BRITISH STANDARD

BS EN
12259-5:2002

Fixed firefighting systems — Components for sprinkler and waterspray systems —

Part 5: Water flow detectors

The European Standard EN 12259-5:2002 has the status of a British Standard

ICS 13.220.20

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 12259-5:2002.

This European Standard is the subject to transitional arrangements agreed under a Commission mandate which is intended to lead to CE marking in support of the Construction Products Directive. In order to allow for any changes in national regulations, the Member States have agreed a transition period of 21 months before CE marking becomes effective.

The UK participation in its preparation was entrusted by Technical Committee FSH/18, Fixed firefighting system, to Subcommittee FSH/18/2, Sprinklers, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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

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

This British Standard, having been prepared under the direction of the Health and Environment Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 4 December 2002

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EUROPEAN STANDARD

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EN 12259-5

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English version

Fixed firefighting systems - Components for sprinkler and water spray systems - Part 5: Water flow detectors

Installations fixes de lutte contre l'incendie - Composants des systèmes d'extinction du type Sprinkleur et à pulvérisation d'eau - Partie 5: Indicateurs de passage d'eau

Ortsfeste Löschanlagen - Bauteile für Sprinkler- und Sprühwasseranlagen - Teil 5: Strömungsmelder

This European Standard was approved by CEN on 10 August 2002.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Contents

Foreword

This document EN 12259-5:2002 has been prepared by Technical Committee CEN/TC 191 "Fixed firefighting systems", the secretariat of which is held by BSI.

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 March 2003, and conflicting national standards shall be withdrawn at the latest by September 2005.

This European Standard 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 89/106/EEC.

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

It forms one Part of EN 12259, covering components for automatic sprinkler systems, and is included in a series of European Standards planned to cover:

- automatic sprinkler systems (EN 12259[1)]);
- gaseous extinguishing systems (EN 12094[1)]);
- powder systems (EN 12416);
- explosion protection systems (EN 26184);
- foam systems (EN 13565[1)]);
- hose reel systems (EN 671);
- smoke and heat control systems (EN 12101[1)]);
- water spray systems (EN xxxx[1)]).

EN 12259 has the general title «Fixed fire fighting systems - Components for sprinkler and water spray systems» and will consist of the following Parts:

- Part 1: Sprinklers
- Part 2: Wet alarm valve assemblies
- Part 3: Dry alarm valve assemblies
- Part 4: Water motor alarms
- Part 5: Water flow detectors
- Part 6: Pipe couplings
- Part 7: Pipe hangers
- Part 8: Pressure switches

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1) In preparation.

- Part 9: Deluge alarm valve assemblies
- Part 10: Multiple controls
- Part 11: Medium and high velocity water sprayers
- Part 12: Pump sets

The annexes A to J are normative; annex K is informative.

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

1 Scope

This European Standard specifies requirements for construction and performance and tests for water flow detectors for use in wet pipe automatic sprinkler systems conforming to EN 12845 «Fixed firefighting systems - Automatic sprinkler systems - Design and Installation»[2)].

Auxiliary components and attachments to water flow detectors are not covered by this standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 60335-1, *Safety of household and similar electrical appliances, Part 1: General requirements (IEC 60335-1 :1991 , modified).*

IEC 61020-6, *Electromechanical switches. Part 6: Sectional specification for sensitive switches.*

ISO 37, *Rubber, vulcanised or thermoplastic - Determination of tensile stress-strain properties.*

ISO 49, *Malleable cast iron fittings threaded to ISO 7-1.*

ISO 65, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1.*

ISO 188, *Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests.*

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs.*

ISO 898-2, *Mechanical properties of fasteners - Part 2: Nuts with specified proof load values; coarse thread.*

2) In preparation

3 Terms and definitions

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

3.1
flow velocity
water velocity through a pipe of the same nominal size as the water flow detector at the same flow rate

3.2
rated working pressure
maximum working pressure at which the water flow detector is intended to operate

3.3
reinforced elastomeric element
elements in a composite of an elastomeric compound with one or more other components that increases the tensile strength of the combination to at least twice that of the elastomeric material alone

3.4
sensitivity
minimum rate of flow of water flow detector in a downstream direction which will cause operation and give a signal

3.5
water flow detector
device which responds at a pre-set flow rate only in the intended direction and operates electrical contacts

4 Construction and performance

4.1 General

The water flow detector shall be suitable for installation, without modification. It shall be possible to remove completely the water flow detector from the piping without leaving obstructions in the pipe.

Unless otherwise indicated by the supplier the flow switch shall be evaluated for suitability with tube in accordance with ISO 65.

4.2 Connections

The dimensions of all connections shall be specified by the water flow detector supplier.

Verification of the specified dimensions shall be tested as specified in annex A.

4.3 Rated working pressure

The rated working pressure of water flow detectors shall be not less than 12 bar.

4.4 Components

4.4.1 Water pressure retaining parts

The water pressure retaining parts of the detectors (other than gaskets or seals) shall be made of cast iron, bronze, brass, monel metal, stainless steel, titanium, aluminium alloy or materials having equivalent physical and mechanical properties. Aluminium alloy and cast iron shall not be in contact with the water.

4.4.2 Configuration

The design of any component, which may be normally disassembled during servicing, shall be such that it cannot be reassembled wrongly.

4.4.3 Strength

4.4.3.1 The installed water flow detector shall withstand, without leakage, permanent distortion or breakage of components, an internal hydrostatic pressure of four times the rated working pressure, for a period of 5 min, when tested in accordance with annex B.

4.4.3.2 The calculated load of any fastener, excluding the force required to compress the gasket, shall not exceed the minimum tensile strength specified in ISO 898-1 and ISO 898-2, when the water flow detector is pressurised to four times the rated working pressure. The area of the application of pressure shall be calculated as follows:

- if a full-face gasket is used, the area of force application is that extending out to line defined by the inner edge of the bolts; for example in a flanged connection;

- if a toroidal sealing ring or ring gasket is used, the area of force application is that extending out to the centre line of the toroidal sealing ring or ring gasket.

4.4.4 Fatigue resistance of springs and diaphragms

Springs and diaphragms shall not fracture or rupture during 10 000 cycles of normal operation when tested in accordance with the operational cycling test in F.2.

4.4.5 Materials for contacting parts

Any part and its bearing, excluding seals, gaskets and diaphragms, where rotation or sliding motion is required, shall be made of bronze, brass, monel metal, stainless steel, titanium or materials having equivalent physical and mechanical properties.

4.4.6 Microswitches

Micro switches where incorporated shall be in accordance with IEC 61020-6.

4.4.7 Earthing and electrical connections

Earthing and electrical connections shall be in accordance with EN 60335-1.

4.4.8 Non-metallic components (excluding gaskets and seals)

After ageing in accordance with annex C there shall be no cracking, warping, creep or other signs of deterioration of non-metallic components and the water flow detector shall meet the operational and leak resistance requirements of 4.6 and 4.9 when tested in accordance with annexes F and I.

Separate samples shall be subjected to the tests in C.1 and C.2.

4.4.9 Sealing elements

4.4.9.1 Non-reinforced elastomer sealing elements

Any non-reinforced elastomer sealing element, other than gaskets, shall conform to the following:

a) either minimum tensile strength 10 MPa and minimum ultimate elongation 300 %; or

b) minimum tensile strength 15 MPa and minimum ultimate elongation 200 %

and

c) maximum set of 5 mm when 25 mm are stretched to 75 mm, held for 2 min, and measured 2 min after release.

When tested in accordance with the appropriate sections of ISO 37 and D.1, and after exposure to oxygen for 96 h at (70 + 1,5) °C and 20 bar as described in ISO 188:

d) the tensile strength and ultimate elongation shall be not less than 70 % of the corresponding specimens that have not been exposed to oxygen, any change in hardness shall be not greater than 5 type A durometer units.

And after immersion in distilled water at (97,5 + 2,5) °C for 70 h:

e) the tensile strength and ultimate elongation shall be not less than 70 % of the corresponding specimens that have not been heated in water. Change in volume of the specimens shall not be greater than 20 %.

4.4.9.2 Reinforced elastomer sealing elements

Any reinforced elastomer sealing element shall be capable of being flexed without cracking or breaking and shall have a change of volumetric expansion not greater than 20 %, when tested in accordance with D.2.

4.5 Clearances

NOTE Clearances are necessary between moving parts and between moving and stationary part so that corrosion or deposits of foreign matter within an assembly will not render the water flow detector sluggish in action or inoperative.

4.5.1 Press-fit bushings shall conform to the appropriate clauses of ISO 49 when tested in accordance with E.1.

4.5.2 Any water flow detector vane shall operate by over-riding an 8 mm diameter rod attached to the inside of the pipewall along the pipe length when tested in accordance with E.2.

4.6 Operation

4.6.1 When tested in accordance with annex F, the waterflow detector shall not operate to give a signal at all at flows below 10 l/min; and, for all flows above 80 l/min the flow detector shall operate to give a continuous signal.

Any adjustable or fixed time delay device incorporated in the water flow detector shall not delay any signal for more than 30 s. Any interruption of the water flow rate to below 10 l/min shall cause the delay device to reset automatically to its initial state.

4.6.2 The water flow detector shall operate during 10 000 cycles of normal operation, after which it shall meet the requirements of 4.6.1 at 1 bar when tested in accordance with F.1. The electrical contact and insulation resistance of the electrical part of the water flow detector shall remain within the manufacturer's specification when tested in accordance with F.2.1 and F.2.2 respectively.

4.6.3 The water flow detector shall be capable of normal operation between the temperature limits of 2 °C and 68 °C after which it shall meet the requirement of 4.6.1 when tested in accordance with F.3. After the test there shall be no sign, on visual examination, of cracking or failure of any vane.

4.7 Corrosion resistance

The water flow detector shall meet the requirements of 4.6.1 at 1 bar and the electrical contact resistance and insulation resistance of the electrical part shall remain within the manufacturer's specification when tested in accordance with annex G.

4.8 Pressure loss due to hydraulic friction

The pressure loss across the water flow detector shall not exceed 0,2 bar when water is flowing through it at a velocity of 5 m/s when tested in accordance with annex H.

4.9 Leak resistance

An installed water flow detector shall withstand without leakage, permanent distortion or structural failure, an internal pressure equal to two times the rated working pressure or 25 bar whichever is the greater for a period of 5 min when tested in accordance with annex I.

4.10 Endurance

The water flow detector and its moving parts shall operate at the flow velocity 10 m/s for 90 min without any permanent distortion, detachment or breakage when tested in accordance with annex J.

4.11 Maintenance

The water flow detector shall be designed to permit cleaning and maintenance without the use of special tools.

5 Marking

The water flow detector shall be marked as follows:

a) name or mark of the supplier;

b) distinctive model number, catalogue designation or equivalent marking;

c) external wall thickness of connecting pipe;

d) electrical current and voltage ratings;

e) rated working pressure in bar;

f) the actual year of manufacture; or

- for water flow detector produced in the last three months of a calendar year the following year date; or
- for water flow detectors produced in the first six months of a calendar year the previous year date;

g) minimum operating flow in l/min at which the devices operates;

h) direction of indicated flow;

i) factory of origin, if manufacture is at two or more factories;

j) the number of this European Standard.

The marking shall be in figures or letters at least 4,8 mm high and either:

k) cast directly on the water flow detector; or

l) on a metal label with raised or depressed characters (for example by etching, casting or stamping) that is mechanically attached (for example by rivets or screws) to the body of the water flow detector; cast labels shall be of non-ferrous metal.

Where ZA.3 covers the same requirements as this clause, the requirements of this clause 5 are met.

6 Instructions for installation and operation

Instructions for installation and operation shall be supplied with each water flow detector. These documents shall include an illustration showing the recommended method of installation and the trim function, assembly views to explain operation, recommendation for and care and maintenance and the following details:

a) water flow detector model or type, and sizes available;

b) the rated working pressure;

c) flow rate sensitivity and tolerance;

d) the water flow detector installation details, including torque settings and pipe dimensions;

e) instructions on how to set the water flow detector time delay and adjustment;

f) electrical details, including minimum current rating at 24 V;

g) design working attitudes;

h) instructions on methods of sealing the conduit entry hole to prevent water leakage from the water flow detector into the conduit (e.g. specification of IP-class in accordance with EN 60529).

7 Evaluation of conformity

7.1 General

The compliance of a water flow detector with the requirements of this standard shall be demonstrated by:

— initial type testing;

— factory production control by the manufacturer.

7.2 Initial type testing

Initial type testing shall be performed to demonstrate conformity with this standard (same product, same characteristic(s), test method, sampling procedure and system of attestation). Tests previously performed in accordance with the provisions of this standard may be taken into account. In addition, initial type testing shall be performed at the beginning of the production of a new product type or at the beginning of a new method of production (where these may affect the stated properties).

All characteristics given in clause 4 shall be subject to initial type testing.

7.3 Factory production control (FPC)

The manufacturer shall establish, document and maintain a FPC system to ensure that the products placed on the market conform with the stated performance characteristics. The FPC system shall consist of 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, and shall be sufficiently detailed to ensure that the conformity of the product is apparent.

A FPC system conforming with the requirements of the relevant part(s) of EN ISO 9000, and made specific to the requirements of this standard, shall be considered to satisfy the above requirements.

The results of inspections, tests or assessments 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.

The production control procedure shall be recorded in a manual, which shall be made available when requested.

The supplier shall carry out and record the results of production tests as part of the production control. These records shall be available if requested.

Annex A
(normative)

Verification of connection dimension test

NOTE See 4.2 for requirement.

Measure or gauge the dimensions of all connections and check against the appropriate standards.

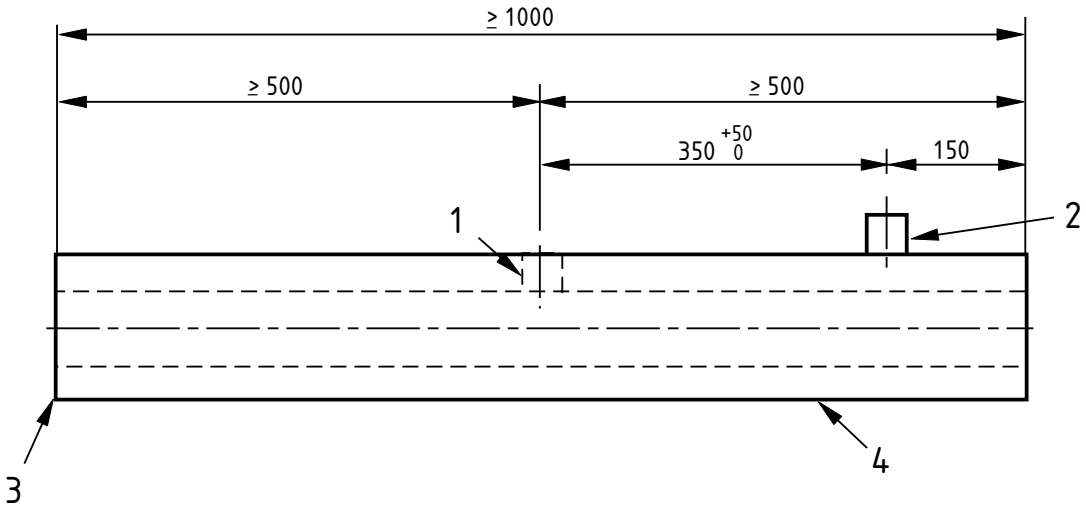
Annex B
(normative)

Pressurisation strength test

NOTE See 4.4.3.1, for requirements.

Install the water flow detector in the pipe assembly as shown in Figure B.1, in accordance with the manufacturer's instructions. Seal the pipe assembly. Pressurise the assembly with water to four times the rated working pressure; maintain the pressure for 5 min. Examine the water flow detector for leakage, permanent distortion or breakage of the components.

Dimensions in millimetres



Key

1 Location of water flow detector

2 15 mm socket

3 Pipe end connections to suit test apparatus

4 Nominal bore to suit size of water flow detector

Figure B.1 — Pipe assembly for pressurisation strength, pipework obstruction, operation, hydraulic friction loss and endurance tests

Annex C
(normative)

Resistance to ageing test for non-metallic components (excluding gaskets and seals)

NOTE See 4.4.8 for requirements.

C.1 Air oven ageing

Age four samples of each non-metallic component in an air oven at (120 ± 2) °C for (180 ± 1) days. Support the elements so that they do not touch each other or the sides of the oven. Remove the samples from the oven and allow to cool in air at (23 ± 2) °C and relative humidity (50 ± 5) % for not less than 24 h before carrying out any test, measurement or examination.

If the material cannot withstand the temperature indicated without excessive hardening or softening, distortion or deterioration, carry out an air oven ageing test at lower temperature, but not less than 70 °C, for longer period of time. Calculate the duration of exposure, D, in days from the following:

$$D = 737\,000\, e^{-0{,}0693\, t}$$

where

t is the test temperature, in degrees Celsius.

NOTE This equation is based on the 10 °C rule, i.e. for every 10 °C rise in temperature, the rate of chemical reaction is approximately doubled.

Examine the components for cracking and warping, creep or other signs of deterioration, which may preclude proper operation of the device. Reassemble the detector and then subject the assembly to the tests specified in annex F and annex I.

C.2 Warm water ageing

Immerse four samples of each of the components in tap water at (87 ± 2) °C for (180 ± 1) days. For parts only occasionally exposed to water, carry out the test for only 14 days. Remove the samples from the water and allow to cool in air at (23 ± 2) °C and relative humidity (50 ± 5) % for not less than 24 h before carrying out any test, measurement or examination.

If the material cannot withstand the temperature indicated without excessive hardening, softening, distortion or deterioration, carry out the water-ageing test at a lower temperature, but not less than 70 °C, for a longer period of time. Calculate the duration of exposure, D, (in days) from the following:

$$D = 74\,857\, e^{-0,\,0693\, t}$$

where

t is the test temperature, in degrees Celsius.

NOTE This equation is based on the 10 °C rule, i.e. for every 10 °C rise, the rate of chemical reaction is approximately doubled. (When applied to plastics ageing it is assumed that the life at temperature, t °C, is half the life at (t – 10 °C).

Examine the components for cracking and warping, creep or other signs of deterioration, which may preclude proper operation of the device. Then subject the assembly to the tests specified in annex F and annex I.

Annex D
(normative)

Sealing elements tests

D.1 Non-reinforced elastomeric seals

NOTE See 4.4.9.1 for requirement.

Prepare a maximum of sixteen test specimens in accordance with ISO 37 and ISO 188; use four of these to satisfy each of the following requirements, as relevant:

4.4.9.1 a) or b) and, c), d) and e)

D.2 Reinforced elastomeric seals

NOTE See 4.4.9.2 for requirement.

Make volumetric measurements of eight specimens before and after the following test:

- expose four test specimens to oxygen for 96 h at (70 ± 1,5) °C and 20 bar as described in ISO 188;
- immerse the remaining four specimens in distilled water at (97,5 ± 2,5) °C for 70 h.

After the tests allow the specimens to cool to room temperature. Bend each specimen back by hand on to itself three times in the same direction, through an arc of 180° around a rod having a diameter four to five times the material thickness. Examine for cracking or breaking.

Annex E
(normative)

Clearances tests

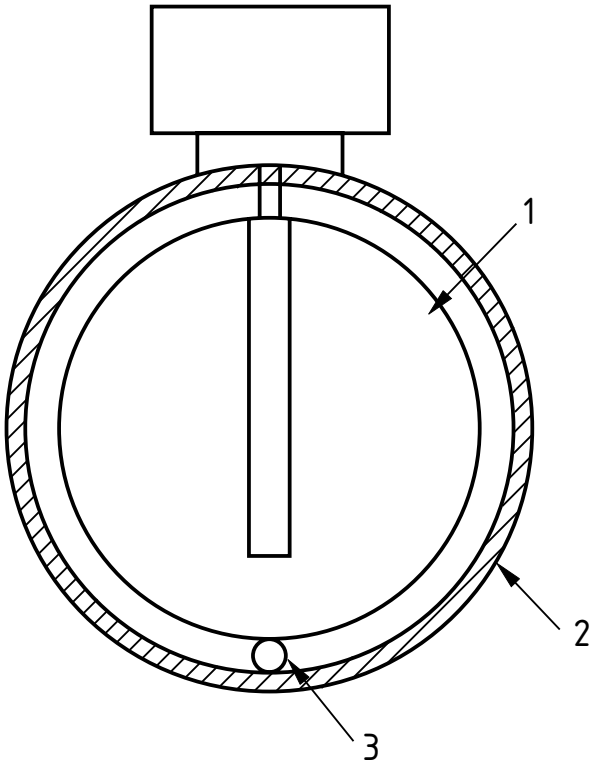
NOTE See 4.5 for requirements.

E.1 Press-fit brushing test

Measure the dimensions of the press-fit bushing and check for conformance with ISO 49.

E.2 Pipework obstruction test

Securely attach a 50 mm long by 8 mm diameter rod to the internal wall of the pipe assembly shown in Figure E.1, along the pipe length, on the downstream side of any water flow detector vane, just clear of the vane. Pass a flow of water of 60^{+5}_{-0} l/min through the pipe assembly, observe for correct operation and signalling.



Key
1 Water flow detector vane
2 Pipe
3 (8 ± 0,01) mm ND rod

Figure E.1 — Test arrangement for pipework obstruction test

Annex F
(normative)

Operation tests

F.1 Sensitivity

NOTE See 4.6.1 for requirement.

Install the water flow detector in the pipe assembly, as shown in Figure B.1, in accordance with the manufacturers' instructions. Connect the assembly to a water supply with a pressure gauge located on the pipework immediately upstream of the device and a flow meter and flow regulating valve on the downstream side.

Determine the flow rate sensitivity of the water flow detector at 1 bar and the rated working pressure. Undertake the test in each orientation recommended by the manufacturer. At each of the pressures increase the flow until the water flow detector operates, maintain this until the provision of a signal is given.

Undertake each test:

a) without a time delay in the signalling system;

b) with the maximum (built in) time delay of the water flow detector.

Decrease the water flow to just below 10 l/min repeat the test, check the re-setting of the time delay device, and repeat the test at 1 bar.

F.2 Operational cycling

NOTE See 4.4.4 and 4.6.2 for requirement.

Install the water flow detector in accordance with the manufacturer's instructions in a pipe assembly shown in Figure B.1 which is connected in the test rig shown in Figure F.1. Subject the water flow detector to 10 000 cycles of operation with the time delay (if fitted) set at the maximum delay.

The water flow detector shall be operated by a flow of water in the pipe cycling between:

0 l/min and 100 l/min.

Before or after completion of cycling subject the water flow detector to the following tests:

a) pressure test in accordance with annex B;

b) sensitivity test in accordance with F.1 at 1 bar pressure;

c) contact resistance test, F.2.1;

d) insulation resistance test, F.2.2.

F.2.1 Contact resistance test

Measure the contact resistance across each pair of closed electrical terminations in the water flow detectors using a suitable measuring device.

Carry out the measurements at the minimum rated current or 50 mA at 24 V d.c. whichever is less, in both directions and record the mean contact resistance for each pair of closed terminations.

F.2.2 Insulation resistance test

Measure the insulation resistance by applying a d.c. voltage of 500 V across:

- the open contacts of each pair of electrical terminations; and

- all the electrical terminations connected together and the nearest metal part, including their mounting plate.

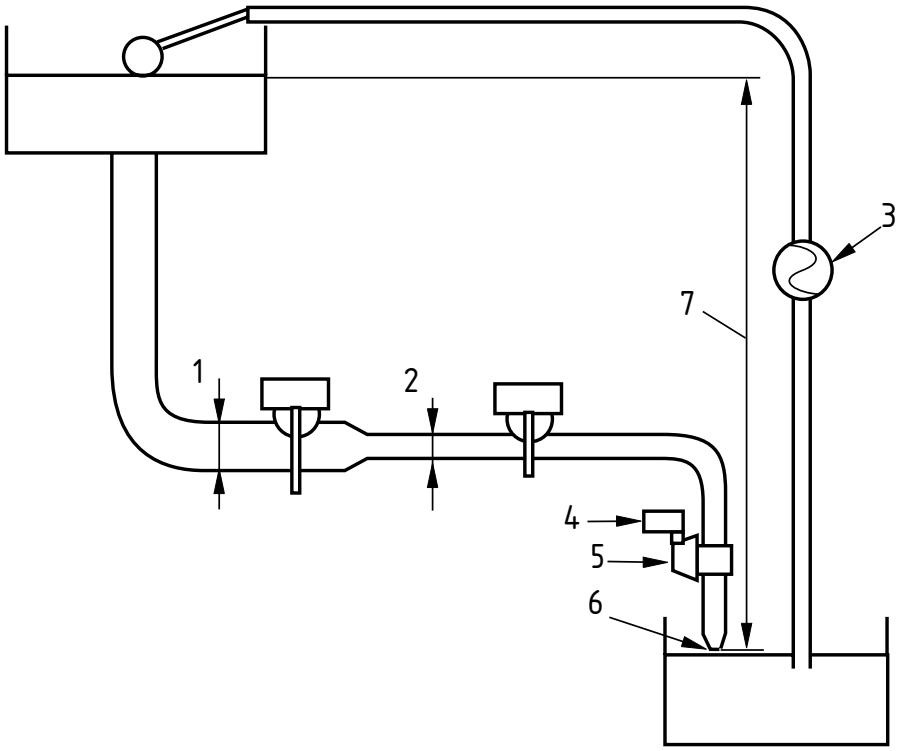
Measure the insulation resistance after an electrification time of 1 min.

Connect each pair of electrical terminations in the water flow to a resistive load and the applied voltage adjusted to provide the following conditions at each pair of terminations:

- 0 to 2 000 cycles : rated current and a.c. voltage of water flow detector;

- 2 001 to 5 000 cycles : rated current at 24 V d.c.;

- 5 001 to 10 000 cycles: minimum rated current or 50 mA at 24 V d.c whichever is less.



Key
1 Water flow detector, D_1
2 Water flow detector, D_2
3 Pump >60 dm^3/min
4 Counter
5 Motorised or solenoid valve
6 k factor, k_1
7 Height, h
NOTE More than one flow switch may be tested on the rig; D_1, D_2 etc.

Figure F.1 — Typical test arrangement for operational cycling

F.3 Temperature resistance

NOTE See 4.6.3 for requirement.

Install the water flow detector in the pipe assembly shown in Figure B.1 in accordance with the manufacturer's instructions. Cool the assembly to (2 ± 1) °C for 24 h and then allow to warm in air at (23 ± 2) °C for at least 2 h. Fill the pipe assembly with water and heat in an oven to (68 ± 2) °C for 90 days. Allow the assembly to cool in air at (23 ± 2) °C for at least 24 h.

Pressurise the assembly in accordance with annex B and then carry out the sensitivity test in accordance with F.1 at 1 bar. Remove the water flow detector and examine visually for cracking or failure of the vane.

Annex G
(normative)

Salt mist corrosion resistance test

NOTE See 4.7 for requirement.

G.1 Reagents

Sodium chloride solution, consisting of a mass fraction of (20 ± 1) % sodium chloride in distilled water, pH between 6,5 and 7,2 and having a density between 1,126 g/ml and 1,157 g/ml at (35 ± 2) °C.

G.2 Apparatus

Fog chamber, of minimum volume 0,43 m^3, fitted with a re-circulating reservoir and aspirating nozzles to deliver a salt spray, and means for sampling and controlling the atmosphere in the chamber.

G.3 Procedure

Support the flow detector in the fog chamber in its normal operating position, and expose to a salt spray by supplying the sodium chloride solution through the nozzles at a pressure of between 0,7 bar and 1,7 bar, while maintaining the temperature in the exposure zone at (35 ± 2) °C. Ensure that solution running off the water flow detector is collected and not returned to the reservoir for re-circulation.

Collect salt mist from at least two points in the exposure zone and measure the rate of application and the salt concentration. Ensure, for each 80 cm^3 of collection area, a collection rate of 1 ml/h to 2 ml/h over a period of 16 $^{+0,25}_{0}$ h.

Expose the water flow detector for a period of 10 $^{+0,25}_{0}$ days.

After exposure, remove the water flow detector from the fog chamber and allow to dry for 7 $^{+0,25}_{0}$ days at a temperature not exceeding 35 °C and at a relative humidity not greater than 70 %. After the drying period, subject the water flow detector to the following tests:

a) pressure test in accordance with annex B;

b) 10 cycles of operation at 1 bar in accordance with F.1, to examine its ability to function and check its sensitivity calibration. The rated current at the rated voltage of the water flow detector shall be applied to a representative pair of terminations for this test;

c) Contact resistance test in accordance with F.2.1;

d) Insulation resistance test in accordance with F.2.2.

Annex H
(normative)

Hydraulic friction pressure loss test

NOTE See 4.8 for requirement.

Install the water flow detector in the pipe assembly shown in Figure B.1, using piping of the same nominal diameter as the nominal size of the detector. Use a differential pressure-measuring device accurate to ± 2 % and use a flow meter accurate to ± 5 %.

Measure and record the differential pressures across the water flow detector at a velocity of 5 m/s.

Replace the water flow detector in the test rig by a section of pipe, of the same nominal size, and measure differential pressure for the same flow rate. Determine the differential pressure. Record the pressure loss due to hydraulic friction as the difference between the differential pressure across the water flow detector and the differential pressure across the replacement pipe.

Annex I
(normative)

Leakage resistance test

NOTE See 4.9 for requirement.

Install the water flow detector in the pipe assembly shown in Figure B.1 in accordance with the manufacturer's instructions. Pressurise the assembly with water to two times the rated working pressure or 25 bar whichever is the greater for 5 min. Examine the water flow detector for leakage, permanent distortion or structural failure.

Annex J
(normative)

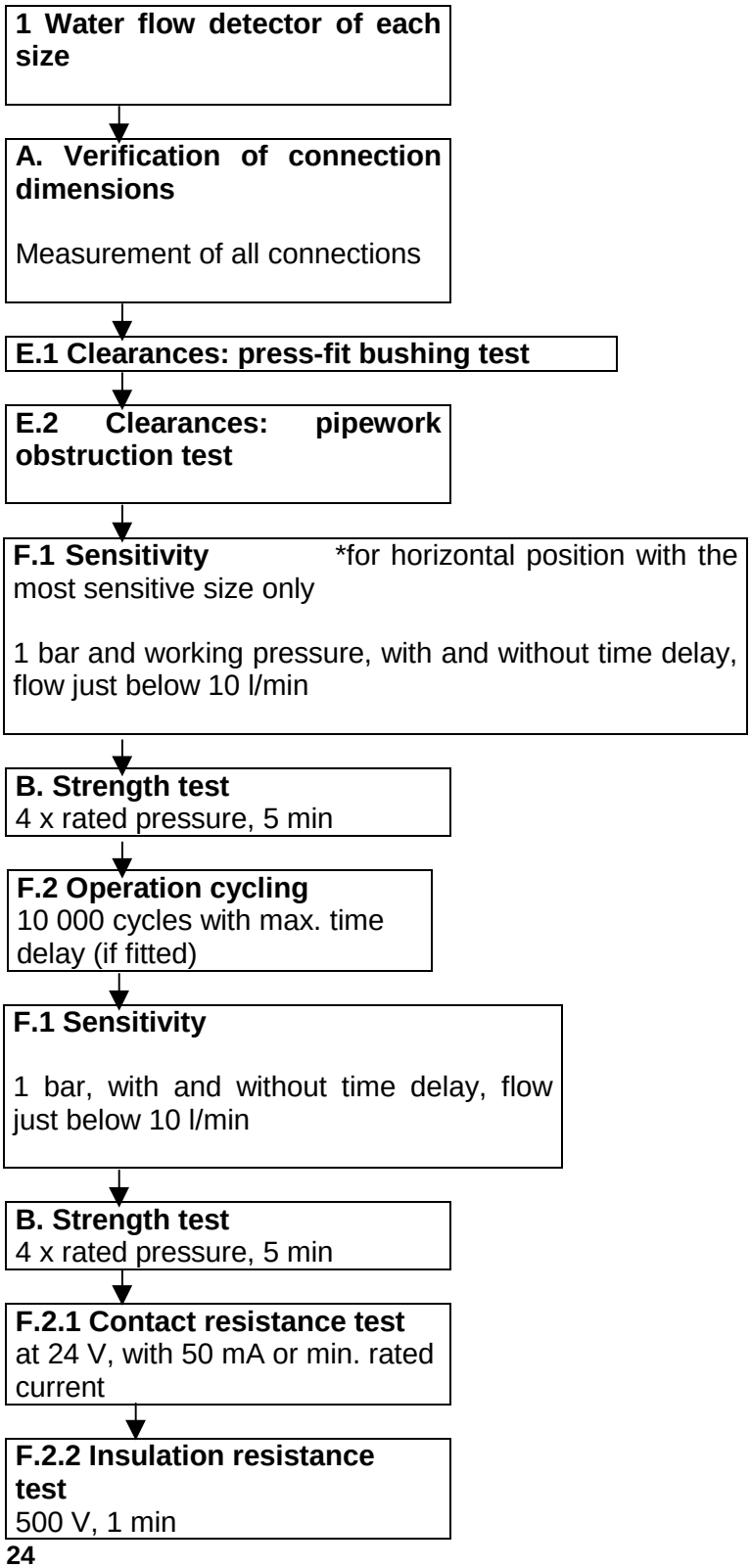
Endurance test

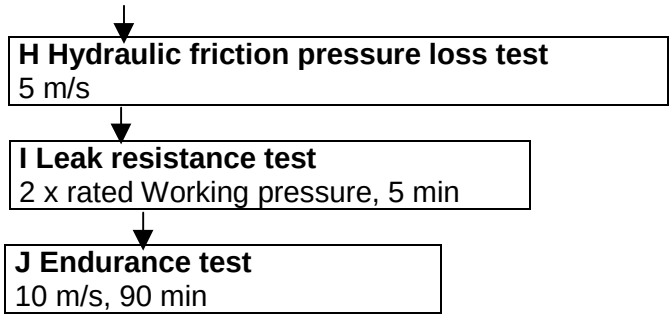
NOTE See 4.10 for requirement.

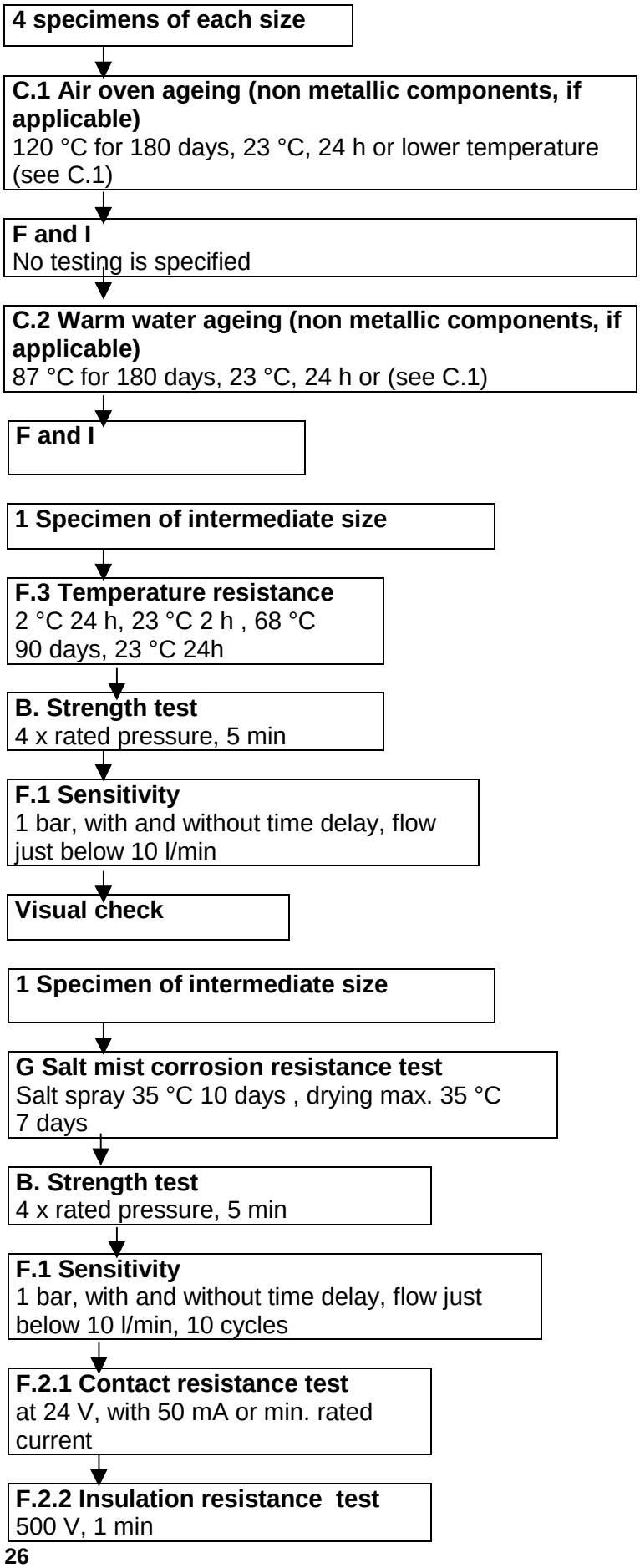
Install the water flow detector in the pipe assembly as shown in Figure B.1 in accordance with the manufacturer's instructions. Connect the pipe assembly to a suitable water supply in a flow test rig. Pass water though the assembly at a velocity 10 m/s for 90 min. After this period examine the water flow detector for permanent distortion, detachment or breakage.

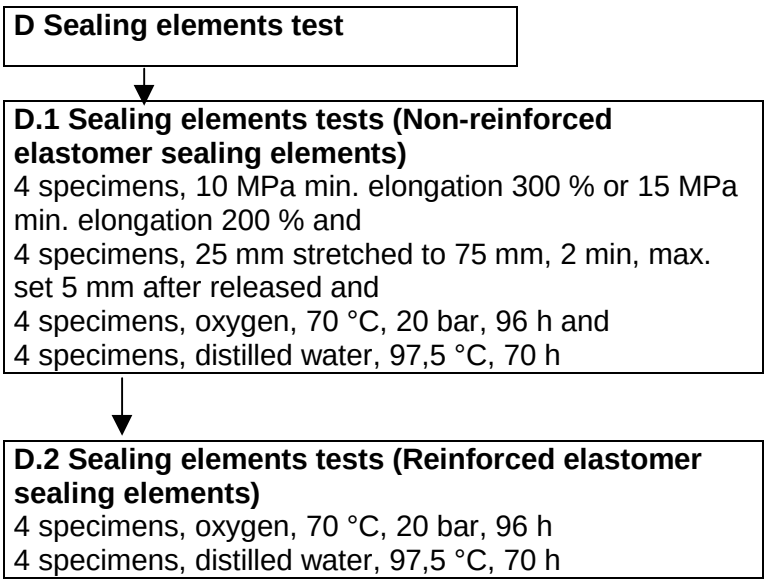
Annex K
(informative)

Typical testing schedule and example of test specimen number of water flow detectors









Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a mandate 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 Mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers the presumption of fitness of the construction products covered by this European Standard for their intended use.

This annex has the same scope as clause 1 of this standard.

> **WARNING:** Other requirements and EU directives, not affecting the fitness for intended use may be applicable to a construction product falling within the scope of this standard.

NOTE 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. An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (CREATE, accessed through http://europa.eu.int/comm/entreprise/construction/internal/hygiene.htm).

Construction product: Water flow detector

Intended use(s): Water flow detectors for fire control/suppression systems in land based buildings and structures.

Table ZA.1 — Relevant clauses

Requirement/characteristic from the mandate	Requirement clauses in this standard	Mandated levels and/or classes	Notes
Nominal activation conditions	4.6.1, 4.6.3	-	
Response delay (response time)	4.6.1	-	
Operational reliability	4.4.3, 4.4.4,4.8, 4.5, 4.6.2, 4.9, 4.10	-	
Durability of operational reliability – Corrosion resistance	4.7	-	
Durability of operational reliability – Strength of non-metallic components	4.4.8, 4.4.9	-	

ZA.2 Procedure for the attestation of conformity of water flow detectors

Water flow detectors for the intended use listed shall follow the system of attestation of conformity shown in Table ZA.2

Table ZA.2 - Attestation of conformity systems

Product	Intended use	Level(s) or class(es)	Attestation of conformity system
Water flow detectors	Fire safety	-	1
System 1: See CPD Annex III.2.(i), without audit testing of samples			

The product certification body will certify the initial type testing of all characteristics given in Table ZA.1 in accordance with the provisions of 7.2, and for the initial inspection of the factory and of the factory production control, and for the continuous surveillance, assessment and approval of the factory production control, all characteristics shall be of interest to the approved body.

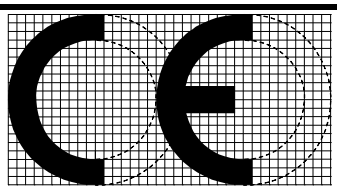
The manufacturer shall operate a factory production control system in accordance with the provisions of 7.3.

ZA.3 CE Marking

The CE marking symbol shall be shown on the water flow detector body, together with the number of this standard, the current/voltage, rated working pressure, flow sensitivity (nominal operating flow) and the flow direction. In addition, the CE marking symbol shall appear on the packaging and/or on the accompanying commercial documents, together with the following information:

- the reference number of the notified body;
- the name or identifying mark of the producer/supplier;
- the last two digits of the year in which the marking was affixed;
- the appropriate number of the EC-certificate of conformity;
- the number of this standard, (EN 12259-5);
- the response delay (response time) in seconds;
- the flow rate sensitivity;
- the rated working pressure in bar;
- the current rating at 24V;
- the direction of flow.

Figure ZA.1 gives an example of the information to be given on the commercial documents.



0123

AnyCo Ltd, P.O. Box 21, B1050
00
0123-CPD-001

EN 12259-5
Waterflow detector
Response time 10 s
Flow rate sensitivity, 56 L/min
Rated working pressure 12 bar
Current rating 50 mA at 24V

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**.**

ZA.4 Certificate and Declaration of Conformity

The manufacturer, or his agent established in the EEA, shall prepare and retain a declaration of conformity, which authorises the affixing of the CE marking. This declaration shall include:

— name and address of the manufacturer, or his authorised representative established in the EEA, and the 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 this EN),

— particular conditions applicable to the use of the product [if necessary],

— name and address (or identification number) of the approved body(bodies),

— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

For characteristics where certification is required (system 1), the declaration shall contain a certificate of conformity with, in addition to the information above, the following information:

— the name and address of the certification body,

— the certificate number,

— conditions and period of validity of the certificate, where applicable,

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

The declaration and certificate shall be presented in the language(s) of the Member State of use of the product.

Bibliography

EN 60529, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

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

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

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