სსტ ენ 12516-2:2014+A1:2021/2022

საქართველოს სტანდარტი

სსკ: 23.060.01

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

სამრეწველო სარქველები - კორპუსის კონსტრუქციის სიმტკიცე - ნაწილი 2: განგარიშების მეთოდი ფოლადის სარქველიანი კორპუსისთვის

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2022

სსტ ენ 12516-2:2014+A1:2021/2022

საინფორმაციო მონაცემები

1 **მიღებულია და დაშვებულია სამოქმედოდ:** სსიპ-საქართველოს სტანდარტებისა და მეტროლოგიის ეროვნული სააგენტოს გენერალური დირექტორის 17/10/2022 წლის № 75 განკარგულებით

2 **მიღებულია „თავფურცლის" თარგმნის მეთოდით:** სტანდარტიზაციის ევროპული კომიტეტის (ენ) სტანდარტი ენ 12516-2:2014+A1:2021 ,, სამრეწველო სარქველები - კორპუსის კონსტრუქციის სიმტკიცე - ნაწილი 2: განგარიშების მეთოდი ფოლადის სარქველიანი კორპუსისთვის"

3 **პირველად**

4 **რეგისტრირებულია:** სსიპ-საქართველოს სტანდარტებისა და მეტროლოგიის ეროვნული სააგენტოს რეესტრში: 17/10/2022 წლის №268-1.3-028127

წინამდებარე სტანდარტის ნებისმიერი ფორმით გავრცელება სააგენტოს ნებართვის გარეშე აკრძალულია

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12516-2:2014+A1

October 2021

ICS 23.060.01

Supersedes EN 12516-2:2014

English Version

Industrial valves - Shell design strength - Part 2: Calculation method for steel valve shells

Robinetterie industrielle - Résistance mécanique des enveloppes - Partie 2 : Méthode de calcul relative aux enveloppes d'appareils de robinetterie en acier

Industriearmaturen - Gehäusefestigkeit - Teil 2: Berechnungsverfahren für drucktragende Gehäuse von Armaturen aus Stahl

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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საინფორმაციო ნაწილი. სრული ტექსტის სანახავად შეიძინეთ სტანდარტი.

European foreword

This document (EN 12516-2:2014+A1:2021) 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of an identical text or by endorsement, at the latest by April 2022, and conflicting national standards shall be withdrawn at the latest by April 2022.

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 includes Amendment 1 approved by CEN on 6 September 2021.

This document supersedes [A1) EN 12516-2:2014 (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 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.

[A1) In comparison with the previous edition EN 12516-2:2004, the following significant changes have been made in the new edition EN 12516-2:2014: (A1]

a) the normative references were updated;

b) all formulae and figures have been renumbered; in particular 10.6 “Design temperature” became 10.5 “Calculation of the bolt diameter”;

c) some formulae were changed:

  1) Formulae (3) to (6) for calculated wall thickness have been added;

  2) Formulae (9) and (10) for calculation of e_c in case of d_o / d_i > 1,7 have been added;

  3) Formulae (17) and (20) for conical bodies or branches have been added;

d) the figures were changed and/or updated:

  1) a new Figure 1 “Composition of section thickness and tolerance allowances” has been added;

  2) Figure 2 “Cone calculation coefficient” has been over-worked;

  3) former Figures 6a and 6b are now combined in Figure 7 “Calculation coefficient B_n for rectangular cross-sections”;

  4) Figures 23, 24, and 25 used to establish the calculation coefficients C_x, C_y and C_z were moved to 8.2.1;

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5) the new Figure 46 “Types of flange connections” has been added;

e) tables were updated:

1) Table 1 giving the symbols characteristics and units has been revised;

2) a column for test conditions in Table 2 “Nominal design stresses (allowable stresses)” has been added;

3) Table 5 “Flat circular plates and annular plates — Bending moments as a function of load cases and clamping conditions” has been revised;

4) Table 7 “Lever arms of the forces in the moment formulae” has been revised;

f) Clause 6 “Nominal design stresses for pressure parts other than bolts” now contains references to PED 97/23/EC;

g) Clause 7 “Calculation methods for the wall thickness of valve bodies” has been restructured; and 7.1 now contains information on calculation of the surface-comparison;

h) Subclauses 8.2.2 and 8.2.3 now draw a distinction between “direct loading” and “not subjected to direct loading”; and 8.2.3 now contains a warning regarding the mean support diameter d_{mA};

i) there is a new Subclause 8.3.3.5 regarding the diameter of centre of gravity;

j) Clause 10 “Calculation methods for flanges” has been over-worked;

k) the former informative Annex A “Allowable stresses” has been deleted;

l) the Annex “Characteristic values of gaskets and joints” has been over-worked;

m) Annex ZA has been updated.

EN 12516, *Industrial valves — Shell design strength*, consists of four parts:

— *Part 1: Tabulation method for steel valve shells*;

— *Part 2: Calculation method for steel valve shells* (the present document);

— *Part 3: Experimental method*;

— *Part 4: Calculation method for valve shells manufactured in metallic materials other than steel*.

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.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

EN 12516, *Industrial valves — Shell design strength*, is composed of four parts. EN 12516-1 and EN 12516-2 specify methods for determining the thickness of steel valve shells by tabulation and calculation methods respectively. EN 12516-3 establishes an experimental method for assessing the strength of valve shells in steel, cast iron and copper alloy by applying an elevated hydrostatic pressure at ambient temperature. EN 12516-4 specifies methods for calculating the thickness for valve shells in metallic materials other than steel.

The calculation method, EN 12516-2, is similar in approach to the former DIN 3840 where the designer is required to calculate the wall thickness for each point on the pressure temperature curve using the allowable stress at that temperature for the material he has chosen (see Bibliography, reference [1]). The allowable stress is calculated from the material properties using safety factors that are defined in EN 12516-2. The formulae in EN 12516-2 consider the valve as a pressure vessel and ensure that there will be no excessive deformation or plastic instability.

The tabulation method, EN 12516-1, is similar in approach to ASME B16.34 (see Bibliography, reference [2]) in that the designer can look up the required minimum wall thickness dimension of the valve body from a table. The internal diameter of the inlet bore of the valve gives the reference dimension from which the tabulated wall thickness of the body is calculated.

The tabulated thicknesses in EN 12516-1 are calculated using the thin cylinder formula that is also used in EN 12516-2. The allowable stress used in the formula is equal to 120,7 MPa and the operating pressure, p_c, in MPa, varies for each PN and Class designation. EN 12516-1 gives these p_c values for all the tabulated PN and Class designations.

EN 12516-1 specifies PN, Standard Class and Special Class pressure temperature ratings for valve shells with bodies having the tabulated thickness. These tabulated pressure temperature ratings are applicable to a group of materials and are calculated using a selected stress, which is determined from the material properties representative of the group, using safety factors defined in EN 12516-1.

Each tabulated pressure temperature rating is given a reference pressure designation to identify it.

The tabulation method gives one thickness for the body for each PN (see EN 12516-1:2014, 3.1 PN (Body)) or Class designation depending only on the inside diameter, D_i, of the body at the point where the thickness is to be determined.

The calculated pressure is limited by the ceiling pressure which sets up an upper boundary for high strength materials and limits the deflection.

A merit of the tabulation method, which has a fixed set of shell dimensions irrespective of the material of the shell, is that it is possible to have common patterns and forging dies. The allowable pressure temperature rating for each material group varies proportionally to the selected stresses of the material group to which the material belongs, using the simple rules above.

A merit of the calculation method is that it allows the most efficient design for a specific application using the allowable stresses for the actual material selected for the application.

The two methods are based on different assumptions, and as a consequence the detail of the analysis is different (see Bibliography, reference [3]). Both methods offer a safe and proven method of designing pressure-bearing components for valve shells.

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