



# SLOVENSKI STANDARD

## SIST EN 1594:2009

01-julij-2009

Nadomešča:  
SIST EN 1594:2000

---

### Sistemi oskrbe s plinom - Cevovodni sistemi za najvišji delovni tlak nad 16 bar - Funkcionalne zahteve

Gas supply systems - 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: **EN 1594:2009**

---

#### **ICS:**

91.140.40      Sistemi za oskrbo s plinom      Gas supply systems

**SIST EN 1594:2009**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 1594:2009

<https://standards.iteh.ai/catalog/standards/sist/a3dc3ee7-59f-471d-82ba-ff6e872a70fe/sist-en-1594-2009>

English Version

Gas supply systems - Pipelines for maximum operating pressure  
over 16 bar - Functional requirementsSystèmes d'alimentation en gaz - Canalisations pour  
pression maximale de service supérieure à 16 bar -  
Prescriptions fonctionnellesGasversorgungssysteme - Rohrleitungen für einen maximal  
zulässigen Betriebsdruck über 16 bar - Funktionale  
Anforderungen

This European Standard was approved by CEN on 8 December 2008.

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.

[SIST EN 1594:2009](https://standards.iteh.ai/catalog/standards/sist/a3dc3ee7-59f-471d-82ba-ff6e872a70fe/sist-en-1594-2009)

<https://standards.iteh.ai/catalog/standards/sist/a3dc3ee7-59f-471d-82ba-ff6e872a70fe/sist-en-1594-2009>

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

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

## Contents

Page

Foreword .....	5
Introduction.....	6
1 Scope.....	7
2 Normative references.....	9
3 Definitions, symbols and abbreviations .....	10
4 Quality and management systems .....	14
5 Safety and the environment .....	15
5.1 Introduction.....	15
5.2 Appropriate safety measures .....	15
5.3 Routing considerations .....	15
5.4 Line valve spacing .....	17
6 Pressure safety.....	17
6.1 Pressure levels .....	17
6.2 Normal operation.....	17
6.3 Requirements for installation of pressure safety devices .....	17
6.4 Pipeline with DP equal to or less than 40 bar and hoop stress equal to or less than 0,45 $R_{t 0,5}$ .....	18
6.5 Pipeline with DP equal to or less than 24 bar and hoop stress equal to or less than 0,30 $R_{t 0,5}$ .....	18
7 Design.....	19
7.1 General .....	19
7.2 Wall thickness determination.....	20
7.3 Additional design requirements .....	21
7.4 Analysis of stress and strain .....	22
7.5 Design report .....	24
7.6 Land management and geotechnical studies .....	25
7.7 Depth of cover .....	25
7.8 Casing pipes .....	26
7.9 Station design.....	26
7.10 Pipeline components .....	28
7.11 Pigging suitability .....	28
7.12 Arrangements for venting .....	28
7.13 Corrosion protection.....	29
8 Materials and components .....	31
8.1 General requirements .....	31
8.2 Pipes .....	34
8.3 Fittings.....	34
8.4 Flanged connections .....	34
8.5 Insulating connections .....	35
8.6 Valves .....	35
8.7 External and internal coatings .....	35
8.8 End preparation.....	35
9 Construction .....	35
9.1 General .....	35
9.2 Execution of work .....	36
9.3 Special crossings.....	42
9.4 Cleaning .....	46

9.5	Testing .....	46
9.6	Acceptance .....	48
10	Operation and maintenance .....	49
10.1	General .....	49
10.2	Organisation .....	49
10.3	Operating and maintenance instructions .....	50
10.4	Emergency plan .....	50
10.5	Records and documentation .....	51
10.6	Commissioning .....	51
10.7	Decommissioning .....	51
10.8	Recommissioning .....	51
10.9	Maintenance, modification and repair .....	51
10.10	Abandonment .....	54
<b>Annex A</b>	<b>(informative) Settlement areas .....</b>	<b>55</b>
<b>A.1</b>	<b>General .....</b>	<b>55</b>
<b>A.2</b>	<b>Procedure .....</b>	<b>55</b>
<b>A.3</b>	<b>Construction settlement .....</b>	<b>55</b>
<b>A.4</b>	<b>Strength calculation .....</b>	<b>56</b>
<b>A.5</b>	<b>Monitoring .....</b>	<b>60</b>
<b>A.6</b>	<b>Action in the event of the allowable/limit values being exceeded .....</b>	<b>60</b>
<b>A.7</b>	<b>Literature .....</b>	<b>60</b>
<b>Annex B</b>	<b>(informative) Mining subsidence .....</b>	<b>61</b>
<b>B.1</b>	<b>General .....</b>	<b>61</b>
<b>B.2</b>	<b>Procedure .....</b>	<b>61</b>
<b>B.3</b>	<b>Strength calculation .....</b>	<b>61</b>
<b>B.4</b>	<b>Action in the event of the allowable/limit values being exceeded .....</b>	<b>61</b>
<b>B.5</b>	<b>Monitoring .....</b>	<b>62</b>
<b>B.6</b>	<b>Literature .....</b>	<b>62</b>
<b>Annex C</b>	<b>(informative) Frost heave .....</b>	<b>63</b>
<b>C.1</b>	<b>General .....</b>	<b>63</b>
<b>C.2</b>	<b>Procedure .....</b>	<b>63</b>
<b>C.3</b>	<b>Strength calculation .....</b>	<b>63</b>
<b>C.4</b>	<b>Other possible measures .....</b>	<b>63</b>
<b>C.5</b>	<b>Literature .....</b>	<b>64</b>
<b>Annex D</b>	<b>(informative) Landslide areas .....</b>	<b>65</b>
<b>D.1</b>	<b>General .....</b>	<b>65</b>
<b>D.2</b>	<b>Procedure .....</b>	<b>65</b>
<b>D.3</b>	<b>Strength calculation .....</b>	<b>66</b>
<b>D.4</b>	<b>Possible action to prevent the allowable/limit values being exceeded .....</b>	<b>66</b>
<b>D.5</b>	<b>Monitoring .....</b>	<b>67</b>
<b>D.6</b>	<b>Literature .....</b>	<b>67</b>
<b>Annex E</b>	<b>(informative) Areas with high seismic risk .....</b>	<b>68</b>
<b>E.1</b>	<b>General .....</b>	<b>68</b>
<b>E.2</b>	<b>Procedure .....</b>	<b>68</b>
<b>E.3</b>	<b>Strength calculation .....</b>	<b>69</b>
<b>E.4</b>	<b>Literature .....</b>	<b>70</b>
<b>Annex F</b>	<b>(informative) Soil mechanics parameters .....</b>	<b>72</b>
<b>F.1</b>	<b>Parameters .....</b>	<b>72</b>
<b>F.2</b>	<b>Soil engineering study .....</b>	<b>73</b>
<b>F.3</b>	<b>Literature .....</b>	<b>73</b>
<b>Annex G</b>	<b>(informative) Bored/jacked crossings .....</b>	<b>75</b>
<b>G.1</b>	<b>General .....</b>	<b>75</b>
<b>G.2</b>	<b>Strength calculation .....</b>	<b>75</b>
<b>G.3</b>	<b>Literature .....</b>	<b>78</b>
<b>Annex H</b>	<b>(informative) Allowable pulsation and vibration levels .....</b>	<b>79</b>

## EN 1594:2009 (E)

H.1	Introduction.....	79
H.2	Pulsations .....	79
H.3	Pipe vibrations.....	79
H.4	Induced effects .....	80
H.5	Literature .....	80
Annex I (informative)	Allowable vibration levels from construction work - blasting.....	81
I.1	General .....	81
I.2	Procedure.....	81
I.3	Strength calculation .....	81
I.4	Literature .....	82
	Bibliography.....	83

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 1594:2009

<https://standards.iteh.ai/catalog/standards/sist/a3dc3ee7-59f-471d-82ba-ff6e872a70fe/sist-en-1594-2009>

## Foreword

This document (EN 1594:2009) has been prepared by Technical Committee CEN/TC 234 "Gas infrastructures", the secretariat of which is held by DIN.

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 2009, and conflicting national standards shall be withdrawn at the latest by July 2009.

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 1594:2000.

There is a complete suite of functional standards prepared by CEN/TC 234 "Gas Supply" to cover all parts of the gas supply system 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.

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 supply systems are 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.

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

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.

## Introduction

This European Standard describes the general functional requirements for gas supply through pipe systems and covers the pressure range greater than 16 bar maximum operating pressure (MOP) for steel systems. It gives normative and informative references for safe and secure gas supply systems. It applies to their design, construction, operation and the related aspects of safety, environment and public health, all in order to provide a safe and secure supply of gas.

The requirements of this European Standard are based on safe gas engineering practice under conditions normally encountered in the gas industry. Requirements for all unusual conditions cannot be specifically provided for, nor are all engineering and construction details prescribed.

Existing industrial safety regulations applying to work areas, safety devices and safe work practices are not intended to be supplanted by this European Standard.

Managers with responsibilities for the design, construction and operation of gas supply systems should have regard to the guidance given in this European Standard and to other relevant standards. It is the responsibility of these managers and engineers to apply these functional requirements, supplemented with other proven good practice to the particular circumstances of each gas supply system.

The designer, constructor or operator of pipeline systems is cautioned that this European Standard is not a design handbook or code of practice. Additional national or company standards describing the details are needed. These detailed standards should be in line with the basic principles of this European Standard.

In preparing this European Standard it was recognized that the suite of relevant European Standards is incomplete. Reference may be made where appropriate to international, national or other standards until relevant European Standards are available.

[SIST EN 1594:2009](#)

<https://standards.iteh.ai/catalog/standards/sist/a3dc3ee7-5f9f-471d-82ba-ff6e872a70fe/sist-en-1594-2009>



## 1 Scope

This European Standard is applicable to pipelines with a maximum operating pressure (MOP) over 16 bar for the carriage of processed, non-toxic and non-corrosive natural gas according to EN ISO 13686 in onland gas supply systems, where:

- pipeline elements are made of unalloyed or low-alloyed carbon steel;
- pipeline elements are joined by welds, flanges or mechanical couplings;
- the pipeline is not located within commercial or industrial premises as an integral part of the industrial process on these premises except for any pipelines and facilities supplying such premises;
- the design temperature of the system is between -40 °C and 120 °C inclusive.

The standard applies to onshore pipeline systems from the point where the pipeline first crosses what is normally accepted as battery limit between on and offshore, e.g.:

- first isolation valve;
- the base of steep sea shelf;
- above the high water/low water mark onto mainland;
- an island.

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

The pipeline standard also applies to a pipeline system with a starting point onshore, also when parts of the pipeline system on the mainland subsequently cross fjords, lakes etc.

This European Standard does not apply to existing pipelines, in use prior to the publication of this European Standard, nor to modifications to existing pipelines.

Gas supply systems covered by this European Standard begin after the gas producer's metering station. The functional demarcation of the pipeline system within a plant area will be determined from case to case. Generally speaking, this will be directly after the first isolating valve of the installation.

This standard also describes the mechanical requirements for pipework in stations with a maximum operating pressure greater than 16 bar. Welding requirements are described in a special application standard on welding for gas supply systems EN 12732. Functional requirements for stations are given in:

EN 1776, *Gas supply systems - Natural gas measuring stations - Functional requirements*

EN 1918-5, *Gas supply systems - Underground gas storage - Part 5: Functional recommendations for surface facilities*

EN 12186, *Gas supply systems - Gas pressure regulating stations for transmission and distribution - Functional requirements*

EN 12583, *Gas supply systems - Compressor stations - Functional requirements*

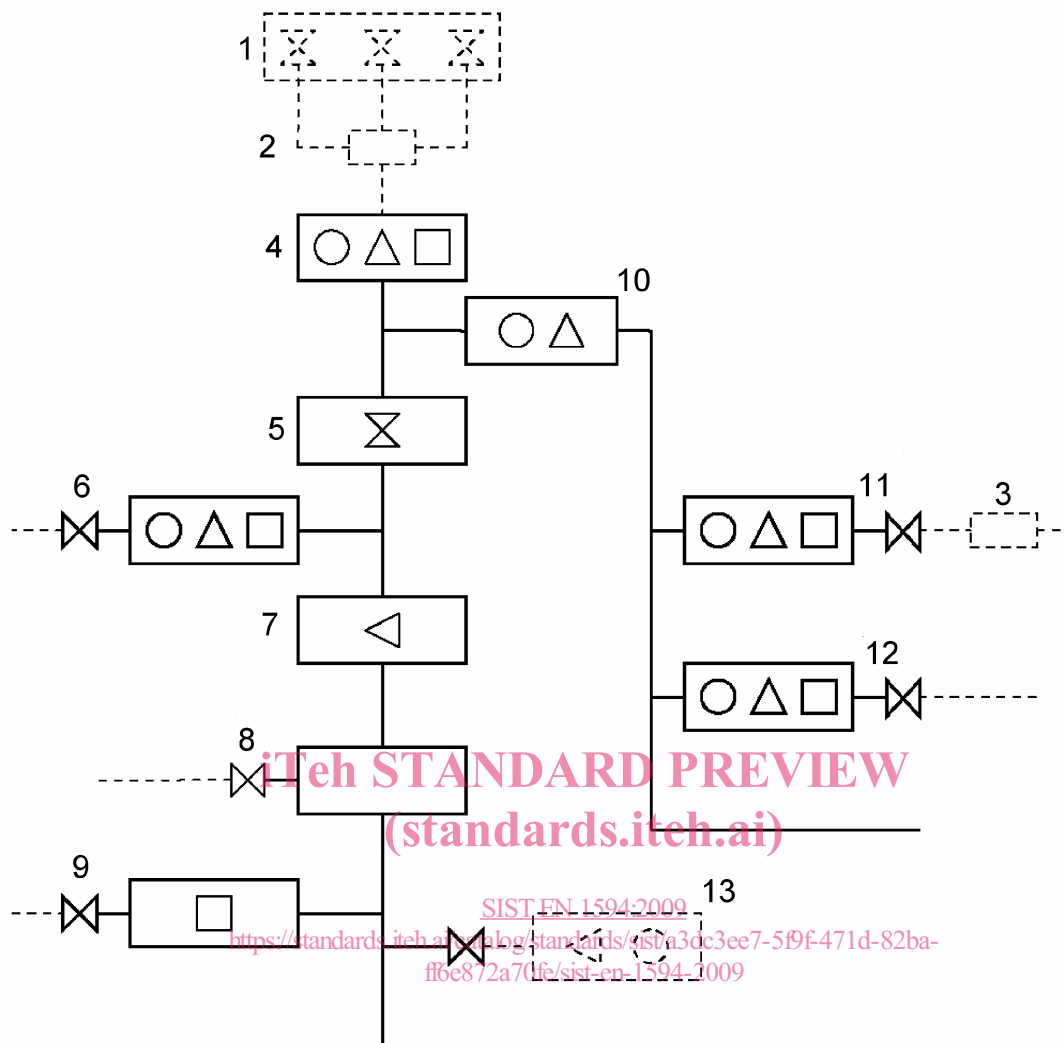
This European Standard specifies common basic principles for gas supply systems. Users of this European Standard should be aware that there may exist more detailed national standards and codes of practice in the CEN member countries.

This European Standard is intended to be applied in association with these national standards and/or codes of practice setting out the above mentioned principles.

In the event of conflicts in terms of more restrictive requirements in the national legislation/regulation with the requirements of this European Standard, the national legislation/regulation shall take precedence.

Reference is made in this European Standard to relevant European and other recognized standards for products used to construct and operate gas supply systems.

A schematic representation of pipelines for gas transmission is given in Figure 1.



## KEY

—————	PIPELINES COVERED BY THIS STANDARD	1	P - WELL, PRODUCTION
- - - - -	PIPELINES NOT COVERED BY THIS STANDARD	2	T - TREATMENT
○	PRESSURE REGULATION	3	D – ODORIZATION
△	PRESSURE SAFETY SYSTEM	4	S 1 -GAS RECEIVING
□	METERING SYSTEM	5	S 2 -VALVE STATION
▽	COMPRESSION	6	S 3 -DELIVERY STATION
⊗	VALVE	7	S 4 -COMPRESSOR STATION
⊗	ISOLATION DEVICE	8	S 5 -OTHER SUPPLY (E.G. FOR BLENDING)
		9	S 6 -EXPORT OR IMPORT
		10	S 7 -PRESSURE REGULATING
		11	S 8 -DOMESTIC DISTRIBUTION
		12	S 9 -INDUSTRIAL DISTRIBUTION
		13	S10 –STORAGE

Figure 1 — Schematic representation of pipelines for gas supply over 16 bar

## 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 1515-3, *Flanges and their joints - Bolting - Part 3: Classification of bolt materials for steel flanges, class designated*

EN 1759-1, *Flanges and their joint - Circular flanges for pipes, valves, fittings and accessories, Class designated - Part 1: Steel flanges, NPS 1/2 to 24*

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test at ambient temperature*

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

EN 10208-2, *Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 2: Pipes of requirement class B*

EN 10288, *Steel tubes and fittings for onshore and offshore pipelines - External two layer extruded polyethylene based coatings*

EN 10289, *Steel tubes and fittings for onshore and offshore pipelines - External liquid applied epoxy and epoxy-modified coatings*

EN 10290, *Steel tubes and fittings for onshore and offshore pipelines - External liquid applied polyurethane and polyurethane-modified coatings*

EN 10301, *Steel tubes and fittings for on and offshore pipelines - Internal coating for the reduction of friction for conveyance of non corrosive gas*

EN 12068, *Cathodic protection - External organic coatings for the corrosion protection of buried or immersed steel pipelines used in conjunction with cathodic protection - Tapes and shrinkable materials*

EN 12186, *Gas supply systems - Gas pressure regulating stations for transmission and distribution - Functional requirements*

EN 12327, *Gas supply systems - Pressure testing, commissioning and decommissioning procedures - Functional requirements*

EN 12560-1, *Flanges and their joints - Gaskets for Class-designated flanges - Part 1: Non-metallic flat gaskets with or without inserts*

EN 12560-2, *Flanges and their joints - Gaskets for Class-designated flanges - Part 2: Spiral wound gaskets for use with steel flanges*

EN 12560-3, *Flanges and their joints - Gaskets for Class-designated flanges - Part 3: Non-metallic PTFE envelope gaskets*

EN 12560-4, *Flanges and their joints - Gaskets for Class-designated flanges - Part 4: Corrugated, flat or grooved metallic and filled metallic gaskets for use with steel flanges*

EN 12583, *Gas supply systems - Compressor stations - Functional requirements*

EN 12732, *Gas supply systems - Welding steel pipework - Functional requirements*

**EN 1594:2009 (E)**

EN 12954, *Cathodic protection of buried or immersed metallic structures – General principles and application for pipelines*

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

EN 14141, *Valves for natural gas transportation in pipelines - Performance requirements and tests*

EN 14870-1:2004, *Petroleum and natural gas industries - Induction bends, fittings and flanges for pipeline transportation systems - Part 1: Induction bends (ISO 15590-1:200,1 modified)*

EN 14870-2:2004, *Petroleum and natural gas industries - Induction bends, fittings and flanges for pipeline transportation systems - Part 2: Fittings (ISO 15590-2:2003, modified)*

EN 14870-3:2006, *Petroleum and natural gas industries - Induction bends, fittings and flanges for pipeline transportation systems - Part 3: Flanges (ISO 15590-3:2004, modified)*

**3 Definitions, symbols and abbreviations**

For the purposes of this document, the following definitions apply. Symbols used in formulae are defined where they occur.

**3.1****casing**

protection by means of a construction around the pipeline in order to prevent external loads, or third party interference

**3.2****commissioning**

activities required to pressurize pipework, stations, equipment and assemblies with gas and to put them into operation

**3.3****control zone**

strip of land over which the pipeline operator has a right to control activities

**3.4****decommissioning**

activities required to take out of service any pipework, station, equipment or assemblies filled with gas and to disconnect them from the system

**3.5****design factor**

$f_o$

factor applied when calculating the wall thickness or pressure

**3.6****design pressure**

DP

pressure on which design calculations are based

**3.7****design temperature**

temperature on which design calculations are based

**3.8****emergency**

situation which could affect the safe operation of the gas supply system and/or the safety of the surrounding area, requiring urgent action

### 3.9

#### **gas**

gaseous fuel which is in gaseous state at a temperature of 15 °C under atmospheric pressure (1,013 25 bar absolute)

### 3.10

#### **gas distribution system**

pipeline system including piping above and below ground and all other equipment necessary to supply the gas to the consumers

### 3.11

#### **gas distributor**

private or public organization authorized to distribute gas to consumers through a gas distribution system

### 3.12

#### **gas transmission**

activity intended to convey gas from one place to another through pipelines in order to supply gas to distribution systems or to industrial consumers

### 3.13

#### **gas transportation system**

pipeline system including piping above and below ground and all other equipment necessary to supply the gas to the gas distribution systems and industrial consumers

### 3.14

#### **golden weld**

golden weld is a weld on which a strength test is not performed

EXAMPLE The test sections tie-in welds and the test section-station tie-in welds are considered as "golden welds".

### 3.15

#### **incident**

unexpected occurrence, which could lead to an emergency situation

NOTE This includes a leakage of gas or plant failure.

### 3.16

#### **incidental pressure**

##### **IP**

pressure which occurs incidentally within a system at which a safety device becomes operative

### 3.17

#### **inspection**

process of measuring, examining, testing, gauging or otherwise determining the status of items of the pipeline system, or installation and comparing it with the applicable requirements

### 3.18

#### **installation**

equipment and facilities for the extraction, production, chemical treatment, measurement, control, storage, or off-take of the transported gas

### 3.19

#### **installation temperature**

temperature arising from ambient or installation conditions during laying or during construction

### 3.20

#### **maintenance**

**EN 1594:2009 (E)**

combination of all technical and associated administrative actions intended to keep an item in, or restore it to, a state in which it can perform its required function

**3.21****maximum incidental pressure****MIP**

maximum pressure which a gas system can experience during a short time, limited by the safety devices

**3.22****maximum operating pressure****MOP**

maximum pressure at which a system can be operated continuously under normal conditions

NOTE Normal conditions are: no fault in any device or stream

**3.23****national requirements**

requirements following from national legislation or more detailed or stringent national standards

**3.24****onshore pipeline**

buried and/or above ground pipeline including those sections laid in or across inland lakes or water courses

**3.25****operating pressure****OP**

pressure which occurs within a system under normal operating conditions

**3.26****operating temperature****OT**

temperature which occurs within a system under normal operating conditions

**3.27****pig**

device which is driven through a pipeline by the flow of fluid, for performing various internal activities (depending on pig type), such as separating fluids, cleaning or inspecting the pipeline

**3.28****pipeline**

system of pipework with all associated equipment and stations up to the point of delivery.

NOTE This pipework is mainly below ground but also includes above ground parts.

**3.29****pipeline components**

elements from which the pipeline is constructed

a) specially designed and manufactured elements:

- 1) pipe including cold-formed bends;
- 2) fittings;

EXAMPLE 1 Reducers, tees, factory-made elbows, flanges, caps, welding stubs, mechanical joints.

- 3) factory made bends;
- 4) fabrications, manufactured from the elements referred to above;

EXAMPLE 2 Manifolds, slug catchers, pig launching/receiving stations, metering and control runs

- 5) equipment;

EXAMPLE 3 Valves, expansion joints, insulation joints, compressors

6) pressure vessels

b) standard pressure equipment:

1) pressure equipment at pipelines, pressure reduction stations or compression stations not specially designed and manufactured for the pipeline

EXAMPLE 4 Measuring devices, valves, pressure regulators, safety valves, filters, heat exchangers, vessels.

### 3.30

#### **pipeline operator**

private or public organization authorized to design, construct and/or operate and maintain the gas supply system

NOTE Synonyms are: network operator, grid operator

### 3.31

#### **pipework**

assembly of pipes and fittings

### 3.32

#### **point of delivery**

point where the gas is transferred to the user

NOTE This can be at a means of isolation or at a meter connection

### 3.33

#### **precommissioning**

activities, including cleaning and possible drying, executed prior to pipeline commissioning

### 3.34

#### **pressure**

gauge pressure of the fluid inside the system, measured in static conditions

### 3.35

#### **pressure control system**

combined system including pressure regulating, pressure safety and eventually pressure recording and alarm systems

### 3.36

#### **pressure regulating system**

system which ensures that a pressure is maintained at the outlet system within required limits

### 3.37

#### **pressure safety system**

system which, independent of the pressure regulating system, ensures that the outlet pressure of the regulator does not exceed the preset value

### 3.38

#### **Raise boring**

(back reaming)

method of vertical drilling in solid rock where a reamer head is pulled back upwards through the small pilot hole

### 3.39

#### **recommissioning**

activities required to put a decommissioned pipeline, associated stations and equipment into service again

### 3.40

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN 1594:2009

<https://standards.iteh.ai/catalog/standards/sist/a3dc3ee7-59f471d-82ba-7777-7777-7777>