

**TÖÖSTUSLIKUD VENTIILID. KORPUSE TUGEVUS. OSA 4:
TERASEST ERINEVATEST METALLIDEST VALMISTATUD
VENTIILIKORPUSTE ARVUTUSMEETOD**

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

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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 9 August 2014.

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Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Symbols and units	5
4 Interrelation of thickness definitions	5
5 Requirements	5
5.1 General.....	5
5.2 Materials — Cast iron	5
5.2.1 Allowable grades	5
5.2.2 Strength values	6
5.2.3 Pressure/temperature ratings for cast iron	8
5.2.4 Welding	8
5.3 Materials — Wrought copper alloys	8
5.3.1 General.....	8
5.3.2 Strength values	10
5.3.3 Pressure/temperature ratings for wrought copper alloy	13
5.4 Materials — Wrought aluminium alloys	13
5.4.1 General.....	13
5.4.2 Strength values	13
5.4.3 Pressure/temperature ratings for wrought aluminium alloys	19
5.5 Allowable stresses.....	19
5.5.1 Aluminium and aluminium alloys - wrought materials	19
5.5.2 Materials other than aluminium.....	19
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC (PED)	20
Bibliography	21

Foreword

This document (EN 12516-4:2014) 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of an identical text or by endorsement, at the latest by April 2015 and conflicting national standards shall be withdrawn at the latest by April 2015.

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 supersedes EN 12516-4:2008.

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/EC.

For relationship with EU Directive 97/23/EC, 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 (the present document).*

The main changes compared to the previous edition are:

- a) normative references have been updated;
- b) Clause 4 has been revised;
- c) additional ductile iron materials were added to Table 2;
- d) Subclause 5.2.2 has been revised;
- e) Safety factors in Table 17 have been corrected to be in line with other practicable standards;
- f) Annex ZA has been revised.

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

1 Scope

This European Standard 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 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.

EN 485-2:2013, *Aluminium and aluminium alloys — Sheet, strip and plate — Part 2: Mechanical properties*

EN 586-2:1994, *Aluminium and aluminium alloys — Forgings — Part 2: Mechanical properties and additional property requirements*

EN 754-2:2013, *Aluminium and aluminium alloys — Cold drawn rod/bar and tube — Part 2: Mechanical properties*

EN 755-2:2013, *Aluminium and aluminium alloys — Extruded rod/bar, tube and profiles — Part 2: Mechanical properties*

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

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

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

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

EN 1562:2012, *Founding — Malleable cast irons*

EN 1563:2011, *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, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, Class designated — Part 3: Copper alloy flanges*

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

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

EN 12420:2014, *Copper and copper alloys — Forgings*

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

EN 12516-2:2014, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells*

CEN/TS 13388:2013, *Copper and copper alloys — Compendium of compositions and products*

EN 13445-8:2009, *Unfired pressure vessels — Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys*

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

3 Symbols and units

Table 1 — Symbols and units

Symbol	Characteristic	Unit
f	nominal design stress	MPa
$f_{d/t}$	nominal design stress for design conditions at temperature t °C	MPa
$f_{d/20}$	nominal design stress for design conditions at 20 °C	MPa
R_m	minimum tensile strength	MPa
$R_{m/20}$	Tensile strength at 20 °C	MPa
$R_{m/t}$	tensile strength at temperature t °C	MPa
$R_{p0,1}$	minimum 0,1 %-proof strength	MPa
$R_{p0,2}$	minimum 0,2 %-proof strength	MPa
$R_{p0,2/t}$	0,2 % — proof strength at temperature t °C	MPa
$R_{p1,0/t}$	1,0 % — proof strength at temperature t °C	MPa

4 Interrelation of thickness definitions

For interrelation of thickness definitions refer to EN 12516-2:2014, Clause 4.

5 Requirements

5.1 General

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 Allowable grades

Materials shall be in accordance with Table 2.