BRITISH STANDARD

BS EN 12117 : 1998
BS 2782 : Part 11 : Method 1121G : 1998

Plastics piping systems — Fittings, valves and ancillaries — Determination of gaseous flow rate/pressure drop relationships

The European Standard EN 12117 : 1997 has the status of a British Standard

ICS 23.040.45; 23.060.01

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National foreword

This British Standard is the English language version of EN 12117 : 1997.

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 standard is incorporated into BS 2782 *Methods of testing plastics* : Part 11 : *Thermoplastics pipes, fitting and valves*, as Method 1121G, for association with related test methods for plastics materials and plastics piping components.

This test method has been prepared for reference by other standards under preparation by CEN for specification of plastics piping and ducting systems and components. It has been implemented to enable experience of the method to be gained and for use for other fresh applications.

It is also for use for the revision or amendment of other national standards as practicable, 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 or specification has been amended or revised to make reference to this method and to adjust any requirements as appropriate.

In particular BS EN 12117, since it does not determine the velocity head loss, is not technically equivalent to either appendix E or appendix F of BS 7336 : 1990. Those appendices should continue to be used for the purposes of BS 7336, which in turn is subject to standstill pending completion and implementation of EN 1555 to provide a revision of BS 7336.

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, which is identical with EN 12117 : 1997, 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.

Additional information

In the list of descriptors on the EN title page, the word 'cocks' should be interpreted as 'valves'.

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

This British Standard, having been prepared under the direction of the Sector Board for Materials and Chemicals, was published under the authority of the Standards Board and comes into effect on 15 March 1998

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 6, an inside back cover and a back cover.

Amendments issued since publication

Amd. No.	Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12117

August 1997

ICS 23.040.45; 23.060.01

Descriptors: Plastic tubes, polyethylene, pipe fittings, cocks, tests, determination, head losses

English version

Plastics piping systems — Fittings, valves and ancillaries — Determination of gaseous flow rate/pressure drop relationships

Systèmes de canalisations en plastiques — Raccords, robinets et équipements auxiliaires — Détermination du rapport débit gazeux/perte de charge

Kunststoff-Rohrleitungssysteme — Formstücke, Armaturen und Zubehörteile — Bestimmung des Zusammenhanges zwischen Gasdurchfluß und Druckabfall

This European Standard was approved by CEN on 1997-05-28. 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.

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CEN

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

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Ref. No. EN 12117 : 1997 E

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.

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

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.

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1 Scope

This standard specifies a method for determining the flow rate/pressure drop relationship of components for plastics piping when tested using air at 25 mbar[1)].

It is applicable to mechanical fittings, valves, tapping tees and other ancillaries intended to be used in polyethylene (PE) piping systems for supply of gaseous fuels.

The data obtained may be used to calculate the flow rate of such gases for a specified pressure drop.

2 Normative references

This 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.

prEN 837-1 : 1994 *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*

3 Principle

Utilizing a constant main pressure, the flow rate through a piping component is varied between specific limits to assess the pressure drop. The average value of the air flow rate for a pressure drop appropriate to the size of the component is then determined for the gas used. The value for other gases may be calculated on the basis of density differences.

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

a) the number of test pieces (see **5.2**);

b) the relevant value(s) for pressure drop, Δp_n (see **7.2**);

c) the relevant value to be used for ρ_{air} and the relevant temperature and pressure if not as given in **7.3**;

d) the relevant value to be used for ρ_{gas} and the relevant temperature and pressure if not as given in **7.3**.

4 Apparatus (see figure 1)

4.1 *A source of air.*

4.2 *Pressure controller* (A), capable of maintaining an output pressure of $(25 \pm 0{,}5)$ mbar.

4.3 *Flow meter* (B), accurate to ± 2 % and of the positive displacement or turbine type.

4.4 *Manometer* (C), for measuring the gas pressure in the main line and capable of checking conformity to **4.2**, **6.4** and **6.7** (class 0,6 or better as specified in prEN 837-1 : 1994).

4.5 *Manometer* (G), for measuring differential pressure Δp, conforming to class 0,25 of prEN 837-1 : 1994.

4.6 *Outlet valve* (E).

5 Test pieces

5.1 Preparation

The test piece shall comprise the component to be tested, fused or connected between two pieces of PE pipe of the same SDR as that component and provided with connectors appropriate to the pressure drop apparatus.

The free lengths of the PE pipe and the geometry of the test arrangement shall conform to figure 1.

For tapping tees, the arrangement shall be such that the pressure drop can be measured through the outlet branch.

Pressure tapping points upstream and downstream of the component under test shall be flush with the pipe bore and free from burrs.

5.2 Number

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

[1)] 1 bar = 10^5 N/m^2.

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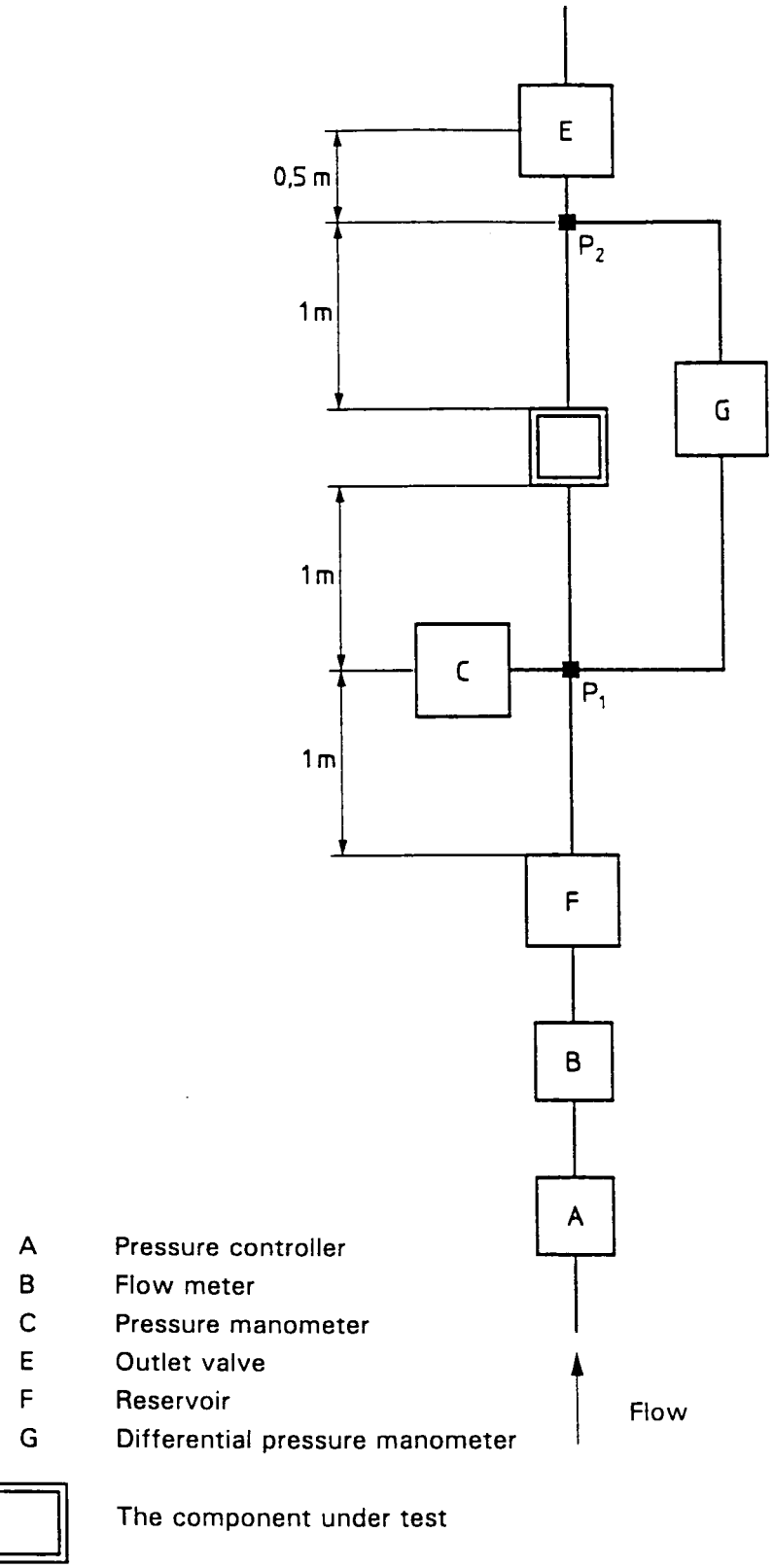

NOTE. The differential pressure Δp is the pressure difference between that at point P_1 and that at point P_2.

Figure 1. Schematic test arrangement for determination of flow rate/pressure drop relationship

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6 Procedure

6.1 Carry out the following procedure at an ambient temperature of (23 ± 2) °C.

6.2 Partially open the outlet valve (E).

6.3 Open the inlet valve to the pressure controller (A) so that air starts to flow and ensure that the air flows from the outlet valve only.

6.4 By means of the pressure controller (A) regulate the air pressure in the main line at point P_1, as shown by manometer C, to (25 ± 0,5) mbar.

6.5 Measure and record the flow rate, Q, on flow meter (B) (see **6.9**) and the pressure drop, Δp, on manometer (G) (see figure 1).

6.6 Open the outlet valve (E) such that the air pressure at point P_1 in the main line is reduced at manometer (C) by approximately 5 mbar.

6.7 Increase the flow rate until the air pressure in the main line at manometer (C) returns to (25 ± 0,5) mbar.

6.8 Measure and record the flow rate, Q, and the pressure drop, Δp.

6.9 Repeat operations **6.6**, **6.7** and **6.8** until the outlet valve (E) is fully open. For tapping tees, the pressure drop shall be measured through the outlet branch.

7 Calculation of results

7.1 Using each set of pressure drop values and the corresponding flow rates, obtained in accordance with **6.5**, **6.8** and **6.9**, calculate the following.

a) The velocity, V, of the flow, in metres per second (m/s), through the outlet pipe component of the test piece (see **5.1**) using the following equation:

$$V = \frac{Q}{A}$$

where:

- Q is the air flow rate, in cubic metres per hour (m^3/h);
- A is the bore area of the outlet pipe in square metres (m^2).

If the following conditions are fulfilled:

1) at least five sets of data for Q and Δp, and hence differing values for V, have been obtained;

2) at least one value of V is ≤ 2,5 m/s;

3) at least one value of V is ≥ 7,5 m/s;

consider the data acceptable.

Otherwise:

4) adjust the inlet valve opening and repeat **6.4** and **6.5** as necessary to obtain the missing value(s);

5) if it is not possible for V to be ≥ 7,5 m/s using a pressure of (25 ± 0,5) mbar, stop the test and report this observation.

b) The factor F for each set of readings, based on the following equation:

$$F = \frac{\Delta p}{Q^2}$$

where:

- Δp is the measured pressure drop, in millibars (mbar);
- Q is the air flow rate, in cubic metres per hour (m^3/h).

Calculate the average value of F.

7.2 Using the average value of F and the specified pressure drop Δp_n, calculate the average air flow rate, Q_a, at that pressure drop.

7.3 Calculate the equivalent flow rate(s) for any other gas Q_{gas} (e.g. natural gas), in cubic metres per hour, using the following relationship:

$$Q_{gas} = Q_a \times \sqrt{\frac{\rho_{air}}{\rho_{gas}}}$$

where:

- Q_a is the average air flow rate at the relevant pressure drop(s) in cubic metres per hour;
- ρ_{air} is the density of air at 23 °C and 1 bar, unless otherwise specified by the referring standard;
- ρ_{gas} is the density of the other gas at 23 °C and 1 bar, unless otherwise specified by the referring standard.

i.e. Q_{gas} = (f) Q

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8 Test report

The test report shall include the following information:

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

b) a full identification of the component, including manufacturer, production date and size(s);

c) the ambient temperature;

d) the pressure drop, flow rate and corresponding velocity for each set of data (see **7.1**) measured;

e) the average value of F, i.e. the relationship between pressure drop and flow rate (see **7.1**);

f) the calculated flow rate(s) at the specified pressure drop(s) for air (see **7.2**) and for the other gas (see **7.3**);

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

h) the date of test.

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