

TÖÖSTUSLIKUD VENTIILID. METALLIST VENTIILIDE
NÕUDED JA KATSETAMINE SURVETARVIKUTENA

Industrial valves - Requirements and testing for
metallic valves as pressure accessories

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16668:2016+A1:2018 sisaldab Euroopa standardi EN 16668:2016+A1:2018 ingliskeelset teksti.	This Estonian standard EVS-EN 16668:2016+A1:2018 consists of the English text of the European standard EN 16668:2016+A1:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 28.03.2018.	Date of Availability of the European standard is 28.03.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 23.060.01

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Industrial valves - Requirements and testing for metallic valves as pressure accessories

Robinetterie industrielle - Exigences et essais pour appareils de robinetterie métalliques utilisés comme accessoires sous pression

Industriearmaturen - Anforderungen und Prüfungen für Metallarmaturen als drucktragende Ausrüstungsteile

This European Standard was approved by CEN on 23 January 2016 and includes Amendment 1 approved by CEN on 8 January 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Contents	Page
European foreword	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	9
4 Category of valves	10
5 Requirements	10
5.1 Design	10
5.1.1 General	10
5.1.2 Shell design strength	10
5.1.3 Protection against exceeding the allowable limits	11
5.2 Materials	11
5.2.1 General requirements	11
5.2.2 European harmonized standards	11
5.2.3 European approval of materials (EAM)	11
5.2.4 Particular Material Appraisal (PMA)	11
5.2.5 Requirements for prevention of brittle fracture at low temperatures	12
5.2.6 Selection of bolting material	12
5.2.7 Material selection for parts other than shell	12
5.3 Manufacturing	12
5.3.1 Welding	12
5.3.2 Heat treatment	14
5.3.3 Traceability	14
5.3.4 Qualification of non-destructive testing personnel	15
5.4 Non-destructive testing (NDT)	15
5.4.1 Non-destructive testing of steel castings	15
5.4.2 Non-destructive testing of joint welding	15
5.5 Final assessment	15
5.6 Marking	16
5.7 Surface and coating testing	16
5.8 Documentation	16
5.8.1 Documentation for final inspection	16
5.8.2 Accompanying documents	17
Annex A (normative) Classification of valves	18
Annex B (informative) European harmonized standards for materials and components for shell parts	23
Annex C (informative) European Approval of Materials (EAM)	25
Annex D (informative) European harmonized supporting standards for valves	26
Annex E (informative) Non-destructive testing of steel castings	28
E.1 Terms and Definitions	28
E.2 Non-destructive testing of steel castings	28
E.2.1 General	28
E.2.2 Testing procedures	31

Annex F (normative) Non-destructive testing (NDT) of joint welding	36
F.1 General	36
F.2 Non-destructive testing (NDT) extent.....	36
F.3 Selection of NDT-methods	42
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2014/68/EU aimed to be covered	43
Bibliography	45

European foreword

This document (EN 16668:2016+A1:2018) has been prepared by Technical Committee CEN/TC 69 “Industrial valves”, 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 September 2018, and conflicting national standards shall be withdrawn at the latest by September 2018.

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 includes Amendment 1, approved by CEN on 8 January 2018.

This document supersedes A1 EN 16668:2016 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

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, which is an integral part of this document.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard is to be understood as an umbrella standard referencing European harmonized Standards for industrial metallic valves as pressure accessories for industrial applications and covers the relevant minimum requirements to meet the Essential Safety Requirements of the Pressure Equipment Directive.

1 Scope

This European standard applies to metallic valves as pressure accessories for industrial applications with a maximum allowable pressure PS greater than 0,5 bar in accordance with the ^{A1} European legislation for pressure equipment ^{A1} and specifies minimum requirements applicable to design, manufacture, testing, materials and documentation.

All relevant essential safety requirements of the ^{A1} European legislation for pressure equipment ^{A1} applicable to valves have been taken into consideration and are addressed in this standard.

This standard is not applicable to:

- safety valve and bursting disc (a safety accessory),
- sight glass with its frames (component of a pressure equipment) and
- measurement chambers.

For other exclusions refer to the ^{A1} European legislation for pressure equipment ^{A1} [32].

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.

^{A1} EN 19:2016 ^{A1}, *Industrial valves — Marking of metallic valves*

^{A1} *deleted text* ^{A1}

EN 545:2010, *Ductile iron pipes, fittings, accessories and their joints for water pipelines — Requirements and test methods*

^{A1} EN 593:2017, *Industrial valves — Metallic butterfly valves for general purposes* ^{A1}

^{A1} EN 736-1:2017 ^{A1}, *Valves — Terminology — Part 1: Definition of types of valves*

^{A1} EN 764-1:2015+A1:2016, *Pressure equipment — Part 1: Vocabulary*

EN 764-2:2012, *Pressure equipment — Part 2: Quantities, symbols and units* ^{A1}

EN 764-4:2014, *Pressure equipment — Part 4: Establishment of technical delivery conditions for metallic materials*

EN 764-5:2014, *Pressure equipment — Part 5: Inspection documentation of metallic materials and compliance with the material specification*

^{A1} EN 764-7:2002, *Pressure equipment — Part 7: Safety systems for unfired pressure equipment* ^{A1}

^{A1} EN 1171:2015 ^{A1}, *Industrial valves — Cast iron gate valves*

EN 1349:2009, *Industrial process control valves*

EN 1515-4:2009, *Flanges and their joints — Bolting — Part 4: Selection of bolting for equipment subject to the Pressure Equipment Directive 97/23/EC*

EN 1561:2011, *Founding — Grey cast irons*

EN 1982:2008, *Copper and copper alloys — Ingots and castings*

EN 1983:2013 ^{A1}, *Industrial valves — Steel ball valves*

EN 1984:2010 ^{A1}, *Industrial valves — Steel gate valves*

EN 10025-1:2004, *Hot rolled products of structural steels — Part 1: General technical delivery conditions* ^{A1}

EN 10025-2:2004, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10028-2:2017, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3:2017, *Flat products made of steels for pressure purposes — Part 3: Weldable fine grain steels, normalized*

EN 10028-4:2017, *Flat products made of steels for pressure purposes — Part 4: Nickel alloy steels with specified low temperature properties*

EN 10028-7:2016, *Flat products made of steels for pressure purposes — Part 7: Stainless steels*

EN 10213:2007+A1:2016, *Steel castings for pressure purposes* ^{A1}

EN 10222-2:1999, *Steel forgings for pressure purposes — Part 2: Ferritic and martensitic steels with specified elevated temperature properties*

EN 10222-3:2017, *Steel forgings for pressure purposes — Part 3: Nickel steels with specified low temperature properties*

EN 10222-4:2017, *Steel forgings for pressure purposes — Part 4: Weldable fine grain steels with high proof strength*

EN 10222-5:2017, *Steel forgings for pressure purposes — Part 5: Martensitic, austenitic and austenitic-ferritic stainless steels* ^{A1}

EN 10269:2013, *Steels and nickel alloys for fasteners with specified elevated and/or low temperature properties*

EN 12163:2011, *Copper and copper alloys — Rod for general purposes*

EN 12164:2011, *Copper and copper alloys — Rod for free machining purposes*

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 12288:2010 ^{A1}, *Industrial valves — Copper alloy gate valves*

^{A1} *deleted text* ^{A1}

EN 12449:2012, *Copper and copper alloys — Seamless, round tubes for general purposes*

EN 12516-1:2014, *Industrial valves — Shell design strength — Part 1: Tabulation method for steel valve shells*

EN 12516-2:2014, *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 12516-4:2014, *Industrial valves — Shell design strength — Part 4: Calculation method for valve shells manufactured in metallic materials other than steel*

EN 13397:2001, *Industrial valves — Diaphragm valves made of metallic materials*

EN 13445-2:2014, *Unfired pressure vessels — Part 2: Materials*

EN 13445-4:2014, *Unfired pressure vessels — Part 4: Fabrication*

EN 13445-5:2014, *Unfired pressure vessels — Part 5: Inspection and testing*

EN 13480-2:2012, *Metallic industrial piping — Part 2: Materials*

EN 13547:2013, *Industrial valves — Copper alloy ball valves*

EN 13709:2010, *Industrial valves — Steel globe and globe stop and check valves*

EN 13789:2010, *Industrial valves — Cast iron globe valves*

deleted text

EN 16767:2016, *Industrial valves — Steel and cast iron check valves*

EN ISO 5817:2014, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2014)*

EN ISO 9606-1:2017, *Qualification testing of welders — Fusion welding — Part 1: Steels (ISO 9606-1:2012 including Cor 1:2012 and Cor 2:2013)*

EN ISO 9606-2:2004, *Qualification test of welders — Fusion welding — Part 2: Aluminium and aluminium alloys (ISO 9606-2:2004)*

EN ISO 9606-3:1999, *Approval testing of welders — Fusion welding — Part 3: Copper and copper alloys (ISO 9606-3:1999)*

EN ISO 9606-4:1999, *Approval testing of welders — Fusion welding — Part 4: Nickel and nickel alloys (ISO 9606-4:1999)*

EN ISO 9606-5:2000, *Approval testing of welders — Fusion welding — Part 5: Titanium and titanium alloys, zirconium and zirconium alloys (ISO 9606-5:2000)*

EN ISO 9712:2012, *Non-destructive testing — Qualification and certification of NDT personnel (ISO 9712:2012)*

EN ISO 14732:2013, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732:2013)*

EN ISO 15609-1:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2004)*

EN ISO 15613:2004, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test (ISO 15613:2004)*

EN ISO 15614-1:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2004)*

EN ISO 15614-2:2005, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 2: Arc welding of aluminium and its alloys (ISO 15614-2:2005)*

EN ISO 15614-5:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 5: Arc welding of titanium, zirconium and their alloys (ISO 15614-5:2004)*

EN ISO 15614-6:2006, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 6: Arc and gas welding of copper and its alloys (ISO 15614-6:2006)*

EN ISO 17635:2010, *Non-destructive testing of welds — General rules for metallic materials (ISO 17635:2010)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 736-1, EN 764 (all parts) and the following apply.

3.1

valve

piping component which influences the fluid flow by opening, closing or partially obstructing the passage of the fluid flow or by diverting or mixing the fluid flow

Note 1 to entry Typical valves are gate valves, globe valves, control valves, check valves, diaphragm valves, butterfly valves, plug and ball valves as well as non-standard valves either manual or actuator operated and steam traps, usually covered by a product standard.

[SOURCE: EN 736-1:1995, modified — The Note 1 to entry was added here.]

3.2

production welding

welding carried out during manufacturing before final delivery to the purchaser including joint welding and finishing welding

3.2.1

joint welding

welding used to weld components in order to obtain an integral unit

3.2.2

finishing welding

welding carried out in order to ensure the agreed quality of the casting

[SOURCE: EN ISO 11970:2007, 3.1.2]