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Infrastruktura za plin - Plinske napeljave z delovnim tlakom nad 0,5 bar za industrijsko uporabo in delovnim tlakom nad 5 bar za industrijsko in neindustrijsko uporabo - 1. del: Podrobne funkcionalne zahteve za načrtovanje, materiale, gradnjo, nadzor in preskušanje

Gas Infrastructure - Gas installation pipework with an operating pressure greater than 0,5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations - Part 1: Detailed functional requirements for design, materials, construction, inspection and testing

Gasinfrastruktur - Gas-Leitungsanlagen mit einem Betriebsdruck größer 0,5 bar für industrielle Installationen und größer 5 bar für industrielle und nicht-industrielle Installationen - Teil 1: Detaillierte funktionale Anforderungen an Planung, Material, Bau, Inspektion und Prüfung

Systèmes d'alimentation en gaz - Canalisations d'installations de gaz avec une pression de service supérieure à 0,5 bar pour les installations industrielles et supérieures à 5 bar pour les installations industrielles et non industrielles (domestiques et commerciales) - Partie 1 : Exigences fonctionnelles détaillées relative à la conception, aux matériaux, à la construction, à l'inspection et aux essais

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Gas Infrastructure - Gas installation pipework with an operating pressure greater than 0,5 bar for industrial installations and greater than 5 bar for industrial and non-industrial installations - Part 1: Detailed functional requirements for design, materials, construction, inspection and testing

Infrastructures gazières - Canalisations d'installations de gaz avec une pression de service supérieure à 0,5 bar pour les installations industrielles et supérieures à 5 bar pour les installations industrielles et non industrielles (domestiques et commerciales) - Partie 1: Exigences fonctionnelles détaillées relative à la conception, aux matériaux, à la construction, à l'inspection et aux essais

Gasinfrastruktur - Gas-Leitungsanlagen mit einem Betriebsdruck größer 0,5 bar für industrielle Installationen und größer 5 bar für industrielle und nicht-industrielle Installationen - Teil 1: Detaillierte funktionale Anforderungen an Planung, Material, Bau, Inspektion und Prüfung

This European Standard was approved by CEN on 16 May 2009.

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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.

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Contents

Page

Foreword 4

1 Scope 5

2 Normative references 7

3 Terms and definitions 12
3.1 Definitions relating to pressure 12
3.2 Definitions relating to the gas installation 13
3.3 Definition relating to means of isolation 14
3.4 Definitions relating to jointing methods 14
3.5 Definitions relating to components 15
3.6 Definitions relating to tests 16
3.7 Definition relating to testing and inspection 16
3.8 Definitions relating to assembly processes for metallic materials 16
3.9 Definitions relating to pressure regulating and metering 17

4 General 17
4.1 Quality system 17
4.2 Selection of materials 18
4.3 Protection against hazards 18
4.4 Accommodation and location of gas pressure regulating and metering systems, gas pressure compressors and gas mixing systems 19

5 Materials 20
5.1 Standards and specifications for pipes and pipe fittings 20
5.2 Ancillaries 24
5.3 Gas pressure regulating and safety systems 25

6 Design of pipework 26
6.1 General 26
6.2 Layout 27
6.3 Dimensioning 28
6.4 Pressure and wall thickness 28
6.5 Safety engineering 35
6.6 Detail engineering 39
6.7 Hot tapping carbon steel pipe 51

7 Design of pressure control systems 52
7.1 General 52
7.2 Pressure regulating system 53
7.3 Instrumentation 53
7.4 Permanent bypasses 54
7.5 Construction requirements 54
7.6 Low gas temperature 56
7.7 Gas compressors 57
7.8 Safety systems 57

8 Construction 61
8.1 Identification of the installation 61
8.2 External hazards 62
8.3 Gas pipework passing through exterior walls 62
8.4 Identification of pipework 64
8.5 Specifications and requirements for joints 65
8.6 Joint suitability 69
8.7 Connections 70

8.8 Corrosion protection 71
8.9 Handling and installation of pipework 78
8.10 Bending of pipes 80
8.11 Welding of supports and anchor points to carbon steel pipework 81
8.12 Installation of pressure regulating systems 82

9 Documentation, inspection and testing 83
9.1 General 83
9.2 Documentation 84
9.3 Inspection 84
9.4 Testing 87

Annex A (informative) Example schematic diagrams of installation options for gas pressure regulating systems 91

Annex B (informative) Examples of methods for testing 93
B.1 General 93
B.2 Strength test on metallic pipework 93
B.3 Tightness test on metallic pipework 95
B.4 Strength and tightness test on PE pipework 98

Annex C (informative) Flammable gases mixing systems 101
C.1 Reverse flow 101
C.2 Control of mixture composition 101
C.3 Matching pressures of components for mixing 103

Annex D (informative) Examples of supports 104

Annex E (normative) Materials 111
E.1 General 111
E.2 Materials with a demonstrated safe history of application in this type of equipment 112

Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC 115

Bibliography 117

Foreword

This document (EN 15001-1:2009) has been prepared by Technical Committee CEN/TC 234 “Gas Infrastructure”, 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 January 2010, and conflicting national standards shall be withdrawn at the latest by January 2010.

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.

Annexes A to D are informative.

The normative Annex E of this document lists some suitable materials for pipework, in addition to the materials listed in Clause 5.

This standard includes requirements concerning current design practice and reflects the state of the art at the time of publication. It provides clear solutions for users of the standard. Other design solutions and construction materials, as well as new developments, may be used if equal or greater safety than that required by this EN can be demonstrated or established.

There is a complete suite of functional standards prepared by CEN/TC 234 “Gas infrastructure” 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 residential, commercial or industrial purposes.

In preparing this 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 the member countries. These detailed statements embrace recognised standards of gas engineering and the specific requirements imposed by the legal structures of the member countries.

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.

1 Scope

This European Standard specifies detailed functional requirements for the design, selection of materials, construction, inspection and testing of

— industrial gas installation pipework and assemblies with an operating pressure greater than 0,5 bar, and

— non-industrial gas installation pipework (residential and commercial) with an operating pressure greater than 5 bar in buildings,

starting from the outlet of the network operator's point of delivery up to the inlet connection to the gas appliance; normally the inlet isolation valve. This standard also covers the inlet connection to the gas appliance comprising of the pipework that does not fall within the scope of the appliance standard.

NOTE The use of the term installation and pipework is interchangeable.

This standard applies to gas installations operating at ambient temperatures between - 20 °C and 40 °C and operating pressures up to and including 60 bar. For operating conditions outside these limitations, reference should additionally be made to EN 13480 for metallic pipework.

For industrial gas installations up to and including 0,5 bar and for non-industrial (residential and commercial) gas installations up to and including 5 bar in buildings, EN 1775 applies.

For gas installations that do not fall within the scope of EN 1775 or other European Standards, this standard applies.

In this standard, the term "gas" refers to combustible gases, which are gaseous at 15 °C and 1 013 mbar absolute atmospheric pressure (normal conditions). These gases are commonly referred to as manufactured gas, natural gas or Liquefied Petroleum Gas (LPG). They are also referred to as first, second or third family gases (see Table 1 of EN 437:2003). The given values are considered as normal conditions for all volumes given in this standard.

LPG storage vessels (including all ancillaries fitted directly to storage vessels) are excluded. Also excluded are LPG installations and sections of LPG installations operating at vapour pressure in the liquid state (e.g. between the storage vessel and any pressure regulator).

In this standard, all pressures are gauge pressures unless otherwise stated.

This standard has been harmonised to address the essential safety requirements of the Pressure Equipment Directive (PED, 97/23/EC) relevant for the joining of gas installation pipework (assemblies) falling within the scope of the PED. These are listed in Annex ZA. However, "this Directive does not cover the assembly of pressure equipment on the site and under the responsibility of the user, as in the case of industrial installations" (PED, Preamble, 5th recital, last paragraph).

Although in this respect, the standard takes into account the essential safety requirements of the PED, no inference can be drawn from this as to whether or not the installation or parts of the installation falls within the scope of the PED. Reference should be made to the PED and national legislation.

This European Standard specifies common basic principles for gas supply systems. Users of this European Standard should be aware that more detailed national standards and/or code of practice may exist 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 basic principles.

In the event of conflicts in terms of more restrictive requirements in national legislation/regulation with the requirements of this standard, the national legislation/regulation shall take precedence as illustrated in CR 13737.

This provision does not apply to requirements that are harmonised to directive 97/23/EC (see Annex ZA).

This CR 13737 gives:

— clarification of all legislations/regulations applicable in a country;

— if appropriate, more restrictive national requirements thereof;

— a national contact point for the latest information.

Functional requirements for commissioning, operation and maintenance of industrial gas installations and assemblies with an operating pressure greater than 0,5 bar and of gas installations greater than 5 bar in buildings and areas intended for non-industrial installations greater than 5 bar are described in EN 15001-2.

Generally, additional safety precautions may be necessary where non-odorized gas is used. For non industrial purposes, the gas should be odorized.

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 287-1, *Qualification test of welders — Fusion welding — Part 1: Steels*

EN 331:1998, *Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings*

EN 334:2005, *Gas pressure regulators for inlet pressures up to 100 bar*

EN 571-1, *Non destructive testing — Penetrant testing — Part 1: General principles*

EN 583-1:1998, *Non-destructive testing — Ultrasonic examination — Part 1: General principles*

EN 751-1:1996, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 1: Anaerobic jointing compounds*

EN 751-2:1996, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 2: Non-hardening jointing compounds*

EN 751-3:1996, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 3: Unsintered PTFE tapes*

EN 764-5:2002, *Pressure equipment — Part 5: Compliance and Inspection Documentation of Materials*

EN 970:1997, *Non-destructive examination of fusion welds — Visual examination*

EN 1044:1999, *Brazing — Filler metals*

EN 1057:2006, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications*

EN 1092-1:2007, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: Steel flanges*

EN 1092-3:2003, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 3: Copper alloy flanges*

EN 1254-1:1998, *Copper and copper alloys — Plumbing fittings — Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes*

EN 1254-2:1998, *Copper and copper alloys — Plumbing fittings — Part 2: Fittings with compression ends for use with copper tubes*

EN 1254-5:1998, *Copper and copper alloys — Plumbing fittings — Part 5: Fittings with short ends for capillary brazing to copper tubes*

EN 1290, *Non-destructive examination of welds — Magnetic particle examination of welds*

EN 1435:1997, *Non-destructive examination of welds — Radiographic examination of welded joints*

EN 1514-1:1997, *Flanges and their joints — Dimensions of gaskets for PN-designated flanges — Part 1: Non-metallic flat gaskets with or without inserts*

EN 1514-2:2005, *Flanges and their joints — Gaskets for PN-designated flanges — Part 2: Spiral wound gaskets for use with steel flanges*

EN 1515-1:1999, *Flanges and their joints — Bolting — Part 1: Selection of bolting*

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

EN 1555-1:2002, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*

EN 1555-2:2002, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes*

EN 1555-3:2002, *Plastic piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings*

EN 1555-4:2002, *Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) — Part 4: Valves*

EN 1555-5:2002, *Plastic piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 5: Fitness for purpose of the system*

EN 1563:1997, *Founding — Spheroidal graphite cast irons*

EN 1594:2009, *Gas supply systems — Pipelines for maximum operating pressure over 16 bar — Functional requirements*

EN 1714:1997, *Non-destructive examination of welds — Ultrasonic examination of welded joints*

EN 1759-1:2004, *Flanges and their joint – Circular flanges for pipes,valves, fittings and accessories, Class designated - Part 1: Steel flanges, NPS 1/2 to 24*

EN 1775:2007, *Gas supply- Gas pipework for buildings — Maximum operating pressure less than or equal to 5 bar — Functional recommendations*

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

EN 10045-1:1990, *Metallic materials — Charpy impact test — Part 1: Test method*

EN 10087:1998, *Free-cutting steels — Technical delivery conditions for semi-finished products, hot-rolled bars and rods*

EN 10088-1:2005, *Stainless steels — Part 1: List of stainless steels*

EN 10088-3:2005, *Stainless steels — Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

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

EN 10208-1:2009, *Steel pipes for pipelines for combustible fluids — Technical delivery conditions — Part 1: Pipes of requirement class A*

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

EN 10216-1:2002, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10216-5:2004, *Seamless steel tubes for pressure purpose — Technical delivery conditions — Part 5: Stainless steel tubes*

EN 10217-1:2002, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10217-7:2005, *Welded steel tubes for pressure purposes — Technical delivery conditions — Part 7: Stainless steel tubes*

EN 10220:2002, *Seamless and welded steel tubes — Dimensions and masses per unit length*

EN 10226-1:2004, *Pipe threads where pressure tight joints are made on the threads — Part 1: Taper external threads and parallel internal threads — Dimensions, tolerances and designation*

EN 10240:1997, *Internal and/or external protective coatings for steel tubes — Specification for hot dip galvanized coatings applied in automatic plants*

EN 10253-2:2007, *Butt-welding pipe fittings — Part 2: Non alloy and ferritic alloy steels with specific inspection requirements*

EN 10255:2004, *Non-alloy steel tubes suitable for welding and threading — Technical delivery conditions*

EN 10289:2002, *Steel tubes and fittings for onshore and offshore pipelines — External liquid applied epoxy and epoxy-modified coatings*

EN 10290:2002, *Steel tubes and fittings for onshore and offshore pipelines — External liquid applied polyurethane and polyurethane-modified coatings*

EN 12007-2:2000, *Gas supply systems — Gas pipelines for maximum operating pressure up to and including 16 bar — Part 2: Specific functional recommendations for polyethylene (MOP up to and including 10 bar)*

EN 12007-3:2000, *Gas supply systems — Pipelines for maximum operating pressure up to and including 16 bar – Part 3: Specific functional recommendations for steel*

EN 12068:1998, *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 12186:2000, *Gas supply systems — Gas pressure regulating stations for transmission and distribution — Functional requirements*

EN 12266-1:2003, *Industrial valves — Testing of valves — Part 1: Pressure tests, test procedures and acceptance criteria - Mandatory requirements*

EN 12279:2000, *Gas supply systems — Gas pressure regulating installations on service lines — Functional requirements*

EN 12327:2000, *Gas supply systems — Pressure testing, commissioning and decommissioning procedures — Functional requirements*

EN 12560-1:2001, *Flanges and their joints — Gaskets for Class-designated flanges — Part 1: Non-metallic flat gaskets with or without inserts*

EN 12560-2:2001, *Flanges and their joints — Gaskets for Class-designated flanges — Part 2: Spiral wound gaskets for use with steel flanges*

EN 12732:2000, *Gas supply systems — Welding steel pipework — Functional requirements*

EN 12799:2000, *Brazing — Non-destructive examination of brazed joints*

EN 12954:2001, *Cathodic protection of buried or immersed metallic structures — General principles and application for pipelines*

EN 13100-1:1999, *Non destructive testing of welded joints of thermoplastics semi-finished products — Part 1: Visual examination*

EN 13134:2000, *Brazing — Procedure approval*

EN 13445-6, *Unfired pressure vessels — Part 6: Requirements for the design and fabrication of pressure vessels and pressure parts constructed from spheroidal graphite cast iron*

EN 13480-2:2002, *Metallic industrial piping — Part 2: Materials*

EN 13480-3:2002, *Metallic industrial piping — Part 3: Design and calculation*

EN 13480-5:2002, *Metallic industrial piping — Part 5: Inspection and testing*

EN 13480-6:2004, *Metallic industrial piping — Part 6: Additional requirements for buried piping*

EN 13774:2003, *Valves for gas distribution systems with maximum operating pressure less than or equal to 16 bar — Performance requirements*

EN 13785:2005, *Regulators with a capacity of up to and including 100 kg/h, having a maximum nominal outlet pressure of up to and including 4 bar, other than those covered by EN 12864 and their associated safety devices for butane, propane or their mixtures*

EN 13786:2004, *Automatic change-over valves having a maximum outlet pressure of up to and including 4 bar with a capacity of up to and including 100 kg/h, and their associated safety devices for butane, propane or their mixtures*

EN 14141:2003, *Valves for natural gas transportation in pipelines — Performance requirements and tests*

EN 14291:2004, *Foam producing solutions for leak detection on gas installations*

EN 14382:2005, *Safety devices for gas pressure regulating stations and installations — Gas safety shut-off devices for inlet pressures up to 100 bar*

EN 20898-2:1993, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread (ISO 898-2:1992)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60079-10:2003, *Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas (IEC 60079-10:2002)*

EN 60079-14, *Explosive atmospheres — Part 14: Electrical installations design, selection and erection (IEC 60079-14:2007)*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 898-1:2009, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread (ISO 898-1:2009)*

EN ISO 3506-1:1997, *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1: Bolts, screws and studs (ISO 3506-1:1997)*

EN ISO 3506-2:1997, *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 2: Nuts (ISO 3506-2:1997)*

EN ISO 5817, *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)*

EN ISO 10380:2003, *Pipework — Corrugated metal hoses and hose assemblies (ISO 10380:2003)*

EN ISO 10806:2003, *Pipework — Fittings for corrugated metal hoses (ISO 10806:2003)*

EN ISO 12944-1:1998, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems –Part 1: General introduction (ISO 12944-1:1998)*

EN ISO 15607:2003, *Specification and qualification of welding procedures for metallic materials — General rules (ISO 15607:2003)*

EN ISO 15609-1:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding (ISO 15609-1:2004)*

EN ISO 15610:2003, *Specification and qualification of welding procedures for metallic materials — Qualification based on tested welding consumables (ISO 15610:2003)*

EN ISO 15612:2004, *Specification and qualification of welding procedures for metallic materials — Qualification by adoption for a standard welding procedure (ISO 15612:2004)*

EN ISO 15614-1:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2004)*

ISO 9329-2, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 2: Unalloyed and alloyed steels with specified elevated temperature properties*

ISO 15348, *Pipework — Metal bellows expansion joints — General*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Definitions relating to pressure

3.1.1
pressure
gauge pressure of the fluid inside the system, measured in static conditions

3.1.2
design pressure
DP
pressure at which the design calculations are based; this is equivalent to the maximum allowable pressure (PS) as given in the PED

3.1.3
maximum allowable pressure
PS
maximum pressure for which pipework is designed in accordance with the strength requirements in this document

NOTE For this standard, PS is equivalent to the design pressure (DP).

3.1.4
maximum incidental pressure
MIP
maximum pressure which a system can experience during a short time, limited by the safety devices

3.1.5
operating pressure
OP
pressure which occurs within a system under normal operating conditions

3.1.6
maximum operating pressure
MOP
maximum pressure at which a system can be operated continuously under normal operating conditions

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

3.1.7
tightness test pressure
TTP
pressure applied to a system during tightness testing

3.1.8
strength test pressure
STP
pressure applied to a system during strength testing

3.1.9
combined test pressure
CTP
pressure applied to a system during combined testing

3.2 Definitions relating to the gas installation

3.2.1
components
any item from which a gas supply system or installation is constructed; a distinction is drawn between the following groups of components:

— ancillaries (for example: pressure regulators, valves, safety devices, expansion joints and insulating joints)

— pipes, including bends made from pipe

— instrumentation pipework

— fittings (for example: reducers, tees, factory-made elbows, flanges, dome ends, welding stubs and mechanical joints)

3.2.2
flexible appliance connector
fitting of flexible pipe to be fitted between the end of fixed pipework and the appliance inlet connection

3.2.3
point of delivery
point where the gas is transferred to the user

NOTE This can be at a means of isolation or at the meter outlet connection and is normally at the point of transfer of ownership.

3.2.4
user(s)
person(s) responsible for the safety of the gas installation and associated risks on a site

NOTE Normally the user will be the site occupier or owner. It should be assumed that every user has a responsibility for work performed on their site, whether or not the work is performed directly for the user or not. This does not mean that they cannot take advice from an independent specialist.

3.2.5
pipework
assembly of pipes and fittings

3.2.6
installation pipework
pipework including components and stations downstream of the point of delivery terminating at the appliance inlet connection

NOTE This pipework is normally the property of the customer.

3.2.7
ventilated space
space where the air is continuously changed by natural or mechanical means

3.2.8
safety zone
area around the pipework from which persons who are not involved in the strength test are excluded during testing