

NF EN 15266

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European standard

NF EN 15266

August 2007

French standard

Classification index: **E 29-825**

ICS: 23.040.70

Stainless steel pliable corrugated tubing kits in buildings for gas with an operating pressure up to 0,5 bar

F : Kits de tuyaux onduleux pliables en acier inoxydable pour le gaz
dans les bâtiments avec une pression de service inférieure ou égale à 0,5 bar
D : Nichtrostende biegbare Wellrohrbausätze in Gebäuden für Gas
mit einem Arbeitsdruck bis 0,5 bar

French standard approved

by decision of the Director General of AFNOR on July 11, 2007 taking effect on
August 11, 2007.

Correspondence

The European standard EN 15266:2007 has the status of French standard.

Analysis

This document specifies the requirements for material, design, manufacture, testing, marking and documentation of stainless steel pliable corrugated gas tubing kits for buildings with a maximum operating pressure (MOP) less than or equal to 0,5 bar and a nominal size range between DN 10 and DN 50 inclusive.

It is intended to be used as a basis for affixing the CE mark in application of Directive 89/106/EEC "Construction Products" (CPD).

Descriptors

Technical International Thesaurus: piping, gas distribution, buildings, steel tubes, hoses, stainless steels, pressure equipment, definitions, materials, design, manufacturing, leaktightness, dimensional measurements, mechanical strength, folding, crushing strength, wear resistance, pressure resistance, thermal resistance, chemical resistance, cleaning materials, reaction to fire, head losses, tests, conformity tests, verification, marking, EEC type-approval marking.

Modifications

Corrections



National foreword

References to French standards

The correspondence between the standards figuring in the clause "Normative references" and the identical French standards is as follows:

EN 437	: NF EN 437 (classification index: D 30-500)
EN 549	: NF EN 549 (classification index: D 36-205)
EN 682	: NF EN 682 (classification index: T 47-306)
EN 751-1	: NF EN 751-1 (classification index: D 36-106-1)
EN 751-2	: NF EN 751-2 (classification index: D 36-106-2)
EN 751-3	: NF EN 751-3 (classification index: D 36-106-3)
EN 1363-1	: NF EN 1363-1 (classification index: P 92-101-1)
EN 1775	: NF EN 1775 (classification index: P 45-200)
EN 10028-7	: NF EN 10028-7 (classification index: A 36-205-7)
EN 10088-3	: NF EN 10088-3 (classification index: A 35-574)
EN 10226-1	: NF EN 10226-1 (classification index: E 03-004-1)
EN 10242	: NF EN 10242 (classification index: E 29-801)
EN 12164	: NF EN 12164 (classification index: A 51-302)
EN 12165	: NF EN 12165 (classification index: A 51-303)
EN 13501-1	: NF EN 13501-1 (classification index: P 92-800-1)
EN 13823	: NF EN 13823 (classification index: P 92-527)
EN ISO 6509	: NF EN ISO 6509 (classification index: A 05-311)
EN ISO 7369	: NF EN ISO 7369 (classification index: E 29-820)
EN ISO 9001	: NF EN ISO 9001 (classification index: X 50-131)
EN ISO 9227	: NF EN ISO 9227 (classification index: A 05-101)
EN ISO 10380	: NF EN ISO 10380 (classification index: E 29-834)
EN ISO 11925-2	: NF EN ISO 11925-2 (classification index: P 92-522)

The correspondence between the standards figuring in the clause "Normative references" and French standards having the same scope, but which are not identical, is as follows:

ISO 6957	: NF EN 14977 (classification index : A 51-110)
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 15266

May 2007

ICS 23.040.01

English Version

**Stainless steel pliable corrugated tubing kits in buildings for gas
with an operating pressure up to 0,5 bar**

Kits de tuyaux onduleux pliables en acier inoxydable pour le
gaz dans les bâtiments avec une pression de service
inférieure ou égale à 0,5 bar

Nichtrostende biegbare Wellrohrbausätze in Gebäuden für
Gas mit einem Arbeitsdruck bis 0,5 bar

This European Standard was approved by CEN on 17 February 2007.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 15266:2007) has been prepared by Technical Committee CEN/TC 342 "Metal hoses, hose assemblies, bellows and expansion joints", the secretariat of which is held by UNI.

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 November 2007, and conflicting national standards shall be withdrawn at the latest by February 2009.

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.

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

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Introduction

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

The requirements of this standard concern designers, manufacturers, suppliers and importers of stainless steel pliable corrugated gas tubing kits for buildings.

Installation and mandatory strength and tightness tests before commissioning should consider the local application regulations where they exist.

This document is applicable to:

- new installation pipework;
- replacements of existing installations; or
- extensions to existing installations.

Stainless steel pliable corrugated gas tubing kits can be used in conjunction with other approved gas pipework.

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1 Scope

This European Standard specifies the requirements for material, design, manufacture, testing, marking and documentation of stainless steel pliable corrugated gas tubing kits for buildings with a maximum operating pressure (MOP) less than or equal to 0,5 bar and a nominal size range from DN 10 to DN 50.

This document applies to stainless steel pliable corrugated gas tubing kits used for 1st, 2nd and 3rd family gases in residential, commercial and industrial gas installations.

This document does not apply to:

- pliable tubing without cover;
- corrugated safety metal hose assemblies for connection to moveable appliances.

This document does not cover the installation aspects of stainless steel pliable corrugated gas tubing kits.

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.

EN 437, *Tests gases - Test pressures – Appliance categories*

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

EN 682, *Elastomeric seals – Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids*

EN 751-1, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 1: Anaerobic jointing compounds*

EN 751-2, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 2: Non-hardening jointing compounds*

EN 751-3, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 3: Unsintered PTFE tapes*

EN 1363-1:1999, *Fire resistance tests – Part 1: General requirements*

EN 1775:1998, *Gas supply - Gas pipework for buildings - Maximum operating pressure ≤ 5 bar - Functional recommendations*

EN 10028-7, *Flat products made of steels for pressure purposes – Part 7: Stainless steels*

EN 10088-3, *Stainless steels - Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

EN 10226-1, *Pipe threads where pressure tight joints are made on the threads - Part 1: Taper external threads and parallel internal threads - Dimensions, tolerances and designation*

EN 10242, *Threaded pipe fitting in malleable cast iron*

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EN 12164, *Copper and copper alloys – Rod for free machining purposes*

EN 12165, *Copper and copper alloys – Wrought and unwrought forging stock*

EN 13501-1:2002, *Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests*

EN 13823, *Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item*

EN ISO 6509, *Corrosion of metals and alloys - Determination of dezincification resistance of brass (ISO 6509:1981)*

EN ISO 7369:2004, *Pipework - Metal hoses and hose assemblies - Vocabulary (ISO 7369:2004)*

EN ISO 9001:2000, *Quality management systems - Requirements (ISO 9001:2000)*

EN ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227:2006)*

EN ISO 10380:2003, *Pipework - Corrugated metal hoses and hose assemblies (ISO 10380:2003)*

EN ISO 11925-2, *Reaction to fire tests - Ignitability of building products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2002)*

ISO 6957, *Copper alloys - Ammonia test for stress corrosion resistance*

3 Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions listed in EN ISO 7369:2004, EN 1775:1998 and the following apply.

3.1

pliable tubing (PLT)

corrugated tubing capable of being bent easily by hand a limited number of times, covered with a tubular outer sheath by the manufacturer at the time of production

3.2

PLT kit

pliable tubing with its related components obtained or specified from one manufacturing source having design and performance responsibility for the kit

3.3

bend radius

radius measured to the centre line of the pliable tubing

3.4

PLT fitting

unique fitting using mechanical attachment methods, in which tightness is achieved with or without seals, excluding other joining methods such as welding, brazing, soldering or gluing

3.4.1

end fitting

PLT fitting intended to join pliable tubing to an external component

3.4.2

coupling

PLT fitting intended to join two sections of pliable tubing

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3.4.3

tee

PLT fitting to join three sections of pliable tubing

3.4.4

manifold

PLT fitting designed to join 4 or more sections of pliable tubing

3.5

seal

any part intended to provide tightness within a PLT fitting

3.6

sleeve

tubular outer sheath intended to protect the connection between the pliable tubing and a PLT fitting from corrosion or mechanical damage

3.7

PLT support

element used to attach the PLT kit to the structure of the building

3.8

rated flow rate

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

3.9

family

group of products produced by one manufacturer for which test results for one product of that group are representative of the characteristics for the whole group

3.10

gas

1st, 2nd and 3rd family gases as defined in EN 437

NOTE These gases are commonly referred to as manufactured gases, natural gas and liquefied petroleum gases.

4 Design requirements

4.1 General

Where additional components are required to complete the PLT kit, these components shall be provided or specified by the kit manufacturer.

4.2 Materials

Materials for the manufacture of a PLT kit shall be selected from Table 1 and on the basis of their related suitability for fabrication, e.g. welding, cold forming, etc. as appropriate, and the conditions under which they will be used.

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Table 1 — Materials

Component	Material
Pliable tubing	Stainless steel according to EN 10028-7: 1.4306, 1.4541, 1.4404, 1.4401, 1.4571
Cover	Synthetic material ^a
PLT fittings	Stainless steel according to EN 10088-3, copper alloys according to EN 12164 and EN 12165
PLT manifold/tees	Stainless steel according to EN 10088-3, copper alloys according to EN 12164 and EN 12165 Malleable cast iron according to EN 10242 types W 400-05; W 350-04; B 350-10 or B 300-06
Supports	Metallic corrosion resistant material
^a see 4.10	

4.3 Nominal size DN and pressure drop

The nominal size of a PLT kit shall be selected from the DN's given in EN ISO 10380:2003, Table 2.

The nominal size range shall be from DN 10 to DN 50.

The minimum bore size of the pliable tubing shall be at least 98 % of the nominal size DN in mm.

The manufacturer shall declare the related pressure drop (see 5.18) for each nominal size DN (see 6.4).

4.4 Threads

End fittings shall have terminating threads according to EN 10226-1.

Integrated threads within the mechanical attachment of the PLT fittings shall not be compatible with EN 10226-1.

4.5 PLT fittings

4.5.1 General

PLT fittings shall provide a tight connection to the pliable tubing. PLT fittings, whether surface finished or not, shall be manufactured from materials listed in Table 1. Copper alloys shall be selected from EN 12164 and/or EN 12165 and shall contain at least 57 % copper and not more than 3,5 % lead.

4.5.2 Stress corrosion

All fittings and components of copper alloy shall be resistant to stress corrosion.

Stress corrosion resistance shall be determined in accordance with ISO 6957 (pH 9,5).

4.5.3 Dezincification

All copper alloys components shall resist dezincification.

If an alloy contains more than 10 % of zinc, its corrosion behaviour shall be assessed according to EN ISO 6509.

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4.6 Seals and sealing agents

Where seals or sealing agents are used in the PLT kit and are exposed to gas, they shall be selected from the appropriate European Standards (EN 549, EN 682, EN 751-1, EN 751-2 and EN 751-3).

4.7 Environment

PLT kit components shall be resistant to any corrosive agent reasonably foreseen in the conditions of the declared intended use.

They shall be durable to climatic conditions according to 5.14 for a reasonably economic working life.

They shall withstand a temperature range of – 40 °C to 60 °C.

NOTE The manufacturer should advise in his installation instructions that where exposed, sections of PLT kits can be protected against excessive mechanical force that can cause damage. Casing/trunking can be used to fulfil this requirement.

4.8 Supports

Supports shall be made of materials mechanically and chemically non aggressive with the other components of the PLT kit with which they are in contact.

Supports shall be designed to carry the system load for a minimum of 30 min in case of fire. The standard temperature/time curve shall be as given in EN 1363-1:1999, Figure 7.

The manufacturer shall supply installations instructions that give the correct support design for the kit supplied. The instructions shall also emphasize the need to design the support fixings to the structure in such a way that maintains the integrity of the system in case of fire for a period not less than the period for which the supports are designed to carry the system load.

4.9 Electrical conductivity requirements

PLT kit components shall be electrically conductive, see 5.17.

NOTE The manufacturer should advise in his installation instructions that equipotential bonding should be in accordance with local application regulations.

4.10 Cover

The cover shall satisfy the tests according to 5.4, 5.7, 5.12, 5.13, 5.14 and 5.16.

If the materials of the cover contain corrosive agents or ingredients such as sulphur or chlorine, such agents shall not be released during manufacturing process or during intended service conditions.

For the purpose of safety, the prevailing colour of the cover shall be yellow, e.g. RAL 1004, 1016, 1018.

5 Performance and test requirements

5.1 General

5.1.1 Introduction

The number and the type of PLT kit samples to be tested, the tests and the compliance criteria shall be as given in 6.2.2, Table 11.

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If any nominal size fails one of the tests within the test sequence schedule given in 5.1.3, Table 3, then all samples of that nominal size will be deemed to have failed to meet the type test requirements of this standard.

Unless otherwise specified in this document:

- all dimensions shall be in mm.
- the tests shall be carried out with the cover in place.
- the tests performed will qualify the other sizes in the same family as specified in Table 2.

Tests results shall only apply to components of the same design and same material.

Table 2 — Test requirements

Nominal size to be tested ^a	Family	Qualified diameters DN
DN 12	X	DN 10 - DN 12 - DN 15
DN 25	Y	DN 20 - DN 25 - DN 32
DN 50	Z	DN 40 - DN 50
^a If these sizes are not available, the largest DN in the relevant family shall be tested.		

The tests shall be performed under ambient conditions. If not otherwise indicated the following tolerances shall apply:

- atmospheric pressure: (+/- 0,1) mbar;
- flow rate: (+/- 5)%;
- temperature above 125°C: (+/- 10)°C;
- dimensions: (+/- 0,1) mm;
- air pressure: (+/- 5)%;
- ambient temperature: (+/- 1)°C;
- time: (+/- 0,1)%;
- sample length: (-1/+3)%.

5.1.2 Type of PLT kit samples

The PLT kit samples used in the following tests shall be assembled in accordance with the manufacturers' instructions. Prior to assembling, each length of the pliable tubing shall be tested according to 5.3. Depending on the test, Type 1 samples (see Figure 1) or Type 2 samples (see Figure 2) shall be used.

Type 1:

End fitting – pliable tubing – end fitting

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Dimensions in millimetres



Figure 1 — PLT sample Type 1

Type 2:

End fitting – pliable tubing – coupling – pliable tubing – end fitting

Dimensions in millimetres

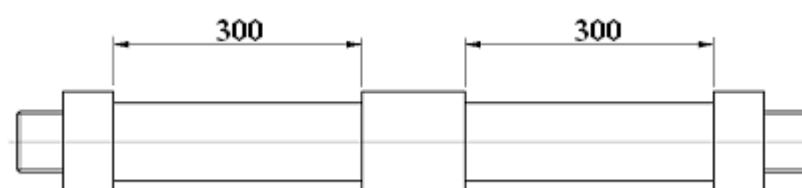


Figure 2 — PLT sample Type 2

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5.1.3 Test sequence schedule

Table 3 gives the sequence to be followed for each test.

Table 3 — System test sequence schedule

Test	Tests to verify the characteristics	Test sequence					Clause of this standard
		1	2	3	4	5	
A	Tightness test	A	-	-	-	-	5.2
B	Dimensional check	B	-	-	-	-	5.3
C	Bending performance	B	A	C	A	-	5.4
D	Crushing resistance	B	A	D	A	B	5.5
E	Stability under pressure	B	A	E	A	-	5.6
F	Wear resistance of outer cover	F	-	-	-	-	5.7
G	Structural strength	B	A	G	A	-	5.8
H	Impact resistance	B	A	H	A	-	5.9
I	Penetration resistance	B	A	I	A	-	5.10
J	Resistance to pull out	B	A	J	A	-	5.11
K	Chemical resistance	A	K	A	-	-	5.12
L	Low temperature resistance	A	L	A	-	-	5.13
M	Ageing	A	M	A	-	-	5.14
N	Tightness in case of fire	A	N	A	-	-	5.15
O	Reaction to fire	O	-	-	-	-	5.16
P	Electrical conductivity	P	-	-	-	-	5.17
Q	Pressure drop	A	Q	-	-	-	5.18
R	Maximum load for admissible deformation	R	-	-	-	-	5.19
Example							
Test H is preceded by tests B and A and followed by test A.							

5.2 Tightness

5.2.1 Tightness for test samples

5.2.1.1 Requirements

The PLT kit shall be tight when tested in accordance with the method given in 5.2.1.2.

The initial tightness test shall be performed with the cover in place. For the final tightness test, the cover shall be removed in order that it does not contribute to the achievement of the tightness.

5.2.1.2 Test method

When held under water and containing air at a pressure of 2 bar the leakage rate of a test sample shall not exceed 10 cm³/h.

NOTE A helium leakage rate not exceeding (7 x 10⁻³) mbar l/s is equivalent to the above requirement.

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A helium leakage rate not exceeding (7×10^{-3}) mbar l/sec shall be equivalent to the above requirement.

5.2.2 Tightness for FPC

5.2.2.1 Requirements

The PLT shall be tight when tested in accordance with the method given in 5.2.2.2.

The tightness test shall be performed just prior to the cover being applied.

Any operation after the cover being applied which may influence the tightness shall require retesting with the cover in place.

5.2.2.2 Test method

When held under water and containing air at a pressure of 2 bar the leakage rate of a PLT shall not exceed 10 cm³/h per 25 m.

NOTE A helium leakage rate not exceeding (7×10^{-3}) mbar l/sec is equivalent to the above requirement.

5.3 Dimensional check

5.3.1 Requirements

When subjected to the following test method, every sample length of pliable tubing shall show no sign of inner diameter restriction.

5.3.2 Test method

A metal sphere or gauge, calibrated to (98 + 0/- 0,5) % of the DN shall pass through the length.

5.4 Bending performance

5.4.1 Requirements

After being bent through 12 cycles in accordance with 5.4.2, PLT samples shall be leak tight when tested in accordance with 5.2.1.2 and there shall be no visible cracks in the cover.

5.4.2 Test method

The samples shall be subjected to a bend test as shown in Figure 3. With one end rigidly fixed the other shall be moved to a starting position A in a circular arc around a former having a radius calculated from the bend radius (pliable test) as given in EN ISO 10380:2003, Table 2, type 3, until the tubing is in intimate contact with the full length of the arc of the former.

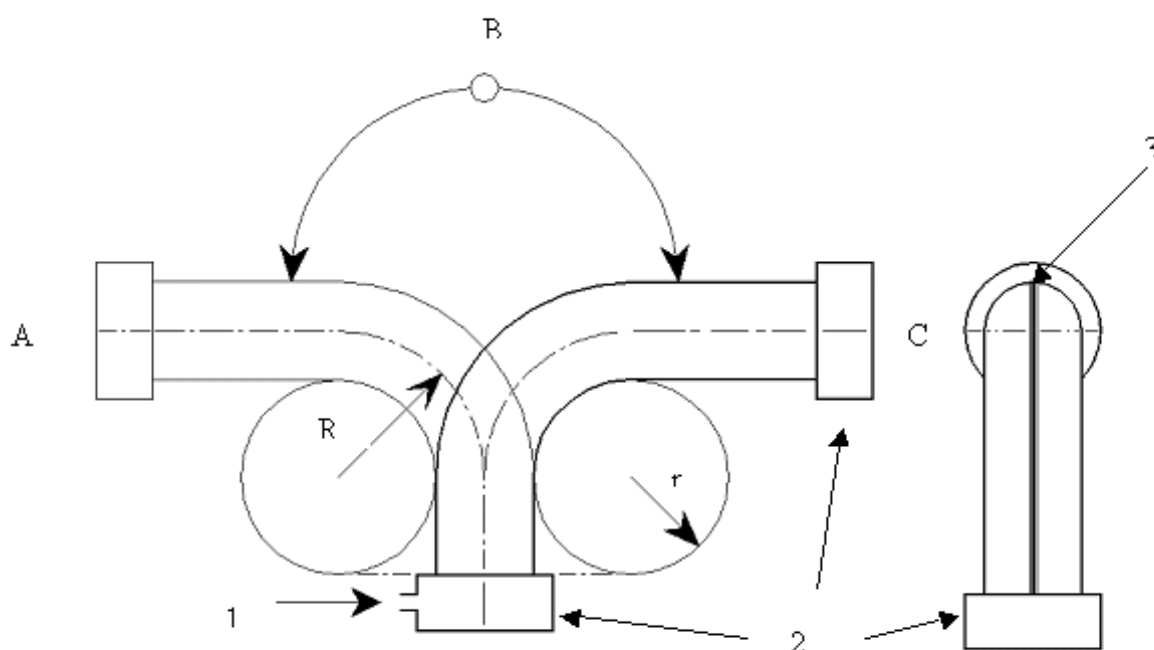
Throughout the test, the sample shall be pressurised with air at a pressure of 500 mbar.

The PLT sample shall be bent 12 times through an arc of 180°, the first cycle comprises one bend starting in a position A moving through B to the end position C, the second cycle being a movement from position C through B to the end position A.

The longitudinal seam weld shall be located in accordance with position 3 (see Figure 3). If helical welding is used, the orientation of the weld shall be ignored.

The test frequency shall be between 5 cycles/min and 15 cycles/min.

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Key

- r former radius
- R bend radius
- 1 pressure sensor
- 2 end fittings
- 3 weld seam orientation

Side view

Figure 3 — Bending test configuration

5.5 Crushing resistance

5.5.1 Requirements

When tested in accordance with 5.5.2, the bore size of the pliable tubing shall not be reduced by more than 15 % of its nominal size DN, and it shall remain tight.

5.5.2 Test method

The internal diameter shall be determined by using the method described in 5.3.2 before the crushing test.

The corrugated part of the PLT kit sample shall be placed on a hard flat support surface. A load of 4000 N shall be gradually applied on a square steel plate of 150 mm side positioned on the PLT kits sample. After a stabilisation time of 5 min, the load shall be removed.

- subject 2 samples of Type 1 to a crushing test as shown in Figure 4;
- subject 2 samples of Type 1 to a crushing test as shown in Figure 5.

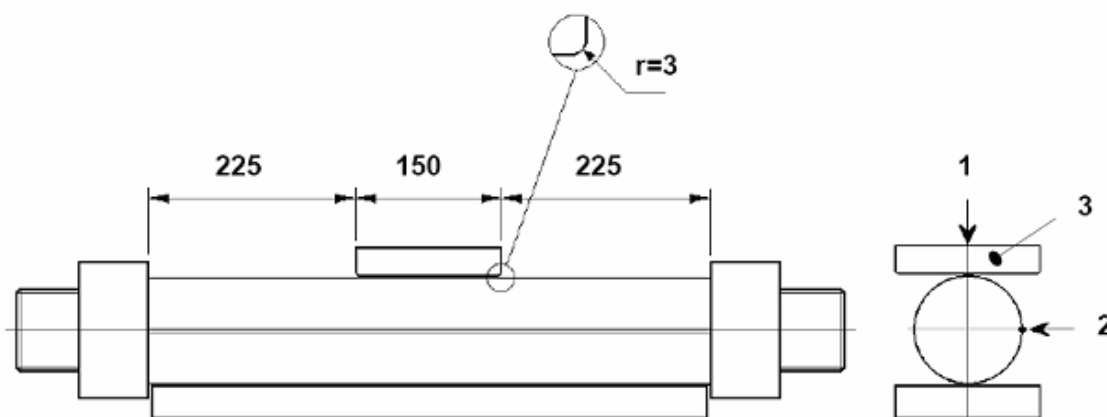
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The seam of the PLT kit sample shall be at right angle to the direction of the load. If helical welding is used, the orientation of the weld shall be ignored.

Carry out the tightness test given in 5.2.1.2.

Following the test, the bore size of the pliable tubing shall be confirmed by using the method given in 5.3.2 but using a sphere or a gauge calibrated to $85^{+0}_{-0,5}$ % of that used in the original dimensional test.

Dimensions in millimetres

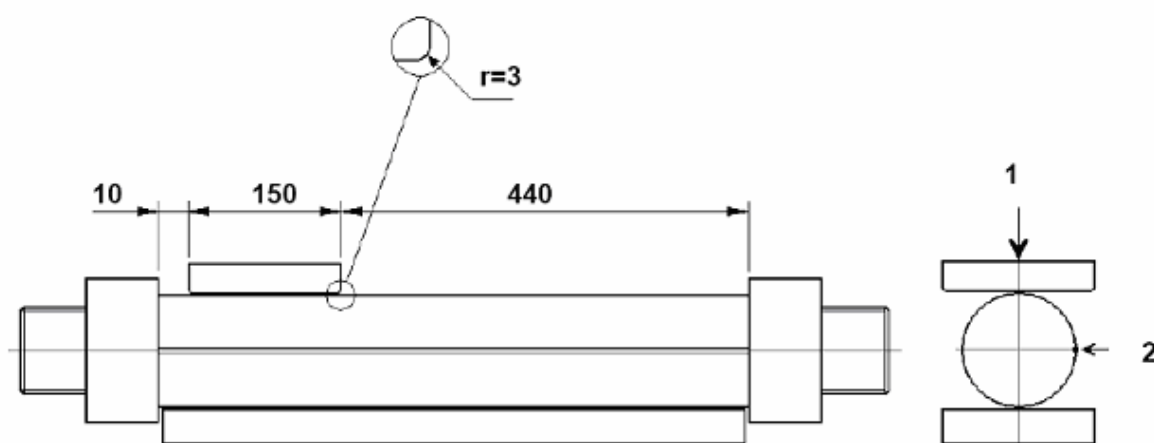


Key

- 1 crushing direction
- 2 seam weld
- 3 steel plate

Figure 4 — Crushing test configuration 1

Dimensions in millimetres



Key

- 1 crushing direction
- 2 seam weld

Figure 5 — Crushing test configuration 2

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5.6 Stability under pressure

5.6.1 Requirements

When subjected to an internal pressure following the test method described in 5.6.2 a PLT kit sample shall remain tight when tested in accordance with 5.2.1.2 and the permanent elongation after the release of the pressure shall not exceed 3 %.

5.6.2 Test method

The length of the PLT kit sample shall be measured on a flat surface and recorded. With one of its ends free and the other one plugged to a pressure device, the PLT kit sample shall be gradually pressurised to the strength test pressure (STP) but to a minimum of 3 bar or higher, as declared by the manufacturer. The pressure shall be maintained for 5 min. Following the release of the pressure the length shall be re-measured.

NOTE Strength test pressure before commissioning should consider local and/or National Regulations where they exist.

5.7 Wear resistance of outer cover

5.7.1 Requirements

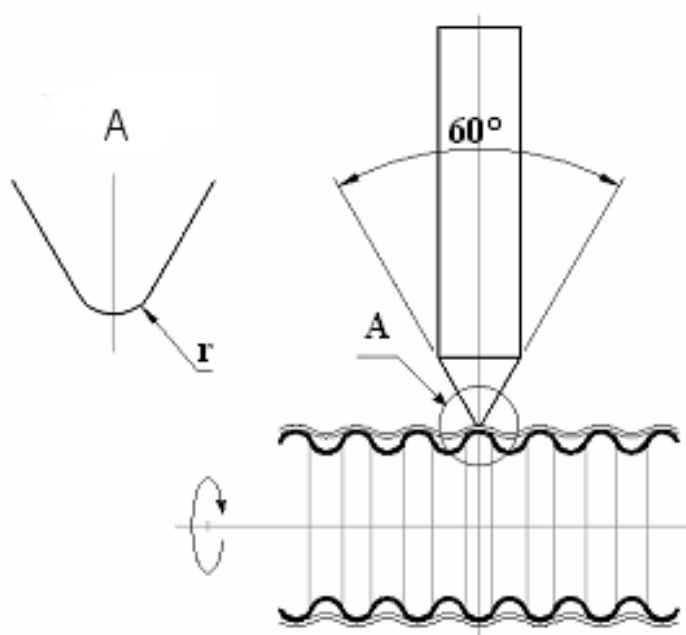
When subjected to the test described in 5.7.2, the cover shall not be fully penetrated.

5.7.2 Test method

The test method shall consist of the following steps:

- 1) a 100 mm length of pliable tubing with its cover in place shall be mounted between centres and rotated with the crest of a corrugation under the test head (see Figure 6);
- 2) adjust the apparatus to apply a force of 30 N to the test head and rotate the tubing through $(350 \pm 5)^\circ$, at a surface speed of (35 ± 5) mm/s;
- 3) the cover shall be visually examined for penetration.

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Key

r 0,5 mm
Detail A Test head

Figure 6 — Test configuration of wear resistance outer cover

5.8 Structural strength test

5.8.1 Requirements

When subjected to an internal pressure following the test method described in 5.8.2 a PLT kit sample shall remain tight when tested in accordance with 5.2.1.2.

Elongation of the PLT kit sample shall be acceptable.

5.8.2 Test method

Subject the unrestrained sample to an internal pressure of 15 bar in a straight position for a period of $(300 \pm 10 - 0)$ s.

If this test is carried out using water, the sample shall be dried prior to the tightness test.

5.9 Impact resistance

5.9.1 Requirements

A PLT kit sample subjected to an impact of 30 J applied onto its PLT coupling shall remain tight when tested in accordance with 5.2.1.2.

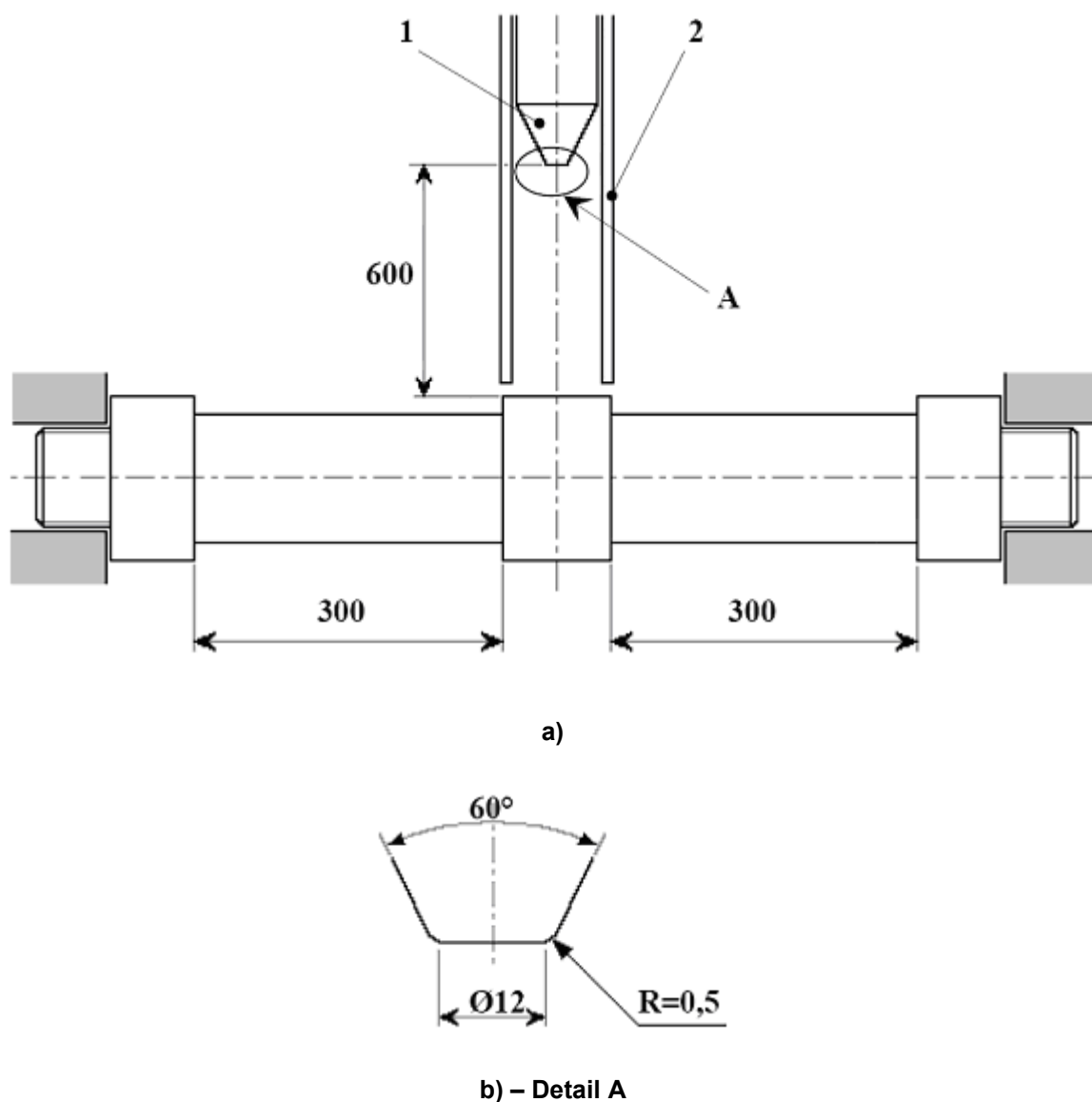
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5.9.2 Test method

Each end fitting shall be secured in a fixed support.

A mass of 5 kg as given in detail A, shall be dropped from a height of 600 mm onto the PLT coupling, see Figure 7.

Dimensions in millimetres



Key

- 1 mass
- 2 guide tube with a loose fit

Figure 7 — Impact test

5.10 Penetration resistance

5.10.1 Requirements

When subjected to the test method as described in 5.10.2, a PLT kit sample shall remain tight when tested in accordance with 5.2.1.2.

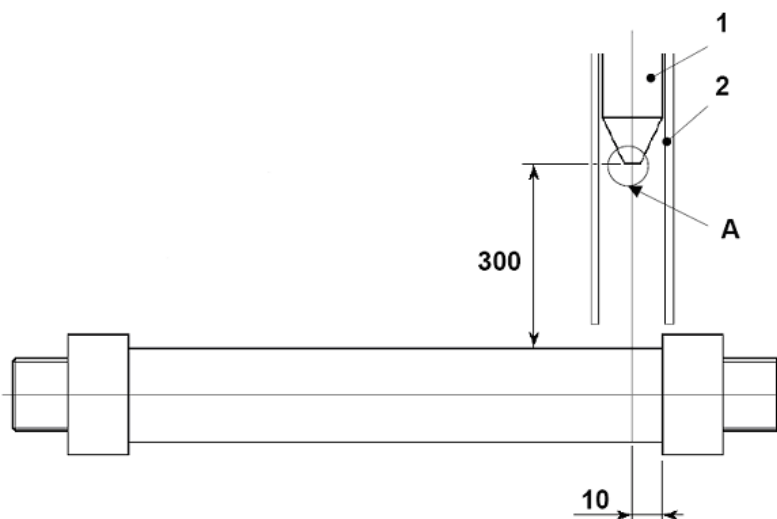
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5.10.2 Test method

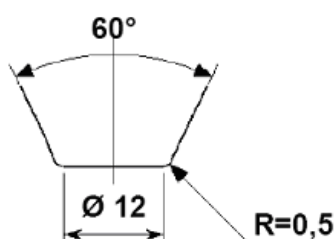
A striker of a mass of 5 kg as given in detail A shall be dropped from a height of 300 mm onto the PLT close to the fitting (20 mm from its insert into the fitting or the nut), see Figure 8.

The seam of the pliable tubing at the point of impact shall be at right angles to the direction of force.

Dimensions in millimetres



a)



b) Detail A

Key

- 1 striker
- 2 guide tube with a loose fit

Figure 8 — Penetration resistance test configuration

5.11 Resistance to pull out

5.11.1 Requirements

When subjected to the test method described in 5.11.2 a PLT kit sample shall remain tight.

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5.11.2 Test requirements

An axial load of 100 times DN in N (e.g. 3200 N for DN 32) shall be gradually applied to the sample at a rate of 50 to 100 N/s and the full load shall be maintained for 10 min. After release of the load, the sample shall be tested in accordance with 5.2.1.2.

5.12 Chemical resistance

5.12.1 Requirements

When subjected to the corrosion tests described in 5.12.2, PLT kit samples shall show:

- no visual signs of blistering or cracking on the pliable tubing cover;
- no visual signs of corrosion or cracking on the pliable tubing with its cover removed;
- no visual signs of corrosion on the PLT fittings, which could affect the safe performance of the product.

The PLT kit samples shall remain tight when tested in accordance with 5.2.1.2.

5.12.2 Test method

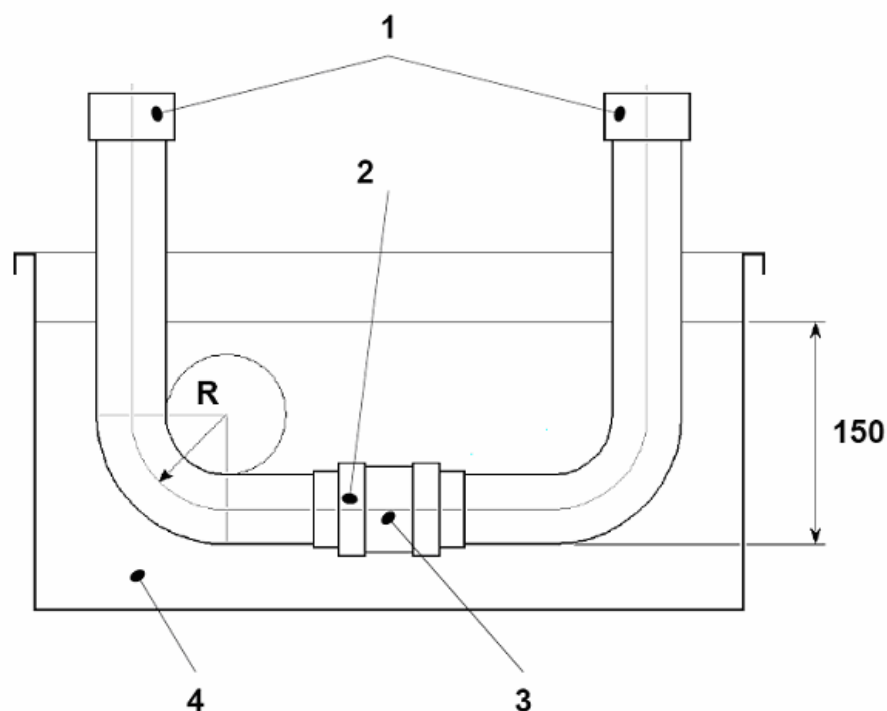
5.12.2.1 General

For each test, a PLT kit sample shall be bent over a cylindrical former whose diameter is calculated using the radius given in EN ISO 10380:2003, Table 2, type 3, to obtain a U bend sample as shown in Figure 9.

The sample shall be partially immersed in the appropriate solution for the specified time. The sample shall be fitted with sleeves if prescribed by the manufacturer's installation instructions.

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Dimensions in millimetres



Key

- 1 plugged end fitting
- 2 sleeve (if prescribed)
- 3 coupling
- 4 test solutions, given in Tables 4 and 5
- R bend radius

Figure 9 — Chemical resistance test configuration

5.12.2.2 Household cleaning agent test

5.12.2.2.1 Test requirements

The requirements of 5.12.1 shall apply.

5.12.2.2.2 Test method

The test method shall be as given in Table 4.

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Table 4 — Household cleaning agent test

Solution type	Chloric bleach (9 % by volume sodium hypochlorite)
Test procedure	<ul style="list-style-type: none"> - Rinse slowly, for 10 s, a volume of around 100 cm³ of the test solution over each fitting (tubing downward); - Immerse the sample in 150 mm of solution at (20 ± 1) °C for (72 ± 1) h; - Rinse the PLT kit sample with de-ionised water; - Visually inspect the cover; - Remove the cover and visually inspect the pliable tubing over its entire length.

5.12.2.3 Hydrochloric acid test

5.12.2.3.1 Test requirements

The requirements of 5.12.1 shall apply.

5.12.2.3.2 Test method

The test method shall be as given in Table 5.

Table 5 — Hydrochloric acid test

Solution type	Hydrochloric acid (4% by volume)
Test procedure	<ul style="list-style-type: none"> - Rinse slowly, for 10 s, a volume of around 100 cm³ of the test solution over each fitting (tubing downward); - Immerse the sample in 150 mm of solution at (20 ± 1) °C for (72 ± 1) h; - Rinse the PLT kit sample with de-ionised water; - Visually inspect the cover; - Remove the cover and visually inspect the pliable tubing over its entire length.

5.12.2.4 Salt spray test

5.12.2.4.1 Test requirements

The requirements of 5.12.1 shall apply.

5.12.2.4.2 Test method

The test method shall be as given in Table 6.

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Table 6 — Salt spray test

Solution type	Salty environment: $(5 \pm 0,5)$ % mass concentration sodium chloride diluted in distilled water
Standard reference	EN ISO 9227 (Neutral Salt Spray (NSS) test)
Test procedure	<ul style="list-style-type: none"> - Place the PLT kit sample in the salt spray chamber for (96 ± 1) h at (35 ± 1) °C The intensity of the spray shall be such that, for each 80 cm^2 of the horizontal collecting surface, (2 ± 1) ml of solution are collected per hour; - Rinse the PLT kit sample with de-ionised water; - Visually inspect the cover. - Remove the cover and visually inspect the pliable tubing over its entire length.

5.13 Low temperature resistance

5.13.1 Requirements

When subjected to 3 freezing cycles as described in 5.13.2, a PLT kit sample shall remain tight when tested in accordance with 5.2.1.2 and the covering shall not show any sign of cracking, colour change, marking change and any other detrimental effect.

5.13.2 Test method

A PLT kit sample shall be bent over a cylindrical former whose diameter is calculated using the radius given in EN ISO 10380:2003, Table 2 type 3, to obtain a U bend sample.

The tightness test shall be carried out in accordance with 5.2.1.2.

The sample shall be placed in an appropriate chamber and the temperature reduced to -40 °C for a period of 12 h. The sample shall be removed and allowed to warm to room temperature. This procedure shall be repeated 2 further times to yield 3 cycles in total.

The sample shall be subjected to a visual examination and the tightness test shall be carried out in accordance with 5.2.1.2.

5.14 Ageing

5.14.1 Requirements

When subjected to 7 ageing cycles, as described in 5.14.2, the cover shall not show any sign of cracking, colour change, marking change or any other detrimental effect and the PLT kit sample shall remain tight when tested in accordance with 5.2.1.2.

5.14.2 Test method

The 24 hour ageing test detailed in Table 7 shall be performed continuously 7 times on the same PLT kit sample.

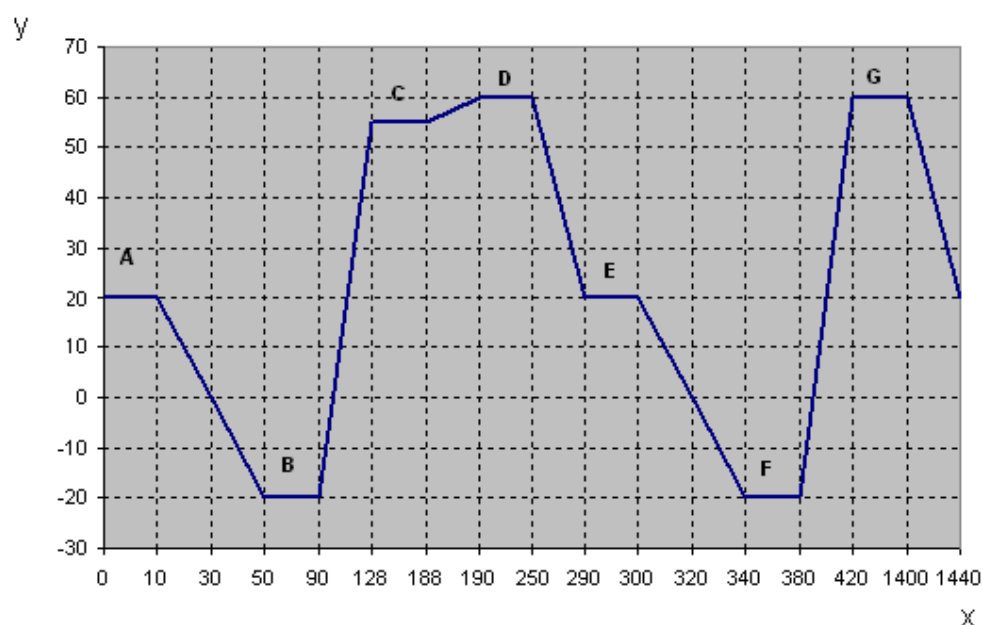
The sample shall be subjected to a visual examination and the tightness test shall be carried out in accordance with 5.2.1.2.

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Table 7 — Details of one 24 hour cycle

Step	Initial time (min)	Final time (min)	Initial temperature (°C)	Final temperature (°C)	Temperature gradient (°C/min)	Humidity	UV (W/m ²)
1	0	10	20	20	0	96%	0
2	10	30	20	0	-1	From 96% to 0%	0
	30	50	0	-20	-1		0
3	50	90	-20	-20	0	0%	0
4	90	127,5	-20	55	2	From 0% to 95%	0
5	127,5	187,5	55	55	0	95%	0
6	187,5	190	55	60	2	From 95% to 40%	0
7	190	250	60	60	0	40%	9,5
8	250	290	60	20	-1	From 40% to 96%	0
9	290	300	20	20	0	96%	0
10	300	320	20	0	-1	From 96% to 0%	0
	320	340	0	-20	-1		0
11	340	380	-20	-20	0	0%	0
12	380	420	-20	60	+2	From 0% to 40%	0
13	420	1400	60	60	0	40%	9,5
14	1400	1440	60	20	-1	From 40% to 0%	0

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Key

- A step 1: rain / humidity 96 %
- B step 3: cold / humidity 0%
- C step 5: warm / humidity 95%
- D step 7: UV / humidity 40%
- E step 9: rain / humidity 96%
- F step 11: cold / humidity 0%
- G step 13: UV / humidity 40%

— temperature cycle
x time (minute)
y temperature (°C)

Figure 10 — Ageing test diagram

The UV energy received by the sample shall be $9,5 \text{ W/m}^2$ in the wavelength range between 400 nm and 300 nm.

The rain used in the test shall consist of de-ionised water with a pH of 7 and a temperature of 20 °C. The water pouring shall be performed by means of an appropriate device to allow the droplets of water to fall down onto the samples. The water flow shall be sufficient to maintain the wetness of the sample.

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5.15 Tightness in case of fire

5.15.1 Requirements

The test is deemed to be passed if the leakage rate of the PLT kit sample, measured under the test conditions given in 5.15.2 does not exceed 150 dm³/h.

5.15.2 Test method

Subject the sample to EN 1775:1998, Annex A, procedure A or B. The manufacturer shall declare the procedure used.

Prior to the test the cover between the fittings shall be removed from the PLT kit sample.

5.16 Reaction to fire

5.16.1 Requirements

The reaction to fire of the pliable tubing shall be classified according to EN 13501-1 after being tested to 5.16.2.

NOTE 1 PLT fittings are classified A1 'no contribution to fire', in accordance with Commission decision 96/603/EEC of 4 October 1996, and are therefore not tested for reaction to fire.

NOTE 2 Seals encased in PLT fittings are classified A1 'no contribution to fire', in accordance with Commission decision 96/603/EEC of 4 October 1996, and are therefore not tested for reaction to fire.

5.16.2 Test procedure

Pliable tubing subjected to the ignitability test according to the requirements of EN 13501-1:2002, Table 1, shall be tested in accordance with EN ISO 11925-2. The test configuration is given in Annex A.

Pliable tubing subjected to the single burning item test according to the requirements of EN 13501-1:2002, Table 1, shall be tested in accordance with EN 13823. The test configuration is given in Annex B.

5.17 Electrical conductivity

5.17.1 Requirements

A PLT kit shall be electrically conductive. The value of resistance shall not exceed those specified in Table 8.

5.17.2 Test method

The test method shall be carried out as follows:

- 1) Pass a current of 25 A and 12 V, derived from a DC source or an AC source of 50 to 60 Hz, between both end fittings of a PLT kit sample;
- 2) Measure the voltage drop;
- 3) Calculate the resistance from the voltage drop and the current.

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Table 8 — Resistance values for the electrical conductivity test

Family	Maximum resistance Ω
X	0,30
Y	0,25
Z	0,20

5.18 Pressure drop

5.18.1 Requirements

The values of the maximum pressure drop, at the intended operating pressures, declared by the manufacturer for each component of the PLT kit shall be validated by the test method given in 5.18.2.

5.18.2 Test rig description

The tests shall be conducted using clean dry air. The air source shall ensure a stabilized flow rate within an accuracy of $\pm 2\%$.

The pressure regulator as shown in Figure 11 shall be capable of maintaining the test pressure within an accuracy of $\pm 2\%$.

The thermocouple shall be capable of measuring the temperature of the air flow with an accuracy of $\pm 2\%$.

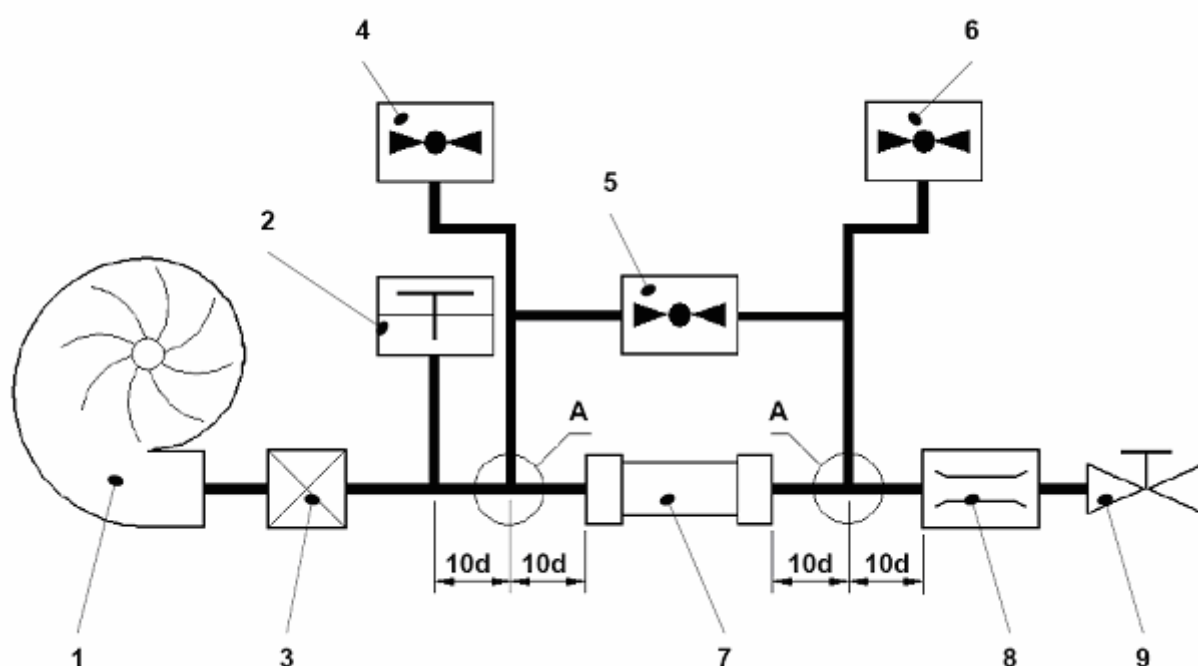
The pressures gauges/sensors shall be capable of measuring the range of pressures used to an accuracy of $\pm 2\%$. A differential pressure gauge/sensor shall be used to read the differential pressure between the inlet and outlet pressures. A flow meter of positive displacement (quantity meter) or inferential type (rate meter) shall be used. The meter shall have an accuracy at full scale of $\pm 2\%$ and shall be capable of measuring any given flow rate within $\pm 5\%$.

NOTE Flow meters calibrated for atmospheric pressure that are designed to operate without a requirement for back pressure may not require flow correction using a final pressure measurement and flow valve.

Rigid piping used for the test apparatus piping upstream and downstream of the PLT kit sample shall have a bore equal to or greater than the internal diameter of the pliable tubing sample tested. The piezometer ring as shown in Figure 12 shall be located at points 10.d upstream and downstream from the inlet and outlet connections. The straight run of pipe upstream and downstream of the PLT kit sample prior to any connection shall not be less than 20.d (where d = diameter of PLT $+0,5/-0$ mm) and shall be designed to make flow as smooth as possible, without adding turbulence.

PLT kit samples shall be connected to the test apparatus piping using the appropriate sized PLT end fitting and the supply pressure shall be adjusted by the regulator to provide the desired inlet pressure.

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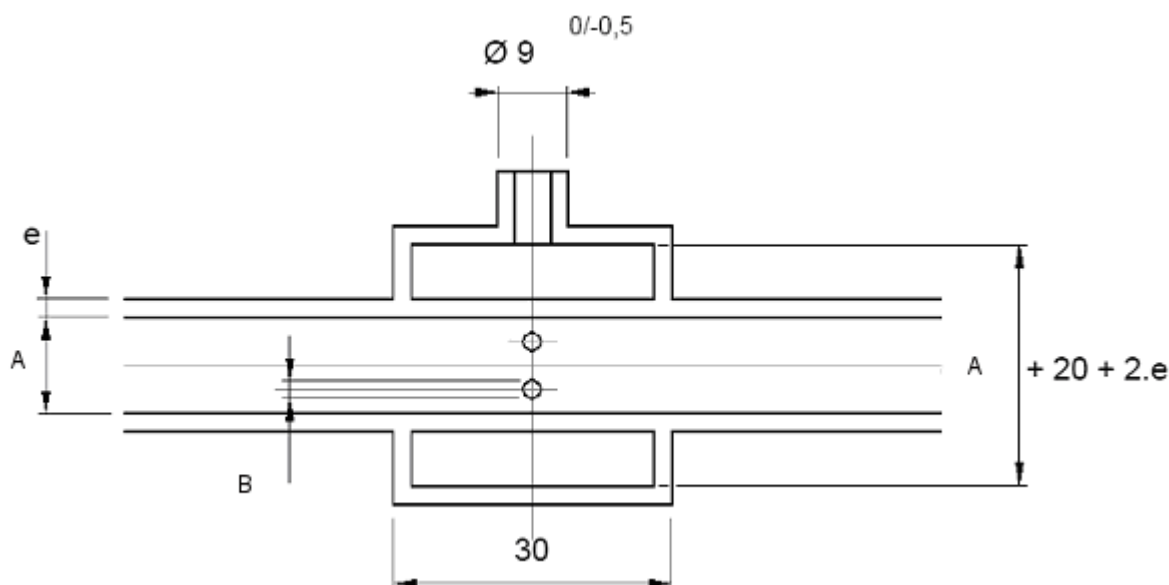
Key

- 1 air source
- 2 regulator
- 3 thermocouple for inlet air temperature
- 4 tubing inlet pressure gauge
- 5 differential pressure gauge
- 6 tubing outlet pressure gauge
- 7 PLT kit sample
- 8 flow meter
- 9 flow meter valve
- A piezometer ring
- d internal diameter of the pliable tubing $d^{+0,5}_0$ mm

Figure 11 — Test rig

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Dimensions in millimetres



Key

- A d min internal diameter of the pliable tubing $d^{+0,5}_0$ mm
B g min 4 holes: diameter 1,5 mm

Figure 12 — Piezometer ring (detail A of Figure 11)

5.18.3 Test method

The tests shall be carried out as follows:

- The air flow rate shall be adjusted by the flow meter valve to a stabilized condition which is defined as a divergence of max. 3% of the mean of the flow rate when observed over a time of 10 s.
- On each test point (sample / family / measured pressure drop according to Table 9) a series of 60 continuous test values shall be recorded. Consideration shall be given to establishing a statistically representative value of the maximum declared pressure drop.
- The test series shall be repeated 3 times if the air flow rate diverges more than 3% of the mean. In case of repetition the air flow rate shall be readjusted for each series.

The range of the samples given in Table 9 is tested as follows:

- a) 5 m length PLT kit sample Type 1 shall be tested in a straight position;
- b) 10 m length PLT kit sample Type 1 shall be tested in a straight position;
- c) The difference between the two measurements shall be used to determine the pressure drop of the pliable tubing.
- d) 10 m length sample shall be bent by 90° in 4 places, according to minimum bend radius of EN ISO 10380:2003, Table 2, type 3, in the same plane with the distance of 500 mm between each

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bend. The location of these bends shall be in the mid position of the length. Comparing this result of pressure drop with the result of b) allows the pressure drop of bends of 90° to be determined.

- e) 10 m length sample shall be equipped with a tee or a manifold in its mid position, each branch equipped with a length of 5 m of pliable tubing in order to determine the pressure drop value of the tested fitting. In a similar approach, pressure drop values for all other PLT fittings shall be determined.

Table 9 — Type of samples

Sample Type	Tubing length	DN
PLT coupling (Type 2, see Figure 2)	5 m each branch	Family X / Y / Z
PLT tee and manifold (according to 5.18.3, e))	5 m each branch	Family X / Y / Z
PLT (Type 1, see Figure 1)	5 m + 10 m	All sizes
Bend 90° (Type 1, see Figure 1)	5 m + 5 m	Family X / Y / Z

Each sample shall be tested with at least 5 different flow rates to generate the pressure drops in Table 10.

Table 10 — Pressure drops

Pressure drop	0,1 mbar	0,3 mbar	0,5 mbar	1,0 mbar	3,0 mbar
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The use of curved sections of pliable tubing shall be permitted as long as they have no influence on the pressure drop measurement.

5.18.4 Conversion of air flow rate

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

$$V_r = V_m \cdot b_v$$

Where b_v is:

for a volumetric meter:

$$b_v = \sqrt{\frac{1013,25 + P_{air}}{1013,25} \frac{P_a + P_{air}}{1013,25} \frac{288,15}{273,15 + t_{air}} \frac{d}{d_r}}$$

for a mass meter:

$$b_v = \frac{288,15}{273,15} \sqrt{\frac{1013,25 + P_{air}}{P_a + P_{air}} \frac{273,15 + t_{air}}{288,15}}$$

where:

V_r volumetric air flow rate under reference conditions, in m³/h;

V_m volumetric air flow rate under test conditions, in m³/h;

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P_a	atmospheric pressure, in mbar;
P_{air}	air supply pressure at the inlet of the meter, in mbar;
t_{air}	air temperature at the measuring point, in °C;
d	air density (e.g. if a wet meter is used);
d_r	dry air density.

If a dry meter or dry air is used: $d/d_r = 1$

5.19 Maximum load for admissible deformation of PLT support

5.19.1 Requirements

When subjected to the test method described in 5.19.2, the PLT supports shall withstand a load without rupture.

Ovalisation or deformation of the PLT support is allowed providing the pliable tubing remains in place.

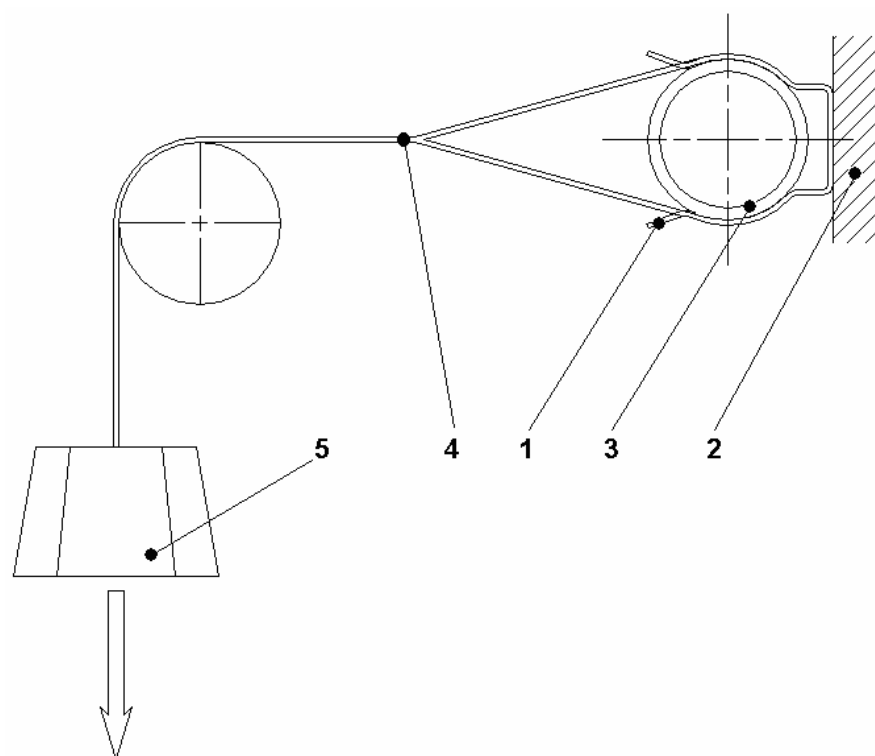
5.19.2 Test method

The PLT support holding a pliable tubing section of 100 mm length with the cover in place, shall be secured to a fixed backing plate using the method supplied with manufacturer's assembly and installation instructions.

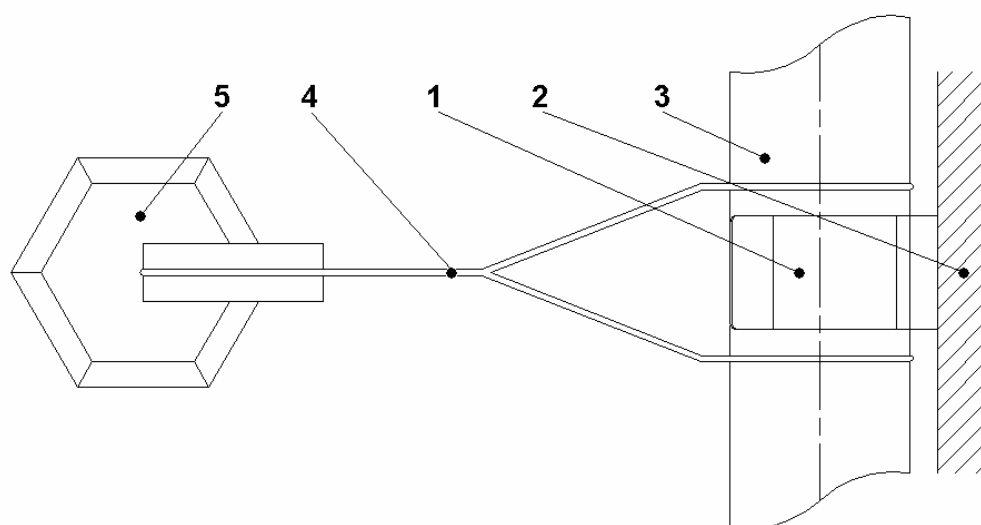
A load of 100 N shall be applied to the pliable tubing by means of metal cables as shown in Figure 13.

Using a furnace, the PLT support sample shall be subjected to a heat cycle for 30 min in accordance with the curve specified in EN 1363-1:1999, Figure 7.

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a) Side view



b) Top view

Key

- 1 PLT Support
- 2 backing plate
- 3 pliable tubing section
- 4 metal cables
- 5 load

Figure 13 — Test configuration for PLT supports

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5.20 Dangerous substances

Materials used in the PLT kit shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the local and/or National Regulations of the member state of destination.

6 Evaluation of conformity

6.1 General

The conformity of the PLT kit with the requirements of this standard and with the stated values shall be demonstrated by:

- initial type testing;
- factory production control by the manufacturer, including product assessment.

For the purposes of testing, PLT kits may be grouped into families of different nominal sizes (see 5.1.1, Table 2) and similar designs which shall mean that the declared performance of the designed characteristic is representative of the family. In case of dissimilar designs or materials in the same family of PLT kit related tests shall be repeated for that characteristic.

6.2 Type testing

6.2.1 Initial type testing

6.2.1.1 General

Initial type testing shall be performed to show conformity with this standard:

- on first use of this standard for a PLT kit being put onto the market;
- at the beginning of the production of a new or modified design of components constituting a part of a PLT kit;
- at the beginning of a new method of production, where this can affect the stated properties.

Type testing may be reduced if tests have been previously performed in accordance with the provisions of this standard (same product, same characteristic(s), test method, sampling procedure, system of attestation of conformity, etc.).

Where characteristics are determined on the basis of conformity with other product standards (for fitting material, covers, seals and sealant), these characteristics need not be reassessed provided that the designer can demonstrate historic data.

6.2.1.2 Characteristics

All characteristics in Clause 5 shall be subjected to initial type testing, with the following exceptions:

- release of dangerous substances which may be assessed indirectly by controlling the content of the substance concerned.

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6.2.2 Sampling and compliance criteria

6.2.2.1 General

Initial type testing shall be performed on samples of PLT kits representative of the manufactured types, and shall be chosen at random from either a production lot, or in the absence of available lots assemblies representative of the production from the market.

Unless otherwise specified, the number and type of samples of PLT kits to be tested, the tests and compliance criteria are as given in Table 11.

Table 11 — Number of units and compliance criteria for initial and subsequent type testing

Type test	Nominal size or families to be tested	Requirement clause	Sample type	Quantity	Assessment method	Compliance criteria
Bending performance	All sizes	5.4.1	1	2	5.4.2	Tightness
Crushing resistance	All sizes	5.5.1	1	4	5.5.2	Tightness, maximum deformation
Stability under pressure	All sizes	5.6.1	1	1	5.6.2	Tightness, elongation level
Wear resistance of outer cover	All sizes	5.7.1	see 5.7	1	5.7.2	No full penetration
Structural strength test	All sizes	5.8.1	1	1	5.8.2	Tightness
Impact resistance	X / Y / Z	5.9.1	2	1	5.9.2	Tightness, maximum deformation
Penetration resistance	All sizes	5.10.1	1	1	5.10.2	Tightness, maximum deformation
Resistance to pull out	All sizes	5.11.1	1	1	5.11.2	Tightness
Chemical resistance	Y	5.12.1	2	3	5.12.2	Tightness, no detrimental effect
Low temperature resistance	Y	5.13.1	2	1	5.13.2	Tightness, no detrimental effect
Ageing	X / Z	5.14.1	2	2	5.14.2	Tightness, no detrimental effect
Tightness in case of fire	X / Y / Z	5.15.1	2	2	5.15.2	Permissible leakage level
Reaction to fire	X / Z	5.16.1	see Annexes A and B			Euroclass classification
Electrical conductivity	X / Y / Z	5.17.1	2	2	5.17.2	-
Pressure drop	see Tables 9 and 10	5.18.1	see Tables 9 and 10	see Tables 9 and 10	5.18.3	Pressure drop statement
Maximum load for admissible deformation	X / Z	5.19.1	-	2	5.19.2	Admissible deformation

The results of all tests shall be recorded and held by the manufacturer for at least 10 years.

6.2.2.2 Subsequent type testing

The initial type tests given in Clause 5 shall be repeated every 3 years.

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6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market conform to the stated performance characteristics. The FPC system shall consist of procedures (works manual), regular inspections and tests and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product. Records shall remain legible, readily identifiable and retrievable.

An FPC system conforming with the requirements of EN ISO 9001:2000, and made specific to the requirements of this standard, shall be considered to satisfy the above requirements.

The results of inspections or tests requiring action shall be recorded, as shall any action taken. The action to be taken when control values or criteria are not met shall be recorded and retained for the period specified in the manufacturer's FPC procedures.

6.3.2 FPC requirements for all manufacturers

The manufacturer shall establish procedures to ensure that the production tolerances allowed for the PLT kit shall be in conformity with the declared values, derived from initial type testing.

The characteristics and minimum test frequencies shall be as given in Table 12.

Table 12 — Minimum frequency of testing for product testing and evaluation as part of FPC

Property	Nominal size or families to be tested	Clause, indicating the relevant test	Minimum number of samples/test	Minimum frequency of the test
Tightness	All sizes	5.2.2.2	100 %	100 %
Bending performance	All sizes	5.4	1	every 5000 m or at least 4 per year
Crushing resistance	X / Y / Z	5.5	1	1 per year
Wear resistance of outer cover	X / Y / Z	5.7	1	4 per year
Structural strength test	X / Y / Z	5.8	1	every 5000 m or at least 4 per year
Impact resistance	X / Y / Z	5.9	1	1 per year
Resistance to pull out	X / Y / Z	5.11	1	4 per year
Chemical resistance	X / Y / Z	5.12	1	2 per year
Maximum load for admissible deformation	X / Z	5.19	1	1 every 3 years

If a single sample of the test batch fails a further sample batch consisting of a minimum of twice the original sample batch from the same manufacturing lot shall be repeated and if one of the new samples fails the production lot shall be rejected.

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The manufacturer shall record the results of the tests specified above. The records shall as a minimum include the following information:

- identification of the PLT kit component tested;
- date of sampling and testing;
- test method performed;
- test result.

6.3.3 Manufacturer's specific FPC system requirements

6.3.3.1 Personnel

The responsibility, authority and relationship between personnel that manage, perform or verify work affecting product conformity, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-conformities from occurring, actions in case of non-conformities and to identify and register product conformity problems. Personnel performing work affecting product conformity shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

6.3.3.2 Equipment

All manufacturing, weighing, measuring and testing equipment necessary to achieve or produce evidence of conformity shall be calibrated or verified and regularly inspected according to documented procedures, frequencies and criteria. Control of monitoring and measuring devices shall be in accordance with EN ISO 9001:2000, 7.6.

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process.

Inspection and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.3.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their conformity. The verification of conformity of the raw material with the specification shall be in accordance with EN ISO 9001:2000, 7.4.3

6.3.3.4 In-process control

The manufacturer shall plan and carry out production under controlled conditions. Production shall incorporate a final leak test as given in 5.2.2 for each pliable tubing length put on the market.

Compliance with EN ISO 9001:2000, 7.5.1 and 7.5.2 shall be deemed to satisfy the requirements of this clause.

6.3.3.5 Traceability

Individual production lots shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes are inspected regularly. Compliance with EN ISO 9001:2000, 7.5.3 shall be deemed to satisfy the requirements of this clause

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6.3.3.6 Non conforming products

The manufacturer shall have written procedures which specify how non-conforming products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures. Compliance with EN ISO 9001:2000, 8.3 shall be deemed to satisfy the requirements of this clause.

6.3.3.7 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to achieve conformity and/or prevent recurrence.

6.4 Assembly and installation instruction

The manufacturer's instructions shall be available in the language(s) of the country of its intended destination giving all necessary information regarding its safe installation and usage together with details of the test(s) that should be used at installation and during its lifetime.

The manufacturer shall include in his documentation and instructions the following minimum information:

- name or identifying mark of the producer;
- product designation and its description;
- description of the PLT kit and its fittings including connections to other equipments of the gas pipework;
- flow factors (pressure drop, capacity and rate) of the pliable tubing and PLT fittings;
- installation drawings of typical applications;
- assembling instructions of the individual parts and components of the PLT kit such as:
 - necessary installation tools;
 - cutting and end preparation of the pliable tubing;
 - method of joining the components;
 - method of joining to other equipment in the gas pipework;
 - tightening torques.
- general methods of installing PLT kits, such as:
 - routing;
 - vertical pliable tubing runs;
 - horizontal pliable tubing runs;
 - concealed sections;
 - underground sections;
 - outdoor installations.

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- system specific testing requirements;
- tightness test before commissioning;
- method of repair;
- warnings:
 - consider the local application regulations;
 - related to the limitation of the use of the PLT kits;
 - related to installation, specifically addressing:
 - do not install this PLT kit unless properly trained;
 - do not mix components from differing PLT kits.
- and where appropriate:
 - storage instructions;
 - method of application of any sealant required;
 - individual assembly instructions for any components which are supplied in unassembled condition.

6.5 Marking, labelling and packaging

Where required by National Regulations the manufacturer shall provide a visible warning that installation shall be performed by an authorised person and/or qualified installer.

Each component of the kit including packaging shall be marked according to the information specified in ZA.3.

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Annex A **(normative)**

Single-flame source test

A.1 General

This annex gives the mounting instructions for reaction to fire of pliable tubing to determine the ignitability of building products subjected to direct impingement of flame. The test procedure is given in EN ISO 11925-2.

A.2 Standardised mounting and fixing

The test bench configuration shall be as given in Figure A.1.

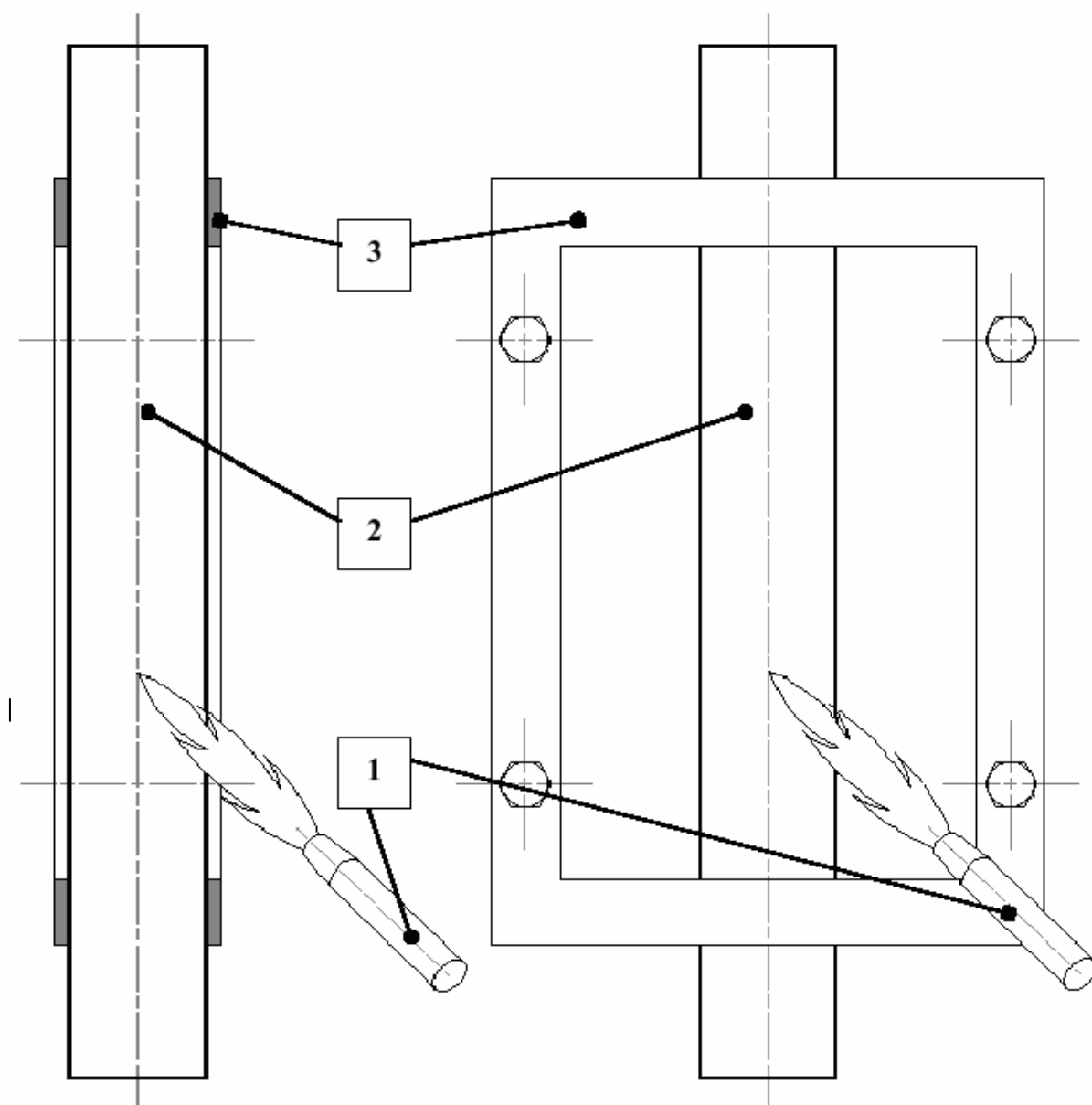
The metal frame supporting the pliable tubing shall have the standard dimensions (110 x 295) mm.

A.3 Test definition

The test shall be performed using the surface exposure procedure. The flame attack shall be located 40 mm above the lower cross member of the metal frame.

A.4 Test duration

The flame shall be maintained for a period of 30 s.



Key

- 1 burner
- 2 pliable tubing
- 3 metal frame

Figure A.1 — Test bench configuration for the single-flame source test

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Annex B
(normative)

Thermal attack by a single burning item

B.1 General

This annex gives the mounting instructions for reaction to fire of the pliable tubing exposed to the thermal attack by a single burning item. The test procedure is given in EN 13823.

B.2 Standardised mounting and fixing

B.2.1 The test bench configuration shall be as given in Figure B.1. The short wing shall contain 2 samples of 500 mm and the long wing one sample of 900 mm.

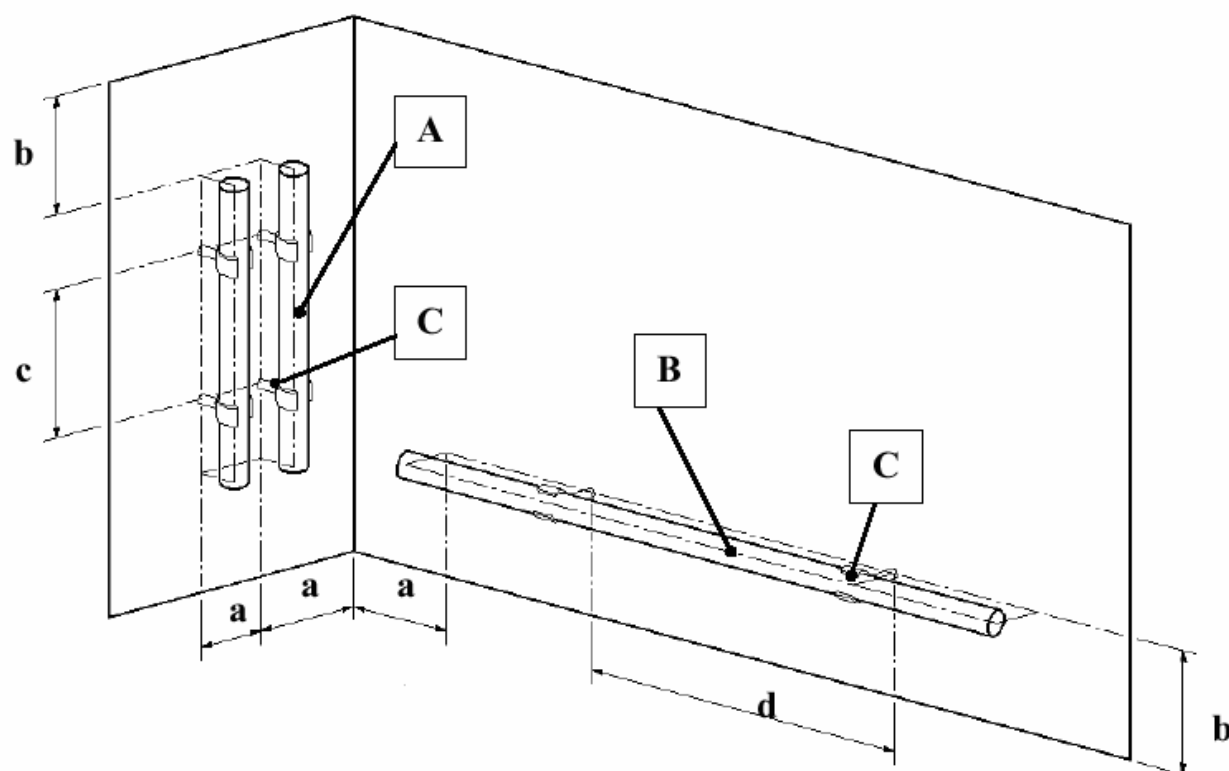
B.2.2 The samples A (see Table B.1) shall be fitted in a vertical position and fixed to the backing board by means of the PLT kit supports.

B.2.3 The sample B (see Table B.1) shall be fitted in a straight horizontal position and fixed to the backing board by means of the PLT kit supports.

Table B.1 — Samples A and B

Family	Length	Quantity
X	500	2
X	900	1
Z	500	2
Z	900	1

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Key

- A pliable tubing samples 500 mm
- B pliable tubing sample 900 mm
- C PLT supports

- a 100 mm
- b 200 mm
- c 250 mm
- d 500 mm

Figure B.1 — Test bench configuration for thermal attack by a single burning item

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Annex ZA
(informative)

**Clauses of this European Standard addressing the provisions of the
EU Construction Products Directive (89/106/EEC)**

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a mandate M/131 "Pipes, tanks and ancillaries not in contact with water intended for human consumption" given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this table below meet the requirements of the mandate M/131 given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the stainless steel pliable corrugated gas tubing kit covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING: Other requirements and other EU Directives, not affecting the fitness for intended uses, can be applicable to the stainless steel pliable corrugated tubing kit falling within the scope of this European Standard.

NOTE 1: In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2: An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through <http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm>).

This annex establishes the conditions for the CE marking of the stainless steel pliable corrugated gas tubing kit intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable:

This annex has the same scope as Clause 1 of this standard and is defined by Table ZA.1.

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Table ZA.1 — Relevant clauses

Product: Stainless steel pliable corrugated gas tubing kit				
Intended use: Gas supply in buildings				
Requirements/Characteristics from the Mandate	Requirement clauses in this European Standard	Mandated level(s) and/or class(es)	Notes	
Dimension tolerances	4.5 / 5.3.1		-	Pass/Fail
Tightness	5.2.1		$\leq 10 \text{ cm}^3/\text{h}$ and containing air at a pressure of 2 bar	Threshold level
Tightness in case of fire	5.15.1		$\leq 150 \text{ dm}^3/\text{h}$	Threshold level and declared procedure A or B
Longitudinal bending strength	5.4.1		12 cycles	Threshold level
Crushing strength	5.5.1		4000 N	Threshold level
Maximum load for admissible deformation	5.6.1		$\geq 3 \text{ bar}$	Declared value
	5.19		100 N	Pass/Fail
Internal pressure strength	5.8.1		15 bar	Threshold level
Impact resistance	5.9.1		$\leq 10 \text{ cm}^3/\text{h}$	Threshold level
Penetration resistance	5.10.1		$\leq 10 \text{ cm}^3/\text{h}$	Threshold level
Resistance to pull out	5.11.1		100 times DN in N	Threshold level
Reaction to fire	5.16.1	See EN 13501-1	Euroclasses A1 to F	Pass/Fail
Electrostatic behaviour	5.17.1		Ω	Threshold level
Effectiveness	5.18		mbar	Declared value
Release of dangerous substances	5.20		-	Substance “x” less than “y” ppm or NPD
Durability	5.7.1 / 5.12.1 / 5.13.1 / 5.14.1		-	Pass/Fail
The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option “No performance determined” (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.				

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ZA.2 Procedure for attestation of conformity of stainless steel pliable corrugated gas tubing kits

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of stainless steel pliable corrugated gas tubing kits indicated in Table ZA.1 in accordance with the decision of the Commission 99/472/EC dated 1999-07-17 as given in Annex III of the mandate for "Pipes, tanks and ancillaries not in contact with water intended for human consumption, mandate M/131", is shown in Table ZA.2a and ZA.2b for the indicated intended use and relevant level or class.

Table ZA.2.a– System(s) of attestation of conformity

Product	Intended use	Level or class	Attestation of conformity system
Piping Kits	In installations not subjected to reaction to fire regulations, Used for the transport/distribution/storage of gas/fuel intended for the supply of building heating/cooling systems, from the external storage reservoir or the last pressure reduction unit of the network to the inlet of the boiler/heater/cooler system(s) of the building(s).	-	3
System 3: See Directive 89/106/EEC (CPD) Annex III.2 (ii), Second possibility.			

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Table ZA.2.b – System(s) of attestation of conformity

Product	Intended use	Level or class	Attestation of conformity System
Piping Kits	<p>In installations in areas subject to reaction to fire regulations</p> <p>Used for the transport/distribution/storage of gas/fuel intended for the supply of building heating/cooling systems, from the external storage reservoir or the last pressure reduction unit of the network to the inlet of the boiler/heater/cooler system(s) of the building(s)</p>	Any	1
System 1: See Directive 89/106/EEC (CPD) Annex III.2.(i), without audit testing of samples.			

The attestation of conformity of the stainless steel pliable corrugated gas tubing kits in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Table ZA.3a and ZA.3b resulting from application of the clauses of this or other European Standards indicated therein.

Table ZA.3.a - Assignment of evaluation of conformity tasks for stainless steel pliable corrugated gas tubing kits under System 3

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1	6.3
	Further testing of samples taken at factory	All characteristics of Table ZA.1	6.3.2
	Initial type testing by a notified test lab	All characteristics of Table ZA.1	6.2

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Table ZA.3.b – Assignment of evaluation of conformity tasks for stainless steel pliable corrugated gas tubing kits under System 1

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	All characteristic of Table ZA.1	6.3.
	Further testing of samples taken at factory	All characteristic of Table ZA.1	6.3.2
	Initial type testing by a notified test lab	All characteristic of Table ZA.1 with the exception of reaction to fire and dangerous substances	6.2
Tasks under the responsibility of the product certification body	Initial type testing	Reaction to fire	6.2
	Initial inspection of factory and of FPC	Parameters related to reaction to fire	6.3
	Continuous surveillance, assessment and approval of FPC	Parameters related to reaction to fire	6.3

ZA.2.2 EC Certificate and declaration of conformity

(In case of System 3) When compliance with the conditions of this annex is achieved, the manufacturer or his agent established in the EEA shall draw up and retain a declaration of conformity (EC Declaration of conformity), which entitles the manufacturer to affix the CE marking.

This declaration shall include:

- name and address of the manufacturer, or his authorised representative established in the EEA, and place of production,
- description of the product (type, identification, use,...), and a copy of the information accompanying the CE marking,
- provisions to which the product conforms (i.e. Annex ZA of EN 15266),
- particular conditions applicable to the use of the product, (e.g. provisions for use under certain conditions and national regulation of installation if any),
- name and address of the notified laboratory(ies),
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

(In case of System 1) When compliance with the conditions of this annex is achieved, the certification body shall draw up a certificate of conformity (EC Certificate of conformity), which entitles the manufacturer to affix the CE marking. The certificate shall include:

- name, address and identification number of the certification body;

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- name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;
- description of the product (type, identification, use, ...);
- provisions to which the product conforms (i.e. Annex ZA of EN 15266);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);
- number of the certificate;
- conditions and period of validity of the certificate, where applicable;
- name of, and position held by, the person empowered to sign the certificate.

In addition, the manufacturer shall draw up a declaration of conformity (EC Declaration of conformity) including the following:

- name and address of the manufacturer, or his authorised representative established in the EEA;
- name and address of the certification body;
- description of the product (type, identification, use, ...), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (i.e. Annex ZA of EN 15266);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);
- number of the accompanying EC Certificate of conformity;
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

ZA.3 CE marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the components of the stainless steel pliable corrugated gas tubing kits. The following information shall accompany the CE marking symbol: Information under (a) shall be marked on the pliable tubing at intervals of 1 m, information under (b) shall be permanently fixed to or marked on PLT fittings; information under (c) if not already fixed or marked on the pliable tubing or PLT fittings shall be given on accompanying commercial documents and packaging.

(a)

- identification number of the certification body, if relevant;
- name or trademark of the manufacturer;
- reference to this European Standard;
- nominal size DN;
- maximum working pressure in mbar;

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- word “gas”;
- traceability identification.

(b)

- name or trademark of the manufacturer;
- nominal size DN;
- identification number of the Notified Body, if relevant;
- traceability identification.

(c)

- name or trademark of the manufacturer;
- last two digits of the year in which the marking is affixed;
- number of the EC Certificate of Conformity or FPC Certificate;
- description of the product: generic name, type, material, dimensions and intended use;
- “No performance determined” for characteristics where this is relevant.

NOTE Additional indications are permitted, as long they do not interfere with above markings.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

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<div style="text-align: center;">  01234 </div>	<p><i>CE conformity marking, consisting of the “CE”-symbol given in Directive 93/68/EEC.</i></p> <p><i>Identification number of the certification body</i></p>
<div style="text-align: center;"> AnyCo Ltd, PO Box 21, B-1050 07 01234-CPD-00234 </div>	<p><i>Name or identifying mark and registered address of the producer</i></p> <p><i>Last two digits of the year in which the marking was affixed</i></p> <p><i>Certificate number</i></p>
<div style="text-align: center;"> EN 15266:2007 Pliable tubing, DN 32 Suitable for use in areas subjected to reaction to fire regulation Reaction to fire : Class B, s1, d0 Dangerous substances : Substance “x” = less than “y” ppm (or NPD) Other characteristics indicated Tightness : 7 cm³/h/25 m Dimension tolerances : Comply Longitudinal bending Strength : 23 cycles Crushing strength : 4000 N Maximum load for admissible deformation : 6 bar Impact resistance : 7 cm³/h Penetration resistance : 7 cm³/h Electrostatic behaviour : 0,35 Ω/m </div>	<p><i>No. of European Standard</i></p> <p><i>Description of product</i> <i>and</i> <i>information on regulated characteristics</i></p>

Figure ZA.1 – Example CE marking information

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned.

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Bibliography

- [1] Directive 89/106/EEC of the European Parliament and the Council of 21 December 1988 on the approximation of the laws of the Member States concerning Construction products (OJEC L 40).
- [2] EN 10088-1:1995, *Stainless steels - Part 1: List of stainless steels*