BS EN 14432:2023

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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

This British Standard is the UK implementation of EN 14432:2023. It supersedes BS EN 14432:2014, which is withdrawn.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 committee manager.

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English Version

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

Citernes destinées au transport de matières dangereuses - Équipements de la citerne pour le transport de produits chimiques liquides et de gaz liquéfié - Vannes de mise en pression de la citerne ou de vidange du produit

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

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 14432:2023) 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of an identical text or by endorsement, at the latest by January 2024, and conflicting national standards shall be withdrawn at the latest by January 2024.

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 14432:2014.

This document has been submitted for reference in:

— the RID; and

— the technical annexes of the ADR.

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

The main changes compared to the previous edition are listed below:

a) the Scope has been revised;

b) Normative references have been updated;

c) the definition and source for 3.4 has been changed;

d) former Clause 4 “functions” has been removed;

e) revision of Clause 4 “Design and materials”;

f) a new Clause 5 “Welding” has been introduced;

g) a new Annex B “dry disconnect couplings” has been introduced.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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1 Scope

This document specifies the requirements for valves useable on tanks with a minimum working pressure greater than 50 kPa for the transport of dangerous goods by road and rail for the following functions:

Tanks for transport of liquid products:

— secondary closure of bottom discharge lines;

— primary closure on top of the tank (liquid, air, other connections);

— aeration valve on top of the tank;

— and other valves as specified in Annex F of EN 14564:2019 according to the scope of this document.

Tanks for gases:

— secondary closure of bottom discharge lines;

— secondary closure on top of the tank for poisonous gases: liquid phase and gas phase;

— and other valves as specified in Annex F of EN 14564:2019.

This includes the following types of closures:

— valves (e.g. spindle operated valves, plug and ball valves, butterfly valves and gate valves);

— dry disconnect couplings.

Primary closures of the gas phase at the foot of a tank for liquefied gas are covered by the requirements of foot valves in EN 14433.

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

EN 10204, *Metallic products - Types of inspection documents*

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 13445-3, *Unfired pressure vessels - Part 3: Design*

EN ISO 14732, *Welding personnel - Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732)*

EN ISO 3834-1, *Quality requirements for fusion welding of metallic materials - Part 1: Criteria for the selection of the appropriate level of quality requirements (ISO 3834-1)*

EN ISO 3834-3, *Quality requirements for fusion welding of metallic materials - Part 3: Standard quality requirements (ISO 3834-3)*

EN ISO 9606 (all parts), *Approval testing of welders - Fusion welding - Part 4: Nickel and nickel alloys (ISO 9606 (all parts))*

EN ISO 15613, *Specification and qualification of welding procedures for metallic materials - Qualification based on pre-production welding test (ISO 15613)*

EN ISO 15614 (all parts), *Specification and qualification of welding procedures for metallic materials - Welding procedure test (ISO 15614 (all parts))*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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
pressure used for the pressure tests

3.4
nominal size
DN
alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections

Note 1 to entry: The number following the letters DN does not represent a measurable value and should not be used for calculation purposes except where specified in the relevant standard.

Note 2 to entry: In those standards which use the DN designation system, any relationship between DN and component dimensions should be given, e.g. DN/OD or DN/ID.

[SOURCE: EN ISO 6708:1995]

4 Design and materials

4.1 General

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

4.2 Design

4.2.1 The valve shall be a stop valve as specified in EN 736-1 or dry disconnect couplings (for examples see Annex B). The operating mechanism shall be protected from inadvertent operation in transit either by a latching device or by locating within an enclosure.

NOTE This can be added at the valve, tank or vehicle. This requirement does not apply to dry break couplings automatically closed during transport.

4.2.2 As a minimum the position and/or direction of closure of the operating mechanism shall be marked.

This may be added at the valve, tank or vehicle. The marking may be omitted if the opening direction is intuitional or not applicable (e.g. in case of hand levers of ball valves and dry couplings). In this case this shall be stated in the manual or type approval of the valve.

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

4.3 Materials

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

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

4.3.3 The materials for the valve casing shall be permanently marked with the material designation corresponding to European pressure vessel material standards or with an equivalent national standard designation.

4.3.4 Proof of the quality characteristics for the valve body shall be provided by means of an inspection certificate 3.1 in accordance with EN 10204 for metallic materials (with additional consideration of EN 764-4 and -5) or an equivalent document.

5 Welding

5.1 Qualification

5.1.1 Manufacturers of welded service equipment shall have a manufacturing system for welding which respects the principles of EN ISO 3834-1 and EN ISO 3834-3 as a minimum.

5.1.2 Welding procedures shall be qualified according to EN ISO 15613 and EN ISO 15614 (all parts) (level 1 or level 2 for EN ISO 15614-1).

5.1.3 Welders shall be qualified according to EN ISO 9606 (all parts) and operators of welding equipment shall be qualified according to EN ISO 14732.

5.2 Welded joints

Recommended weld shapes are given in EN 1708-1.

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 specified 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 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 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” or “connected” and “disconnected”) without pressure and 10 full cycles (“open” to “closed” or “connected” and “disconnected”) at MWP (MAWP) or maximum actuation 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 specified in EN 12266-1:2012, Table A.5.

8 Production tests

8.1 General

Each valve produced shall conform to the drawings and other documents 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 specified 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 specified 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) manufacturers name or symbol;

c) manufacturers type (part or drawing number);

d) material of the valve casing:

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

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

f) year of manufacture;

g) unique serial number (batch signing is prohibited);

h) reference number of this document (i.e. EN 14432:2023);

i) temperature range.

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 (see Table A.1) 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.

Annex B
(informative)

Dry Disconnect Couplings

A dry disconnect coupling is a quick coupling which connects and disconnects with minimum release of transferred product and each separated section contains a self-closing shut-off valve, which seals automatically. The system consists of a male coupling (tank side) and a female coupling ("shore side"). The male coupling can only be opened with a suitable /compatible female coupling via a rotary movement. The entire "coupling mechanism" as well as the required handles are also located on the female coupling. The male coupling closes automatically by a spring-loaded valve poppet.

An example for a generally common type of a dry disconnect coupling for use as product discharge and/or air inlet valve on the flange connection of the tank is shown in Figure B.1. Other types of connection to the tank (e.g. threaded connection), nominal diameters are possible but not shown.

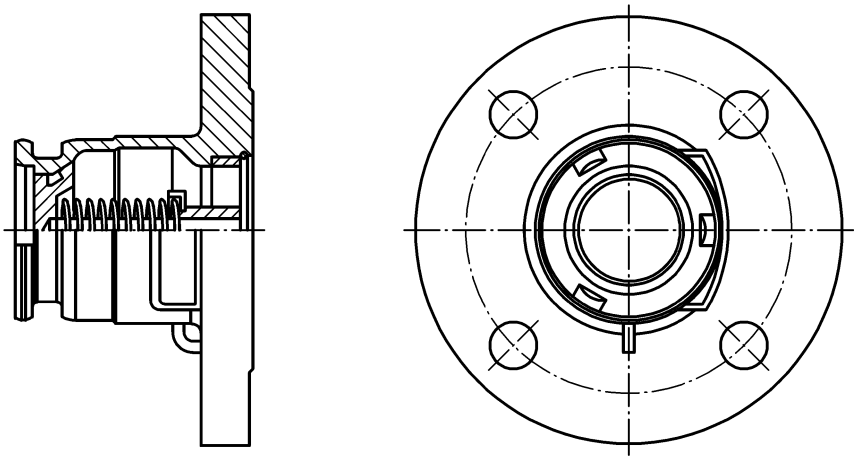

Figure B.1 — Example of a dry Disconnect Coupling

Bibliography

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

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

[3] EN 764-4, *Pressure equipment - Part 4: Establishment of technical delivery conditions for metallic materials*

[4] EN 764-5, *Pressure equipment - Part 5: Inspection documentation of metallic materials and compliance with the material specification*

[5] EN 1708-1, *Welding - Basic welded joint details in steel - Part 1: Pressurized components*

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

[7] EN ISO 6708:1995, *Pipework components - Definition and selection of DN (nominal size) (ISO 6708:1995)*

[8] EN 14564:2019, *Tanks for transport of dangerous goods - Terminology*

[9] EN 14433, *Tanks for the transport of dangerous goods - Tank equipment for the transport of liquid chemicals and liquefied gases - Foot valves*

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

bsi.