2 Pipes

Wherever possible, pipes in accordance with the relevant standards shall be used and shall be

— cut in such a way that their ends are perpendicular to the axis of the pipe,

— free from grooving, cavities or the presence of impurities, and

— clean, free of grease and dry.

4.3.3 Assembly of pipes and components

As applicable, components shall be assembled to pipe using the values of tightening torque specified by the manufacturer. Torque values shall be measured using appropriate tools and recorded. Re-tightening of joints before leakage testing is not permissible.

4.4 Adhesively bonded assemblies

4.4.1 General

The following parameters are set by the standard making reference to this part of ISO 1167:

a) diametrical clearance (difference in diameter between mean inside diameter of the socket and mean outside diameter of the pipe);

b) setting time (time between the application of the adhesive and the start of the test);

c) curing conditions (temperature, air humidity).

Where a diametrical clearance is required, the internal surface of the socket of the component shall be machined in order to obtain the required value.

4.4.2 Preparation of the assembly

The surfaces of the pipes and components shall be prepared in accordance with the instructions of the adhesive manufacturer, with the parts of the assembly

— cut in such a way that their ends are perpendicular to the axis of the pipe,

— free from grooving, cavities or the presence of impurities, and

— clean, free of grease and dry.

The parts of the assembly shall be conditioned at a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) % for at least 6 h, unless otherwise specified.

4.4.3 Bonding of the assembly

The adhesive shall be prepared in accordance with the adhesive manufacturer's instructions. Unless otherwise specified, a sample of the adhesive shall be taken according to EN 1066 and the adhesive shall be examined and prepared according to EN 1067.

The adhesive shall be applied and the assembly built, in accordance with the manufacturer's instructions, in a draught-free area at a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) %, unless otherwise specified.

Any excess of adhesive on the exterior of the contact surface shall be removed with clean tissue paper.

The bonded assemblies shall be stored in a well-ventilated area for the specified setting time. The setting time shall be counted from the end of the insertion operation.

Unless otherwise specified, the following setting times for adhesive joints are recommended:

PVC-U — 20 days at (23 ± 2) °C followed by four days at (60 ± 2) °C;

PVC-C — 20 days at (23 ± 2) °C followed by four days at (80 ± 2) °C;

ABS — 20 days at (23 ± 2) °C followed by four days at (40 ± 2) °C.

The assembly method and the complete identification of the adhesive shall be included in the test report.

4.5 Non-end-load-bearing assemblies

The test piece shall comprise an assembly containing at least one pipe sample joined to a socket of a component or to a socketed pipe, with the pipe

— cut in such a way that their ends are perpendicular to the axis of the pipe,

— free from grooving, cavities or the presence of impurities, and

— clean, free of grease and dry.

Test piece assembly shall be carried out in accordance with written instructions supplied by the component manufacturer. The assembly method shall be identified in the test report.

Assembly lubricants shall not be applied unless specified by the component manufacturer. Lubrication shall only be applied in accordance with the manufacturer's assembly instructions.

Connecting rods or external frames may be used as necessary to prevent any separation.

4.6 Free length of pipes

4.6.1 Free length of pipes in end-load-bearing assemblies

In the case of two pipes butt fused together, the free length, l_O, of the pipe between end caps shall be at least three times the nominal outside diameter and in any case not less than 250 mm. If, for pipes with a nominal outside diameter greater than 315 mm, the specified minimum free length cannot be achieved, a shorter free length may be chosen with a minimum of two times the outside diameter.

In the case of a single component or several components in one assembly, l_O of the pipes between the components or between the component and an end cap shall be at least twice the outside diameter and in any case not less than 150 mm for pipes with a nominal outside diameter $\leqslant$ 250 mm, and at least 1,5 times the outside diameter for pipes with a nominal outside diameter $>$ 250 mm.

For testing tapping tees, the free length between test pieces on the same pipe shall be at least 100 mm.

4.6.2 Free length of pipes in non-end-load-bearing assemblies

The free lengths of the pipe sections shall be equal to the nominal outside diameter, but shall not be less than 150 mm.

4.7 Testing of tolerance variations

The testing of tolerance variations of components in an assembly shall be undertaken using pipe lengths either as extruded or manufactured from thick wall pipes to create the necessary pipe form. Pipes may be machined to achieve maximum/minimum tolerances, but the minimum specified wall thickness shall be maintained.

Unless otherwise specified, components shall not be machined to simulate assembly tolerance variations.

4.8 Measurement of dimensions

The relevant dimensions of pipes and test pieces shall be measured in accordance with ISO 3126.

Bibliography

[1] ISO 12176-1, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 1: Butt fusion*

[2] ISO 12176-2, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 2: Electrofusion*

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