

**METALLIST TÖÖSTUSTORUSTIK. OSA 3: KAVANDAMINE
JA ARVUTAMINE**

Metallic industrial piping - Part 3: Design and calculation

EESTI STANDARDI EESSÖNA**NATIONAL FOREWORD**

See Eesti standard EVS-EN 13480-3:2017+A2+A3:2020 sisaldab Euroopa standardi EN 13480-3:2017 ja selle muudatuste A2:2020, A3:2020 ja A1:2021 ingliskeelset teksti.	This Estonian standard EVS-EN 13480-3:2017+A2+A3:2020 consists of the English text of the European standard EN 13480-3:2017 and its amendments A2:2020, A3:2020 and A1:2021.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 28.06.2017, muudatused A2 19.08.2020, A3 19.08.2020 ja A1 03.03.2021.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation. Date of Availability of the European standard is 28.06.2017, for A2 19.08.2020, A3 19.08.2020 and A1 03.03.2021.
Muudatusega A2 lisatud või muudetud teksti algus ja lõpp on tekstis ära märgitud märgenditega [A₂] [A₂] . Muudatusega A3 lisatud või muudetud teksti algus ja lõpp on tekstis ära märgitud märgenditega [A₃] [A₃] . Muudatusega A1 lisatud või muudetud teksti algus ja lõpp on tekstis ära märgitud märgenditega [A₁] [A₁] . Standard on kättesaadav Eesti Standardikeskusest.	The start and finish of text introduced or altered by amendment A2 is indicated in the text by symbols [A₂] [A₂] . The start and finish of text introduced or altered by amendment A3 is indicated in the text by symbols [A₃] [A₃] . The start and finish of text introduced or altered by amendment A1 is indicated in the text by symbols [A₁] [A₁] The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 23.040.01

Standardite reproduutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13480-3 + A2 + A3 +
A1

June 2017, August 2020, August 2020,
March 2021

ICS 23.040.01

Supersedes EN 13480-3:2012

English Version

Metallic industrial piping - Part 3: Design and calculation

Tuyauteries industrielles métalliques - Partie 3 :
Conception et calcul

Industrielle metallische Rohrleitungen - Teil 3:
Konstruktion und Berechnung

This European Standard was approved by CEN on 21 June 2017. Amendment A2 was approved by CEN on 12 July 2020.
Amendment A3 was approved by CEN on 12 July 2020. Amendment A1 was approved by CEN on 25 January 2021.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard and its amendments 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-CENELEC Management Centre or to any CEN member.

This European Standard and its Amendments A2, A3 and A1 exist 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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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

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

Contents

	Page
European foreword.....	10
[A₂] Amendment A2 European foreword [A₂].....	12
[A₃] Amendment A3 European foreword [A₃].....	13
[A₁] Amendment A1 European foreword [A₁].....	14
1 Scope.....	15
2 Normative references.....	15
3 Terms, definitions, symbols and units	16
3.1 Terms and definitions	16
3.2 Symbols and units	16
4 Basic design criteria.....	17
4.1 General.....	17
4.2 Loadings.....	18
4.2.1 General.....	18
4.2.2 Combination of loads	18
4.2.3 Loads for dimensioning	18
4.2.4 Other loads to be taken into account	20
4.2.5 Design conditions.....	21
4.3 Thickness	24
4.4 Tolerances	27
4.5 Joint coefficient.....	27
4.6 Dimensioning of piping components subject to pressure.....	28
5 Design stresses.....	28
5.1 General.....	28
5.2 Time-independent nominal design stress	29
5.2.1 Steels other than austenitic steels	29
5.2.2 Austenitic steels.....	29
5.2.3 Nickel and / or chromium alloy steels.....	30
5.2.4 [A₃] Steels castings [A₃].....	30
5.2.5 Additional requirements for steels with no specific control.....	30
5.3 Time-dependent nominal design stress	31
5.3.1 General.....	31
5.3.2 Steels.....	31
5.3.3 Nickel and/or chromium alloy steels.....	32
6 Design of piping components under internal pressure	32
6.1 Straight pipes.....	32
6.2 Pipe bends and elbows.....	32
6.2.1 General.....	32
6.2.2 Symbols.....	33
6.2.3 Required wall thicknesses	33
6.3 Mitre bends.....	34
6.3.1 General.....	34
6.3.2 Symbols.....	34
6.3.3 Effective radius of mitre bend	35
6.3.4 Multiple mitre bends	35

6.3.5	Single mitre bends.....	36
6.3.6	Adjacent straight pipe sections of mitre bends	36
6.4	Reducers	36
6.4.1	Conditions of applicability	36
6.4.2	Specific definitions.....	37
6.4.3	Specific symbols and abbreviations.....	37
6.4.4	Conical shells.....	38
6.4.5	Junctions - general.....	39
6.4.6	Junction between the large end of a cone and a cylinder without a knuckle.....	39
6.4.7	Junction between the large end of a cone and a cylinder with a knuckle	42
6.4.8	Junction between the small end of a cone and a cylinder	43
6.4.9	Offset reducers	45
6.4.10	Special forged reducers.....	45
6.5	Flexible piping components.....	46
6.5.1	General	46
6.5.2	Expansion joints.....	46
6.5.3	Corrugated metal hose assemblies	47
6.6	Bolted flange connections	49
6.6.1	General	49
6.6.2	Symbols	49
6.6.3	Standard flange	49
6.6.4	Non-standard flange	50
7	Design of ends under internal pressure.....	50
7.1	Dished ends.....	50
7.1.1	Symbols	50
7.1.2	Hemispherical ends	51
7.1.3	Torispherical ends	51
7.1.4	Ellipsoidal ends	53
7.1.5	Calculation of β	54
7.2	Circular flat ends.....	57
7.2.1	General	57
7.2.2	Symbols	57
7.2.3	Unstayed flat circular ends welded to cylindrical shells/pipes.....	58
7.2.4	Unstayed flat circular bolted ends.....	66
7.2.5	Reinforcements of openings in unstayed flat ends.....	71
8	Openings and branch connections	75
8.1	General	75
8.2	Symbols	75
8.3	Limitations	76
8.3.1	Thickness ratio	76
8.3.2	Openings in the vicinity of discontinuities	78
8.3.3	Types of reinforcement	79
8.3.4	Calculation method	80
8.3.5	Elliptical openings and oblique branch connections	80
8.3.6	Reinforcing pads	81
8.3.7	Dissimilar material of shell and reinforcements	82
8.3.8	Extruded outlets.....	82
8.3.9	Forged tee.....	82
8.3.10	Branches in bends or elbows.....	83
8.3.11	Screwed-in branches	83
8.4	Isolated openings.....	84
8.4.1	General	84

8.4.2	Unreinforced openings.....	87
8.4.3	Reinforced openings with $d_i/D_i < 0,8$	87
8.4.4	A₁ Reinforced single openings with $0,8 < d_i/D_i \leq 1,0$ A₁	93
8.5	Adjacent openings.....	93
8.5.1	Unreinforced openings.....	93
8.5.2	A₁ Reinforced openings with $d_i/D_i \leq 0,8$ A₁	93
8.6	Design of special piping components.....	94
8.6.1	Cylindrical Y-pieces	94
8.6.2	Spherical Y-pieces	95
8.6.3	Triform reinforced branches.....	96
9	Design of piping components under external pressure.....	97
9.1	General.....	97
9.2	Symbols and elastic stress limits.....	99
9.2.1	Symbols.....	99
9.2.2	Elastic stress limits.....	100
9.3	Cylindrical pipes, elbows and mitre bends.....	101
9.3.1	Determination of lengths	101
9.3.2	Interstiffener collapse	103
9.3.3	Overall collapse of stiffened pipes	105
9.3.4	Stiffener stability.....	106
9.3.5	Heating/cooling channels	109
9.4	Reducers (conical shells)	110
9.5	Dished ends	111
9.5.1	Hemispherical ends.....	111
9.5.2	Torispherical ends.....	112
9.5.3	Ellipsoidal ends.....	112
10	Design for cyclic loading.....	112
10.1	General.....	112
10.2	Exemption from detailed fatigue analysis	113
10.3	Fatigue design for cyclic pressure.....	113
10.3.1	Equivalent full load cycles.....	113
10.3.2	Simplified fatigue analysis	114
10.4	Fatigue design for thermal gradients.....	128
10.4.1	General.....	128
10.4.2	Design guidance	128
10.5	Fatigue design for combined loads	128
11	Integral attachments.....	129
11.1	General.....	129
11.2	Allowable stresses	129
11.3	Symbols.....	130
11.4	Hollow circular attachments.....	131
11.4.1	Limitations.....	131
11.4.2	Preliminary calculations	132
11.4.3	Analysis of attachments welded to pipe with a full penetration weld.....	134
11.4.4	Analysis of attachments welded to pipe with fillet or partial penetration weld	134
11.5	Rectangular attachments	134
11.5.1	Limitations.....	134
11.5.2	Preliminary calculations	135
11.5.3	Analysis of attachments welded to pipe with a full penetration weld.....	137
11.5.4	Analysis of attachments welded to pipe with fillet or partial penetration weld	137
11.6	Stress analysis of the run pipe.....	137

11.7 Shear stress analysis in attachment.....	139
11.7.1 Hollow circular attachments	139
11.7.2 Rectangular attachments.....	139
11.8 Alternative calculation methods.....	139
12 Flexibility analysis and acceptance criteria.....	140
12.1 Basic conditions	140
12.1.1 General	140
12.1.2 Loading conditions.....	140
12.1.3 Allowable stresses.....	140
12.2 Piping flexibility.....	142
12.2.1 General	142
12.2.2 Basic conditions	142
12.2.3 Displacement strains.....	142
12.2.4 Displacement stresses	143
12.2.5 Stress range	144
12.2.6 Cold pull	144
12.2.7 Properties for flexibility analysis	144
12.2.8 Supporting conditions.....	145
12.2.9 Expansion joints.....	146
12.2.10 Flexibility analysis	147
12.3 Flexibility analysis.....	149
12.3.1 A ₂ General A ₂	149
12.3.2 A ₂ Stress due to sustained loads A ₂	150
12.3.3 A ₂ Stress due to sustained and occasional or exceptional loads A ₂	151
12.3.4 A ₂ Stress range due to thermal expansion and alternating loads A ₂	152
12.3.5 A ₂ Additional conditions for the creep range A ₂	154
12.3.6 A ₂ Stresses due to a single non-repeated support movement A ₂	155
12.3.7 A ₂ Determination of resultant moments A ₂	156
12.3.8 Reactions	157
12.4 Fatigue analysis.....	157
12.5 Vibration	158
13 Pipe Supports	158
13.1 General requirements.....	158
13.1.1 General	158
13.1.2 Classification of supports.....	159
13.1.3 Additional definitions	159
13.1.4 Boundaries	161
13.1.5 Pipe supports welded to the pipe	163
13.2 Selection of pipe supports	164
13.2.1 General	164
13.2.2 Detail design of pipe supports	165
13.2.3 Support location.....	166
13.3 Constant hangers/base mounted (pedestal) constant supports.....	166
13.3.1 General	166
13.3.2 Load deviation from calibrated load	166
13.3.3 Site adjustment of the calibrated load	166
13.3.4 Travel reserve (Overtravel).....	166
13.3.5 Blocking.....	166
13.3.6 Identification Marking/Name plate	166
13.4 Variable load spring hangers and base mounted (pedestal) variable load spring supports	167
13.4.1 General	167

13.4.2 Tolerance on spring rate	168
13.4.3 Travel reserve (Overtravel)	168
13.4.4 Blocking	168
13.4.5 Name plate	168
13.5 Rigid struts	168
13.6 Shock arrestors, shock absorber (snubber)	169
13.7 Sliding supports	169
13.8 Anchors	170
13.9 Documentation of supports	170
13.10 Marking of supports	170
13.11 A_2 Design and manufacture of pipe supports A_2	170
13.11.1 Material requirements	170
13.11.2 Design temperatures for support components	170
13.11.3 Design details	172
13.11.4 Determination of component sizes	172
13.11.5 Welded connections	174
13.11.6 Threaded connections	176
13.11.7 Additional requirements on springs	176
13.11.8 Design details for rigid struts	177
13.11.9 A_2 Design details for shock arrestors, shock absorbers (snubbers) A_2	177
13.11.10 Clamps for shock arrestors, rigid struts	178
Annex A (informative) Dynamic effect	179
A.1 General	179
A.1.1 Introduction	179
A.1.2 Vibration design guidelines	179
A.2 Analysis by calculation	185
A.2.1 General	185
A.2.2 Seismic events	185
A.2.3 Rapid valve closure	190
A.2.4 Flow induced vibration	193
A.2.5 Safety valve discharge	196
A.2.6 Allowable stresses	198
A.2.7 Structural vibration properties	198
A.3 Alternative means of design verification	200
A.3.1 Comparative studies	200
A.3.2 Full scale testing	200
A.3.3 Reduced scale testing	201
A.4 Validation (measuring)	201
Annex B (normative) More accurate calculation of bends and elbows	202
B.1 General	202
B.2 Symbols and units	202
B.3 Required wall thickness	203
B.4 Calculation	204
B.4.1 Calculation of wall thickness	204
B.4.2 Stress calculation	206
Annex C (informative) Expansion joints	210
C.1 Incorporation of expansion joints into piping systems	210
C.1.1 General	210
C.1.2 Types of expansion joints	211
C.1.3 Design of expansion joints	211
C.1.4 Designing with expansion joints	212

C.1.5	Analyses and calculation.....	213
C.1.6	Cold pull	214
C.2	Maximum spacing for unrestrained axially compensated straight runs	214
C.2.1	General	214
C.2.2	Calculation rules	215
C.2.3	Maximum spacing for defined conditions.....	216
C.3	Indication for the design of expansion joints	217
C.3.1	General	217
C.3.2	Information for the system analyst.....	218
Annex D (normative) Flanges.....		219
D.1	Purpose	219
D.2	Specific terms and definitions.....	219
D.3	Specific symbols and abbreviations.....	220
D.4	General	221
D.4.1	Introduction.....	221
D.4.2	Use of standard flanges without calculation.....	221
D.4.3	Bolting.....	222
D.4.4	Flange construction	224
D.4.5	Machining	224
D.4.6	Gaskets	224
D.5	Narrow face gasketed flanges	225
D.5.1	General	225
D.5.2	Bolt loads and areas.....	228
D.5.3	Flange moments	229
D.5.4	Flange stresses and stress limits.....	229
D.5.5	Narrow face flanges subject to external pressure	235
D.5.6	Lap joints	235
D.5.7	Split ring flanges	238
D.6	Full face flanges with soft ring type gaskets	239
D.6.1	Specific symbols and abbreviations.....	239
D.6.2	Bolt loads and areas.....	240
D.6.3	Flange design.....	241
D.6.4	Full face flanges subject to external pressure.....	241
D.7	Seal welded flanges	241
D.8	Reverse narrow face flanges.....	242
D.8.1	Internal pressure	242
D.8.2	External pressure	245
D.9	Reverse full face flanges	245
D.9.1	General	245
D.9.2	Design following method of D.5.....	245
D.9.3	Design following method of D.6.....	247
D.10	Full face flanges with metal to metal contact	249
D.10.1	General	249
D.10.2	Specific symbols and abbreviations.....	249
D.10.3	Design	250
Annex E (normative) Design of branch connections in piping accessories		252
E.1	Scope	252
E.1.1	General	252
E.2	Reinforcement	254
E.2.1	Angles and areas	254
E.2.2	The following condition shall be satisfied:.....	254
E.3	Flexibility analysis.....	255

Annex F (informative) Testing during operation in the case of cyclic loading	257
F.1 Testing during operation	257
F.2 Measures to be taken when the calculated fatigue life has been reached.....	257
Annex G (informative) Physical properties of steels.....	258
G.1 General.....	258
G.2 Physical properties.....	258
G.2.1 Density	258
G.2.2 Differential coefficient of linear expansion.....	259
G.2.3 Specific thermal capacity.....	259
G.2.4 Thermal diffusivity.....	259
G.2.5 Poisson's ratio	259
G.3 Physical properties of steels	259
G.4 Material properties of carbon steel (structural steel) at elevated temperatures	265
Annex H (normative) Flexibility characteristics, flexibility and stress intensification factors and section moduli of piping components and geometrical discontinuities.....	266
Annex I (informative) Production testing of spring supports and shock absorbers (shock absorbers)	277
I.1 Constant load supports	277
I.2 Variable spring supports.....	277
I.3 Shock arrestors	277
Annex J (normative) Type testing of support components	282
Annex K (informative) Attachment of supports to structures	283
K.1 Attachment of supports to concrete structures	283
K.2 Attachment to metallic structures	284
K.2.1 Standard bolts	284
K.2.2 Friction grip bolts	284
K.2.3 Welding.....	284
Annex L (informative) Buckling of linear type supports	285
L.1 General.....	285
L.2 Symbols.....	285
L.3 Basic formulae.....	286
L.4 Allowable compressive stress	286
L.5 Buckling length	287
Annex M (informative) Design guidance for structural components	289
M.1 Linear type components subjected to bending	289
M.1.1 General.....	289
M.1.2 Supplementary verifications for linear type supports	289
M.2 Stability of plate type supports	291
M.3 Anchorage plates or equivalent anchorage components	291
M.3.1 General.....	291
M.3.2 Design of simple anchorage plates	291
M.3.3 Fixing plates with stiffening gussets	291
M.3.4 Load calculations for anchorages fixed in concrete	292
Annex N (normative) Documentation of supports	293
Annex O (normative) Alternative method for checking branch connections	295
O.1 Scope	295
O.2 Symbols.....	295
O.3 Design and checking of the branch connection.....	297
O.3.1 Limit value for the load due to pressure only for straight pipes without opening	297

0.3.2 Determination of the minimum thicknesses under loading due to pressure only	297
0.3.3 Checking of the thicknesses selected for the combination of pressure loading and loadings due to external loads	298
Annex P (informative) Recommended gaskets for industrial piping	349
Annex Q (informative) Simplified pipe stress analysis	351
Q.1 General	351
Q.2 Simplified procedure.....	351
Q.2.1 General	351
Q.2.2 Specification of allowable spacing of supports.....	351
Q.2.3 Check of elasticity	351
Q.3 Explanatory notes for Table Q.1	353
Q.4 Symbols	355
Q.5 Indices f_L.....	355
Q.6 Explanatory notes to Q.2.2	356
Q.6.1 Specification of allowable spacing of supports.....	356
Q.7 Conversion of the allowable lengths.....	357
Q.7.1 Other support conditions.....	357
Q.7.2 Other parameters	357
Q.8 Additional single loads	358
Q.8.1 General	358
Q.9 Explanatory note on Figure Q.2	360
Q.9.1 General	360
Q.9.2 Required pipe leg length L_1, for f_1 from the nomogram.....	363
Q.9.3 Required pipe leg length L_2, for f_2 from the nomogram	363
Annex R (informative) Surveillance of components operating in the creep range	368
R.1 General	368
R.2 Recording of operating data	368
R.3 Calculation of the creep exhaustion or the theoretical residual lifetime.....	368
R.4 Assessment of the cumulated creep.....	370
R.5 Review and repair of cracks	370
R.6 Creep and fatigue	370
R.7 Measures when reaching certain degrees of exhaustion	370
Annex Y (informative) History of EN 13480-3.....	371
Y.1 Differences between EN 13480-3:2012 and EN 13480-3:2017.....	371
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2014/68/EU aimed to be covered	373
Bibliography	374

European foreword

This document (EN 13480-3:2017) has been prepared by Technical Committee CEN/TC 267 "Industrial piping and pipelines", 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 December 2017, and conflicting national standards shall be withdrawn at the latest by December 2017.

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 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(s).

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

This European Standard EN 13480 for metallic industrial piping consists of eight interdependent and not dissociable Parts which are:

- *Part 1: General;*
- *Part 2: Materials;*
- *Part 3: Design and calculation;*
- *Part 4: Fabrication and installation;*
- *Part 5: Inspection and testing;*
- *Part 6: Additional requirements for buried piping;*
- *CEN/TR 13480-7, Guidance on the use of conformity assessment procedures;*
- *Part 8: Additional requirements for aluminium and aluminium alloy piping.*

Although these Parts may be obtained separately, it should be recognised that the Parts are interdependant. As such the manufacture of metallic industrial piping requires the application of all the relevant Parts in order for the requirements of the Standard to be satisfactorily fulfilled.

A1) This document is maintained by a working group (Maintenance Help Desk - MHD) whose scope of work is limited to corrections and interpretations related to EN 13480. **A1**

The contact to submit queries can be found at <http://www.unm.fr> (en13480@unm.fr). A form for submitting questions can be downloaded from the link to the MHD website. After subject experts have agreed an answer, the answer will be communicated to the questioner. Corrected pages will be given specific issue number and issued by CEN according to CEN Rules. Interpretation sheets will be posted on the website of the MHD.

This document supersedes EN 13480-3:2012. This new edition incorporates the Amendments which have been approved previously by CEN members, and the corrected pages up to Issue 5 without any further technical change. Annex Y provides details of significant technical changes between this European Standard and the previous edition.

Amendments to this new edition may be issued from time to time and then used immediately as alternatives to rules contained herein.

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

[A2] Amendment A2 European foreword

This document (EN 13480-3:2017/A2:2020) has been prepared by Technical Committee CEN/TC 267 "Industrial piping and pipelines", 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 February 2021, and conflicting national standards shall be withdrawn at the latest by February 2021.

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 standardization request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of EN 13480-3:2017.

This document includes the text of the amendment itself. The amended/corrected pages of EN 13480-3:2017 will be published as Issue 4 of the European Standard.

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. **[A2]**

[A3] Amendment A3 European foreword

This document (EN 13480-3:2017/A3:2020) has been prepared by Technical Committee CEN/TC 267 "Industrial piping and pipelines", 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 February 2021, and conflicting national standards shall be withdrawn at the latest by February 2021.

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 standardization request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this EN 13480-3:2017.

This document includes the text of the amendment itself. The amended/corrected pages of EN 13480-3:2017 will be published as Issue 4 of the European Standard.

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. [A3]

[A1] Amendment A1 European foreword

This document (EN 13480-3:2017/A1:2021) has been prepared by Technical Committee CEN/TC 267 "Industrial piping and pipelines", 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 September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

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(s).

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

This document includes the text of the amendment itself. The amended/corrected pages of EN 13480-3:2017 will be published as Issue 2 of the European Standard. **[A1]**

1 Scope

This Part of this European Standard specifies the design and calculation of industrial metallic piping systems, including supports, covered by EN 13480.

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.

A1 EN 764-5:2014, *Pressure equipment - Part 5: Inspection documentation of metallic materials and compliance with the material specification* **A1**

EN 1515-2:2001, *Flanges and their joints — Bolting — Part 2: Combination of flange and bolting materials for steel flanges PN designated*

EN 1515-3:2005, *Flanges and their joints — Bolting — Part 3: Classification of bolt materials for steel flanges, Class designated*

EN 1515-4:2010, *Flanges and their joints — Bolting — Part 4: Selection of bolting for equipment subject to the Pressure Equipment Directive 97/23/EC*

A1 deleted text **A1**

EN 1993 (all parts), *Eurocode 3: Design of steel structures*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN 10216-2:2013, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties*

A3 EN 12516-2:2014, *Industrial valves — Shell design strength — Part 2: Calculation method for steel valve shells* **A3**

EN 13445-3:2014, *Unfired pressure vessels — Part 3: Design*

EN 13480-1:2017, *Metallic industrial piping — Part 1: General*

EN 13480-2:2017, *Metallic industrial piping — Part 2: Materials*

EN 13480-4:2017, *Metallic industrial piping — Part 4: Fabrication and installation*

EN 13480-5:2017, *Metallic industrial piping — Part 5: Inspection and testing*

EN ISO 5817:2007, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections* (ISO 5817:2003, corrected version:2005, including Technical Corrigendum 1:2006)