



**SLOVENSKI STANDARD**  
**oSIST prEN 16668:2022**  
**01-marec-2022**

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**Industrijski ventili - Zahteve in preskušanje kovinskih ventilov kot tlačnega pribora**

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

Industriearmaturen - Anforderungen und Prüfungen für Metallarmaturen als drucktragende Ausrüstungsteile

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

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**Ta slovenski standard je istoveten z: prEN 16668**

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**ICS:**

23.060.01      Ventili na splošno      Valves in general

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**en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 16668**

January 2022

ICS 23.060.01

Will supersede EN 16668:2016+A1:2018

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 draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 69.

If this draft becomes a European Standard, 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.

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

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

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**prEN 16668:2022 (E)****European foreword**

This document (prEN 16668:2022) has been prepared by Technical Committee CEN/TC 69 “Industrial valves”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 16668:2016+A1:2018.

In comparison with the previous edition, the following technical modifications have been made:

- the following clauses and subclauses were modified: 5.3.1.1, 5.3.1.2, 5.3.1.3, 5.3.1.4, 5.3.1.5, 5.3.1.6, 5.3.1.7, 5.3.2, 5.3.4;
- Annex ZA was modified.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

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## Introduction

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

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## 1 Scope

This document 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 European legislation for pressure equipment and specifies minimum requirements applicable to design, manufacture, testing, materials and documentation.

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

This document 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 European legislation for pressure equipment [31].

## 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 19:—<sup>1</sup>, *Industrial valves - Marking of metallic valves*

EN 736-1:2018, *Valves - Terminology - Part 1: Definition of types of valves*

EN 764-1:2015+A1:2016, *Pressure equipment - Part 1: Vocabulary*

EN 764-2:2012, *Pressure equipment - Part 2: Quantities, symbols and units*

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*

EN 764-7:2002, *Pressure equipment - Part 7: Safety systems for unfired pressure equipment*

EN 1349:2009, *Industrial process control valves*

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

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*

<sup>1</sup> Under preparation. Current stage is prEN 19:2021.



- EN 12516-1:2014+A1:2018, *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+A1:2018, *Industrial valves - Shell design strength - Part 4: Calculation method for valve shells manufactured in metallic materials other than steel*
- EN 13445-2:2021, *Unfired pressure vessels - Part 2: Materials*
- EN 13445-4:2021, *Unfired pressure vessels - Part 4: Fabrication*
- EN 13445-5:2021, *Unfired pressure vessels - Part 5: Inspection and testing*
- EN 13480-2:2017, *Metallic industrial piping - Part 2: Materials*
- 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 15609-1:2019, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding (ISO 15609-1:2019)*
- 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 15614-1:2017, *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 15614-1:2017, Corrected version 2017-10-01)*

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EN ISO 15614-1:2017/A1:2019, *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 - Amendment 1 (ISO 15614-1:2017/Amd 1:2019)*

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 17635:2016, *Non-destructive testing of welds - General rules for metallic materials (ISO 17635:2016)*

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 736-1:2018, EN 764-1:2015+A1:2016, EN 764-2:2012, EN 764-4:2014, EN 764-5:2014, EN 764-7:2002 and the following apply.

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

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

**3.1****valve**

pipng 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 736-1:2018, 3.1 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**

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

[SOURCE: EN ISO 11970:2016, 3.1.2]

**3.3****repair welding**

welding carried out after delivery to the end user, i.e. after the casting has been in service

[SOURCE: EN ISO 11970:2016, 3.2]

**3.4****sample**

set of one or more units taken from a batch and intended to provide information on the batch

Note 1 to entry: This definition is based on ISO 2859-1.

**3.5****material manufacturer**

person or organization (like founder, forge-, welding shop) which provides material to the responsible valve manufacturer

**4 Category of valves**

A classification under the use of DN and PS and fluid groups 1 and 2 leads to maximum category III. For respective results, see Annex A.

Valves classified in Article 4 (3) of the European legislation for pressure equipment, are excluded from conformance to requirements of this document, but are expected to meet the “sound engineering practice” by conformity to the relevant product standard.

**5 Requirements**

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**5.1 Design****5.1.1 General**

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Valves shall meet the design requirements of this document and are expected to meet the ones referenced in Annex ZA of their relevant European harmonized standards.

NOTE Annex D contains a summary of European harmonized standards for valves.

The manufacturer shall conduct a hazard analysis for the intended use and for the reasonably foreseeable conditions.

It is recommended to have this hazard analysis documented.

If the manufacturer identifies hazards which apply to the valve the manufacturer shall take account of his analysis by appropriate measures in order to reduce or eliminate the hazard identified.

**5.1.2 Shell design strength**

The shell design strength shall be determined by the following:

- a) for steel valves designed by the tabulation method: according to EN 12516-1:2014+A1:2018;
- b) for steel valves designed by calculation: according to EN 12516-2:2014;
- c) for copper alloy, aluminium and cast iron valves: according to EN 12516-4:2014+A1:2018;
- d) if the shell strength resistance is validated by an experimental method: according to EN 12516-3:2002.

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Appropriate calculation methods other than those specified in the relevant European harmonized standards giving same level of safety may be applied.

**NOTE** The valve obturator normally is no part of the shell – except if an “end of line service” is agreed between valve manufacturer and customer – in this case, all requirements related to the European legislation for pressure equipment apply to the obturator as well.

**WARNING** — Basis of design is expected to comply with the requirements of the European legislation for pressure equipment relative to the design for adequate strength using calculation methods validated, if necessary, by an experimental method. The use of experimental design methods without calculation is limited.

**5.1.3 Protection against exceeding the allowable limits**

If the hazard analysis identifies the allowable limits under reasonably foreseeable conditions could be exceeded, manufacturer shall fit the valve with a suitable protective device.

**5.2 Materials****5.2.1 General requirements**

Shell materials shall be selected in accordance with EN 12516-1:2014+A1:2018, EN 12516-4:2014+A1:2018 or EN 13445-2:2021. Other metallic shell materials may be used providing they are covered by an EAM or PMA.

The inspection documents of material shall be in accordance with EN 764-5:2014.

**NOTE** EAM or PMA is not required for valves classified in Article 4 (3) of the European legislation for pressure equipment.

Where relevant the requirements given in EN 764-4:2014 should be considered.

**5.2.2 European harmonized standards**

A summary of Harmonized European Material Standards for shell parts is given in Annex B.

**5.2.3 European approval of materials (EAM)**

EAM for materials are intended for repeated use. They are established in accordance with EN 764-4:2014 and apply to materials or treatment condition and product forms or dimensions not covered in a European Harmonized Standard.

Annex C contains a link to OJEU Website for European approval of materials (EAM).

**5.2.4 Particular Material Appraisal (PMA)**

If no material according to a harmonized European material standard is available the manufacturer is obliged to perform or obtain the required particular material appraisal (PMA).

For valves in categories III or IV, a specific assessment of the PMA shall be performed by the notified body in charge of conformity assessment procedures for the valves.

PMA apply also as follows:

- a material or a product form or a thickness not covered by a European material Standard or EAM;
- a material specified in a European material Standard or EAM for materials for pressure equipment is intended in an exceptional case for service conditions outside its specified range of application.

Table 1 shows a selection of EN material standards covering materials for which it is required to obtain a PMA when used as shell material.

**Table 1 — EN material standards for which a PMA is required**

Main material group	European Standard / Material
Steels specified in European standards	EN 10025-2:2019 (S235JR, S235JRG2 and S355J2G3) EN 10222-2:2017+A1:2021 (P250GH)
Cast irons	EN 1561:2011 EN 545:2010
Copper	EN 1982:2017 EN 12449:2016+A1:2019 EN 12163:2016 EN 12164:2016

### 5.2.5 Requirements for prevention of brittle fracture at low temperatures

It is the responsibility of the manufacturer to apply appropriate methods for the prevention of brittle fracture at low temperatures. Temperature limits as given in EN 12516-1:2014+A1:2018 and EN 12516-4:2014+A1:2018 shall be considered.

The methods to prevent brittle fracture at low temperatures described in EN 13480-2:2017 and EN 13445-2:2021, Annex B shall be applied.

### 5.2.6 Selection of bolting material

Material selection for bolting shall be in accordance with EN 10269:2013. Other bolting materials may be used providing they are covered by an EAM or PMA.

EN 1515-4:2021 provides a possible selection of bolting for equipment subject to the European legislation for pressure equipment.

### 5.2.7 Material selection for parts other than shell

Material selection for parts other than shell is the responsibility of the valve manufacturer.

The stuffing box packing shall not cause corrosion on a stem, shaft or pivot.

NOTE Asbestos materials are not allowed.

## 5.3 Manufacturing

### 5.3.1 Welding

#### 5.3.1.1 General requirements

Welding of the shell itself or on components of shell shall only be undertaken if the following conditions are satisfied:

- a) a welding procedure specification is held by the manufacturer;
- b) the welding procedures selected by the manufacturer are qualified for the field of application;
- c) the welders and welding operators are qualified for the work allocated to them and their approval is valid.

Welding of high-alloy martensitic chromium steels (>13 % Cr) requires particular qualification, except casting production welds at the foundry.