BRITISH STANDARD

BS EN
1503-2:2000

Valves — Materials for bodies, bonnets and covers —

Part 2: Steels other than those specified in European Standards

The European Standard EN 1503-2:2000 has the status of a British Standard

ICS 23.060.01; 77.140.30

National foreword

This British Standard is the official English language version of EN 1503-2:2000.

The UK participation in its preparation was entrusted by Technical Committee PSE/7, Industrial valves, to Subcommittee PSE/7/1, Basic valves, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 10, an inside back cover and a back cover.

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This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 December 2000

ISBN 0 580 36745 2

Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1503-2

October 2000

ICS 23.060.00; 77.140.30

English version

Valves - Materials for bodies, bonnets and covers - Part 2: Steels other than those specified in European Standards

Appareils de robinetterie - Matériaux pour les corps, chapeaux et couvercles - Partie 2: Autres aciers que ceux spécifiés dans les normes européennes

Armaturen - Werkstoffe für Gehäuse, Oberteile und Deckel - Teil 2: Stähle, die in Europäischen Normen nicht festgelegt sind

This European Standard was approved by CEN on 6 October 2000.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1503-2:2000 E

Contents

Foreword

This European Standard 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 2001, and conflicting national standards shall be withdrawn at the latest by April 2001.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. This European Standard is considered to be a supporting standard to those application and product standards which in themselves support an essential safety requirement of a New Approach Directive and which make reference to this European Standard.

EN 1503 comprises four parts :

— Part 1 : Steels specified in European Standards ;

— Part 2 : Steels other than those specified in European Standards ;

— Part 3 : Cast irons specified in European Standards ;

— Part 4 : Copper alloys specified in European Standards.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard lists steels for pressure containing valve bodies, bonnets and covers which are given in Standards other than European Standards.

2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporate in it by amendments or revision. For undated references, the latest edition of the publication referred to applies (including amendments).

EN 1503-1, *Valves – Materials for bodies, bonnets and covers – Part 1 : Steels specified in European Standards.*

prEN 1092-1:1997, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges.*

ASTM A 105-95, *Carbon Steel Forgings*.

ASTM A 106-94a, *Seamless Carbon Steel Pipe.*

ASTM A 182-94c, *Alloy Steel Forged or Rolled Parts.*

ASTM A 203-93, *Nickel Alloy Steel Plates.*

ASTM A 204-93, *Pressure Vessel Plates, Carbon Steel, Molybdenum.*

ASTM A 216-93, *Carbon Steel Castings.*

ASTM A 217-93, *Alloy Steel Castings.*

ASTM A 240-94b, *Stainless Steel Plate.*

ASTM A 302-93, *Pressure Vessel Plates, Carbon Steel, Manganese-Molybdenum and Manganese-Molybdenum-Nickel.*

ASTM A 312-94b, *Stainless Steel Pipe, Seamless or Welded.*

ASTM A 335-94, *Seamless Ferritic Alloy Steel Pipe.*

ASTM A 350-95, *Low-Temperature Alloy Steel Forged or Rolled Parts.*

ASTM A 351-94, *Stainless Steel Castings.*

ASTM A 352-93, *Low-Temperature Carbon and Alloy Steel Castings.*

ASTM A 358-94, *Electric Fusion-Welded Stainless Steel Pipe.*

ASTM A 369-92, *Ferritic Alloy Forged or Bored Pipe.*

ASTM A 376-93, *Stainless Steel Pipe, Seamless for Central Station Service.*

ASTM A 387-84, *Alloy Steel Plates.*

ASTM A 430-91, *Stainless Steel Forged or Bored Pipe.*

ASTM A 479-95, *Alloy Steel Bars and Shapes.*

ASTM A 515-92, *Carbon Steel Plates, High Temperature.*

ASTM A 516-90, *Carbon Steel Plates, Low Temperature.*

ASTM A 537-91, *Carbon-Manganese-Silicon Steel Plates.*

ASTM A 672-94, *Electric-Fusion Welded Steel Pipe.*

ASTM A 675-90a, *Carbon Steel Bars.*

ASTM A 691-93, *Carbon & Alloy Steel Pipe - Electric-Fusion Welded.*

ASTM A 696-90a, *Carbon Steel Bars.*

ASTM A 739-90a, *Alloy Steel Bars.*

ASTM A 789-94, *Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service.*

ASTM A 790-94, *Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe.*

3 Materials

As well as the EN-steels which are listed in EN 1503-1 all ASTM-steels given in Tables 1, 2 and 3 can also be used for the manufacture of pressure containing valve bodies, bonnets and covers.

Table 1 lists unalloyed steels, Table 2 low alloy steels and Table 3 high alloy steels.

The materials shall be used within the limits specified in the tables.

The material shall not be used at temperatures below -29°C or the standard impact test temperature specified in the material standard.

Table 1 - Unalloyed steels

Line	Forgings				Castings				Flat products				Tube				Bar			
	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group	ASTM			prEN 1092-1:1997 Material. group	ASTM			prEN 1092-1:1997 Material. group	ASTM			prEN 1092-1:1997 Material. group
	No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation	
1					A216	WCC	Not for prolonged use over 425ºC	1C2	A515 A516	70 70	Not for prolonged use over 425ºC	1C1 1C1	A106 A672	C B70	Not to be used over 425ºC	1C2 1C1	A675	70	Not for prolonged use over 425ºC	1C1
					A352	LCC	Not to be used over 345ºC	1C2	A537	Cl 1	Not to be used over 370ºC	1C1	A672	C70		1C1	A696	C		1C1
2	A105 A350	LF2	Not for prolonged use over 425ºC	1C1 1C1	A216	WCB	Not for prolonged use over 425ºC	1C1	A515 A516	65 65	Not for prolonged use over 425ºC	1C3 1C3	A672 A672	B65 C65	Not for prolonged use over 425ºC	1C3 1C3	A105 A350	LF2	Not for prolonged use over 425ºC	1C1 1C1
					A352	LCB	Not to be used over 345ºC	1C3					A106	B		1C4	A675	65		1C3
3	A350	LF1	Not for prolonged use over 425ºC	1C4					A515 A516	60 60	Not for prolonged use over 425ºC	1C4 1C4	A672 A672	B60 C60	Not for prolonged use over 425ºC	1C4 1C4	A350 A675	LF1 60	Not for prolonged use over 425ºC	1C4 1C4
																	A696	B	Not to be use over 540ºC	1C4
4									A537	Cl.2	Not to be used over 370ºC	1C11								

Table 2 - Low alloy steels

Line	Forgings				Castings				Flat products				Tube				Bar			
	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.
	No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation	
1	A182	F1	Not for prolonged use over 470ºC	1C5	A217 A352	WC1 LC1	Not for prolonged use over 470ºC Not to be used over 345ºC	1C5 1C5					A335 A369	P1 FP1	Not for prolonged use over 470ºC	1C6 1C6	A182	F1	Not for prolonged use over 470ºC	1C5
2	A182	F2	Not to be used over 540ºC	1C7	A217	WC4	Not to be used over 540ºC. See Note	1C7	A387 A387	2 Cl.1 2 Cl.2	Not to be used over 540ºC	1C6 1C6	A691	½CR	Not for prolonged use over 540ºC	1C6	A182	F2	Not to be used over 540ºC	1C7
3					A217	WC5	Not to be used over 565ºC. See Note	1C7												
4	A182	F5	Not to be used over 650ºC.	1C13	A217	C5	Not to be used over 650ºC. See Note	1C13	A387	5 Cl.1	Not to be used over 650ºC.	1C12	A335	P5	Not to be used over 650ºC.	1C12	A182	F5	Not to be used over 650ºC.	1C13
5	A182	F5a	Not to be used over 650ºC.	1C13					A387	5 Cl.2	Not to be used over 650ºC.	1C12	A335 A369 A691	P5b FP5 5CR	Not to be used over 650ºC.	1C12 1C12 1C12	A182	F5a	Not to be used over 650ºC.	1C13
6	A182	F9	Not to be used over 650ºC.	1C14	A217	C12	Not to be used over 650ºC. See Note	1C14									A182	F9	Not to be used over 650ºC.	1C14
7									A387	11 Cl.1	Not for prolonged use over 595ºC	1C8								
8	A182	F11 Cl.2	Not for prolonged use over 595ºC	1C9	A217	WC6	Not to be used over 595ºC. See Note	1C9	A387	11 Cl.2	Not for prolonged use over 595ºC	1C9	A335 A369 A691	P11 FP11 1¼CR	Not for prolonged use over 595ºC	1C8 1C8 1C8	A182 A739	F11 Cl.2 B11	Not for prolonged use over 595ºC	1C9 1C9
9									A387	12 Cl.1	Not for prolonged use over 470ºC	1C6								
10	A182	F12 Cl.2	Not for prolonged use over 595ºC	1C9					A387	12 Cl.2	Not for prolonged use over 595ºC	1C8	A335 A369 A691	P12 FP12 1CR	Not for prolonged use over 595ºC Not for prolonged use over 595ºC. See Note	1C8 1C8 1C8	A182	F12 Cl.2	Not for prolonged use over 595ºC	1C9
11	A182	F21	Not for prolonged use over 595ºC	1C11					A387	21 Cl.2	Not for prolonged use over 595ºC	1C11					A182	F21	Not for prolonged use over 595ºC	1C11
12									A387	22 Cl.1	Not for prolonged use over 595ºC	1C8	A335 A369 A691	P22 FP22 2¼CR	Not for prolonged use over 595ºC	1C8 1C8 1C8				
13	A182	F22 Cl.3	Not for prolonged use over 595ºC	1C10	A217	WC9	Not to be used over 595ºC. See Note	1C10	A387	22 Cl.2	Not for prolonged use over 595ºC	1C10					A182 A739	F22 Cl.3 B22	Not for prolonged use over 595ºC	1C10 1C10
14									A203	A	Not for prolonged use over 425ºC	1C3								
15									A203	D	Not for prolonged use over 425ºC	1C3								
16					A352	LC2	Not to be used over 345ºC	1C2	A203	B	Not for prolonged use over 425ºC	1C2								
17	A350	LF3	Not to be used over 345ºC	1C2	A352	LC3	Not to be used over 345ºC	1C2	A203	E	Not for prolonged use over 425ºC	1C2					A350	LF3	Not to be used over 345ºC	1C2
18									A204	A	Not for prolonged use over 470ºC	1C5								

"to be continued"

Table 2 *(continued)*

Line	Forgings				Castings				Flat products				Tube				Bar			
	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.
	No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation	
19									A204	B	Not for prolonged use over 470ºC	1C5	A691	CM-70	Not for prolonged use over 470ºC	1C5				
20									A204	C	Not for prolonged use over 470ºC	1C7	A691	CM-75	Not to be used over 565ºC.	1C7				
21									A302 A302	A B	Not to be used over 540ºC	1C11 1C11								
22									A302	C	Not to be used over 540ºC	1C11								
23									A302	D	Not to be used over 540ºC	1C11								
NOTE Use normalised and tempered material only.																				

Table 3 - High alloy steels

Line	Forgings				Castings				Flat products				Tube				Bar			
	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.
	No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation	
1	A182	F304	Not to be used over 815ºC. See Note 1	2C1	A351	CF8	Not to be used over 815ºC. See Note 1	2C1	A240	304	Not to be used over 815ºC. See Note 1	2C1	A312 A358 A376 A430	TP304 304 TP304 FP304	Not to be used over 815ºC. See Note 1	2C1 2C1 2C1 2C1	A182 A479	F304 304	Not to be used over 815ºC. See Note 1	2C1 2C1
					A351	CF8A	Not to be used over 345ºC	2C2												
2	A182	F304H	Not to be used over 815ºC.	2C1					A240	304H	Not to be used over 815ºC.	2C1	A312 A376 A430	TP304H TP304H FP304H	Not to be used over 815ºC.	2C1 2C1 2C1	A182 A479	F304H 304H	Not to be used over 815ºC.	2C1 2C1
3	A182	F304L	Not to be used over 425ºC	2C3	A351	CF3	Not to be used over 425ºC	2C1	A240	304L	Not to be used over 425ºC	2C3	A312	TP304L	Not to be used over 425ºC	2C3	A182 A479	F304L 304L	Not to be used over 425ºC	2C3 2C3
					A351	CF3A	Not to be used over 345ºC	2C2												
4					A351	CH8	Not to be used over 815ºC. See Note 1	2C6	A240	309S	Not to be used over 815ºC. See Note 1, 2 and 4	2C6								
5					A351	CH20	Not to be used over 815ºC. See Note 1	2C6	A240	309H	Not to be used over 815ºC.	2C6	A312 A358	TP309H 309H	Not to be used over 815ºC.	2C6 2C6				
6									A240	310S	Not to be used over 815ºC. See Note 1, 2 and 4	2C7					A479	310S	Not to be used over 815ºC. See Note 1, 2 and 4	2C7
7	A182	F310H	Not to be used over 815ºC.	2C7	A351	CK20	Not to be used over 815ºC. See Note 1	2C7	A240	310H	Not to be used over 815ºC.	2C7	A312 A358	TP310H 310H	Not to be used over 815ºC.	2C7 2C7	A182 A479	F310H 310H	Not to be used over 815ºC.	2C7 2C7
8	A182	F316	Not to be used over 815ºC. See Note 1	2C2	A351	CF8M	Not to be used over 815ºC. See Note 1	2C2	A240	316	Not to be used over 815ºC. See Note 1	2C2	A312 A358 A376 A430	TP316 316 TP316 FP316	Not to be used over 815ºC. See Note 1	2C2 2C2 2C2 2C2	A182 A479	F316 316	Not to be used over 815ºC. See Note 1	2C2 2C2
9	A182	F316H	Not to be used over 815ºC.	2C2					A240	316H	Not to be used over 815ºC.	2C2	A312 A376 A430	TP316H TP316H FP316H	Not to be used over 815ºC.	2C2 2C2 2C2	A182 A479	F316H 316H	Not to be used over 815ºC.	2C2 2C2
10	A182	F316L	Not to be used over 455ºC	2C3	A351	CF3M	Not to be used over 455ºC	2C2	A240	316L	Not to be used over 455ºC	2C3	A312	TP316L	Not to be used over 455ºC	2C3	A182 A479	F316L 316L	Not to be used over 455ºC	2C3 2C3
11					A351	CG8M	Not to be used over 540ºC	2C2	A240	317	Not to be used over 815ºC. See Note 1	2C2	A312	TP317	Not to be used over 815ºC. See Note 1	2C2				
12	A182	F321	Not to be used over 540ºC	2C4					A240	321	Not to be used over 540ºC	2C4	A312 A358 A376 A430	TP321 321 TP321 FP321	Not to be used over 540ºC	2C4 2C4 2C4 2C4	A182 A479	F321 321	Not to be used over 540ºC	2C4 2C4

"to be continued"

Table 3 *(continued)*

Line	Forgings				Castings				Flat products				Tube				Bar			
	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.	ASTM			prEN 1092-1:1997 Material. group.
	No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation		No.	Grade	Limitation	
13	A182	F321H	Not to be used over 815ºC. See Note 3	2C4					A240	321H	Not to be used over 815ºC. See Note 3	2C4	A312 A376 A430	TP321H TP321H FP321H	Not to be used over 815ºC.	2C4 2C4 2C4	A182 A479	F321H 321H	Not to be used over 815ºC. See Note 3 Not to be used over 815ºC.	2C4 2C4
14	A182	F347	Not to be used over 540ºC	2C5	A351	CF8C	Not to be used over 815ºC. See Note 1	2C5	A240	347	Not to be used over 540ºC	2C5	A312 A358 A376 A430	TP347 347 TP347 FP347	Not to be used over 540ºC	2C5 2C5 2C5 2C5	A182 A479	F347 347	Not to be used over 540ºC	2C5 2C5
15	A182	F347H	Not to be used over 815ºC. See Note 3	2C5					A240	347H	Not to be used over 815ºC. See Note 3	2C5	A312 A376 A430	TP347H TP347H FP347H	Not to be used over 815ºC.	2C5 2C5 2C5	A182 A479	F347H 347H	Not to be used over 815ºC. See Note 3 Not to be used over 815ºC.	2C5 2C5
16	A182	F348	Not to be used over 540ºC	2C5					A240	348	Not to be used over 540ºC	2C5	A312 A376	TP348 TP348	Not to be used over 540ºC	2C5 2C5	A182 A479	F348 348	Not to be used over 540ºC	2C5 2C5
17	A182	F348H	Not to be used over 815ºC. See Note 3	2C5					A240	348H	Not to be used over 815ºC. See Note 3	2C5	A312	TP348H	Not to be used over 815ºC.	2C5	A182 A479	F348H 348H	Not to be used over 815ºC. See Note 3 Not to be used over 815ºC.	2C5 2C5
18	A182	F44	Not to be used over 400°C	2C8	A351	CK3M CuN	Not to be used over 400°C	2C8	A240	S31254	Not to be used over 400ºC.	2C8	A312 A358	S31254 S31254	Not to be used over 400ºC.	2C8 2C8	A479	S31254	Not to be used over 400ºC.	2C8
19	A182	F51	Not to be used over 315ºC	2C8					A240	S31803	Not to be used over 315ºC	2C8	A789 A790	S31803 S31803	Not to be used over 315ºC	2C8 2C8	A479	S31803	Not to be used over 315ºC	2C8
20	A182	F53	Not to be used over 315ºC	2C8					A240	S32750	Not to be used over 315ºC	2C8	A789 A790	S32750 S32750	Not to be used over 315ºC	2C8 2C8	A479	S32750	Not to be used over 315ºC	2C8

NOTE 1 Use only at temperatures above 540ºC when carbon content is 0,04% or higher.

NOTE 2 For service temperature greater than 565ºC the grain size shall not be finer than ASTM 6.

NOTE 3 For temperatures above 540ºC, use only if the material is heat treated by heating to a minimum temperature of 1095ºC.

NOTE 4 For temperatures above 540ºC, use only if the material is solution heat treated to the minimum temperature specified in the material specification but not lower than 1040ºC and quenched in water or rapidly cooled by other means.

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