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Strip wound flexible safety metallic hose assemblies for the connection of domestic appliances using gaseous fuels

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ICS

English version

Strip wound flexible safety metallic hose assemblies for the connection of domestic appliances using gaseous fuels

Tuyaux flexibles métalliques agrafés de sécurité pour le raccordement des appareils à usage domestique utilisant les combustibles gazeux

Gewickelte, flexible metallene Sicherheitsgasschlauchleitungen für den Anschluss von Haushaltsgasgeräten

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 236.

If this draft becomes a European Standard, 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (prEN 15070:2004) has been prepared by Technical Committee CEN/TC 236 “Non industrial manually operated shut-off valves for gas and particular combinations valves-other products”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This draft European Standard was prepared by CEN/TC 236/WG2, the Secretariat of which is held by SNV. The working group was in liaison with CEN/TC 218, CEN/TC 342 and ISO/TC 5 /SC 11.

Attention is drawn to the need for careful quality control as given in EN ISO 9000.

This standard is based on a balance of requirements given by the major national European Gas Authorities for strip wound flexible metallic hose assemblies for the connection of domestic gas appliances.

It reflects the recognised practise and technology of the products approved today as well as the present culture of usage by the consumer.

The introduction of new technologies supported by National Gas Authorities may require the adoption of this standard regarding individual requirements and test.

Introduction

This European Standard contains the general safety requirements relating to the safety of persons, animal and property and the protection of their environment.

1 Scope

The objective of this European Standard is to achieve safe operation of strip wound flexible metallic gas hose assemblies by specifying the requirements of performance, materials and test methods.

The strip wound flexible metallic gas hose assemblies as specified are suitable for the connection of domestic appliances inside or outside a dwelling, using gas at a pressure lower than 0,5 bar.

These assemblies are designed for the use with movable appliances; they may also be used for the connection of fixed appliances.

Where these assemblies are directly connected to a valve, such a valve shall be compatible with the strip wound flexible metallic gas hose assembly and shall conform to prEN 15069.

The term gas relates to a first, second or third family gas as referred to in EN 437, Table 1. These gases are commonly referred to as manufactured gases, natural gases or petroleum gases (LPG).

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 amendments) applies.

EN 437, *Test gases – Test pressures – Appliance categories.*

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment.*

EN 1775, *Gas Supply – Gas pipework for buildings – Maximum operating pressure ≤ 5 bar – Functional recommendations*.

prEN 15069, *Safety gas connection valves for metal hose assemblies used for the connection of domestic appliances using gaseous fuels*.

ISO/DIS 105-F02, *Textiles – Tests for colour fastness – Part F02: Specification for cotton and viscose adjacent fabrics*.

ISO 9227, *Corrosion tests in artificial atmospheres – Salt spray tests*.

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
domestic appliance
appliance intended for the use by individual householders inside or outside a dwelling

3.2
strip wound flexible metallic gas hose assembly
element of flexible pipe-work to be fitted between (1) the end of fixed pipework including the valve or the socket of a quick disconnect device, and (2) the appliance inlet connection

It consists of a strip wound flexible metallic hose, its end fittings with appropriate gaskets and if required, an armouring and/or an external protection.

3.3
strip wound flexible metallic hose
pressure-tight flexible hose made from helically wound pre-formed metallic strip, where the turns are interconnected by single or double overlapping, sealed with a packing

3.4
end fittings
components attached to a strip wound flexible metallic hose so as to constitute a strip wound flexible metallic gas hose assembly

3.5
screwed connection
leak-tight threaded connection

This connection can only be assembled and disassembled with an appropriate tool.

3.6
integrated non-detachable fitting
end fitting, permanently attached to the strip wound flexible metallic hose by such a method as swaging, welding or brazing, as will ensure that it may not be detached without destruction or alteration

3.7
safety quick connection device
end fitting consisting of two parts that is designed to permit quick connection and disconnection without tools, the assembly shall be leak-tight such that it shall prevent the release of gas from the upstream pipe work when disconnected

This assembly shall be designed to prevent accidental disconnection and incorrect operation.

3.8
armouring
external reinforcement, partly or wholly covering the strip wound flexible metallic hose, which is designed to improve the mechanical characteristics of the hose

3.9
external protection
any outer cover used to protect the strip wound flexible metallic hose from environmental and other outside influences

3.10
nominal length
length of a strip wound flexible metallic gas hose assembly measured along its axis, including its end fittings, but excluding swivel nuts

Hose assemblies incorporating the plug of a quick connection device shall be measured to the point where the plug enters the socket in the working position.

3.11
bending radius
radius measured to the centre line of the hose

3.12
restricted bending radius
bending radius, which by the use of a member is limited to a minimum value

A lower value can only be reached by permanently deforming or destroying this member.

3.13
rated flow-rate
flow rate, under standard reference conditions, at a given pressure drop

3.14
seal
gasket
packing
non metallic element assuring the tightness between two adjacent elements, be they fixed or moveable in respect to each other

3.15
swivel joint
rotary joint
element or device that enables a continuous axial rotation of the strip wound flexible metallic hose with respect to the gas inlet or the appliance, and which functions without reducing the gas tightness of the strip wound flexible metallic gas hose assembly

4 Construction requirements

4.1 General

These requirements ensure that the construction of a strip wound flexible metallic gas hose assembly which, when properly installed and correctly used, under normal chemical, mechanical and thermal conditions will provide long term safe operation without ageing.

4.2 Nominal size

The nominal size of strip wound flexible metallic gas hose assemblies shall be designated DN 8 and DN 12 and shall be determined by the flow rate requirements given in Table 2.

4.3 Materials

The strip wound flexible metallic gas hose assembly described by this standard shall be manufactured from materials, which shall withstand the performance and test requirements given in Clause 5. The strip wound flexible metallic hose shall be manufactured from stabilised austenitic stainless steel or electroplated mild steel strip. Any seal, gasket or packing made from rubber shall conform to EN 549. End fittings and non-permanently attached parts, whether surface finished or not, shall be manufactured from stainless steel, or from copper alloys containing at least 57 % copper and up to 3,5 % lead.

NOTE Where there may be risk of stress corrosion cracking, it is recommended that any threaded parts manufactured from the above copper alloys shall be low temperature annealed.

4.4 Requirements for the connection between hose and fittings

The connection between the hose and the end fitting of a hose assembly as defined by this standard shall be made by a method such as swaging, welding or brazing, resulting in an integrated non-detachable connection, which can only be detached by irreparably damaging the hose or the end fitting. The connection shall ensure pressure tightness and shall withstand all tests requested in Clause 5.

It shall be possible to withdraw swivel nuts in order to free the sealing surface.

4.5 End fitting design requirements

The design of the end fittings shall be in accordance with 5.18.

Hoses not equipped with quick connection devices shall be equipped with at least one end fitting incorporating a swivel nut.

The design of swivel nuts shall ensure that when used in conjunction with the appropriate seal/gasket and appropriate matching part, leak-tightness is achieved at a maximum torque of 10 N · m and that when further tightened to an overtorque of 50 N · m there shall be no visible deformation or cracking and it shall remain leak-tight.

Fittings used in conjunction with swivel nuts shall incorporate a means, using standard tools, of tightening the swivel nut without applying torsion to the hose or damage to the fitting.

Where threads are used at both ends of an assembly and there is a possibility of the assembly being installed the wrong way round, the fittings shall be identified by different colours and the flow direction shall be marked by the use of an arrow.

Seals / gaskets shall be from material suitable for the intended application, designed to be reusable and shall be retained in a groove of the fitting or held in place by caps.

It is not permitted to use adaptors to reach compatibility of fittings.

4.6 Hose assembly lengths

The preferred nominal lengths of the strip wound flexible metallic gas hose assemblies shall be 0,5 m, 0,75 m, 1,0 m, 1,25 m, 1,5 m and 2,0 m. The admissible length tolerance is ± 20 mm. The maximum nominal length of a strip wound flexible metallic gas hose assembly shall be to 2,0 m.

Hose assemblies shall not be joined together to form a hose string.

4.7 Corrosion requirements

Strip wound flexible metallic gas hose assemblies shall be resistant to any corrosive agents reasonably foreseen in a domestic environment. If necessary the corrosion resistance of a hose assembly may be increased by some form of external protection.

4.8 Insulation requirements

The strip wound flexible metallic hose part of a hose assembly shall be electrically insulated by an appropriate synthetic material at potential points of contact with external metallic elements where cathodic corrosion may take place.

4.9 Electric conductivity requirements

Strip wound flexible metallic gas hose assemblies shall be electrically continuous.

4.10 Hygiene

The strip wound flexible metallic gas hose assembly shall have an outer surface, which can be readily cleaned by normal household means.

4.11 Cover materials

If the materials of a synthetic cover contain corrosive agents as ingredients, such as sulphur or chlorine, care shall be taken to ensure that such agents are not released during the manufacturing process or during normal service.

5 Performance and test requirements

5.1 General

If any sample fails one of the tests within the sequence given in Table 1 then all samples will be deemed to have failed to meet the type test requirements of this standard. Unless otherwise stated the tests are performed under ambient conditions.

5.2 Test sequence schedule

Nine strip wound flexible metallic gas hose assemblies of 1 m length and one hose of 0,5 m length shall be tested in the sequence given in Table 1.

Table 1 — Test sequence schedule

Hose assembly	**No**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**No of samples**
Hose length in meters	***M***	**1,0**	**1,0**	**1,0**	**1,0**	**1,0**	**1,0**	**1,0**	**1,0**	**1,0**	**0,5**	
Initial leak-tightness test	5.3.2.2	X	X	X	X	X	X	X	X	X	X	10
Strength test	5.4.2		X									1
Flow rate test	5.5.2	X										1
Electrical continuity test	5.6.2	X										1
Tension test	5.7.2		X									1
Durability of marking test	5.8.2	X										1
Ageing test	5.9.2	X										1
Salt spray test	5.10.2.1	X										1
Corrosion resistance test with hydrochloric acid	5.10.2.2	X										1
Corrosion resistance test against household cleaning materials	5.10.2.3		X									1
Resistance to flame	5.11.2										X	1
Resistance to high temperature	5.12.2										X	1
Suppleness test	5.13.2			X	X	X						3
Bending test restricted bend radius	5.14.1.2			X	X	X						3
Flexing test	5.15.2							X	X	X		3
Torsion test	5.16.2						X					1
Impact resistance test	5.17.2						X					1
Fitting tests where requested	5.18											
Drop test	5.18.2.2.1							X				1
Crush test	5.18.2.2.2							X				1
Torque test	5.18.3.2							X				1
Final leak-tightness test	5.3.2.3	X	X	X	X	X	X	X	X	X		9

NOTE The schedule in the above sequence chart may be subject to change during the process of drafting this European Standard.

5.3 Leak-tightness performance

5.3.1 Requirement

The strip wound flexible metallic gas hose assembly shall be leak-tight when tested in accordance with the methods given in 5.3.2.

In the initial leak-tightness test any external protection shall remain in place. In the final leak-tightness test it shall be determined that any external protection shall not contribute to the achievement of the given leakage rate.

Leak-tightness performance requirements between a hose assembly and its safety quick connection device are given in prEN 15069.

5.3.2 Test procedure

5.3.2.1 General

The strip wound flexible metallic gas hose assembly shall be tested by the following methods.

5.3.2.2 Initial leak-tightness test

When subjected to an internal air pressure of 3 bar there shall be no leakage for the first 10 s and the leakage rate shall not exceed 10 cm^3/h over a period of one minute.

5.3.2.3 Final leak-tightness test

When subjected to an internal air pressure of 50 mbar with any external protection removed to within not less than 25 mm from each end fitting there shall be no leakage for the first 10 s and the leakage rate shall not exceed 10 cm^3/h over a period of one minute.

5.4 Structural strength

5.4.1 Requirement

A strip wound flexible metallic gas hose assembly shall have a structural strength capable of resisting any environmental mechanical influence reasonably foreseen. This is regarded as being equivalent to withstanding an internal pressure of 6 bar.

5.4.2 Test procedure

The length of the strip wound flexible metallic gas hose assembly is measured on a flat surface and recorded. The strip wound flexible metallic gas hose assembly, one of its ends being free to move, shall be gradually pressurised up to 6 bar. This pressure shall be maintained for at least 5 min.

The permanent elongation after release of pressure shall not exceed 3 % of the length before pressurisation. No visual deformation of the strip wound flexible metallic hose or any other part of the assembly is permitted.

Following the test the strip wound flexible metallic gas hose assembly shall be subjected to the leak-tightness test given in 5.3.2.3.

5.5 Flow rate

5.5.1 Requirement

The minimum flow rate through a strip wound flexible metallic gas hose assembly without the valve and when tested as follows shall be as given in Table 2.

The flow rate shall be determined using dry air at a pressure of 20 mbar and a pressure drop of 1,0 mbar. Measurements shall be made at an ambient pressure of 1013 mbar and at a temperature of 15 °C.

NOTE The power equivalent of the gas flowing through a hose is also influenced by the hose length, the installation situation and the type of the gas family. In case of doubt it is recommended that the manufacturer indicates a power rating for the application, installation, gas family and the gas appliance type for which the hose is intended.

Table 2 — Flow rate requirements

Nominal size of hose assembly	Overall length of hose assembly	Minimum air flow rate
DN 8	1,0 m	0,5 m^3/h
DN 12	1,0 m	1,5 m^3/h

5.5.2 Test procedure

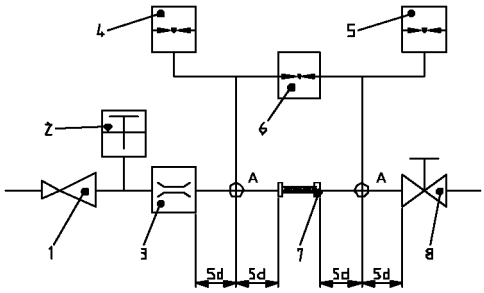
The air is supplied at constant pressure to a positive displacement inferential meter of suitable range, having an error not greater than 5 % of the rate to be measured. The air is passed at a pressure of 20 mbar, through a straight length of pipe connected directly to the inlet of the strip wound flexible metallic gas hose assembly, see Figure 1. Any adapter fitted to the strip wound flexible metallic gas hose assembly shall not create an additional pressure drop.

The pipe shall have a bore size as given in Figure 1 detail A and is to be at least 10 pipe diameters in length with a pressure tapping five diameters upstream of the strip wound flexible metallic gas hose assembly. Another pressure tapping is positioned five pipe diameters downstream of the strip wound flexible metallic gas hose assembly on a similar pipe, which is also of at least 10 diameters in length. A differential pressure gauge capable of being read directly to 0,05 mbar or less is connected as shown in Figure 1.

The air flow rate is adjusted by means of a control valve on the outlet of the pipe to give the required differential pressure across the valve and the air temperature is maintained to ± 0,5 °C. The flow rate is recorded and the measured values are corrected to standard conditions.

If the strip wound flexible metallic gas hose assembly has an end fitting which incorporates features that are part of a quick connection device, and those features impair the flow, they may be eliminated for the purposes of this test.

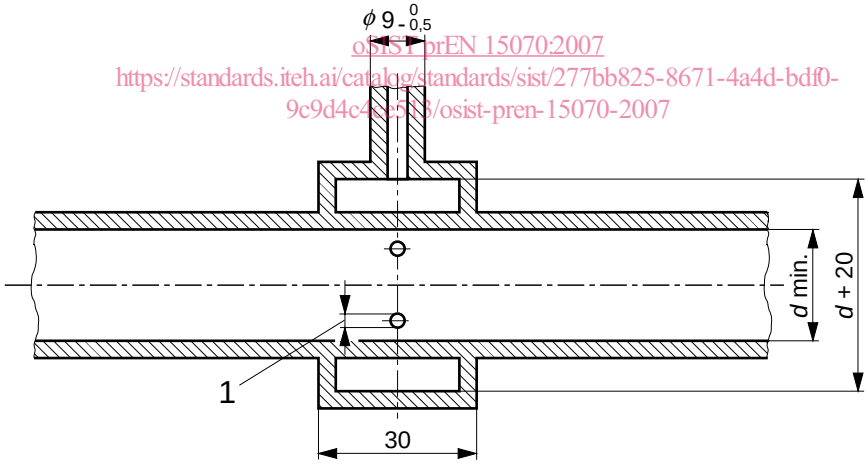
NOTE The flow rate of an end fitting which forms part of a safety quick connection device is tested as part of the quick connection device under the requirements of prEN 15069.



1 Adjustable governor for inlet pressure
2 Thermometer for air temperature
3 Flow meter
4 Inlet pressure gauge
5 Outlet pressure gauge
6 Differential pressure gauge
7 Hose assembly
8 Manual control tap

Figure 1 — Configuration of flow test equipment

Dimensions in millimetres



Nominal size DN	Diameter *d* min mm
8	9
12	15

1 4 holes 15

Figure 1 — Detail A

5.5.3 Conversion of air flow rate

Depending on the means of measurement used, the corrected rated flow rate is calculated from the following formula:

$$V_r = V_m \sqrt{\frac{d}{d_r} \bullet \frac{1013{,}25 + p}{1013{,}25} \bullet \frac{p_a + p}{1013{,}25} \bullet \frac{288{,}15}{273{,}15 + t_{air}}}$$

where

V_r is the volumetric air flow rate under reference conditions, in cubic metres per hour;

V_m is the volumetric air flow rate under test conditions, in cubic metres per hour;

p_a is the atmospheric pressure, in millibar;

p is the air supply pressure at the inlet of the meter, in millibar;

t_{air} is the air temperature at the measuring point, in degrees Celsius;

d is the air density (e.g. if a wet meter is used);

d_r is the dry air density.

If a dry meter is used, the ratio $\frac{d}{d_r} = 1$.

5.6 Electric continuity

5.6.1 Requirement

The strip wound flexible metallic gas hose assembly shall be electrically continuous. The electric resistance of an installed strip wound flexible metallic gas hose assembly shall not exceed 1 Ω/m.

5.6.2 Test procedure

A strip wound flexible metallic gas hose assembly of 1 m nominal length shall be connected between dummy fittings representative of the gas inlet and appliance connection. These dummy fittings shall be connected for maximum 1 min to an alternating current of 25 A supplied by a generator whose open circuit voltage does not exceed 12 V.

The voltage drop is measured between the dummy fittings and the electric resistance is calculated from the voltage drop and the related current. The resistance shall not exceed 1 Ω/m. The electric resistance of the electric cables shall not be included in the measurement.

5.7 Tension

5.7.1 Requirements

A strip wound flexible metallic gas hose assembly shall be capable of withstanding an axial tension of 900 N for size DN 12 and 600 N for size DN 8 without leakage. When under this load the assembly length shall not increase more than 10 %. After release of the load the permanent elongation shall not exceed more than 3 % of the original length and the strip wound flexible metallic gas hose assembly shall meet the requirements of the leak-tightness test given in 5.3.2.3.

5.7.2 Test procedure

The strip wound flexible metallic gas hose assembly including its cover shall be attached at one end by its end fitting to a fixed support. The other end shall be fixed to a movable part, which moves in the axis of the hose