



SLOVENSKI STANDARD

SIST EN 12516-4:2008

01-oktober-2008

Industrial valves - Shell design strength - Part 4: Calculation method for valve shells manufactured in metallic materials other than steel

Industrial valves - Shell design strength - Part 4: Calculation method for valve shells manufactured in metallic materials other than steel

Industriearmaturen - Gehäusefestigkeit - Teil 4: Berechnungsverfahren für drucktragende Gehäuse von Armaturen aus anderen metallischen Werkstoffen als Stahl

Robinetterie industrielle - Résistance mécanique des enveloppes - Partie 4 : Méthode de calcul relative aux enveloppes d'appareils de robinetterie en matériaux autres que l'acier

Ta slovenski standard je istoveten z: EN 12516-4:2008

ICS:

23.060.01 Ventili na splošno Valves in general

SIST EN 12516-4:2008

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12516-4:2008

<https://standards.iteh.ai/catalog/standards/sist/11cc5d69-5fa4-4078-9b99-f996ce613efc/sist-en-12516-4-2008>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12516-4

January 2008

ICS 23.060.01

English Version

**Industrial valves - Shell design strength - Part 4: Calculation
method for valve shells manufactured in metallic materials other
than steel**

Robinetterie industrielle - Résistance mécanique des
enveloppes - Partie 4 : Méthode de calcul relative aux
enveloppes d'appareils de robinetterie en matériaux
métalliques autres que l'acier

Industriearmaturen - Gehäusefestigkeit - Teil 4:
Berechnungsverfahren für drucktragende Gehäuse von
Armaturen aus anderen metallischen Werkstoffen als Stahl

This European Standard was approved by CEN on 14 December 2007.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Symbols and units	5
4 Interrelation of thickness definitions.....	6
5 Requirements	6
5.1 General.....	6
5.2 Materials — Cast iron	7
5.2.1 General.....	7
5.2.2 Calculation parameters	7
5.2.3 Pressure/temperature ratings for cast iron.....	8
5.2.4 Welding	8
5.3 Materials — Wrought copper alloys.....	9
5.3.1 General.....	9
5.3.2 Calculation parameters	10
5.3.3 Pressure/temperature ratings for wrought copper alloy	12
5.4 Materials — Wrought aluminium alloys	13
5.4.1 Calculation parameters	13
5.4.2 Pressure/temperature ratings for wrought aluminium alloys	13
5.5 Allowable stresses.....	15
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC	16
Bibliography	17

SIST EN 12516-4:2008

<https://standards.iteh.ai/catalog/standards/sist/11cc5d69-5fa4-4078-9b99-f996ce613efc/sist-en-12516-4-2008>

Foreword

This document (EN 12516-4:2008) 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 July 2008, and conflicting national standards shall be withdrawn at the latest by July 2008.

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 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 97/23.

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

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*
- *Part 3: Experimental method*
- *Part 4: Calculation method for valve shells manufactured in metallic materials other than steel*

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

EN 12516-4:2008 (E)**1 Scope**

This part of EN 12516 specifies the calculation method for valve shells manufactured in metallic materials other than steel. The loadings to be accounted for are in accordance with EN 12516-2.

Design methods are in accordance with EN 12516-2, design by formulae according to the relevant clauses.

2 Normative references

The following referenced documents are indispensable for the application 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 485-2, *Aluminium and aluminium alloys — Sheet, strip and plate — Part 2: Mechanical properties*

EN 573-3:2007, *Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products*

EN 586-2, *Aluminium and aluminium alloys — Forgings — Part 2: Mechanical properties and additional property requirements*

EN 754-2, *Aluminium and aluminium alloys - Cold drawn rod/bar and tube - Part 2: Mechanical properties*

EN 755-2, *Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 2: Mechanical properties*

EN 1092-2:1997, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN-designated — Part 2: Cast iron flanges*

EN 1092-3:2003, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN-designated - Part 3: Copper alloy flanges*

EN 1092-4:2002, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN-designated - Part 4: Aluminium alloy flanges*

EN 1561:1997, *Founding — Grey cast irons*

EN 1562:1997, *Founding — Malleable cast irons*

EN 1563:1997, *Founding — Spheroidal graphite cast irons*

EN 1653:1997, *Copper and copper alloys — Plate, sheet and circles for boilers, pressure vessels and hot water storage units*

EN 1759-3:2003, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 3: copper alloy flanges*

EN 1982:1998, *Copper and copper alloys — Ingots and castings*

EN 12163:1998, *Copper and copper alloys — Rod for general purposes*

EN 12420:1999, *Copper and copper alloys — Forgings*

EN 12449:1999, *Copper and copper alloys — Seamless, round tubes for general purposes*

EN 12516-2:2004, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells*

EN 12982:2000, *Industrial valves - End-to-end and centre-to-end dimensions for butt welding end valves*

ISO 7005-2, *Metallic flanges — Part 2: Cast iron flanges*

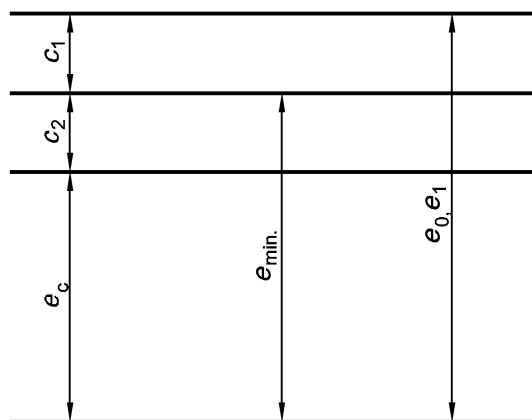
ISO 7005-3, *Metallic flanges — Part 3: Copper alloy and composite flanges*

3 Symbols and units

Table 1 — Symbols and units

Symbol	Characteristic	Unit
c_1	tolerance	mm
c_2	corrosion allowance	mm
e	wall thickness	mm
f	nominal design stress	MPa or N/mm ²
f_d	Maximum value of the nominal design stress for normal operation load cases	MPa or N/mm ²
$f_{d/t}$	nominal design stress for design conditions at temperature t °C	MPa or N/mm ²
R_m	minimum tensile strength	N/mm ² , MPa
$R_{m/t}$	tensile strength at temperature t °C	MPa or N/mm ²
$R_{p0,1}$	minimum 0,1 %-proof strength at temperature t °C	N/mm ² , MPa
$R_{p0,2}$	minimum 0,2 %-proof strength	N/mm ² , MPa
$R_{p0,2/t}$	0,2 % — proof strength at temperature t °C	MPa or N/mm ²
$R_{p1,0/t}$	1,0 % — proof strength at temperature t °C	MPa or N/mm ²
TS	maximum/minimum allowable temperature	°C
ε	extra thickness due to casting process	mm
δ	casting tolerance	mm

4 Interrelation of thickness definitions



Key

e_c calculated wall thickness

e_{\min} minimum wall thickness including corrosion allowance

c_2 corrosion allowance

$c_1 = \varepsilon + \delta$ manufacturer allowance c_1

e_0, e_1 total wall thickness

Figure 1 — Interrelation of thicknesses definitions

SIST EN 12516-4:2008

The manufacturer shall decide the thickness allowance for corrosion or other chemical attack.

f996cc613efc/sist-en-12516-4-2008

5 Requirements

5.1 General

When materials specified in following tables are not available, other suitable materials may be used when the technical documentation defining the characteristics of these materials has been accepted in accordance with the requirements for European Approval for Materials (EAM) or Particular Material Appraisal (PMA).

The calculation method for a valve shell in materials other than steel shall be in accordance with EN 12516-2. The choice of materials and their parameters shall be taken from the following clauses of this European Standard.

5.2 Materials — Cast iron

5.2.1 General

Materials shall be in accordance with Table 2.

Table 2 — Allowable material grades

Graphite structure	Standard	R_m N/mm ²	Designation	
			Symbol	Number
Grey cast iron	EN 1561	200 ^a	EN-GJL-200	EN-JL1030
	EN 1561	250	EN-GJL-250	EN-JL1040
Spheroidal graphite cast iron	EN 1563	350	EN-GJS-350-22-LT	EN-JS1015
	EN 1563	350	EN-GJS-350-22U-LT	EN-JS1019
	EN 1563	350	EN-GJS-350-22-RT	EN-JS1014
	EN 1563	400	EN-GJS-400-18	EN-JS1020
	EN 1563	400	EN-GJS-400-18-LT	EN-JS1025
	EN 1563	400	EN-GJS-400-18-RT	EN-JS1024
	EN 1563	400	EN-GJS-400-15	EN-JS1030
	EN 1563	400	EN-GJS-400-18U-LT	EN-JS1049
	EN 1563	500	EN-GJS-500-7	EN-JS1050
	EN 1563	600	EN-GJS-600-3	EN-JS1060
	EN 1563	700	EN-GJS-700-2	EN-JS1070
Malleable cast iron	EN 1562	300	EN-GJMB-300-6	EN-JM1110
	EN 1562	350	EN-GJMB-350-10	EN-JM1130

^a Grade 200 shall not be used for valves with flanged connections PN 25 or above.

Material properties shall be taken from the material standards listed in Table 2.

5.2.2 Calculation parameters

Calculation parameters shall be in accordance with Table 3 to Table 4

Table 3 — Strength values for wall thickness up to 60 mm

Material grade	Characteristic value	Strength characteristics $R_{p0,2}$ at operating temperature in °C						
		20	100	150	200	250	300	350
EN-GJS-700-2/2U	$R_{p0,2}$	420	400	390	370	350	320	280
EN-GJS-600-3/3U	$R_{p0,2}$	370	350	340	320	300	270	220
EN-GJS-500-7/7U	$R_{p0,2}$	320	300	290	270	250	230	200
EN-GJS-400-15/15U	$R_{p0,2}$	250	240	230	210	200	180	160
EN-GJS-400-18/18U-LT	$R_{p0,2}$	240	230	220	200	190	170	150
EN-GJS-350-22/22U-LT	$R_{p0,2}$	220	210	200	180	170	150	140