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## Tanks for transport of dangerous goods - Service equipment for tanks - Emergency pressure relief valve

Citernes destinées au transport de matières dangereuses - Équipements de service pour citernes - Clapet de surpression accidentelle

Tanks für die Beförderung gefährlicher Güter - Bedienungsausrüstung von Tanks - Notentlastungsventil

This European Standard was approved by CEN on 23 April 2018.

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**SS-EN 14596:2018 (E)**

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## European foreword

This document (EN 14596:2018) 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of an identical text or by endorsement, at the latest by February 2019, and conflicting national standards shall be withdrawn at the latest by February 2019.

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 14596:2005.

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

This edition of EN 14596 has the following significant changes from the earlier standard:

- Introduction and relieving pressure changed to reflect the change in ADR tank classification from low pressure tanks to gravity discharge tanks;
- a note regarding weather protection;
- a vapour venting performance test has been added;
- the keeping period for test results clarified;
- drop test rig, (Annex A), dimensions of sand boxes improved;
- venting capacity table moved to new annex (Annex B) and made informative.

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 pressure) at 50° C and petrol - Service equipment).

This standards programme comprises the following standards:

EN 13081, *Tanks for transport of dangerous goods – Service equipment for tanks – Vapour collection adaptor and coupler*

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.*

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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 transport of dangerous goods – Service equipment – Cap for the adaptor for bottom loading and unloading*

EN 16257, *Tanks for 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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **Introduction**

An emergency pressure relief valve allows venting from a tank compartment during excess pressure.

The emergency pressure relief valve may, in addition, perform the closing and opening functions of a fill hole cover, as specified in EN 13314 [1].

The emergency pressure relief valve is fitted to gravity discharge tanks and should not be considered as a pressure tank safety valve as defined in ADR [2].

The function of the emergency pressure relief valve may also be performed by the fill hole cover in accordance with EN 13314.

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### 1 Scope

This document covers the emergency pressure relief valve.

It specifies the performance requirements and the critical dimensions of the emergency pressure relief valve. It also specifies the tests necessary to verify the 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 [2] which have a vapour pressure not exceeding 110 kPa at 50 °C and petrol, and which have no sub-classification as toxic or corrosive.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 12266-2:2012, *Industrial valves - Testing of metallic valves - Part 2: Tests, test procedures and acceptance criteria - Supplementary requirements*

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

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 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1

##### **relieving pressure**

pressure at which the emergency pressure relief valve starts to open

### 4 Functions

When in any orientation, the emergency pressure relief valve shall function as follows:

- open, to relieve excess pressure within the tank compartment; and
- close, when the excess pressure has been relieved; and
- when closed, contain the substance within the tank compartment

## 5 Design characteristics

### 5.1 Relieving pressure

The emergency pressure relief valve shall be vapour and liquid tight up to its relieving pressure.

The relieving pressure of the emergency pressure relief valve shall be specified by the manufacturer and shall exceed the pressure arising from 110 % of the sum of:

- the maximum static head of liquid which would be applied by the densest substance in the tank compartment to which the emergency pressure relief valve shall be fitted, and
- the specified relieving pressure of the breather device fitted to the same compartment.

### 5.2 Weather protection

The emergency pressure relief valve shall be designed, or provision made, to eliminate the accumulation of water, which could freeze and impair the operation of the valve.

If a cover is used to provide the weather protection, then the cover shall not affect the operation or performance of the valve.

### 5.3 Drop test

Each type of emergency pressure relief valve shall be structurally capable of withstanding, without leakage or permanent deformation that would affect its structural integrity, a drop test as described in 6.3.4.

### 5.4 Vapour venting performance

The minimum vapour venting capacity of the valve shall be reached at a pressure less than the test pressure of the tank compartment to which it is attached.

### 5.5 Temperature range

Unless otherwise specified, the design temperature range shall be  $-20\text{ °C}$  to  $+50\text{ °C}$ . Where the emergency pressure relief valve is subjected to more severe conditions, the design temperature range shall be extended to  $-40\text{ °C}$  or  $+70\text{ °C}$  as applicable.

### 5.6 Materials of construction

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

### 5.7 Dimensional characteristics

The height of any part of the emergency pressure relief valve shall not exceed 150 mm, above its mounting face, when in the fully open position.

### 5.8 Electrical resistance

The electrical resistance between any conductive part of the emergency pressure relief valve, which may come into contact with the dangerous substances, and the main body of the valve shall not exceed  $1 \times 10^6\ \Omega$

Provision shall be made for bonding the main body of the valve to the tank such that the electrical resistance between the two shall not exceed  $10\ \Omega$

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### 5.9 Optional function

The emergency pressure relief valve may perform the opening and closing functions of the fill hole cover as specified in EN 13314.

## 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 and EN 12266-2 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.
- Test results shall be recorded and maintained in accordance with the manufacturer's procedures.

### 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; and
- relieving pressure test.

#### 6.2.2 Seat tightness test

##### 6.2.2.1 General

The relieving mechanisms may be locked to enable the test pressure to be achieved.

##### 6.2.2.2 Valve classification type

The valve classification type shall be (for test method selection only): diaphragm valve (EN 12266-1:2012, Table A.3).

##### 6.2.2.3 Test pressure

The test pressure shall be 65 kPa.

##### 6.2.2.4 Test duration

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

##### 6.2.2.5 Acceptance criteria

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

### 6.2.3 Relieving pressure test

#### 6.2.3.1 Test procedure

The test medium shall be air or other suitable gas. The choice of the test medium is the responsibility of the manufacturer. The test shall be performed on the complete valve.

- The valve shall be positioned in its normal operating orientation.
- With the valve in the closed position, a steadily increasing pressure shall be applied to the upstream side of the valve. The pressure acting on the downstream side of the valve shall be equal to atmospheric pressure.
- Once the relieving pressure has been noted, the upstream pressure shall be steadily reduced to confirm the reseal pressure.
- The valve shall be considered as starting to open when visually detectable leakage commences. Reseating of the valve shall occur when such leakage stops.

#### 6.2.3.2 Acceptance criteria

The recorded relieving pressure shall be not less than the valve's specified relieving pressure and the valve shall reseal at a pressure not less than 0,8 times the specified relieving pressure.

### 6.3 Type tests

#### 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 Valves 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 (EN 12266-1:2012, section A4); and
- relieving pressure test; and
- drop test, and
- Vapour venting performance test.

#### 6.3.2 Seat tightness test

The seat tightness test shall be performed in accordance with the production test.

#### 6.3.3 Relieving pressure test

The relieving pressure test shall be performed in accordance with the production test.

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### 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 6.3.4.3.6

#### 6.3.4.3 Test procedure

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

**6.3.4.3.1.** mount the complete device under test to the mounting flange of the drop test apparatus. The centre-line of the device shall be positioned on the centre-line of the securing flange;

**6.3.4.3.2.** fill the vessel with water to a level of 1,3 m above the centre-line of the securing flange. Plug the level indication hole;

**6.3.4.3.3.** hoist the apparatus to the release point, 1,2 m above rest position;

**6.3.4.3.4.** stir and smooth to an even consistency the sand of the sand boxes and replace the rubber pad;

**6.3.4.3.5.** release the apparatus and allow to drop through a vertical distance of 1,2 m;

**6.3.4.3.6.** within one minute of dropping, pressurize the vessel so that the pressure in the vessel at the horizontal centre-line of the device under test 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 Vapour venting performance test**

This test determines the pressure drop across the emergency pressure relief valve over a range of flow rates determined by the manufacturer. The test shall be carried out under ambient conditions.

To determine the vapour venting performance the emergency pressure relief valve shall be mounted in a test rig which guarantees a stable test medium flow rate to establish a constant pressure during the test. To establish a flow across the emergency pressure relief valve, the valve shall be opened only by the differential pressure created by the product flow. No external actuation devices shall be used.

The flow rate and the corresponding pressure drop across the pressure relief valve shall be recorded.

## **7 Marking**

The emergency pressure relief valve shall have all the following permanent identification markings:

- reference to this standard;
- manufacturer's name and/or logo;
- manufacturer's type or assembly number;
- serial number and/or date of manufacture;
- relieving pressure in kPa;
- rated vapour venting capacity and pressure, in m<sup>3</sup>/h and kPa;
- any special operating conditions.

## **8 Installation, operating and maintenance instructions**

The equipment shall be provided with installation, operation and maintenance instructions, which shall include the performance data of the valve.