

DIN EN 15001-1:2023-04 (E)

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

Contents

	Page
European foreword	7
1 Scope.....	9
2 Normative references.....	10
3 Terms and definitions	17
3.1 Definitions relating to pressure	17
3.2 Definitions relating to the gas installation	18
3.3 Definition relating to means of isolation.....	19
3.4 Definitions relating to jointing methods.....	19
3.5 Definitions relating to components	20
3.6 Definitions relating to tests.....	21
3.7 Definition relating to testing and inspection.....	22
3.8 Definitions relating to assembly processes for metallic materials	22
3.9 Definitions relating to pressure regulating and metering.....	22
4 General.....	23
4.1 Quality system and competence.....	23
4.2 Selection of materials.....	23
4.2.1 Specification of materials and components	23
4.2.2 Compliance with EU Directive 2014/68/EU.....	23
4.2.3 Certification of materials and components	24
4.3 Protection against hazards.....	24
4.3.1 Resistance to fire.....	24
4.3.2 Resistance to corrosive substances and atmosphere	24
4.3.3 Protection against variations in the operating pressure	24
4.3.4 Protection against gas hazards	24
4.3.5 Electrical installation	25
4.4 Accommodation and location of gas pressure control and metering systems, gas pressure compressors and gas mixing systems	25
4.4.1 Requirements for the enclosure of installations.....	25
4.4.2 Installation in an appliance room.....	25
4.4.3 Protection against adverse influences.....	26
5 Materials	26
5.1 Standards and specifications for pipes and pipe fittings	26
5.1.1 General.....	26
5.1.2 Carbon steel pipes	26
5.1.3 Carbon steel and iron fittings	28
5.1.4 Stainless steel pipes and pipe fittings (including flanges and valves).....	28
5.1.5 Copper.....	30
5.1.6 Polyethylene	30
5.1.7 Ancillaries.....	30
5.1.8 Valves	30
6 Design of pipework	31
6.1 General.....	31
6.1.1 Installation drawings and technical file	31
6.1.2 Measuring and test instruments	31
6.1.3 Properties of gas	31
6.2 Layout.....	32
6.2.1 Limits of the pipework location.....	32

6.2.2	Above-ground pipework.....	32
6.2.3	Buried pipework.....	32
6.2.4	Distance between buried pipework and buildings	32
6.2.5	Unacceptable locations for gas pipework in buildings	32
6.3	Dimensioning.....	33
6.3.1	Pressure loss	33
6.3.2	Gas velocity	33
6.4	Pressure and wall thickness.....	33
6.4.1	PS and test pressure	33
6.4.2	Pipe wall thickness.....	34
6.5	Safety engineering.....	39
6.5.1	Principles of pipework	39
6.5.2	Isolation of the gas supply	40
6.5.3	Location of pipework	43
6.5.4	Supporting structures.....	43
6.5.5	Depressurising and purging	43
6.6	Detail engineering.....	43
6.6.1	Pipe transits.....	43
6.6.2	Branches	44
6.6.3	Joints.....	47
6.6.4	Ancillaries	49
6.6.5	Above ground pipework inside and outside buildings	50
6.6.6	Buried pipework.....	53
6.6.7	Wall thickness related to bending of steel pipes.....	55
6.6.8	Provision for expansion and flexibility	56
6.7	Hot tapping carbon steel pipe	56
6.7.1	General	56
6.7.2	Principles.....	56
6.7.3	Conditions	56
6.7.4	Design evaluation	57
7	Design of pressure control systems	57
7.1	General	57
7.2	Pressure regulating system	58
7.3	Instrumentation	58
7.4	Permanent bypasses.....	59
7.4.1	Bypasses for equalization or testing.....	59
7.4.2	Bypasses of the safety system	59
7.5	Construction requirements	59
7.5.1	Pressure resistance.....	59
7.5.2	Operation.....	59
7.5.3	Insulating joint/flange.....	59
7.5.4	Gas velocity	59
7.5.5	External sensing lines	59
7.5.6	Breather and vent pipes.....	60
7.5.7	Isolating valves.....	61
7.5.8	Filter, separators	61
7.5.9	Pressure gauges	61
7.5.10	Pressure tapplings and purge connections	61
7.6	Low gas temperature.....	61
7.6.1	Functional requirements	61
7.6.2	Design temperature effects.....	61
7.6.3	Condensation	62

7.7	Gas compressors	62
7.7.1	Construction	62
7.7.2	Temperature rise.....	62
7.7.3	Pressure variation.....	62
7.8	Safety systems.....	62
7.8.1	Pressure safety system	62
7.8.2	Gas pressure compressors	65
7.8.3	Gas mixing systems	66
8	Construction	66
8.1	Identification of the installation.....	66
8.1.1	Installation drawings	66
8.1.2	Identification of the components.....	66
8.1.3	Weld identification.....	66
8.2	External hazards	67
8.2.1	Mechanical loads.....	67
8.2.2	Electric currents.....	67
8.2.3	Environmental influences.....	67
8.3	Gas pipework passing through exterior walls.....	67
8.3.1	Buried pipe transits	67
8.3.2	Aboveground pipe transits.....	69
8.4	Identification of pipework.....	70
8.4.1	Identification of above-ground pipework.....	70
8.4.2	Identification of buried pipework	70
8.5	Specifications and requirements for joints	70
8.5.1	Welded joints and pipe fittings in carbon steel and stainless steel pipes.....	70
8.5.2	Joints in copper pipework	75
8.5.3	Fusion joints in plastic pipes	75
8.5.4	Flange joints.....	75
8.5.5	Compression joints.....	75
8.5.6	Threaded joints	75
8.6	Joint suitability	75
8.7	Connections.....	76
8.7.1	Connection points/pipe ends	76
8.7.2	Appliance isolating valves	76
8.8	Corrosion protection	77
8.8.1	Metal-to-metal contact.....	77
8.8.2	Above-ground protection of pipework	77
8.8.3	Protection of buried pipework	79
8.8.4	Corrosion at pipe supports.....	82
8.9	Handling and installation of pipework.....	82
8.9.1	PE pipework.....	82
8.9.2	Steel pipework.....	82
8.9.3	Copper pipework	83
8.9.4	Pipe trench filling	83
8.10	Bending of pipes.....	84
8.10.1	Bending of steel pipes	84
8.10.2	PE pipe bending.....	84
8.10.3	Copper pipe bending.....	85
8.11	Welding of supports and anchor points to carbon steel pipework	85
8.12	Installation of pressure regulating systems.....	86
8.12.1	Protection of the installation space	86
8.12.2	Construction requirements.....	87

9	Documentation, inspection and testing.....	87
9.1	General	87
9.2	Documentation	88
9.2.1	General	88
9.2.2	Technical file	88
9.3	Inspection.....	89
9.3.1	Joint inspection	89
9.3.2	Corrosion protection	93
9.3.3	Recording of test results	93
9.4	Testing.....	94
9.4.1	General	94
9.4.2	Instrumentation.....	94
9.4.3	Test Media	95
9.4.4	Strength testing	95
9.4.5	Tightness testing.....	96
9.4.6	Procedure for strength and tightness testing.....	96
9.4.7	Safety during tests	96
9.4.8	Hot tapping	97
9.4.9	Pressure regulating systems and ancillaries.....	97
9.4.10	Recording of test results	97
Annex A	(informative) Examples of methods for testing	98
A.1	General	98
A.2	Strength test on metallic pipework.....	98
A.2.1	Duration	98
A.2.2	Conditions	98
A.2.3	Pneumatic testing.....	99
A.2.4	Hydrostatic testing.....	99
A.2.5	Pressure assessment	99
A.3	Tightness test on metallic pipework	100
A.3.1	General	100
A.3.2	Pipework which can be inspected visually.....	100
A.3.3	Pipework which cannot be inspected fully by visual means.....	101
A.4	Strength and tightness test on PE pipework.....	102
Annex B	(informative) Flammable gases mixing systems	104
B.1	Reverse Flow	104
B.2	Control of mixture composition	104
B.3	Matching pressures of components for mixing	106
Annex C	(informative) Examples of supports	107
Annex D	(normative) Materials	115
D.1	General	115
D.2	Materials with a demonstrated safe history of application in this type of equipment	118

Annex E (informative) Significant technical changes between this European standard and the previous version EN 15001-1:2009.....	120
Annex ZA (informative) Relationship between this European Standard and the essential requirements of EU Directive 2014/68/EU aimed to be covered	125
Bibliography	127