BS EN 13616-1:2016

BSI Standards Publication

Overfill prevention devices for static tanks for liquid fuels

Part 1: Overfill prevention devices with closure device

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National foreword

This British Standard is the UK implementation of EN 13616-1:2016. Together with BS EN 13616-2:2016 and BS EN 16657:2016, it supersedes BS EN 13616:2004 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee PVE/393, Equipment for storage tanks and filling stations, to Subcommittee PVE/393/3, Overfill prevention devices.

A list of organizations represented on this subcommittee 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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English Version

Overfill prevention devices for static tanks for liquid fuels - Part 1: Overfill prevention devices with closure device

Dispositifs limiteurs de remplissage pour réservoirs statiques pour carburants liquides - Partie 1: Dispositifs limiteurs de remplissage avec dispositif de fermeture

Überfüllsicherungen für ortsfeste Tanks für flüssige Brenn- und Kraftstoffe - Teil 1: Überfüllsicherungen mit Schließeinrichtung

This European Standard was approved by CEN on 8 April 2016.

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European foreword

This document (EN 13616-1:2016) has been prepared by Technical Committee CEN/TC 393 "Equipment for storage tanks and for filling stations", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by December 2016, and conflicting national standards shall be withdrawn at the latest by 2017-07-11.

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, together with EN 13616-2 and EN 16657, supersedes EN 13616:2004.

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 or ZB, which is an integral part of this document.

According to EN 13616:2004, the following fundamental changes are given:

— splitting of EN 13616:2004; the new EN 13616, under the general title *Overfill prevention devices for static tanks for liquid fuels*, will consist of the following parts:

  — *Part 1: Overfill prevention devices with closure device;*

  — *Part 2: Overfill prevention devices without closure device.*

— parameters regarding explosion safety updated;

— informative Annex C concerning environmental aspects added;

— the requirements for overfill prevention devices without closure device on static tanks are in EN 13616-2;

— the requirements for overfill prevention devices without closure device on the tank vehicle were moved to EN 16657, *Tanks for the transport of dangerous goods — Transport tank equipment for overfill prevention devices for static tanks*.

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, Former Yugoslav Republic of Macedonia, 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.

1 Scope

This European Standard contains requirements, test and assessment methods, marking, labelling and packaging applicable to overfill prevention devices with closure device. The devices are usually composed by

— sensor,

— evaluation device,

— closure device.

Overfill prevention devices intended to be used in/with underground and/or above ground, non-pressurized, static tanks designed for liquid fuels.

NOTE Liquid fuel means liquids for internal combustion engines, heating/cooling boilers and generators.

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 1127-1:2011, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

EN 14879-4:2007, *Organic coating systems and linings for protection of industrial apparatus and plants against corrosion caused by aggressive media — Part 4: Linings on metallic components*

EN 60079-14, *Explosive atmospheres — Part 14: Electrical installations design, selection and erection (IEC 60079-14)*

EN ISO 80079-36:2016, *Explosive atmospheres — Part 36: Non-electrical equipment for explosive atmospheres — Basic method and requirements (ISO 80079-36:2016)*

3 Terms and definitions

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

3.1
overfill prevention device
device installed in a supply system, which automatically stops the delivery, preventing the liquid level in the tank exceeding a final closure level

3.2
initial closure level
lower level than final closure level at which the overfill prevention device stops the liquid flow and which level it can be reopened

3.3
final closure level
level at which the overfill prevention device prevents any further product, apart from a permissible leak rate, entering the storage tank

3.4
supply system
connection hoses, fittings, devices and any fixed pipework through which the liquid is delivered to the static tank from any tank vehicle

Note 1 to entry: The supply system includes both tank vehicle and stationary tank equipment.

3.5
tank vehicle
vehicle built to carry liquids in integral tanks comprising one or more compartments intended for discharge to static tanks

3.6
operational leak rate
permitted flow rate of liquid allowed to pass through the overfill prevention device after final closure

3.7
operational pressure
pressure in the filling pipe which can be reached during the filling of the tank, excluding the pressure during the closure of the overfill prevention device

3.8
vapour tight overfill prevention device
device where no vapour can pass through from the ullage spaces in normal operation

4 Requirements

4.1 General

The overfill prevention device shall be either vapour tight or non-vapour tight.

4.1.1 Vapour tight

The overfill prevention device shall not leak vapour between the filling pipe and the tank vapour space.

4.1.2 Non vapour tight

The overfill prevention device shall not present an overall vapour leak greater than the equivalent leak from a hole of Ø 3 mm at a pressure 3,5 kPa pressure.

4.2 Effectiveness

4.2.1 General

For pressure, flow velocity, flow rate and time the tolerances are ± 5 %.

4.2.2 Operational flow range and operational pressure range

4.2.2.1 Overfill prevention device for gravity filling only (see Table C.1)

The device shall work at flow velocities between 0,2 m/s and 3 m/s.

The device shall not re-open at a static pressure > 15 kPa after closure.

The device shall withstand static pressure of at least 200 kPa after closure.

4.2.2.2 Overfill prevention device for gravity or pump filling (see Table C.1)

The device shall work at flow velocities between 0,2 m/s and 3 m/s.

The device shall not open at a static pressure > 15 kPa after closure.

The device shall withstand a static pressure of at least 600 kPa or 800 kPa after closure according to manufacturer's declaration.

4.2.3 Pressure surge range

4.2.3.1 General

The operation of the overfill prevention device shall not generate pressure in excess of the design criteria of the supply system.

4.2.3.2 Overfill prevention device for gravity filling only

Any pressure surge created by the overfill prevention device at closure, exceeding 300 kPa, shall not exceed a period of more than 10 ms.

4.2.3.3 Overfill prevention device for gravity or pump filling

For pumps with a performance of 600 kPa, any pressure surge created by the overfill prevention device at closure exceeding 900 kPa shall not exceed a period of more than 10 ms.

For pumps with a performance of 800 kPa any pressure surge created by the overfill prevention device at closure exceeding 1 200 kPa shall not exceed a period of more than 10 ms.

4.2.4 Closure level range

4.2.4.1 General

For both, single and two stage closure devices once the final closure level is reached, no further liquid other than the operational leak rate (see 4.2.5) shall enter the tank.

The final closure level shall be set so that after final closure of any device, the contents of the flexible delivery hose (and preferably the site delivery pipe) can be emptied into the tank.

4.2.4.2 Single stage closure device

On filling the tank to the final closure level, a complete and automatic closure of the flow, other than the operational leak rate (see 4.2.5), shall be effected.

4.2.4.3 Two stages closure device

On filling the tank to the initial closure level, automatic closure of the flow shall be effected. After reopening, and when the final closure level is reached, a complete and automatic closure of the flow, other than the operational leak rate (see 4.2.5), shall be effected.

4.2.5 Operational leak rate

The device shall not have a leak flow rate greater than 300 l/h after initial or final closure level at operational pressure.

4.3 Construction

4.3.1 Requirements for equipment for use in hazardous area according to Annex A.

4.3.2 All construction materials shall be compatible with and resist chemical attack by the liquid and its vapours, within the temperature range of −20 °C to +40 °C. The manufacturer shall specify all materials in contact with the liquid. Chemical suitability shall be tested in accordance with 5.2.

NOTE For equipment designed for operation in explosive atmospheres the normal ambient temperature range is −20°C to +40°C, unless otherwise specified and marked. See Annex A and relevant standards indicated for complete information.

4.3.3 The overfill prevention device shall be of a durable construction. Durability shall be tested in accordance with 5.2, 5.6 and test rig according to Annex B.

4.3.4 All parts of the overfill prevention device situated either internally or externally on the tank shall withstand static negative pressure of $(30\ ^{0}_{-5})$ kPa and positive pressure of $(100\ ^{0}_{-5})$ kPa test to comply with 5.4.

4.4 Durability against wear from closure cycles

The device shall fulfil 4.2 after 1 500 cycles at the maximum flow (see Table C.1) and operational pressure given in 4.2.2.1 and 4.2.2.2 on the test rig according to Annex B.

5 Test methods

5.1 General

The manufacturer shall compile a list of all components and supply specifications to demonstrate that these components will not be affected in the design temperature range.

For all tests other than 5.2 and 5.4, the overfill prevention device shall be installed in accordance with the manufacturer's instructions in a test rig layout as shown in Annex B.

5.2 Chemical suitability test

The durability of all materials of the complete overfill prevention device normally exposed to liquids or their vapours, shall be tested against chemical attacks for the declared liquid with the test liquid of each relevant group according to Annex C of EN 14879-4:2007.

Respectively three samples shall be immersed into test liquid and shall be exposed to their vapour 56 days at a temperature of (+20 ± 5) °C.

After this test the functionality of the overfill prevention device shall be checked.

5.3 Temperature range test

A fresh sample shall be used. The manufacturer shall compile a list of all components and supply specifications to demonstrate that these components will not be affected in the design temperature range. The different components shall be separately tested at the temperature of −20°C and +40°C.

A complete overfill prevention device shall be subjected to the temperatures; all mechanisms shall move, function freely and close by a manual test.

The manual test shall include a final closure simulation, and verify leak rate complies with 4.2.5 at −20°C and +40°C.

5.4 Component pressure tests

If any part of overfill prevention device is designed to be installed inside the tank or any other part of the system which may be pressurized, it shall be placed in a closed pressure vessel and subjected to an external pressure for (60 ± 5) min for each test. After the test, the device shall be working correctly, according to 5.5.

The equipment shall be subjected, in the vessel, to the following pressures:

— negative pressure: $30^{\ 0}_{-5}$ kPa ;

— pressure: $100^{+10}_{\ 0}$ kPa .

Any resultant deformation shall not prevent and after the test, the device shall be working according to 5.5.

5.5 Function tests

5.5.1 General

The overfill prevention device shall be mounted in accordance with manufacturer's instructions in a test rig layout shown in Figure B.1.

The test liquid for these tests can be water containing a corrosion preventing agent or an aliphatic petroleum distillate.

5.5.2 Final closure level test

5.5.2.1 The final closure level test shall be carried out on the test rig specified in the Annex B. According to 4.2.2, the overfill prevention device shall be tested by gravity and/or by pump delivery. This test shall be performed for single stage devices or the final closure of two stages devices.

5.5.2.2 The overfill prevention device for gravity filling shall be tested as follows:

— Verify the initial (if applicable) or final closure level at minimum velocity according to 4.2.2.1.

— Record the result.

— Verify that the device remains closed at pressures above 15 kPa.

— Record the result.

— Drain the filling line through the overfill prevention device.

— Verify the initial (if applicable) or final closure level at the maximum velocity according to 4.2.2.1.

— Record the result.

— Drain the filling line through the overfill prevention device.

— Verify the final closure level (if initial closure level applicable) at the maximum velocity according to 4.2.2.1 by 5 %.

— If the system closes and drains correctly, the device has passed.

5.5.2.3 The overfill prevention device for pump filling shall be tested as follows:

— Verify the initial (if applicable) or final closure level at minimum velocity according to 4.2.2.2.

— Record the result.

— Verify that the device remains closed at pressures above 15 kPa.

— Record the result.

— Drain the filling line through the overfill prevention device.

— Verify the initial (if applicable) or final closure level at the maximum velocity according to 4.2.2.2.

— Record the result.

— Drain the filling line through the overfill prevention device.

— Verify the final closure level (if initial closure level) at the maximum velocity according to 4.2.2.2 by 5 %.

— If the system closes and drains correctly, the device has passed.

5.5.2.4 Overfill prevention devices for gravity or pump filling shall be 100 % tested according to 5.5.2.2 and 5 % according to 5.5.2.3.

The maximum operational pressure surge shall not exceed that specified in 4.2.2.

After initial closure level (if applicable), the supply system shall be allowed to drain down according to manufacturer's instructions and verified to have occurred.

5.5.3 Operational leak rate after final closure level test

After final closure level, within 1 min of the final closure measure the leakage rate through the assembly. This shall not exceed the value as specified in 4.2.5. The test shall be completed on the test rig specified in the Annex B.

5.5.4 Pressure surge test

The maximum pressure surge generated at the pressure test point upon closure of the device shall be measured and shall not exceed the requirement in 4.2.3. This may be checked simultaneously with flow closure tests according to 5.5.2.

The surge pressure shall be recorded at maximum flow rate in accordance with 4.2.2.1 and 4.2.2.2 using a pressure sensor located in the pipework within 200 mm above the device on the test rig specified in Annex B.

The pressure sensor and its measuring system shall have a response time of 1 ms.

Surge tests shall be carried out in accordance with Figure B.1. The bore size of the hose shall be equal to the overfill prevention device size.

5.6 Mechanical strength

With the valve closed, maintain an internal to external pressure of 1,5 times the maximum static pressure according to 4.2.2.1 for (120 ± 10) s. There shall be no permanent deformation detected by a visual inspection. The device shall then be submitted to the durability test.

5.7 Vapour tight – Non vapour tight test procedure

5.7.1 Vapour tight test procedure

The device shall be installed in the test rig layout according to Figure B.1. The inlet and outlet of the filling line shall be closed. The line shall have a 3,5 kPa pressure applied. The pressure shall remain stable for 5 min at (3,5 ± 0,1) kPa.

5.7.2 Non vapour tight test procedure

The device shall be installed in the test rig layout according to Figure B.1. The inlet and the outlet shall be closed. The line shall have a 3,5 kPa pressure applied. The volume of air lost through the device shall be measured over a 5 min period and the results recorded.

A pipe of the same diameter as the Overfill Prevention Device, with a hole of Ø 3 mm, shall be installed in the test rig at position. The pipe shall have a 3,5 kPa pressure applied. The volume of air lost through the hole shall be measured over a 5 min period and the results recorded.

The device will be accepted as non-vapour tight, providing that the volume recorded is equal to or less than the volume recorded in the pipe with a hole of Ø 3 mm.

5.8 Durability test

To ensure that the device will be durable against wear from closure cycles, the correct operation of the device shall be tested 1 500 times at the maximum flow and maximum pressure (see Table C.1). Reach the initial (if applicable) or final closure level, drain the filling line through the overfill prevention device and repeat the operation.

After the durability tests are completed, the device shall be re-tested according to 5.5.

6 Assessment and verification of constancy of performance - AVCP

6.1 General

The compliance of overfill prevention devices with closure device with the requirements of this European Standard and the performance declared by the manufacturer in the DoP shall be demonstrated by:

— determination testing of the product type

— 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 conformity of the product with its declared performance(s).

6.2 Type testing

6.2.1 General

All performance related to characteristics included in this European Standard shall be determined when the manufacturer intends to declare the respective performance unless the standard gives provisions for declaring them without performing tests. (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment 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 AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

For the purposes of assessment, 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 Products may be grouped in different families for different characteristics.

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

In addition, the product type determination testing shall be performed for all characteristics included in the standard, for which the manufacturer declares performance:

— at the beginning of production of a new or modified overfill prevention devices with closure device (unless a member of the same product range), or

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

— they shall be repeated for the appropriate characteristic(s), whenever a design change occurs in the overfill prevention devices with closure device, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which could 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 assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility of the manufacturer of overfill prevention devices with closure device to ensure that device as a whole is correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

The number of samples of overfill prevention devices with closure device to be tested/assessed shall be in accordance with Table 1.

Table 1 — Number of samples to be tested and compliance criteria

Characteristic	Requirement	Assessment method	No. of samples	Compliance criteria
Vapour tight	4.1.1	5.7.1	1	
Operational flow range	4.2.2	5.5.2	1	
Pressure range	4.2.2.1 4.2.2.2	5.5.2	1	
Pressure surge range	4.2.3	5.5.4	1	
Closure level range	4.2.4	5.5.2	1	
Operational leak rate	4.2.5	5.5.3	1	
Durability against wear from closure cycles	4.4	5.8	1	
Chemical suitability	4.3.2	5.2	1	
Temperature range	4.3.2	5.3	1	
Components pressure	4.3.4	5.4	1	
Mechanical strength	4.3.4	5.6	1	

6.2.3 Test reports

The results of the product type determination testing 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 overfill prevention devices with closure device to which they relate.

6.2.4 Shared other party results

A manufacturer may use the results of the product type determination testing obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has the same performance, related to specific essential characteristics, the other party who has carried out the product type

determination testing concerned or has had it carried out, has expressly accepted [1)] to allow the manufacturer to use the results and the test report, for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performance and they also:

  — ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the product type determination testing, and that there are no significant differences with regard to production facilities or production control processes compared to that used for the product that was subjected to the product type determination testing; and

  — keeps available a copy of the product type determination testing report that contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

6.2.5 Cascading determination documentation of the product type testing results

For some construction products, there are companies (often called "system houses") which supply or ensure the supply of, on the basis of an agreement [2)] some or all of the components (e.g. in case of windows: profiles, gaskets, weather strips) [3)] to an assembler who then manufactures the finished product (referred to below as the "assembler") in his factory.

Provided that the activities for which such a system house is legally established include manufacturing/assembling of products as the assembled one, the system house may take the responsibility for the determination of the product type regarding one or several essential characteristics of an end product which is subsequently manufactured and/or assembled by other firms in their own factory.

When doing so, the system house shall submit an "assembled product" using components manufactured themselves or by others, to the product type determination testing and then make the product type determination testing report available to the assemblers, i.e. the actual manufacturer of the product placed on the market.

To take into account such a situation, the concept of cascading product type determination documentation might be taken into consideration in the technical specification, provided that this concerns characteristics for which either a notified product certification body or a notified test laboratory intervene, as presented below.

The product type determination testing report that the system house has obtained from tests carried out by a notified body and which is supplied to the assemblers, may be used for the regulatory marking purposes without the assembler having to involve a notified body to undertake the product type determination testing of the essential characteristic(s) already tested, provided that:

— the assembler manufactures a product which uses the same combination of components (components with the same characteristics) and in the same way, as that for which the system house has obtained the product type determination testing report. If this report is based on a

1) The formulation of such an agreement can be done by licence, contract, or any other type of written consent.

2) This can be, for instance, a contract, license or whatever kind of written agreement, which should also contain clear provisions with regard to responsibility and liability of the component producer (system house, on the one hand, and the assembler of the finished product, on the other hand.

3) These companies may produce components but they are not required to do so.

combination of components not representing the final product to be placed on the market, and/or is not assembled in accordance with the system house's instruction for assembly, the assembler shall submit his finished product for product type determination testing;

— the system house has given the instructions for manufacturing/assembling the product and installation guidance to the manufacturer;

— the assembler (manufacturer) assumes the responsibility for correct assembly of the product in accordance with the manufacturing/assembly and installation guidance instructions for the product given to them by the system house;

— the instructions for manufacturing/assembling the product and installation guidance given to the assembler (manufacturer) by the system house are an integral part of the assembler's Factory Production Control system and are referred to in the product type determination report;

— the assembler is able to provide documented evidence that the combination of components they are using and the manufacturing methods, correspond to the product type determination report the system house has obtained for (they shall keep a copy of the system house's product type determination report);

— regardless of any reference in the agreement signed with the system house, to their responsibility and liability under private law, the assembler remains responsible for the product being in compliance with the declared performances, including both the design and the manufacture of the product, which is given when they affixe the regulatory marking on his product.

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 declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control incoming raw materials or components, equipment, the production process and the finished 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 factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be audited. Factory production control therefore brings together operational techniques and all other measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as foreseen in 6.2.4 and 6.2.5.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manage, performer verify work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

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

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

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining factory production control. 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 constancy of performance 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-constancy of performance.

Where sub-contracting 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 sub-contractors, the FPC of the sub-contractor may be taken into account, where appropriate for the product in question.

The manufacturer who sub-contracts all of his activities may in no circumstances pass the above responsibilities on to a sub-contractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

6.3.2.2 Equipment

6.3.2.2.1 Testing

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

6.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure that, 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.

6.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. Where supplied kit components are used, the constancy of performance of the component shall be that given in the appropriate harmonized technical specification for that component.

6.3.2.4 Traceability and marking

Individual overfill prevention devices with closure device shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Controls during manufacturing process

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

6.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, and the means of control, are:

— Each piece shall be tested for effective closure using the final closure level test indicated in 5.5.2.

6.3.2.7 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.

Where the product fails to satisfy the acceptance criteria, the procedure for dealing with non-conforming products shall apply. The necessary corrective action(s) 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 and signed by 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 recorded.

6.3.2.8 Corrective action

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

6.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures for 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 declaration of performance.

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 inspection/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 component 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 state of the product, e.g. 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 and 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 inspected/tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

6.3.4 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this European Standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the product type determination testing, as described in 6.2.1.

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

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

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

Overfill prevention devices with closure device produced as a one-off, prototypes for pre-production assessment, and products produced in very low quantities (10 per year or less) shall be 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 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 suitable for production. 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 production commences 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 included in 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 product complying with the requirements of this European standard and that the product will be the same as the samples used for the product type determination testing, for which compliance with this European standard has been verified.

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

7 Classification

Two types of devices are defined in this standard:

— overfill prevention device by gravity fill only;

— overfill prevention device by gravity or pump fill (2 subtypes: up to 400 kPa or up to 800 kPa).

8 Marking, labelling and packaging

8.1 Identification

The device shall be permanently marked with, as a minimum, the following information:

— manufacturer's name or mark;

— type;

— maximum static pressure;

— serial number and/or date of manufacture;

— EN number of this European Standard;

— vapour tight (yes/no);

— temperature range if it is outside the temperature range of −20 °C to +40 °C.

8.2 Instruction plate

The overfill prevention device shall be supplied with an instruction plate to be permanently fastened at the filling point. It shall contain the following information:

— manufacturer;

— type;

— maximum static pressure;

— operator instructions (to be followed in the event of overfill prevention device operating).

— temperature range if it is outside the temperature range of −20 °C to +40 °C.

8.3 Technical documentation

Technical documentation shall be supplied with the overfill prevention device. It shall contain information shown in 8.1 and 8.2:

— installation instructions;

— test instructions on the site;

— list of suitable liquids.

Only trained personnel should adjust, install, inspect the overfill prevention device.

Annex A
(normative)

Equipment for use in a hazardous area

A.1 General

Where the overfill prevention device or part of the overfill prevention device is intended for use in hazardous areas, the method of identification of hazardous situations that can lead to an explosion shall conform to EN 1127–1:2011.

NOTE For the purpose of this annex, the terms and definitions given in EN 1127–1:2011, EN 60079–0:2012 and EN ISO 80079-36:2016 and the following apply.

A.2 Avoidance or reduction of ignition sources

All electrical and non-electrical equipment and components, intended for use in potentially explosive atmospheres, shall be designed and constructed in conformity with the required categories for group II equipment to ensure avoidance of any ignition sources as detailed in 5.2 of EN 1127-1:2011. To classify the category of the equipment, it shall be subjected to an ignition hazard assessment in accordance with 6.2 of EN 1127-1:2011. To classify the category of the non-electrical equipment, it shall be subjected to an ignition hazard assessment in accordance with 5.2 of EN ISO 80079-36:2016.

Specific information regarding main risks is indicated in A.3, A.4 and A.5.

A.3 Electrical equipment

Any electrical equipment installed and located in hazardous areas classified as Zone 2 shall be at least Category 3 of EN 1127-1:2011 and shall conform to the requirements of EN 60079-14.

Any electrical equipment, installed and located in hazardous areas classified as Zone 1 shall be at least Category 2 of EN 1127-1:2011 and shall conform to the requirements of EN 60079-14.

Any electrical equipment installed and located in hazardous areas classified as Zone 0 shall be at least Category 1 of EN 1127-1:2011 and shall conform to the requirements of EN 60079-14.

A.4 Non-electrical equipment

Any non-electrical equipment, intended for use in a potentially explosive atmosphere, shall conform to the requirements of EN ISO 80079-36 and where relevant, the selected European standard for the specific type of ignition protection.

A.5 Electrostatic discharge

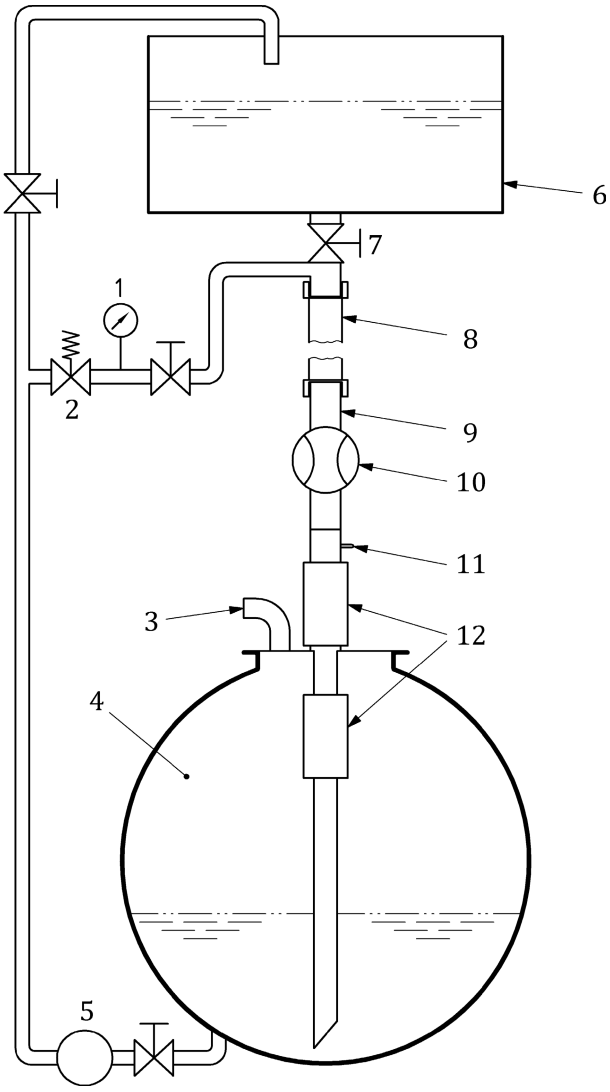
The requirements of EN ISO 80079-36 shall apply for earthing of conducting parts.

The overfill prevention devices shall be designed to eliminate the risk of ignitions due to electrostatic discharges. The relevant requirements of EN ISO 80079-36 shall apply.

NOTE Further information see CLC/TR 50404, IEC/TS 60079–32–1 and IEC 60079–32–2.

Annex B
(normative)

Test rigs layouts



Key

1	pressure gauge	7	flow control valve
2	pressure regulator	8	hose 3 m long
3	80 NB vent pipe	9	pipe 1 m long
4	ullage space	10	flowmeter
5	pump	11	surge pressure test point
6	header tank	12	overfill prevention device and drop tube assembly

Figure B.1 — Example of test rig layout

Annex C
(normative)

Additional information on diameter and flow rate

The diameter and flow rate for overfill prevention device with closure device shall be in accordance with Table C.1.

Table C.1 — Diameter and flow rate

Diameter	**Minimum flow rate** l/h **Corresponding to 0,2 m/s flow velocity**	**Maximum flow rate** l/h **Corresponding to 3 m/s flow velocity**	**Tolerance %**
DN 50	1 400	21 000	±5
DN 80	3 600	54 000	±5
DN 100	5 600	84 000	±5

Annex D
(informative)

Environmental checklist

Table D.1 — Environmental checklist

Environmental Issue	Stages of the life cycle										All stages
	Acquisition		Production		Use			End-of-Life			
	Raw materials and energy	Pre-manu-factured materials and components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/ Material and Energy Recovery	Incineration without energy recovery	Final disposal	Transportation
Inputs											
Materials	6.3.2.3	—	6.3.1	6.3.2.9	—	6.3.2.2.2	—	6.3.2.7	—	—	—
Water	—	—	Annex A 5.5.1	—	—	—	—	—	—	—	—
Energy	—	—	Annex A 5.5.1	—	4	—	—	—	—	—	—
Land	—	—	Annex A 5.5.1	—	—	—	—	—	—	—	—
Outputs											
Emissions to air	—	—	—	—	4.1.1 4.1.2	—	—	—	—	—	—
Discharges to water	—	—	—	—	Whole document	—	—	—	—	—	—
Discharges to soil	—	—	—	—	Whole document	—	—	—	—	—	—
Waste	—	—	—	—	—	—	—	6.3.2.7	—	—	—
Noise, vibration, radiation, heat	—	—	—	—	4.2.2	—	—	—	—	—	—
Other relevant aspects											
Risk to the environment from accidents or unintended use	—	5.2	—	—	8	—	—	—	—	—	—
Customer information	—	—	—	—	8, Annexes ZA, ZB	—	—	—	—	8	—
Comments:											

NOTE 1 The stage of packaging refers to the primary packaging of the manufactured product. Secondary or tertiary packaging for transportation, occurring at some or all stages of the life cycle, is included in the stage of transportation.

NOTE 2 Transportation can be dealt with as being a part of all stages (see checklist) or as separate sub-stage. To accommodate specific issues relating to product transportation and packaging, new columns can be included and/or comments can be added.

Annex ZA
(informative)

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

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/131 [PIPES, TANKS and ANCILLARIES not in contact with water intended for human consumption] given to CEN by the European Commission and the European Free Trade Association.

If this European standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the overfill prevention devices with closure device intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

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

Table ZA.1 — Relevant clauses for Overfill prevention devices with closure device used in/with underground or above ground, non-pressurized, static tanks designed for liquid fuels

Product: Overfill prevention devices with closure device **Intended use:** used in/with underground or above ground, non-pressurized, static tanks designed for liquid fuels			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Vapour tight	4.1	—	—
Operational flow range	4.2.1	—	—
Operational pressure range	4.2.1	—	—
Closure level range	4.2.3	—	—
Operational leak rate	4.2.5	—	—
Pressure surge range	4.2.2	—	—
Durability against wear from closure cycles	4.4	—	—

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option "No performance determined" (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure for AVCP of overfill prevention devices with closure device

ZA.2.1 System(s) of AVCP

The AVCP system(s) of overfill prevention devices with closure device indicated in Table ZA.1, established by EC Decision 1999/472/EC published in Official Journal of the European Communities L 184/42 from 17.7.1999 is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System(s) of AVCP

Product(s)	Intended use(s)	Level(s) or class(es) of performance	AVCP system(s)
Overfill prevention devices with closure device	Overfill prevention devices intended to be used in/with underground or above ground, non-pressurized, static tanks designed for liquid fuels.	—	3
System 3: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.4			

The AVCP of the overfill prevention devices with closure device in Table ZA.1 shall be according to the AVCP procedures indicated in Table ZA.3 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3 — Assignment of AVCP tasks for Overfill prevention devices with closure device under system 3

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Final closure level test	6.3.2.6
Tasks for a notified testing laboratory	Determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product	Vapour tight Operational flow range Operational pressure range Closure level range Operational leak rate Pressure surge range Durability against wear from closure cycles.	6.2.2

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

In case of products under system 3

— the factory production control carried out by the manufacturer; and

— the determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product, carried out by the notified testing laboratory.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011.

According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product-type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;

e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

f) for the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined).

Regarding the supply of the DoP, article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for vertical air/flue terminals

DECLARATION OF PERFORMANCE

No. 001 CPR 2015-07-14

1) Unique identification code of the product-type:

overfill prevention devices with closure device

2) Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

overfill prevention devices with closure device

Type:

3) Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

Overfill prevention devices with closure device intended to be used in/with underground or above ground, non-pressurized, static tanks designed for liquid fuels.

4) Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

AnyCo SA,

PO Box 21

B-1050 Brussels, Belgium

Tel. +32987654321

Fax: +32123456789

Email: **anyco.sa@provider.be**

5) Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2):

Anyone Ltd

Flower Str. 24

West Hamfordshire

UK-589645 United Kingdom

Tel. +44987654321

Fax: +44123456789

e-mail: anyone.ltd@provider.uk

6) System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

System 3

7) In case of the declaration of performance concerning a construction product covered by a harmonized standard:

Notified factory production control certification body No. 5678 performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control and issued the certificate of conformity of the factory production control.

8) Declared performance

Essential characteristics	**Performance**	**Harmonized technical specification**
Vapour tight – No vapour tight	**Vapour tight/equivalent to Ø 3 mm hole according the standard**	EN 13616–1:2016
Operational flow range	**0,2 m/s to 3 m/s**	
Operational pressure range	**200 kPa to 800 kPa**	
Closure level range	**Pass**	
Operational leak rate	**Less than or equal to 300 l/h**	
Pressure surge range	**Pass**	
Durability: against wear from closure cycles	**Pass**	

9) The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8.

This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by:

……

(name and function)

…… ……..

(place and date of issue) (signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the overfill prevention devices with closure device

or

— to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

— to the packaging

or

— to the accompanying documents.

NOTE In addition to the above, ZA.3 of Annex ZA of the standard could include provisions to be followed where it is intended to split the information accompanying the CE marking and to place them in different locations

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed;

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;

— the unique identification code of the product-type;

— the reference number of the declaration of performance;

— the level or class of the performance declared;

— the dated reference to the harmonized technical specification applied;

— the identification number of the notified body;

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figure ZA.1 give examples of the information related to products subject to AVCP under each of the different systems to be given in ZA.3.

CE 8910	*CE marking, consisting of the "CE"-symbol* *Identification number of the notified test laboratory*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **16** **001 CPR 2015-07-14**	*name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 13616–1:2016 **Overfill prevention devices with closure device** intended to be used in/with underground or above ground, non-pressurized, static tanks designed for liquid fuels. **Vapour tight:** yes or equivalent to Ø3 hole according the standard **Operational flow range:** 0,2 m/s to 3 m/s **Operational pressure range:** 200 kPa to 800 kPa **Closure level range:** Pass **Operational leak rate:** Less than or equal to 300 l/h **Pressure surge range:** Pass **Durability against wear from closure cycles:** Pass	*No. of European Standard applied, as referenced in OJEU (see note 14)* *Unique identification code of the product type* *Intended use of the product as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.1 — Example CE marking information of products under AVCP system 3

Annex ZB
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2014/34/EU

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 2014/34/EU (ATEX).

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative Clauses of this standard given in Table ZB.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZB.1 — Correspondence between this European Standard and Directive 2014/34/EU

Clause(s)/sub-clause(s) of this European Standard	Nature of requirement	Essential Requirements Annex II of Directive 2014/34/EU (ATEX)
4.2	Design and manufacturing after due analysis of possible operating faults	1.0.2
4.3.1	Surrounding area conditions	1.0.4
8	Marking	1.0.5
8.2	Instructions	1.0.6
8.2	a) All equipment must be accompanied by instructions	1.0.6
8.1	— recapitulation of marking information	1.0.6
8.3	c) Instructions – diagrams necessary for correct use etc	1.0.6
4.3.2	no reaction between materials used and explosive atmosphere	1.1.2
4.3.1; 4.3.2; 4.3.3	no reduction in protection due to corrosion, wear, etc	1.1.3
4.2; 4.3	technological knowledge of explosion protection	1.2.1
4.3	Additional means of protection	1.2.5
4.3	hazards arising from different ignition sources	1.3.1
4.3.2	hazards arising from static electricity	1.3.2
4.2; 4.3	safety in presence of voltages, humidity, vibration etc	1.4.1
4.2; 4.3	mechanical and thermal stress, aggressive substances	1.4.2

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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[3] EN 60079-0, *Explosive atmospheres — Part 0: Equipment — General requirements (IEC 60079-0)*

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[7] EN 60079-6, *Explosive atmospheres — Part 6: Equipment protection by oil immersion "o" (IEC 60079-6)*

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[11] EN 60079-15, *Explosive atmospheres — Part 15: Equipment protection by type of protection "n" (IEC 60079-15)*

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