BRITISH STANDARD

BS EN 12107 : 1998
BS 2782 : Part 11 : Method 1121F : 1998

Plastics piping systems — Injection-moulded thermoplastics fittings, valves and ancillary equipment — Determination of the long-term hydrostatic strength of thermoplastics materials for injection moulding of piping components

The European Standard EN 12107 : 1997 has the status of a British Standard

ICS 23.040.45; 23.060.01

National foreword

This British Standard is the English language version of EN 12107 : 1997.

This standard has the secondary identifier BS 2782 : Part 11 : Method 1121F, so that it is cross-referenced within the existing series of British Standards which cover related test methods for plastics materials and plastics piping components.

The UK participation in its preparation was entrusted to Technical Committee PRI/61, Plastics piping systems and components, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

This test method supports other standards that are in preparation by CEN for the specification of plastics piping and ducting systems and components.

It may be used for the revision or amendment of other national standards, but it should not be presumed to apply to any existing standard or specification which contains or makes reference to a different test method until that standard/specification has been amended or revised to make reference to this method.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled 'International Standards Correspondence Index', or by using the 'Find' facility of the BSI Standards Electronic Catalogue.

WARNING. This British Standard does not necessarily detail all the precautions necessary to meet the requirements of the Health and Safety at Work etc. Act 1974. Attention should be paid to any appropriate safety precautions and the method should be operated only by trained personnel.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 5 and a back cover.

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EUROPEAN STANDARD

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English version

Plastics piping systems — Injection-moulded thermoplastics fittings, valves and ancillary equipment — Determination of the long-term hydrostatic strength of thermoplastics materials for injection moulding of piping components

Systèmes de canalisation en plastique — Raccords, robinets et équipements auxiliaires en thermoplastiques moulés par injection — Détermination de la résistance hydrostatique à long terme des matières thermoplastiques utilisées pour le moulage par injection des composants de canalisation

Kunststoff-Rohrleitungssysteme — Spritzgegossene thermoplastische Formstücke, Armaturen und Zubehörteile — Bestimmung des Zeitstand-Innendruckverhaltens von thermoplastischen Werkstoffen für das Spritzgiessen von Rohrleitungsteilen

This European Standard was approved by CEN on 1997-06-28. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 155, Plastics piping systems and ducting systems, the secretariat of which is held by NNI.

In some system standards material strength requirements are specified, including design stress values based on a minimum required strength (MRS) in accordance with EN ISO 12162.

To determine MRS-values the extrapolation method is specified in ISO/TR 9080 : 1992 and for extruded pipes the test method is described in EN 921.

This standard specifies the test method for injection-moulded tubular test pieces as well as for extruded pipe test pieces, both of material compound intended for use for injection moulding. Generally the test method for extruded pipes described in EN 921 is included in this standard or it is referred to.

The material-dependent parameters and/or performance requirements are incorporated in the system standard(s) concerned.

Annex A, which is informative, gives a bibliography.

This standard is one of a series of standards on test methods which support system standards for plastics piping systems and ducting systems.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 1998, and conflicting national standards shall be withdrawn at the latest by February 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard specifies methods for preparing tubular test pieces for testing thermoplastics materials used for injection moulding, to evaluate the long-term resistance to constant internal water pressure at constant temperature and to check the hydrostatic strength of the material.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 921	*Plastics piping systems — Thermoplastics pipes — Determination of resistance to internal pressure at constant temperature*
ISO/TR 9080 : 1992	*Thermoplastics pipes for the transport of fluids — Methods of extrapolation of hydrostatic stress rupture data to determine the long-term hydrostatic strength of thermoplastics pipe materials*

3 Principle

This test method is intended to evaluate and to check the long-term resistance of thermoplastics material compounds for injection moulding. The evaluation comprises a comparison with long-term resistance of the equivalent material compound used for the extruded pipe in the same piping system. For both injection-moulding compounds and extrusion compounds, the long-term hydrostatic resistance is determined according to the extrapolation method given in ISO/TR 9080 : 1992 and the MRS-values are considered valid for the design of all piping components having the same material type.

This test method is also used for checking individual points of the established regression curves as a minimum material test requirement.

Whatever the type of material or method of test piece manufacture, after conditioning, test pieces are subjected to a specified constant internal hydrostatic pressure for a specified period of time or until the test piece fails.

Throughout the test, the test pieces are kept in an environment, at a specified constant temperature, comprising water (water-in-water test), another liquid (water-in-liquid test) or air (water-in-air test).

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

a) the type of test piece, i.e. extruded or injection-moulded, and its diameter and wall thickness (see clause **4** and **6.3**);

b) the type of end caps to be used (see clauses **5** and **9**);

c) the sampling procedure (see **6.1**);

d) the number of test pieces (see **6.4**);

e) the following parameters as required by EN 921 (see clauses **7**, **8** and **9**):

1) the test temperature;

2) the test pressure, p, or the circumferential (hoop) stress, σ, to be induced by the test pressure;

3) the conditioning period;

4) the type of test, i.e. water-in-water/liquid/air;

5) the duration of the test under pressure and the criteria for a failure;

6) the requirements, or patterns of requirements, if any, which determine the need for additional testing.

4 Test conditions

For the evaluation of the MRS of injection-moulded material compounds, the following two cases shall be considered:

a) *The material compound used for injection moulding is different from the material compound used for extrusion*

The MRS-value for the compound, used for injection moulding, shall be evaluated in accordance with ISO/TR 9080 : 1992.

For a compound used only for injection moulding, the MRS-value shall be evaluated using injection-moulded tubular test pieces.

If the injection-moulding compound can also be processed by extrusion, the MRS-value may be evaluated using either injection-moulded or extruded tubular test pieces.

If the MRS-value has been determined using extruded pipe test pieces, a comparison test with injection-moulded tubular test pieces shall not be required, unless specified in the referring standard.

If the MRS-value is determined using injection-moulded test pieces with a bond line and a failure occurs in the bond line area, the result may be disregarded and the test repeated on another test piece.

NOTE. To evaluate the MRS and to compare results, it is important that the extruded and the injection-moulded test pieces have the same characteristics. Therefore, for all these tests, preferably an injection-moulded test piece without a bond (weld) line is used.

b) *The material compound used for injection moulding is the same as the material compound used for extrusion*

If the extrapolation procedure in accordance with ISO/TR 9080 : 1992 has been, or is, carried out only with extruded pipe test pieces (e.g. to establish the conformity of the material for use for extruded pipes) and the test has been, or is, executed in accordance with EN 921, the evaluated MRS shall also be valid for the design of components manufactured by injection moulding.

In this case a comparison test with an injection-moulded tubular test piece shall not be required, unless such testing is specified in the referring standard.

Otherwise the MRS-value shall be evaluated using injection-moulded test pieces.

5 Apparatus

The apparatus, including the end caps, shall conform to EN 921 (see cause **9**).

6 Test pieces

6.1 Sampling

The sampling requirements shall be as specified in the referring standard.

6.2 Cutting

If the test piece is extruded, it shall be cut, if necessary, so that its ends are perpendicular to its axis.

6.3 Dimensions

6.3.1 *Injection-moulded tubular test piece*

The test piece shall have one of the two shapes given in figure 1. It shall be produced in one nominal outside diameter, d_n, between 25 mm and 110 mm inclusive and with a wall thickness as specified in the referring standard.

The free length, l_o, of the tubular test piece, excluding the extremities (see figure 1), shall be $3d_n$, except for the nominal outside diameter d_n of 50 mm, for which a free length of minimum 140 mm is appropriate.

6.3.2 *Extruded pipe test piece*

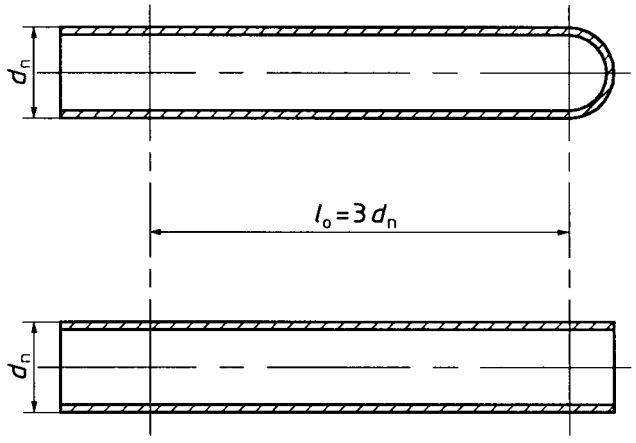
An extruded pipe from which test pieces are to be taken shall be produced in one nominal outside diameter, d_n, between 25 mm and 110 mm inclusive and with a wall thickness as specified in the referring standard.

The free length, l_o, of the test piece shall be $3d_n$ with a minimum of 250 mm.

6.4 Number

The number of test pieces shall be as specified in the referring standard.

NOTE. The number of test pieces depends on the purpose of the test (e.g. type test or audit test).



NOTE. Only for d_n = 50 mm, the free length l_o is minimum 140 mm.

Figure 1

7 Calibration of the apparatus and calculation of the test pressure

Calibration of the apparatus and calculation of the test pressure shall be in accordance with EN 921.

8 Conditioning

Conditioning shall be in accordance with EN 921.

9 Procedure

Conduct the procedure in accordance with EN 921.

To evaluate the MRS-value in accordance with ISO/TR 9080 : 1992, use end caps type a). To test the material strength at a specified requirement, use end caps of either type a) or type b), as specified by the referring standard.

10 Test report

The test report shall include the following information:

a) a reference to this standard and to the referring standard;

b) the complete identification of the sample;

c) the type of the material;

d) the nominal dimensions of the pipe;

e) the measured dimensions of the test pieces;

f) the test temperature and its range during the test;

g) the stress applied;

h) the calculated test pressure and precision of its measurement;

i) the nature of the environment, i.e. air, water or liquid, and nature of the liquid, if used;

j) the free length of the test pieces;

k) the number of test pieces tested;

l) the time to achieve the test pressure;

m) the duration of the test;

n) the type(s) of failure, if any;

o) observations made during and after the test;

p) any factors which may have affected the results, such as any incidents or any operating details not specified in this standard;

q) the date of test or dates between which the test was conducted.

Annex A (informative) Bibliography

EN ISO 12162 *Thermoplastics materials for pipes and fittings for pressure applications — Classification and designation — Overall service (design) coefficient*

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