BS EN 14432:2014

BSI Standards Publication

Tanks for the transport of dangerous goods — Tank equipment for the transport of liquid chemicals and liquefied gases — Product discharge and air inlet valves

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National foreword

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

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Tanks für die Beförderung gefährlicher Güter - Ausrüstung für Tanks für die Beförderung von flüssigen Chemieprodukten und Flüssiggasen - Produktabsperr- und Gaswechselventile

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Foreword

This document (EN 14432:2014) 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of an identical text or by endorsement, at the latest by April 2015 and conflicting national standards shall be withdrawn at the latest by April 2015.

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

This document supersedes EN 14432:2006.

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

This European Standard has been submitted for reference into:

— the RID [1]; and

— the technical annexes of the ADR [2].

NOTE These regulations take precedence over any clause of this standard. It is emphasised that RID/ADR/ADN are being revised regularly at intervals of two years which may lead to temporary non-compliances with the clauses of this standard.

Compared to EN 14432:2006 the following changes have been made:

a) the scope of the standard has been enlarged to include liquefied gases;

b) the references to ADR/RID have been included in the respective clauses of the main part of the standard;

c) the normative references have been updated;

d) change of test conditions (test pressure, hold time).

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1 Scope

This European Standard specifies the requirements for product discharge and air inlet valves for use on transportable tanks with a minimum working pressure greater than 50 kPa for the transport of dangerous goods by road and rail.

NOTE 1 The term 'valve' includes ball valves as well as butterfly valves and similar closure devices.

It is applicable to metallic equipment for use on tanks with gravity and/or pressure filling and discharge for liquid chemicals and liquefied gases. It includes carbon dioxide while excluding refrigerated liquefied gases.

NOTE 2 The standard is also applicable to liquefied gases including LPG, however, for a dedicated LPG standard see EN 13175 [3].

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 736-1, *Valves - Terminology - Part 1: Definition of types of valves*

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 12516-1, *Industrial valves - Shell design strength - Part 1: Tabulation method for steel valve shells*

EN 12516-2, *Industrial valves - Shell design strength - Part 2: Calculation method for steel valve shells*

EN 12516-3:2002, *Valves - Shell design strength - Part 3: Experimental method*

EN 13445-1, *Unfired pressure vessels - Part 1: General*

EN ISO 11299-1:2013, *Plastics piping systems for renovation of underground gas supply networks - Part 1: General (ISO 11299-1:2011)*

3 Terms and definitions

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

3.1
maximum working pressure
MWP
maximum pressure up to which the valve can be operated, not more than the test pressure divided by 1,3

[SOURCE: ADR/RID chapter 6.8]

3.2
maximum allowable working pressure
MAWP
maximum pressure up to which the valve can be operated, not more than the test pressure divided by 1,3 (liquified gases) respectively 1,5 (liquids)

[SOURCE: ADR/RID chapter 6.7]

3.3
test pressure
the pressure used for the pressure tests

3.4
nominal size
DN
numerical designation of the size of a component which is a convenient round number approximately equal to the manufacturing dimension in millimetres

[SOURCE: EN ISO 11299-1:2013]

4 Functions

4.1 The product discharge valve is a secondary stop valve for tank bottom discharge (liquid chemicals and liquefied gases) and a primary stop valve for tank top discharge (liquid chemicals). For tanks intended for transportation of dangerous goods, it is used for the unloading and loading of the product.

4.2 The air inlet valve is a primary stop valve according to EN 736-1; it provides a closure on the tank to which a pressurizing or vapour recovery line may be attached.

5 Design and materials

5.1 General

The manufacturer shall specify, in drawings and other papers, the design and the materials of the product discharge or air inlet valve. Where non-standard flange attachments are used, the valve specification shall include information regarding mating details of the tank flange.

5.2 Design

5.2.1 The valve shall be a stop valve as defined in EN 736-1.

5.2.2 The operating mechanism shall be protected from inadvertent operation in transit either by a latching device or by locating within an enclosure.

5.2.3 As a minimum, each valve shall be marked with the direction of opening of the operating mechanism.

5.2.4 Regarding the calculation of flanges and body wall thickness, the requirements given in EN 12516-1, EN 12516-2 and EN 12516-3 or EN 13445-1 apply.

5.3 Materials

5.3.1 The manufacturer shall provide, with the equipment, the material specification for those parts that may come into contact with the product.

5.3.2 The material elongation at fracture of the pressure-loaded components of the valve shall be a minimum of 12 %.

5.3.3 The relevant EN reference, where possible, for the valve casing material shall be permanently marked on the valve casing. Should no EN exist then the appropriate national standard designation may be used.

6 Test media

6.1 Hydraulic tests

Hydraulic tests shall be carried out using a fluid in accordance with EN 12266-2:2012, A.1.5.

6.2 Pneumatic tests

Pneumatic tests shall be carried out using a gas in accordance with EN 12266-2:2012, A.1.5.

7 Type tests

7.1 General

Each valve used for testing shall conform to the drawings and dimensions specified and specification provided by the manufacturer. Each design of valve as verified in Annex A shall be subjected to a type test. Type testing according to 7.2 to 7.5 shall be carried out under ambient conditions. If the valve is required to operate outside the temperature range –40 °C to +50 °C, the design shall be taken into account either by the type testing or a validated calculation method. For the calculation of the test pressure, EN 12516-3:2002, 6.3 and 6.4 apply.

The tests shall be carried out with the casing/valve attached to a flange equivalent to that for which its use is intended.

7.2 Valve casing hydraulic pressure test

The valve casing shall be hydraulically tested, using a test medium conforming to 6.1, at a pressure equal to 2,25 times the MWP, or 400 kPa, whichever is the greater. The test pressure shall be maintained for a minimum of 5 min on the valve casing without permanent deformation occurring.

7.3 Valve assembly pressure test

The valve assembly shall be hydraulically or pneumatically tested, using a test medium conforming to 6.1 or 6.2 at a pressure equal to 1,5 times the MWP (MAWP) or 400 kPa, whichever is the greater. The test pressure shall be maintained for a minimum of 10 min on the valve assembly. The leakage shall not exceed Rate A as defined in EN 12266-1:2012, Table A.5. Each assembly pressure test shall be carried out:

a) with the valve in the closed position and the outlet open to test for leakage from the seats;

b) with the valve in the open position and the outlet closed off to test for leakage from gland seals or body joints.

7.4 Valve assembly pneumatic tightness test

The valve assembly shall be pneumatically tested, using a test medium conforming to 6.2, at pressures equal to 20 kPa and 1,0 times the MWP (MAWP). The assembly shall be totally immersed in a water bath, or, where total immersion of the valve assembly is not possible, a suitable leak detection fluid shall be applied. The test

pressure shall be maintained for a minimum of 10 min on the assembly during which test period leakage shall not exceed Rate A as defined in EN 12266-1:2012, Table A.5. Each pneumatic tightness test shall be carried out:

a) with the valve in the closed position and the outlet open to test for leakage from the seats;

b) with the valve in the open position and the outlet closed off to test for leakage from gland seals or body joints.

7.5 Cyclic test

The valve assembly shall be subjected to a mechanical cycle test to a minimum of 1 000 full cycles (“open” to “closed”) without pressure and 10 full cycles (“open” to “closed”) at MWP (MAWP) or maximum rating coupling pressure at ambient temperature being applied. After completion of the cyclic test, the valve shall be tested in accordance with 7.4 and the leakage shall not exceed Rate A as defined in EN 12266-1:2012, Table A.5.

8 Production tests

8.1 General

Each product discharge or air inlet valve produced shall conform to the drawings and other papers in which the design and the materials were specified by the manufacturer. The production tests according to 8.2 to 8.4 shall be carried out under ambient conditions.

8.2 Function test

Each valve shall be opened and closed once.

8.3 Valve casing pressure test

Each valve casing shall be hydraulically or pneumatically tested, using a test medium conforming to 6.1 or 6.2, at a pressure equal to 1,5 times the MWP (MAWP), or 400 kPa, whichever is the greater. The test pressure shall be maintained as given in EN 12266-1 on the casing and the leakage shall not exceed Rate A as defined in EN 12266-1:2012, Table A.5.

8.4 Valve assembly pneumatic tightness test

Each valve assembly shall be pneumatically tested as a finally assembled device, using a test medium conforming to 6.2, at pressures equal to 20 kPa and at least 25 % of the test pressure. The assembly shall be totally immersed in a water bath, or where total immersion of the valve assembly is not possible, a suitable leak detection fluid shall be applied. The test pressure shall be maintained as given in EN 12266-1 on the assembly and the leakage shall not exceed Rate A as defined in EN 12266-1:2012, Table A.5. Each pneumatic tightness test shall be carried out:

a) with the valve in the closed position and the outlet open to test for leakage from the seats;

b) with the valve in the open position and the outlet closed off to test for leakage from gland seals or body joints.

9 Marking

The valve shall be permanently marked with the following information:

a) DN (nominal size) of the valve;

b) manufacturer's name or symbol;

c) material of the valve casing:

   1) materials shall be used as specified in EN standards, where possible;

d) maximum working pressure (MWP) or maximum allowable working pressure (MAWP);

e) year of manufacture;

f) unique serial number;

g) reference number of this standard (i.e. EN 14432:2014);

h) temperature range (if not within the range –20 °C to + 50 °C).

10 Supply requirements

10.1 Order information

Information such as product characteristics to be carried in the tank, nominal size of the valve, MWP (MAWP) of the valve, connection type and size of the valve, and maximum and minimum operating temperatures shall be provided by the customer at the time of ordering.

10.2 Installation and operation

The manufacturer shall provide with each valve installation, operating and maintenance instructions for correct use of the equipment in accordance with the manufacturer's recommendations.

Annex A
(normative)

Verification of valve design type

A valve type shall be verified as follows:

a) it shall have the same construction and MWP but may have a different DN (nominal size);

b) the size in bold shall be tested for each valve design type. Generally, the lowest and the highest size shall be tested and this covers all sizes in between. For example, where the range is DN 50 – DN 150 then sizes shown in bold type shall be type tested **50**, 80, 100, 125, **150**;

c) where different seal materials or sealing systems are used in the same valve design type, the test in 7.4 shall be performed on the valve design type for each combination of seal material group and system, followed by the cyclic test in 7.5;

Table A.1 — Sealing group

Sealing material (sealing group)	**Samples**
Metal-to-metal sealing/metallic sealing	Soft aluminium Soft copper or brass Iron or mild steel Stainless steel
Elastomeric sealing	FPM/FKM EPDM NBR HNBR FFKM (Perfluorelastomer) Silicon Nitrile Butyl PUR
(Thermo-) Plastic sealing	PTFE PA ECTFE FEP
Composite sealing	PTFE/FEP-covered elastomer Fibre-filled elastomeric sealing Spring loaded PTFE-sealing
Fibre sealing	Fibre gaskets Plant fibre sealing

d) where a valve casing is constructed from a material that has a lower strength than the type-tested valve, tests in 7.2 and 7.3 shall be performed; where a valve casing is constructed from a material that has a higher strength than the type-tested valve with a similar ductility, the tests in 7.2 and 7.3 are considered to be fulfilled.

Bibliography

[1] Regulation concerning the International Carriage of Dangerous Goods by Rail (RID)

[2] European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)

[3] EN 13175, *LPG Equipment and accessories - Specification and testing for Liquefied Petroleum Gas (LPG) tank valves and fittings*

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