



SLOVENSKI STANDARD
kSIST FprEN 1594:2013

01-april-2013

Infrastruktura za plin - Cevovodni sistemi za največji delovni tlak nad 16 bar - Funkcionalne zahteve

Gas infrastructure - Pipelines for maximum operating pressure over 16 bar - Functional requirements

Gasversorgungssysteme - Rohrleitungen für einen maximal zulässigen Betriebsdruck über 16 bar - Funktionale Anforderungen

Systèmes d'alimentation en gaz - Canalisations pour pression maximale de service supérieure à 16 bar - Prescriptions fonctionnelles

Ta slovenski standard je istoveten z: FprEN 1594

ICS:

91.140.40 Sistemi za oskrbo s plinom Gas supply systems

kSIST FprEN 1594:2013

en,fr,de

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

FINAL DRAFT
FprEN 1594

January 2013

ICS 23.040.01; 75.200

Will supersede EN 1594:2009

English Version

Gas infrastructure - Pipelines for maximum operating pressure over 16 bar - Functional requirements

Systèmes d'alimentation en gaz - Canalisations pour
pression maximale de service supérieure à 16 bar -
Prescriptions fonctionnelles

Gasversorgungssysteme - Rohrleitungen für einen maximal
zulässigen Betriebsdruck über 16 bar - Funktionale
Anforderungen

This draft European Standard is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 234.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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, 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 United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	6
Introduction	7
1 Scope	8
2 Normative references	10
3 Terms, definitions, symbols and abbreviations	12
4 Quality and management systems.....	16
5 Safety and the environment.....	17
5.1 General.....	17
5.2 Appropriate safety measures	17
5.3 Routing considerations.....	18
5.3.1 General.....	18
5.3.2 Surveys	18
5.3.3 Environmental impact	18
5.3.4 Ground conditions.....	18
5.4 Line valve spacing	19
6 Pressure safety	19
6.1 Pressure levels.....	19
6.2 Normal operation	19
6.3 Requirements for installation of pressure safety devices	20
6.4 Pipeline with DP equal to or less than 40 bar and hoop stress equal to or less than 0,45 $R_{t0,5}$	20
6.5 Pipeline with DP equal to or less than 24 bar and hoop stress equal to or less than 0,30 $R_{t0,5}$	20
7 Design	21
7.1 General.....	21
7.1.1 Design principles	21
7.1.2 Basis of design	21
7.2 Wall thickness determination	22
7.2.1 Straight pipe	22
7.2.2 Bends and elbows	23
7.3 Additional design requirements.....	23
7.3.1 Forces	23
7.3.2 Soil engineering data required	24
7.3.3 Structural models for pipeline sections	24
7.4 Analysis of stress and strain	25
7.4.1 Elastic and extended elastic design	25
7.4.2 Limit state design	26
7.5 Design report.....	27
7.6 Land management and geotechnical studies.....	28
7.7 Depth of cover.....	28
7.8 Casing pipes.....	29
7.9 Station design	29
7.9.1 Layout	29
7.9.2 Components	30
7.9.3 Interaction with onland pipeline section	30
7.9.4 Station pipework	31
7.10 Pipeline components.....	31
7.11 Pigging suitability	31
7.12 Arrangements for venting.....	31

7.13	Corrosion protection.....	32
7.13.1	General	32
7.13.2	External coating.....	32
7.13.3	Cathodic protection.....	33
7.14	Grid connections	34
8	Materials and components	34
8.1	General requirements	34
8.1.1	Base material	34
8.1.2	Manufacturing.....	34
8.1.3	Weldability.....	34
8.1.4	Mechanical properties.....	35
8.1.5	Inspection documents	37
8.1.6	Other steel types or grades	37
8.1.7	Records	37
8.2	Pipes	37
8.3	Fittings.....	37
8.3.1	General	37
8.3.2	Manufacturing.....	38
8.4	Flanged connections.....	38
8.5	Insulating connections	38
8.5.1	Type test.....	38
8.5.2	Strength test	38
8.5.3	Electrical test	38
8.5.4	External tightness test.....	39
8.6	Valves	39
8.7	External and internal coatings	39
8.8	End preparation	39
9	Construction	39
9.1	General	39
9.2	Execution of work.....	39
9.2.1	General	39
9.2.2	Marking out the site.....	39
9.2.3	Initial site inspections	40
9.2.4	Working strip	40
9.2.5	Separation of topsoil.....	40
9.2.6	Trenches.....	40
9.2.7	Crossing and proximity of buried structures (cables and pipes)	41
9.2.8	Handling and stringing	41
9.2.9	Bends.....	41
9.2.10	Welding and weld examination	42
9.2.11	External coating.....	42
9.2.12	Lowering into the trench.....	44
9.2.13	Ballasting, anchoring	45
9.2.14	Tie-ins	45
9.2.15	Backfill	45
9.2.16	Reinstatement.....	45
9.2.17	Markings.....	46
9.2.18	Final site inspection with owners and users	46
9.3	Special crossings	46
9.3.1	General	46
9.3.2	Open-trench road or path crossings	46
9.3.3	Trenchless crossings.....	46
9.3.4	Requirements for casings	49
9.3.5	Open trench major water crossings	49
9.3.6	Horizontal Directional Drilling (HDD).....	49
9.4	Cleaning	50
9.5	Testing	51
9.5.1	General	51
9.5.2	Test preparation	51

FprEN 1594:2013 (E)

9.5.3	Strength test.....	51
9.5.4	Tightness test.....	52
9.5.5	Pre-testing	52
9.5.6	Dewatering.....	52
9.5.7	Golden welds.....	52
9.6	Acceptance.....	52
9.6.1	As built records.....	52
9.6.2	Precommissioning.....	53
9.6.3	Handover and documentation	53
10	Operation and maintenance	53
10.1	General.....	53
10.1.1	Policy	53
10.1.2	Safety and environment	54
10.2	Organisation.....	54
10.3	Operating and maintenance instructions.....	54
10.4	Emergency plan	55
10.5	Records and documentation	55
10.6	Commissioning	56
10.7	Decommissioning	56
10.8	Recommissioning	56
10.9	Maintenance, modification and repair	56
10.9.1	General.....	56
10.9.2	Pipeline surveillance, inspection and monitoring.....	56
10.9.3	Execution of repairs and modifications	57
10.9.4	Work involving cutting of the pipeline.....	57
10.9.5	Work on in-service pipelines	57
10.9.6	Repairs after Emergency	58
10.9.7	Other and special maintenance activities	58
10.10	Abandonment.....	59
Annex A	(informative) Settlement areas	60
A.1	General.....	60
A.2	Procedure	60
A.3	Construction settlement	60
A.4	Strength calculation	61
A.4.1	Interaction between pipe and soil: pipeline considered as beam	62
A.4.2	Simplified calculation method.....	63
A.5	Monitoring	65
A.6	Action in the event of the allowable/limit values being exceeded.....	65
A.7	Bibliography.....	65
Annex B	(informative) Mining subsidence.....	66
B.1	General.....	66
B.2	Procedure	66
B.3	Strength calculation	66
B.4	Action in the event of the allowable/limit values being exceeded.....	67
B.5	Monitoring	67
B.6	Bibliography.....	67
Annex C	(informative) Frost heave	68
C.1	General.....	68
C.2	Procedure	68
C.3	Strength calculation	68
C.4	Other possible measures	68
C.5	Bibliography.....	69
Annex D	(informative) Landslide areas	70
D.1	General.....	70
D.2	Procedure	70
D.3	Strength calculation	71
D.4	Possible action to prevent the allowable/limit values being exceeded	71
D.5	Monitoring	72

D.6	Bibliography	72
Annex E	(informative) Areas with high seismic risk	74
E.1	General	74
E.2	Procedure	74
E.3	Strength calculation	75
E.3.1	Vibratory ground motion (shaking)	75
E.3.2	Permanent ground movement	76
E.3.3	Possible action to prevent the allowable/limit values being exceeded	76
E.4	Bibliography	76
Annex F	(informative) Soil mechanics parameters	78
F.1	Parameters	78
F.2	Soil engineering study	79
F.3	Bibliography	79
Annex G	(informative) Bored/jacked crossings	81
G.1	General	81
G.2	Strength calculation	81
G.2.1	Horizontal directional drilling	81
G.2.2	Jacked/bored crossings	84
G.3	Bibliography	85
Annex H	(informative) Allowable pulsation and vibration levels	86
H.1	Introduction	86
H.2	Pulsations	86
H.2.1	General	86
H.2.2	Allowable pulsation levels	86
H.3	Pipe vibrations	86
H.3.1	General	86
H.3.2	Criteria for vibration levels	87
H.4	Induced effects	87
H.5	Bibliography	87
Annex I	(informative) Allowable vibration levels from construction work - blasting	88
I.1	General	88
I.2	Procedure	88
I.3	Strength calculation	88
I.4	Bibliography	89
Annex J	(informative) Significant technical changes between this European Standard and the previous edition	91
	Bibliography	93

Foreword

This document (FprEN 1594:2013) has been prepared by Technical Committee CEN/TC 234 "Gas infrastructure", the secretariat of which is held by DIN.

This document is currently submitted to the Unique Acceptance Procedure.

This document will supersede EN 1594:2009.

This document has been prepared under mandate M/017 given to CEN by the European Commission and the European Free Trade Association.

Annex J provides details of significant technical changes between this European Standard and the previous edition.

There is a complete suite of functional standards prepared by CEN/TC 234 "Gas infrastructure" to cover all parts of the gas infrastructure from the input of gas to the transmission system up to the inlet connection of the gas appliances, whether for domestic, commercial or industrial purposes.

Compliance to this standard ensures the interoperability, safety and reliability requirements of pipeline systems.

Directive 2009/73/EC concerning common rules for the internal market in natural gas and the related Regulation (EC) No 715/2009 on conditions for access to the natural gas transmission networks also aim at technical safety (security) including technical reliability of the European gas system. These aspects are also in the scope of CEN/TC 234 standardisation. In this respect, CEN/TC 234 evaluated the indicated EU legislation and amended this technical standard accordingly, where required and appropriate.

A list of the relevant functional standards prepared by CEN/TC 234 is included in Clause 2 and the Bibliography of this document.

CEN/TC 234 will continue its work updating this European Standard to the latest developments at regular intervals.

In preparing this European Standard, a basic understanding of gas supply by the user has been assumed.

Gas infrastructure is complex and the importance on safety of their construction and use has led to the development of very detailed codes of practice and operating manuals in member countries. These detailed statements embrace recognised standards of gas engineering and specific requirements imposed by legal structures of these member countries.