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Tanks for transport of dangerous goods — Service equipment — Breather device

National foreword

This British Standard is the UK implementation of EN 14595:2016. It supersedes BS EN 14595:2005 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee AUE/18, Tanks for the transport of dangerous goods.

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

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Tanks for transport of dangerous goods - Service equipment - Breather device

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Tanks für die Beförderung gefährlicher Güter - Bedienungsausrüstung - Belüftungseinrichtung

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European foreword

This document (EN 14595:2016) has been prepared by Technical Committee CEN/TC 296 “Tanks for transport of dangerous goods”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

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

This document supersedes EN 14595:2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The following significant changes were made in this new edition of EN 14595:

— device name changed to align with ADR,

— Introduction revised to clarify the combination of breather and safety device as requirements for compliance with this standard and to include reference to EN 16522,

— EN 12266-2 removed from the normative reference list,

— requirement for secondary positive means of security clarified,

— below atmospheric relieving pressure rating clarified,

— electrical resistance requirements refined,

— the keeping period for test results clarified,

— drop test rig, (Annex A), dimensions of sand boxes improved.

This document forms part of a coherent standards programme (i.e. Tanks for transport of liquid dangerous goods with vapour pressure not exceeding 110 kPa (absolute) at 50° C and petrol — Service equipment).

This standards programme comprises the following standards:

— EN 13082, *Tanks for transport of dangerous goods — Service equipment for tanks — Vapour transfer valve*;

— EN 13083, *Tanks for transport of dangerous goods — Service equipment for tanks — Adaptor for bottom loading and unloading*;

— EN 13308, *Tanks for transport of dangerous goods — Service equipment for tanks — Non pressure balanced footvalve*;

— EN 13314, *Tanks for transport of dangerous goods — Service equipment for tanks — Fill hole cover*;

— EN 13315, *Tanks for transport of dangerous goods — Service equipment for tanks — Gravity discharge coupler*;

— EN 13316, *Tanks for transport of dangerous goods — Service equipment for tanks — Pressure balanced footvalve*;

— EN 13317, *Tanks for transport of dangerous goods — Service equipment for tanks — Manhole cover assembly*;

— EN 14595, *Tanks for transport of dangerous goods — Service equipment — Breather device*;

— EN 14596, *Tanks for transport of dangerous goods — Service equipment for tanks — Emergency pressure relief valve*;

— EN 16249, *Tanks for the transport of dangerous goods — Service equipment — Cap for the adaptor for bottom loading and unloading*;

— EN 16257, *Tanks for the transport of dangerous goods — Service equipment — Footvalve sizes other than 100 mm dia (nom)*;

— EN 16522, *Tanks for transport of dangerous goods — Service equipment for tanks — Flame arresters for breather devices*.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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.

Introduction

The breather device as specified includes a safety device to prevent the contents from spilling out if the tank overturns.

The breather may be a separate device, or an integral part of another device.

Where the breather device is separate from the safety device (to prevent the contents from spilling out of the tank), the functional performance of these elements in combination is required in order to comply with this standard.

Where a flame arrestor is required, EN 16522, *Flame arrestors for breather devices*, specifies requirements.

1 Scope

This European Standard covers the breather device used to ensure normal tank compartment breathing.

It specifies the performance requirements and the critical dimensions of the breather device. It also specifies the tests necessary to verify compliance of the equipment with this document.

The service equipment specified by this document is suitable for use with liquid petroleum products and other dangerous substances of Class 3 of ADR [1] which have a vapour pressure not exceeding 110 kPa (absolute) at 50 °C and petrol, and which have no sub-classification as toxic or corrosive.

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 12266-1:2012, *Industrial valves - Testing of metallic valves - Part 1: Pressure tests, test procedures and acceptance criteria - Mandatory requirements*

EN 14564, *Tanks for transport of dangerous goods - Terminology*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation (ISO 228-1)*

EN 60529, *Degrees of protection provided by enclosures (IP Code)*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14564 apply.

4 Functions

The breather device:

— shall provide pressure and vacuum breathing for a tank compartment,

— may provide venting where a specific venting device is not fitted, and

— shall prevent the spilling out of the contents of the tank in the event of an overturn.

5 Design characteristics

5.1 General

Breather devices shall be of the re-sealing type and may or may not breathe or vent directly to atmosphere. They shall be designed to prevent unauthorized adjustment of the relieving pressure settings.

The functions described in Clause 4 may be provided by one combined device or by separate independent devices. Discrete devices that are not mounted externally shall have a secondary positive means for being secured.

5.2 Ingress protection

The breather device shall be designed, or provision made, to meet the requirements of IP31 in accordance with EN 60529.

5.3 Pressure ratings

5.3.1 Above atmospheric relieving pressure (pressure relief)

Breather devices shall have a relieving pressure of not more than 12 kPa(gauge) in their normally installed attitude.

5.3.2 Below atmospheric relieving pressure (vacuum)

The relieving pressure of breather devices shall be between −0,4 kPa (gauge) and −2,5 kPa (gauge) in their normally installed attitude.

5.3.3 Tank overturn

The breather device shall be designed to prevent the spilling out of the contents of the tank in the event of an overturn.

5.4 Flow capacity

The flow capacity shall be the flow rate (in m^3/h) of air (at 20 °C) achieved by the breather device at the following pressures:

— pressure flow capacity: 30 kPa above pressure relieving pressure;

— vacuum flow capacity: 3 kPa below vacuum relieving pressure.

5.5 Temperature range

Unless otherwise specified, the design temperature range shall be −20 °C to +50 °C.

Where the breather device is subjected to more severe conditions, the design temperature range shall be extended to −40 °C or +70 °C as applicable.

5.6 Materials of construction

The manufacturer shall provide, with the equipment, a full material specification for those parts that may come into contact with the substances described in Clause 1.

5.7 Dimensional characteristics

When the breather device is provided with threaded connections, the threads shall conform to EN ISO 228-1.

5.8 Electrical resistance

The electrical resistance between any conductive part of the device which may come into contact with the dangerous goods and its mounting shall not exceed 1 MΩ.

6 Tests

6.1 General

Two classes of tests are required: production tests and type tests.

Testing methods and procedures shall conform to EN 12266-1 except as specified within this document.

Unless otherwise specified, test fluids shall be air or other suitable gas. The choice of the fluid is the responsibility of the manufacturer. Tests shall be performed on the complete breather device.

6.2 Production tests

6.2.1 General

The number, frequency and sampling methods of production test samples shall be not less than those specified within ISO 2859-1 (AQL of 2,5).

Production tests shall comprise the following:

— seat tightness test (EN 12266-1:2012, A.4); and

— overturn seat tightness test (EN 12266-1:2012, A.4).

6.2.2 Seat tightness test

6.2.2.1 Test procedure

With the device under test positioned in its normally installed attitude, and closed in a leak -tight condition, a steadily increasing differential test pressure from 0 kPa to the relieving pressure shall be applied.

At the device's specified relieving pressure, the differential test pressure shall be held for a time period in accordance with EN 12266-1:2012, Table A.4.

During this period, the leakage rate shall conform to rate B of EN 12266-1:2012, Table A.5.

On completion of this test, the differential test pressure shall be steadily reduced to a value equal to 0,8 times the device's specified relieving pressure, and held for a time period in accordance with EN 12266-1:2012, Table A.4.

During this period, the leakage rate shall conform to rate A of EN 12266-1:2012, Table A.5.

6.2.2.2 Acceptance criteria

6.2.2.2.1 General

The test shall be considered satisfactory if the following criteria are met.

6.2.2.2.2 Above atmospheric relieving pressure (pressure relief)

— The specified relieving pressure is not greater than 12 kPa; and

— at the specified relieving pressure, the leakage rate conforms to rate B of EN 12266-1:2012, Table A.5; and

— at 0,8 times the specified relieving pressure, the leakage rate conforms to rate A of EN 12266-1:2012, Table A.5.

6.2.2.2.3 Below atmospheric relieving pressure (vacuum)

— The specified relieving pressure is not less than −0,4 kPa (gauge) and not greater than −2,5 kPa (gauge); and

— at the specified relieving pressure, the leakage rate conforms to rate B of EN 12266-1:2012, Table A.5; and

— at 0,8 times the specified relieving pressure, the leakage rate conforms to rate A of EN 12266-1:2012, Table A.5.

6.2.3 Overturn seat tightness test

6.2.3.1 Test procedure

The procedure simulates a tank vehicle rolling onto each side and upside down.

With the breather device installed in the test position, the test pressure shall be applied to the upstream side of the breather device. The pressure acting on the downstream side of the breather device shall be equal to atmospheric pressure.

6.2.3.2 Test positions

The breather device shall be tested at 90°, 180° and 270° from its normally installed attitude, around the horizontal axis.

6.2.3.3 Test pressure

The test pressure shall be the normal relieving pressure plus the pressure arising from 110 % of the maximum static head of liquid which would be applied by the densest substance in the tank compartment to which the breather device shall be fitted at the applicable test position.

6.2.3.4 Test duration

The test duration shall conform to EN 12266-1:2012, Table A.4.

6.2.3.5 Acceptance criteria

The acceptance criteria shall conform to rate F of EN 12266-1:2012, Table A.5.

6.2.3.6 Test results

Test results shall be recorded and maintained in accordance with the manufacturer's procedures.

6.3 Type test

6.3.1 General

A minimum of 2 production samples of each model type shall be type tested to demonstrate the performance and mechanical strength of the design.

NOTE Devices having one design, size and set pressure are considered to be of one model type.

Unless otherwise noted, all type tests shall be performed at maximum and minimum design temperatures. Type tests shall comprise the following:

— seat tightness test; and

— overturn seat tightness test; and

— drop test.

6.3.2 Seat tightness test

The seat tightness test shall be performed in accordance with the production test (see 6.2).

6.3.3 Overturn seat tightness test

The overturn seat tightness test shall be performed in accordance with the production test (see 6.2).

6.3.4 Drop test

6.3.4.1 General

The function of the drop test is to subject tank top equipment to the dynamic forces that may result if the tank rolls onto its side. The test shall be carried out under ambient conditions.

6.3.4.2 Test apparatus

The drop test apparatus comprises a vessel having on one side a mounting flange to which the device under test can be mounted. It shall have all the following characteristics:

a) the dimensions, tolerances and characteristics of the drop test apparatus shall be in accordance with Annex A;

b) the stops shall be of steel and shall not incorporate a material or design feature that would tend to cushion the impact;

c) the impact zone for the stops shall be as specified in Annex A (see detail of sand box);

d) the lifting and release equipment shall permit hoisting to, and dropping from, the test height;

e) the guides and the hoisting equipment shall not restrain free fall;

f) the design of the lifting apparatus and the operating procedures shall be in accordance with local safety regulations and shall be such as to prevent accidental dropping of the test apparatus;

g) the test vessel shall be able to be pressurized to meet the requirements of 6.3.4.3 f).

6.3.4.3 Test procedure

The test procedure shall be carried out in the following sequence:

a) mount the complete device under test to the mounting flange of the drop test apparatus. The centreline of the device shall be positioned on the centreline of the securing flange;

b) fill the vessel with water to a level of 1,3 m above the centreline of the securing flange. Plug the level indication hole;

c) hoist the apparatus to the release point, 1,2 m above rest position;

d) stir and smooth to an even consistency the sand of the sand boxes and replace the rubber pad;

e) release the apparatus and allow to drop through a vertical distance of 1,2 m;

f) within one minute of dropping, pressurize the vessel so that the pressure in the vessel at the horizontal centreline of the breather device is 0,8 times the device's relieving pressure, wipe off the device under test and securing flange assembly and observe for leaks.

6.3.4.4 Re-test

Where a leak is caused by maladjustment, the fault may be rectified and the test repeated.

6.3.4.5 Acceptance criteria

Leakage, from any source, shall not exceed rate B of EN 12266-1:2012, Table A.5.

6.3.5 Test results

Test results shall be recorded and maintained in accordance with the manufacturer's procedures.

7 Marking

The pressure and vacuum breather device shall have all the following permanent identification markings:

— reference to this document EN 14595:2016;

— manufacturer's name and/or logo;

— manufacturer's type or assembly number;

— serial number and/or date of manufacture;

— relieving pressures (in kPa);

— pressure flow capacity, at relieving pressure plus 30 kPa (in m^3/h at 20 °C);

— vacuum flow capacity, at relieving pressure minus3 kPa (in m^3/h at 20 °C);

— any special operating conditions.

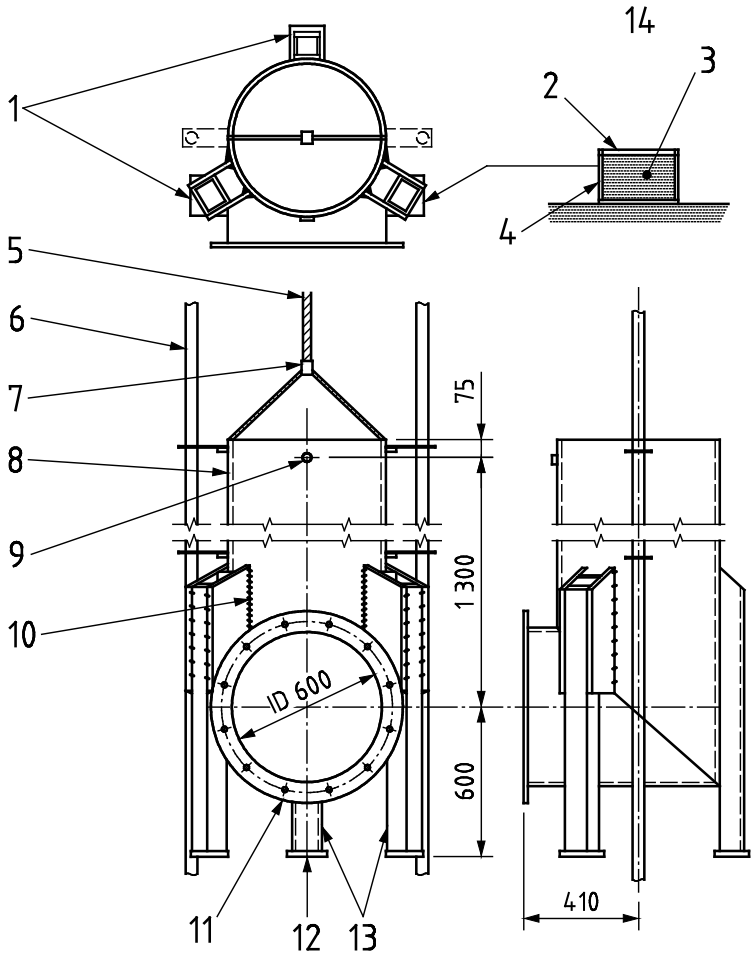
8 Installation, operating and maintenance instructions

The equipment shall be provided with installation, operation and maintenance instructions.

Annex A
(normative)

Drop test apparatus

Dimensions in millimetres



Key

1 3 sand boxes
2 natural rubber pad (280 mm ± 5 mm) x (280 mm ± 5 mm) × 25 mm thick. IRHD: 70 shore
3 dry sand
4 steel box 300 mm x 300 mm x 250 mm high, 8 mm thick, bottom fully attached
5 hoist rope
6 guide column (DN 100)
7 release mechanism. All lifting equipment rated 1,5 t
8 test vessel ID 600 mm ± 10 mm, shell 8 mm thick
9 hole for level indication
10 steel plate 10 mm thick weld as shown
11 flange OD 750 mm x 20 mm thick (min) with 12 holes; I 22 mm on PCD 680 mm
12 steel plate (stop) 150 mm x 130 mm x 10 mm
13 3 support legs equally spaced, rectangular steel tube 102 mm x 76 mm x 6 mm
14 detail of one sand box

Provision shall be made to pressurize the vessel in accordance with 6.3.4.2 g).

Figure A.1 — Drop test apparatus

Bibliography

[1] ADR. European Agreement concerning the International Carriage of Dangerous Goods by Road – (flammable liquids)

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