SLOVENSKI STANDARD
SIST EN 12117:1999

01-julij-1999

Cevni sistemi iz polimernih materialov - Fitingi, ventili in pribor - Določanje razmerja plinskega pretoka/padca tlaka

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

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

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

Ta slovenski standard je istoveten z: **EN 12117:1997**

ICS:

83.140.30	Cevi, fitingi in ventili iz polimernih materialov	Plastics pipes, fittings and valves

SIST EN 12117:1999 **en**

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

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CEN

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

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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of an identical text or by endorsement, at the latest by February 1998, and conflicting national standards shall be withdrawn at the latest by February 1998.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.

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 reference

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.

1) 1 bar = 10^5 N/m^2

4 Apparatus (see figure 1)

4.1 A source of air.

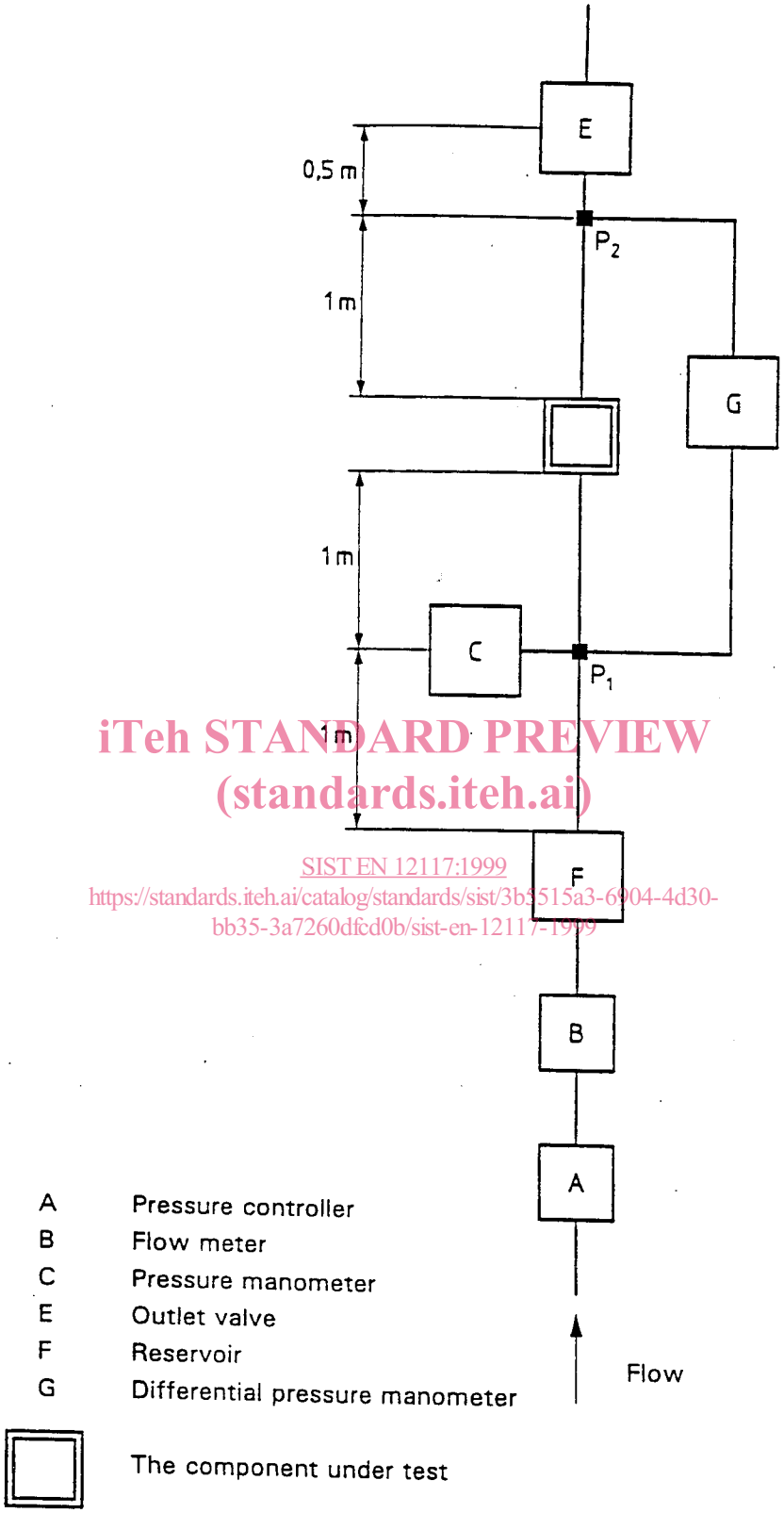
4.2 Pressure controller (A), capable of maintaining an output pressure of (25 ± 0,5) mbar.

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).



A	Pressure controller
B	Flow meter
C	Pressure manometer
E	Outlet valve
F	Reservoir
G	Differential pressure manometer

The component under test

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

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.

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 $\leq$ 2,5 m/s;

3) at least one value of V is $\geq$ 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 $\geq$ 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.