BS EN 671-2:2012

BSI Standards Publication

Fixed firefighting systems — Hose systems

Part 2: Hose systems with lay-flat hose

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National foreword

This British Standard is the UK implementation of EN 671-2:2012. It supersedes BS EN 671-2:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee FSH/18/11, Hose reel systems.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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This European Standard was approved by CEN on 9 March 2012.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 671-2:2012) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2012 and conflicting national standards shall be withdrawn at the latest by January 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 671-2:2001.

EN 671-2:2001 has been technically revised and editorial edited. The order of clauses has been changed. Annex ZA has been updated.

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.

For convenience of application in testing, the normative annexes of this European Standard are arranged so that Annex A gives the sequence of testing for conformity assessment and Annexes B, C, D, E and F are in the correct sequence for testing.

EN 671 has the general title “Fixed firefighting systems — Hose systems” and is in three parts:

— *Part 1: Hose reels with semi-rigid hose;*

— *Part 2: Hose systems with lay-flat hose;*

— *Part 3: Maintenance of hose reels with semi-rigid hose and hose systems with lay-flat hose*.

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, Croatia, 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, Turkey and the United Kingdom.

Introduction

Fire hose systems in proper condition provide a very effective firefighting facility with a continuous supply of water available immediately.

The requirements of this European Standard have been specified to ensure that hose system can be operated efficiently by one person and that such systems have a long service life.

1 Scope

This European Standard specifies requirements and methods of test for the construction and performance of fire hose reel systems with lay-flat hose for installation in buildings, permanently connected to a water supply, for use by the occupants.

Furthermore, it provides also for requirements on evaluation of conformity and marking of these products.

Its requirements may apply in general for other applications, for example in marine applications or in aggressive environments, but additional requirements may be necessary in such cases.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 671-3, *Fixed firefighting systems — Hose systems — Part 3: Maintenance of hose reels with semi-rigid hose and hose systems with lay-flat hose*

EN 14540, *Fire-fighting hoses — Non-percolating layflat hoses for fixed systems*

EN ISO 4892-2:2006, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc amps (ISO 4892-2:2006)*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

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

ISO 5208, *Industrial valves — Pressure testing of metallic valves*

ISO 7010, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

3 Terms and definitions

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

3.1
cabinet
box to protect the hose system against environmental or physical damage

3.2
coupling
device used to connect the hose to the valve and to the shut-off nozzle

3.3
fire hose system; hose system
firefighting appliance consisting essentially of a cabinet or cover, hose support, manual stop valve, lay-flat hose with couplings, shut-off nozzle

3.4
hose support
device used to hold the hose and shall be one of the following types:

— Type 1: rotating reel;

— Type 2: cradle with the hose double coiled;

— Type 3: hose basket with the hose flaked

3.5
lay-flat hose
hose which is flat-sectioned except when it is internally pressurized

3.6
maximum working pressure
maximum allowable pressure for which the hose system is designed

Note 1 to entry: All pressures are gauge pressures and are expressed in Mega Pascal (1 MPa = 10 bar).

[SOURCE: EN 671-1:2012]

3.7
shut-off nozzle
component, at the end of the hose, used to direct and control the discharge of water

[SOURCE: EN 671-1:2012]

4 Requirements

4.1 General

Conformity with the requirements given in this Clause 4 shall be verified by testing in accordance with Clause 5.

4.2 Distribution of extinguishing media

4.2.1 Hose bore

The inside diameter of the hose shall be maximum 52 mm.

4.2.2 Minimum flow rate

The flow rates in jet and spray settings shall be according to Table 1.

Table 1 — Minimum flow rates and minimum *K*-coefficient according to pressure

Nozzle- or equivalent diameter	**Minimum flow rate *Q*** l/min			***K*-coefficient** [a]
mm	*P* = 0,2 MPa	*P* = 0,4 MPa	*P* = 0,6 MPa	
9	65	92	113	46
10	78	110	135	55
11	96	136	167	68
12	102	144	176	72
13	120	170	208	85

[a] Flow rate *Q* at a pressure *P* is related to the equation $Q = K\sqrt{10P}$, where *Q* is in l/min and *P* is in MPa.

4.2.3 Effective throw range

The effective throw ranges of the discharges at a pressure of 0,2 MPa shall not be less than as follows (as appropriate):

a) jet discharge: 10 m;

b) sheet spray discharge: 6 m;

c) conical spray discharge: 3 m.

4.2.4 Spray discharge

Nozzles with a spray setting shall give a spray angle as follows:

a) sheet spray: 90° ± 5°;

b) conical spray: not less than 45°.

4.3 Operational reliability

4.3.1 Hose — General

The hose shall be lay-flat and according to EN 14540.

4.3.2 Shut-off nozzle

4.3.2.1 General

The hose shall terminate in a shut-off nozzle, which shall give the following control settings:

a) shut;

b) spray;

c) jet.

It is recommended that the sequence should be as above with the spray setting between the shut setting and the jet setting.

Any spray discharge shall be in the form of either a sheet spray or a conical spray.

Trigger operated shut-off nozzles shall be self closing.

4.3.2.2 Marking of control condition — Rotary operated nozzles

Rotary operated nozzles shall be marked to show the direction of closing and opening.

4.3.2.3 Marking of control conditions — Lever and trigger operated nozzles

Lever and trigger operated nozzles shall be marked to show the settings for:

a) shut;

b) spray;

c) jet.

4.3.3 Shut-off nozzle — Resistance to impact

The nozzle shall not break or show any visible leakage.

4.3.4 Shut-off nozzle — Operating torque

The torque necessary to operate the nozzle to each control setting (i.e. operating, spray, jet or flow rate control) at maximum working pressure shall not exceed 7 Nm.

4.3.5 Inlet stop valve

A manual stop valve shall be fitted to the hose system.

The valve shall be screw down or other slow-opening type.

The inlet shall be threaded according to ISO 7-1.

The inlet and outlet shall form an angle of not less than 90° and not more than 135°.

The valve shall be closed by turning the handle in a clockwise direction and the direction of opening shall be marked.

When tested in accordance with ISO 5208 for a maximum working pressure of 1,2 MPa the valve shall conform to the appropriate requirements.

4.3.6 Hydraulic properties — Resistance to internal pressure

Hose assemblies shall be designed for the following pressures:

a) maximum working pressure: 1,2 MPa;

b) test pressure: 2,4 MPa;

c) minimum burst pressure: 4,2 MPa.

When tested in accordance with ISO 5208 for a maximum working pressure of 1,2 MPa the valve shall conform to the appropriate requirements.

4.3.7 Hydraulic properties — Security of couplings

Hose assemblies shall not leak when tested to the test pressure in accordance with Annex F.

4.4 Ability to pull out the hose

4.4.1 Type 1 Reel

The reel shall rotate around a spindle so that the hose can be withdrawn freely. The inside drum shall have a minimum diameter of not less than 70 mm and shall have a slit not less than 20 mm wide across the full diameter of the drum into which the folded hose is located.

4.4.2 Type 1 and 3 Supports swinging

Types 1 and 3 hose supports, if fixed to the cabinet, shall allow a swing to a position at a minimum of 90° to the plane of the back of the cabinet. The turning axis shall be vertical.

NOTE There are no specific requirements for Type 2.

4.4.3 Hose — Maximum length

For handling reasons the length of the hose should not exceed 20 m.

4.5 Colour

The colour of the support shall be red.

4.6 Cabinet

4.6.1 General

Cabinet for a hose system shall be fitted with a door. Cabinet doors shall open to minimum 170^{o} to allow the hose to be run out freely in any direction. Cabinet shall be free of sharp edges, which might damage the equipment or cause injury.

Lockable cabinet shall be provided with an emergency opening device, which may be protected only by transparent frangible material. To provide access for inspection and maintenance, the cabinet shall be unlock able with a key.

If the emergency opening device is protected by a frangible glass front this shall be of the type which when broken does not leave jagged or sharp edges, which might cause injury when the emergency opening is operated.

When transparent material is used as a part of the construction of the door then this shall not be used as the emergency access to the hose system.

Cabinet may also be used to contain other firefighting equipment, provided that the cabinet is of sufficient size and the equipment does not interfere with the prompt use of the hose system.

For service in some climatic conditions it may be necessary to provide the cabinet with suitable ventilating openings.

4.6.2 Opening/closing device

An opening/closing device of the cabinet shall be provided to allow periodical inspection and maintenance. The opening device shall have provision for a security seal to be fitted.

The force necessary to open and secure the seal shall be not less than 20 N and not more than 40 N.

4.6.3 Cabinet for manual hose system with screw down type valve

The screw down valve shall be positioned in the cabinet for manual hose reel in such a way that there is at least 35 mm free space around the external diameter of the hand wheel, when the valve is in any position from fully open to fully closed.

4.6.4 Identification symbol

Hose system cabinet shall be marked with the symbol *Fire hose reel*, Reference nr. F002, in ISO 7010.

NOTE The symbol may have a luminescent surface.

4.7 Durability aspects

4.7.1 Durability of operational reliability

4.7.1.1 Resistance to external corrosion on coated parts

Any coated parts of the hose system with lay-flat hose shall provide adequate protection (see Annex B).

NOTE The advice of the hose reel manufacturer should be requested in cases of special corrosion risk.

4.7.1.2 Resistance to corrosion of waterways

There shall be no significant corrosion defects (see Annex D) and the mechanical operation of all working parts shall be unimpaired.

4.7.1.3 Ageing tests for plastics materials

Samples or test pieces of plastic materials used in components subjected to a mechanical and/or hydraulic effort shall not show cracking or crazing after aging test.

5 Test methods

5.1 General

To verify the conformity with the requirements in Clause 4, the following test methods shall be used. The test indicated in clauses shall be carried out according to the sequence shown in Annex A, Table A.1.

5.2 Distribution of extinguishing media

5.2.1 Hose bore

The hose bore shall be tested according to EN 14540.

5.2.2 Minimum flow rate

The flow rates shall be tested in accordance with E.4.1 at a pressure of 0,6 MPa.

5.2.3 Effective throw range

The effective throw ranges shall be determined in accordance with E.4.2.

5.2.4 Spray discharge

Spray discharge shall be determined in accordance with E.3.

5.3 Operational reliability

5.3.1 Hose — General

Verification shall be in compliance with EN 14540.

5.3.2 Shut-off nozzle

5.3.2.1 General

Visual inspections shall be done during tests in E.3.

5.3.2.2 Marking of control condition — Rotary operated nozzles

Rotary nozzle shall be inspected for marking of direction for opening and closing.

Lever and trigger operated nozzles shall be inspected that they are marked with settings for shut, spray and jet.

5.3.3 Shut-off nozzle — Resistance to impact

The shut-off nozzle shall be tested in accordance with E.1.

5.3.4 Shut-off nozzle — Operating torque

The operating torque shall be tested according with E.2.

5.3.5 Inlet stop valve

The provisions of 4.3.5 are verified by visual inspection.

5.3.6 Hydraulic properties — Resistance to internal pressure

Hose assemblies shall be tested to the appropriate test pressure given in accordance with Annex F.

5.3.7 Hydraulic properties — Security of couplings

Hose assemblies shall be tested in accordance with Annex F.

5.4 Ability to pull out the hose

5.4.1 Type 1 Reel

The dimension shall be determined by a meter or another ordinary equipment.

5.4.2 Type 1 and Type 3 Supports swinging

The specific requirements have to be visually inspected.

5.4.3 Hose — Maximum length

The maximum length shall be tested in accordance with EN 14540.

5.5 Colour

The colour of the support shall be visually inspected.

5.6 Cabinet

Check that the minimum angle of opening of the cabinet is 170° using an appropriate measuring device.

If a security seal is fitted, check that the necessary force to break the seal is between 20 N and 40 N using an appropriate measuring device.

If a screw down stop valve is fitted, measure the distance between the hand wheel of the screw down stop valve and the cabinet and check that is not less than 35 mm.

The remaining properties in 4.6 have to be visually inspected.

5.7 Durability aspects

5.7.1 Durability of operational reliability

5.7.1.1 Resistance to corrosion on coated parts

Resistance to external corrosion shall be tested in accordance with Annex B.

5.7.1.2 Resistance to corrosion of waterways

The waterways shall be tested in accordance with Annex D.

5.7.1.3 Ageing tests for plastics materials

The aging test shall be in accordance with Annex C.

6 Evaluation of conformity

6.1 General

The compliance of hose systems with lay-flat hose to the requirements of this European Standard and with the stated values (including classes) shall be demonstrated by:

— initial type testing;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the product.

6.2 Initial Type Testing — Type Testing

6.2.1 General

Initial type testing and type testing shall be performed to demonstrate compliance with this European Standard,

All essential characteristics for which the manufacturer declares performances, are subject to Initial Type Testing. In addition, the need to perform Type Tests applies to all other characteristics included in a standard when the manufacturer claims compliance, unless the standard gives provisions (e.g. use of previously existing data, CWFT and conventionally accepted performance) for declaring performances without performing tests.

Tests previously performed in accordance with the provisions of this European Standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same system of attestation of conformity on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE 1 Same system of attestation of conformity means testing by an independent third party under the responsibility of a product certification body.

For the purposes of testing, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family.

NOTE 2 Products may be in different families for different characteristics.

NOTE 3 Reference to the test method standards should be made to allow the selection of a suitable representative sample.

In addition, Type Tests or Initial Type Testing shall be performed for all characteristics included in the standard for which the manufacturer declares performances:

— at the beginning of the production of a new or modified hose system with a lay-flat hose design (unless a member of the same family), or

— at the beginning of a new or modified method of production (where this may affect the stated properties);

they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the hose system with lay-flat hose design, in the raw material or in the supplier of the components, or in the production process (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of compliance with other product standards, these characteristics need not be

reassessed. The specifications of these components shall be documented, as shall the inspection scheme for ensuring their compliance.

Products marked in accordance with appropriate harmonised European specifications may be presumed to have the performances stated with that marking, although this does not replace the responsibility of the hose system with lay-flat hose designer to ensure that the hose system with lay-flat hose as a whole is correctly designed and its components have the necessary performance values to meet the design.

6.2.2 Test samples

Test samples of the product shall be representative of the current production.

6.2.3 Test reports

All Type Tests, Initial Type Tests and their results shall be documented in test reports.

All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the hose system with lay-flat hose to which they relate.

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 comply with the stated performance characteristics.

The FPC system shall consist of written procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This production control system documentation shall ensure a common understanding of conformity evaluation and enable the achievement of the required product characteristics and the effective operation of the production control system to be checked.

Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with this technical specification.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organising the effective implementation of the FPC system.

Tasks and responsibilities in the production control organisation shall be documented and this documentation shall be kept up-to-date.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate conformity of the product at appropriate stages;

— identify and record any instance of non-conformity;

— identify procedures to correct instances of non conformity.

The manufacturer shall draw up and keep up-to-date documents defining the Factory Production Control which he applies.

The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process.

The FPC system should achieve an appropriate level of confidence in the conformity of the product. This involves:

(a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

(b) the effective implementation of these procedures and instructions;

(c) the recording of these operations and their results;

(d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-conformity.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass these responsibilities on to a subcontractor.

Manufacturers having an FPC system, which comply with EN ISO 9001 and which addresses the requirements of this European standard are recognized as satisfying the FPC requirements of the Council Directive 89/106/EEC.

6.3.2.2 Personnel

The responsibility, authority and the relationship between personnel that manages, performs or verifies 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.

6.3.2.3 Equipment

6.3.2.3.1 Testing

All weighing, measuring and testing equipment shall be calibrated or verified and regularly inspected according to documented procedures, frequencies and criteria.

6.3.2.3.2 Manufacturing

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.

Inspections 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.

6.3.2.4 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the attestation of conformity level of the component shall be that given in the appropriate harmonised technical specification for that component.

6.3.2.5 Design process

The factory production control system shall document the various stages in the design of the hose systems with lay-flat hose, identify the checking procedure and those individuals responsible for all stages of design.

During the design process itself, a record shall be kept of all checks, their results, and any corrective actions taken.

This record shall be sufficiently detailed and accurate to demonstrate that all stages of the design phase, and all checks, have been carried out satisfactorily.

6.3.2.6 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

6.3.2.7 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained.

6.3.2.8 Non-complying products

The manufacturer shall have written procedures which specify how non-complying 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.

6.3.2.9 Corrective action

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

6.3.2.10 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

6.3.3 Product specific requirements

The FPC system shall:

— address this European Standard

and

— ensure that the products placed on the market comply with the stated performance characteristics.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan, and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

These records shall be available for inspection.

Where the product fails to satisfy the acceptance measures, the provisions for non-conforming products shall apply, the necessary corrective action shall immediately be taken and the products or batches not conforming shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

Individual products or batches of products and the related manufacturing documentation shall be completely identifiable and retraceable.

6.3.4 Initial inspection of factory and of FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation.

The factory and FPC documentation shall be assessed to verify that the requirements of 6.3.2 and 6.3.3 are fulfilled. During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics required by this European Standard are in place and correctly implemented, and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice, and

c) that the product complies with the initial type testing samples, for which compliance with this European Standard has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented.

If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

6.3.5 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken once a year.

The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to type testing and that the correct actions have been taken for non-compliant devices.

6.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics required by this European Standard, then all the essential characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to Initial Type Testing, except as described in 6.2.1and 6.3.7.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

6.3.7 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity

The hose system with lay-flat hose produced as a one-off, prototypes assessed before full production is established, and products produced in very low quantities (100 per year) are assessed as follows.

For type assessment, the provisions of 6.2.1, 3rd paragraph apply, together with the following additional provisions:

— in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;

— on request of the manufacturer, the results of the type assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate.

The manufacturer shall maintain records allowing traceability of the product.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The following shall be assessed:

— the FPC-documentation; and

— the factory.

In the initial assessment of the factory and FPC it shall be verified:

a) that all resources necessary for the achievement of the product characteristics required by this European Standard will be available, and

b) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice, and

c) that procedures are in place to demonstrate that the factory production processes can produce a component complying with the requirements of this European Standard and that the component will be the same as the initial type testing samples, for which compliance with this European Standard has been verified.

Once series production is fully established, the provisions of 6.3 shall apply.

7 Marking

The hose system shall be marked with the following information:

a) manufacturer’s name or trade mark, or both;

b) number of this European Standard;

c) year of manufacture;

d) maximum working pressure;

e) length and bore of hose;

f) nozzle equivalent diameter (marked on the nozzle).

NOTE Where regulatory marking covers the same information as this clause, the requirements of this clause are met.

8 Instruction

8.1 Instructions for use

Fire hose system assemblies shall be provided with full operational instructions for display on or adjacent to the hose system.

8.2 Installation and maintenance instructions

An installation manual specific for the hose system shall be made available.

Maintenance procedures shall be as specified in EN 671-3.

Annex A
(normative)

Schedule for testing sequence

NOTE See 6.2.

The following tests shall be carried out in the sequence given in Table A.1.

Table A.1 — Test sequence

	Test/characteristic	Requirement clause [a]	Test method
	Opening		
1	Opening of manual inlet stop valve	4.3.5	-
	Durability aspects		
2	Resistance to external corrosion on coated parts	4.7.1.1	Annex B
3	Resistance to corrosion of waterways	4.7.1.2	Annex D
4	Resistance of plastics materials	4.7.1.3	Annex C
	Hydraulic tests		
5	Resistance to impact, for shut-off nozzle	4.3.3	E.1
6	Operating torque, for shut-off nozzle	4.3.4	E.2
7	Measurement of spray angle	4.2.4	E.3
	Discharge performance		
8	Minimum flow rate	4.2.2	E.4.1
9	Effective throw range	4.2.3	E.4.2
	Physical endurance		
10	Resistance to internal pressure	4.3.6	
11	Security of couplings	4.3.7	
	[a] Sampling, including number of the samples, and the conformity criteria for some characteristics are also given in these clauses.		

Annex B
(normative)

Test method for resistance to external corrosion

NOTE See 4.7.1.1 for requirement.

Prepare a rectangular test piece as shown in Figure B.1 of nominal size 150 mm × 100 mm with the same thickness as the material of which the product is made and with the protective coating of thickness not less than 0,8 times and not more than the thickness used in the product.

Use a steel scriber to mark a cross (see Figure B.1) through the protective coating until the underlying material appears. Place the test piece in a 5 % salt spray chamber for 240 h ± 8 h as specified in EN ISO 9227:2006. After the test, examine the test piece. Provided that not more than 2 mm of each side of the groove formed by the cross is detached, the coating has adequately protected the metal.

Dimensions in millimetres

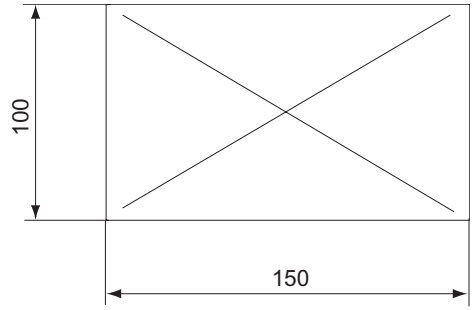


Figure B.1 — Corrosion test piece

Place the complete hose reel, without hose, in a 5 % salt spray chamber for 240 h ± 8 h as specified in EN ISO 9227:2006. After the test, check that the mechanical operation of all working parts is unimpaired and that there is no significant corrosion defects inside or outside. Significant corrosion defects are pits, cracks and blisters.

Annex C
(normative)

Ageing test for plastics materials

NOTE See 4.7.1.3 for requirement.

Expose the plastics materials to light and water spray according to EN ISO 4892-2:2006, Method A Cycle No. 1. Xenon-arc sources:

— the total dose of exposure shall be 2 GJ/m^2.

Visually examine the materials for cracking and crazing.

Annex D
(normative)

Test method for resistance to corrosion of waterways

NOTE 1 See 4.7.1.2 for requirement.

NOTE 2 The test may be carried out either using the complete hose reel or a partially assembled hose reel comprising the complete waterways.

Fully fill the waterways from the inlet stop valve to the nozzle with a 1 % m/m solution of sodium chloride in demineralised water.

Store for 3 months ± 5 days at a temperature of (20 ± 5) °C.

At the conclusion of the test, check that the mechanical operation of all working parts is unimpaired and that there are no significant corrosion defects inside or outside. Significant corrosion defects are pits, cracks and blisters.

Annex E
(normative)

Test methods for shut-off nozzle

E.1 Resistance to impact

NOTE See 4.3.3 for requirement.

Carry out the test using a fully assembled length of hose including couplings and nozzle. Unwind the hose and lay it out completely as shown in Figure E.1. Fill the hose with water and pressurise to the maximum working pressure. Hold the nozzle in the closed position at (1,5 ± 0,05) m above a concrete floor and allow it to drop freely 5 times without any initial force. Examine the nozzle for damage.

Dimensions in millimetres

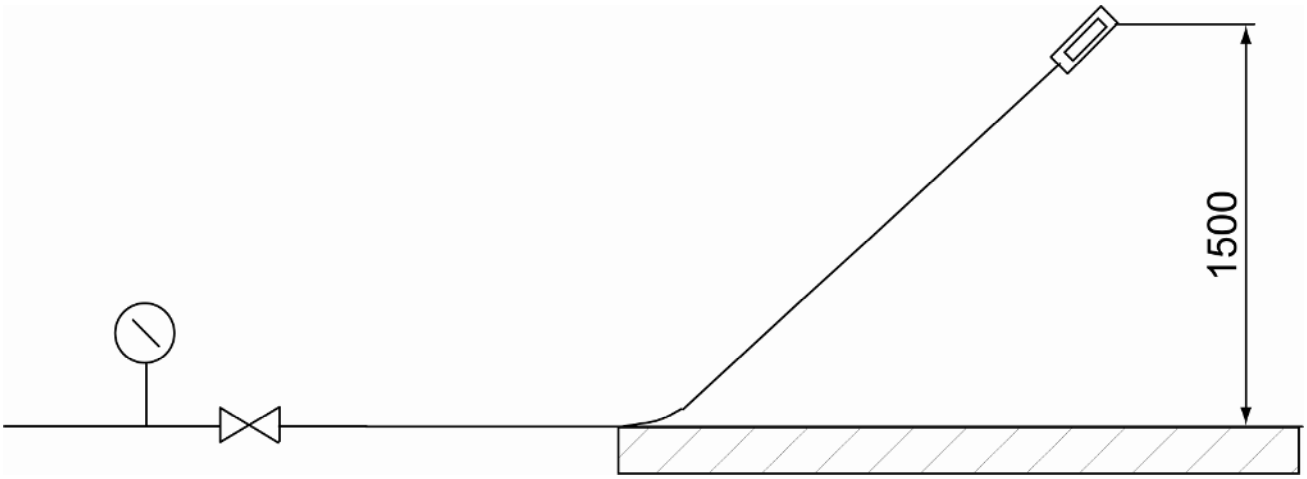


Figure E.1 — Arrangement for impact test

E.2 Operating torque

NOTE See 4.3.4 for requirement.

Carry out the test using a nozzle after the test in E.1. Secure the nozzle to a fixed support without interfering with its operation. Measure the operating torque at the maximum working pressure and check that the operating pressures do not exceed the appropriate values given in Table 2.

E.3 Spray discharge

NOTE 1 See 4.2.4 for requirement.

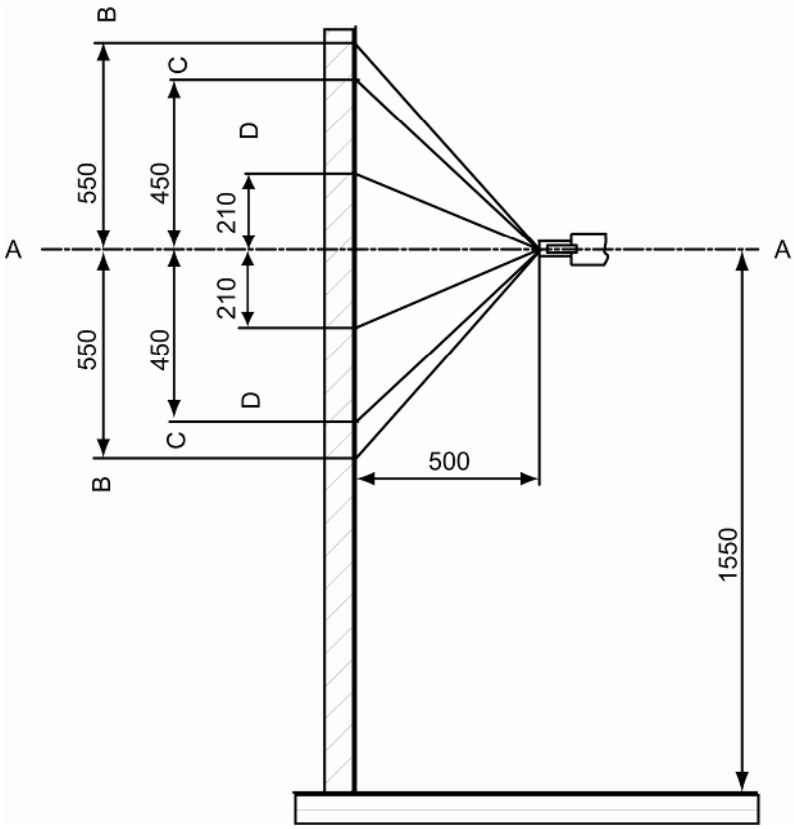
Mount the nozzle horizontally on a fixed support at (1,5 ± 0,05) m above the ground in a draught-free zone (wind speed less than 2 m/s) and (0,5 ± 0,005) m from a vertical plate suitably marked as shown in Figure E.2.

Connect the water supply and adjust the incoming pressure to (0,6 ± 0,025) MPa. Adjust the nozzle to spray position and start the water discharge. Check that the discharge is as follows:

a) for nozzles with a conical spray pattern, symmetrical about the A-A axis covering not less than the D-D zone all around the A-A axis, or

b) for nozzles with a sheet spray pattern covering not more than the B-B zone and not less than the C-C zone on each side of the A-A axis.

Dimensions in millimetres



NOTE 2 Nozzle with conical spray pattern or nozzle with sheet spray pattern in vertical orientation.

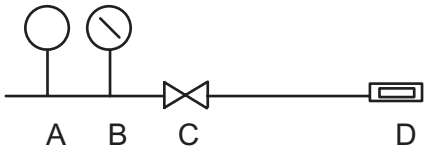
Figure E.2 — Test arrangement for measurement of spray discharge angle

E.4 Flow rate and throw range

E.4.1 Flow rate

NOTE See 4.2.2 for requirement.

Install the hose system in accordance with the manufacturer's instructions, generally as shown in Figure E.3. Lay out the hose completely straight and horizontal. Fully open the stop valve. Measure and record the flow rate, *Q*, in spray and/or jet settings, as appropriate, at a pressure of (0,6 + 0,025) MPa.



Components

A	flow meter
B	pressure gauge
C	stop valve
D	nozzle

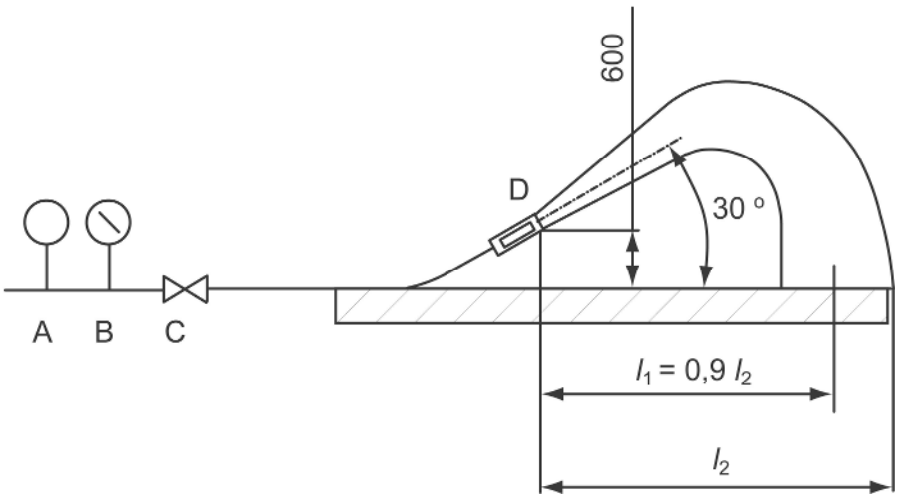
Figure E.3 — Test arrangement for non-destruction test

E.4.2 Throw range

NOTE See 4.2.3 for requirement.

Mount the nozzle to a support tilted at 30° to the ground with the discharge outlet (0,6 ± 0,01) m above the ground generally as shown in Figure E.4. Adjust the inlet pressure to (0,2 ± 0,025) MPa at the inlet valve. With the nozzle in the appropriate (jet or spray) position, measure the effective throw of water. Test nozzles with a conical spray angle at the minimum spray angle. Measure the effective range as 0,9 × the maximum range.

Dimensions in millimetres



Components

A	flow meter
B	pressure gauge
C	stop valve
D	nozzle
l_1	effective range
l_2	maximum range

Figure E.4 — Test arrangement for measurement of throws range

Annex F
(normative)

Test method for resistance to internal pressure

Connect the complete hose assembly to a pressure source and fill it with water, expelling all the air. Raise the pressure to 2,4 MPa and maintain this pressure. After 1 min, examine the test piece for any sign of leakage, particularly around the couplings and then release the pressure.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a mandate M/109 "Fire alarm/detection, fixed firefighting, fire and smoke control and explosion suppression products", as amended by M/139, given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the mandates given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the hose reels with semi-rigid hose 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 use, can be applicable to the hose reels with semi-rigid hose 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 EUROPE
(accessed through http://ec.europa.eu/enterprise/construction/cpd-ds/.

This annex establishes the conditions for the CE marking of the hose systems with lay-flat hose intended for the use indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as Clause 1 of this standard related to the aspect covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses

Construction product: Hose system with lay-flat hose **Intended use:** Fixed installations to provide the occupants of a building the means to control and extinguish a fire nearby.			
Essential characteristics	**Requirement clauses in this European Standard**	**Levels and/or classes**	**Notes***
DISTRIBUTION OF EXTINGUISHING MEDIA with:			
— Hose bore	4.2.1		a) verification according to 5.2.1, b) expressed as "pass/fail"
— Minimum flow rate	4.2.2	-	a) test according to E.4.1, b) expressed as *Q* according to Table 1
— Effective throw range	4.2.3	-	a) test according to E.4.2, b) according to one of the three types of discharge of water at pressure 0,2 MPa expressed as "pass/fail"
— Spray discharge	4.2.4	-	a) test according to E.3, b) according to one of two types of spray of water expressed as "pass/fail"
OPERATIONAL RELIABILITY with:			
— Hose – General	4.3.1	-	a) verification of compliance with EN 14540 b) expressed as "pass/fail"
— Shut-off nozzle – General	4.3.2	-	a) verification according to 5.3.2 b) expressed as "pass/fail"
— Shut-off nozzle - Resistance to impact	4.3.3	-	a) test according to E.1 b) expressed as "pass/fail"
— Shut-off nozzle – Operating torque	4.3.4	-	a) test according to E.2 b) expressed as "pass/fail"
— Inlet stop valve	4.3.5	-	a) verification according to 5.3.5 b) expressed as "pass/fail"
— Hydraulic properties - Resistance to internal pressure	4.3.6	-	a) test according to Annex F b) expressed as "pass/fail"
— Hydraulic properties – Security of couplings	4.3.7	-	a) test according Annex F b) expressed as “pass/fail”
ABILITY TO PULL OUT THE HOSE with:			
— Type 1 Reel	4.4.1	-	a) verification according to 5.4.1, b) expressed as "pass/fail"
—Type 1 and Type 3 Reel – Supports swinging	4.4.2		a) verification according to 5.4.2, b) expressed as "pass/fail"
DURABILITY OF OPERATIONAL RELIABILITY with:			

— resistance to corrosion of coated parts	4.7.1.1	-	a) test according to Annex B b) expressed as "pass/fail"
— resistance to corrosion of waterways	4.7.1.2	-	a) test according to Annex D b) expressed as "pass/fail"
— ageing tests for plastics materials	4.7.1.3	-	a) test according to Annex C b) expressed as "pass/fail"
DANGEROUS SUBSTANCES** See Notes 1 and 2 in ZA.1.			

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, for durability and where the characteristic is subject to a threshold level.

ZA.2 Procedure for the attestation of conformity of hose systems with lay-flat hose

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of hose reels with semi-rigid hose indicated in Table ZA.1 in accordance with the EC Decision 1996/577/EC *(OJEU L 254 of 1996-10-08)*, as amended by EC Decision 2002/592/EC *(OJEU L 192 of 2002-07-20)*, as given in Annex III of the Mandates for fire alarm/detection, fixed firefighting, fire and smoke control and explosion suppression products, is shown in Table ZA.2 for the indicated intended use and relevant level or class.

Table ZA.2 — System of attestation of conformity

Product	Intended use	Level(s) or class(es)	Attestation of conformity system
First aid hose systems-kits	Fire safety		1 [a]
[a] System 1: See Council Directive 89/106/EEC (CPD) Annex III.2 (i), without audit testing of samples.			

The attestation of conformity of the hose system with lay-flat hose in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Table ZA.3 resulting from application of the clauses of this or European Standard indicated therein.

Table ZA.3 – Assignment of evaluation of conformity tasks for hose system with lay-flat hose under system

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 essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.3.1 to 6.3.3 and 6.3.6
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.3.1 to 6.3.3 and 6.3.6
Tasks under the responsibility of the product certification body	Initial type testing (ITT)	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.2
	Initial inspection of factory and of FPC	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared. Documentation of the FPC	6.3.4
	Continuous surveillance, assessment and approval of FPC	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared and documentation of FPC	6.3.5

ZA.2.2 EC certificate of conformity

When compliance with the conditions of this annex is achieved, the notified certification body shall draw up the EC certificate of conformity, which entitles the manufacturer to affix the CE marking. The EC certificate of conformity shall include:

— name, address and identification number of the notified certification body;

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

— description of the product (type, identification, use);

— provisions to which the product conforms (i.e. Annex ZA of this EN);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

— the number of the EC certificate;

— conditions of validity of the certificate, where applicable;

— name of, and position held by, the person empowered to sign the certificate.

The above mentioned EC certificate of conformity shall be presented in the official language or languages of the Member State in which the product is intended to be used.

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/EEC. The CE marking, followed by the identification number of the certification body, shall be shown on the hose system with lay-flat hose itself. If, however, the space available does not allow all the information accompanying the CE marking to be shown on the hose reel itself, the CE-marking, including all the information following it and accompanying it shall appear on the commercial documents accompanying the product. The following information shall follow and accompany the CE marking symbol:

a) name or identification number of the notified certification body;

b) name or identifying mark of the manufacturer (see Note in ZA.2.2);

c) the last two digits of the year in which the marking was affixed;

d) number of the EC certificate of conformity;

e) reference to this European Standard;

f) description of the product and its intended use:

   — generic name;

   — hose inside diameter (mm) and length (m);

   — nozzle type (i.e. jet, sheet and/or conical);

— angle of conical spray (if greater than 45°);

— nozzle equivalent diameter;

— essential characteristics listed in Table ZA.1, which are to be declared.

Figure ZA.1 gives an example of the CE marking to appear on each hose system with lay-flat hose.

CE 01234	*CE symbol given in Directive 93/68/EEC* *Identification number of the notified product certification body*
Any Co Ltd **12** 01234-CPD-00234	*Name or identifying mark of the manufacturer* *NOTE Registered address of the manufacturer may be added.* *Last two digits of the year in which the marking was affixed* *Number of the EC certificate of conformity*
EN 671-2:2012 **Hose system with lay-flat hose**	*No. of European Standard and year of its publication*
- hose inside diameter: 45 mm - hose length: 20 m - nozzle type: Sheet - nozzle diameter: 13 mm Fixed installations to provide the occupants of a building the means to control and extinguish a fire nearby.	*Description of product and its intended use*
DISTRIBUTION OF EXTINGUISHING MEDIA: — Hose bore: *Pass* — Minimum flow rate: *120 l/mm at MPa* *Pass* — Effective throw range: *Pass* — Spray discharge: *Pass* **OPERATIONAL RELIABILITY:** — Hose, General: *Pass* — Shut-off nozzle, General: *Pass* — Shut-off nozzle, Resistance to impact: *Pass* — Shut-off nozzle, Operating torque: *Pass* — Inlet stop valve: *Pass* — Hydraulic properties, Resistance to internal pressure: *Pass* — Hydraulic properties, Security of couplings: *Pass* **ABILITY TO PULL OUT THE HOSE:** — Type 1 Reel: *Pass* — Type 1 and Type 3 Reel, Support swinging: *Pass* **DURABILITY OF OPERATIONAL RELIABILITY:** — Resistance to external corrosion of coated parts: *Pass* — Resistance to corrosion of waterways: *Pass* — Ageing tests for plastics materials: *Pass*	*Information on essential characteristics*

Figure ZA.1 — Example of the CE marking to be shown on the hose system with lay-flat hose

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 1 European legislation without national derogations need not be mentioned.

NOTE 2 Affixing the CE marking symbol means, if a product is subject to more than one directive, that it complies with all applicable directives.

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