BS EN 12327:2012

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Gas infrastructure — Pressure testing, commissioning and decommissioning procedures — Functional requirements

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National foreword

This British Standard is the UK implementation of EN 12327:2012. It supersedes BS EN 12327:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GSE/33, Gas supply.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Foreword

This document (EN 12327:2012) 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of an identical text or by endorsement, at the latest by February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.

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This document supersedes EN 12327:2000.

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Introduction

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 point of input of gas to the transmission system up to the inlet connection of the gas appliances, whether for domestic, commercial or industrial purposes. In addition, a new EN Work Item is being prepared by CEN/TC 234/WG 10, "Gas Service Lines".

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

Gas infrastructures 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 recognized standards of gas engineering and the specific requirements imposed by the legal structures of the member countries.

1 Scope

This European Standard describes common principles for pressure testing, commissioning and decommissioning of gas infrastructures as covered by the functional European Standards of the Technical Committee CEN/TC 234, see Annex B. They have been extracted from the detailed codes of practice and operating manuals in the member countries.

This European Standard does not cover installation pipework which is covered by EN 1775.

The specified procedures are applicable to strength testing, tightness testing and combined testing. Test pressure levels, test periods and acceptance criteria are not covered by this European Standard.

Additional measures or different methods of testing, commissioning or decommissioning can be required by legislation of the individual member countries or at the discretion of the pipeline operator.

This European Standard specifies common basic principles for gas infrastructure. 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 European Standard, the national legislation/regulation should take precedence as illustrated in CEN/TR 13737 (all parts).

CEN/TR 13737 (all parts) give:

— clarification of all legislations/regulations applicable in a member state;

— if appropriate, more restrictive national requirements;

— a national contact point for the latest information.

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.

EN 837-1, *Pressure gauges — Part 1: Bourdon tube pressure gauges — Dimensions, metrology, requirements and testing*

EN 837-2, *Pressure gauges — Part 2: Selection and installation recommendations for pressure gauges*

EN 837-3, *Pressure gauges — Part 3: Diaphragm and capsule pressure gauges — Dimensions, metrology, requirements and testing*

3 Terms and definitions

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

3.1 General terminology

3.1.1
gas infrastructure
pipeline systems including pipework and their associated stations or plants for the transmission and distribution of gas

3.1.2
authorized person
competent person who is appointed to fulfil a given task on gas infrastructure

3.1.3
competent person
person who is trained, experienced and approved to perform activities relating to gas infrastructures

Note 1 to entry: Means of approval, if any, will be determined within each member country.

3.1.4
competent authority
body authorized by the member country to ensure that the pipeline operator fulfils the requirements of this and other relevant standards

3.1.5
pipeline operator
private or public organization authorized to design, construct and/or operate and maintain the gas infrastructure

3.1.6
pipework
assembly of pipes and fittings

3.1.7
pipeline
system of pipework with all associated equipment and stations up to the point of delivery

Note 1 to entry: This pipework is mainly below ground but includes also aboveground parts.

3.1.8
point of delivery
point of a gas network where the gas is transferred to the user

Note 1 to entry: This can be at a means of isolation (e.g. at the outlet of a LPG storage vessel) or at a meter connection.

Note 2 to entry: For this European Standard, the point of delivery is typically nominated by the distribution system operator and may be defined in National Regulations or Codes of Practice.

3.1.9
strength test
specific procedure to verify that the pipework and/or station meets the requirements for mechanical strength

3.1.10
tightness test
specific procedure to verify that the pipework and/or station meets the requirements for tightness

3.1.11
combined test
specific procedure to verify that the pipework and/or station meets the requirements for mechanical strength and tightness

3.1.12
lower explosive limit
LEL
concentration of flammable gas or vapour in air, below which the gas atmosphere is not explosive

3.1.13
commissioning
activities required to pressurise pipework, stations, equipment and assemblies with gas and to put them into operation

3.1.14
decommissioning
activities required to take out of service any pipework, station, equipment or assemblies filled with gas and to disconnect them from the system

3.1.15
purging
process for safely removing air or inert gas from pipework and/or pipeline components and replacing it with gas, or the reverse process

Note 1 to entry: A distinction is made between the following methods:

— direct purging is the displacement of air by gas or vice versa;

— indirect purging is the displacement of air by inert gas followed by the displacement by gas or vice versa.

Note 2 to entry: Alternatively by means of a barrier (a slug of inert gas or a pig) between the air and the gas or vice versa.

3.2 Pressure related terminology

3.2.1
design pressure
DP
pressure on which design calculations are based

3.2.2
operating pressure
OP
pressure which occurs within a system under normal operating conditions

3.2.3
maximum operating pressure
MOP
maximum pressure at which a system can be operated continuously under normal operating conditions

Note 1 to entry: Normal operating conditions are: no fault in any device or stream.

3.2.4
maximum incidental pressure
MIP
maximum pressure which a system can experience during a short time, limited by the safety devices

4 Pressure testing

4.1 General

4.1.1 The implementation of the requirements for pressure testing shall be performed by an authorized person.

4.1.2 The pressure of a strength test or combined test shall be higher than the maximum incidental pressure (MIP) of the system. The pressure of the tightness test, which will normally be carried out after the strength test, can be below the MIP of the system. The tightness test pressure shall be at least the operating pressure of the system where no previous strength test has been carried out, as in the case of:

— short extensions of existing pipework; and

— connections between new and existing systems, where joints are exposed for testing.

All pressure levels are gauge pressures (relative pressures) measured at the prevailing atmospheric pressure.

4.1.3 A written procedure shall be prepared by the pipeline operator or competent authority, taking into account local conditions, national legislation, standards and/or codes of practice, and shall specify the following:

— test method;

— test pressure;

— test period;

— test medium;

— acceptance criteria;

— allowable pressure/volume variation;

— minimum pressure in the existing gas infrastructure;

— leak detection methods;

— release of test medium;

— disposal of water.

4.1.4 The test method and pressure level to be applied in each case depends on the materials used, the type of joints, the intended application and the provisions of the relevant functional standards for gas infrastructures (see Annex B).

4.1.5 The maximum allowable pressure/volume variation depends on the material, pressure level, diameter and the location of the test section.

4.1.6 The effects of atmospheric pressure variations and/or temperature variations, particularly where a part of the test section is not completely buried, shall be taken into account.

4.1.7 When plastic material is being tested, consideration should be given to creep effects during pressurization and testing.

EXAMPLE Polyethylene.

4.1.8 The pressure level shall be verified using pressure measurement equipment of minimum accuracy class 0,6 with a maximum measurement range between 1,1 to 1,5 times the test pressure. A recording device of accuracy class 1 may be used, if appropriate. A check shall be made to verify that the complete test section is pressurized. To take into account temperature changes affecting the test pressure, the temperature can be measured with an instrument having a minimum scale reading of 1 °C.

4.1.9 Measuring instruments shall comply with appropriate standards or specifications and shall have valid certificates of calibration. Pressure gauges shall comply with EN 837-1, EN 837-2 and EN 837-3, where applicable.

4.1.10 The test equipment shall be capable of withstanding the specified test pressure.

4.1.11 Care shall be taken not to over-pressurize the test section beyond the specified test pressure level.

4.1.12 Suitable precautions shall be taken in order to avoid potential hazards to persons and to the environment.

4.1.13 As far as possible pipework should be buried, however, if pipework is exposed, it shall be adequately secured.

4.1.14 While the pressure is being raised no unauthorized person shall enter the test area of any exposed part of the test section or interfere with it. Warning notices shall be displayed, where deemed necessary.

4.1.15 Only work related to the pressure test shall be carried out on the test section.

4.1.16 Pressure testing should not be carried out against closed valves.

NOTE Valves in the closed position should not be assumed to be leak tight.

4.1.17 All pipework that does not have end load resistance shall be restrained against movement during the test by design or external means.

4.1.18 Upon satisfactory completion of the pressure test, the pipeline section should be commissioned as soon as possible. If there is a time lag between testing and commissioning, the pipeline section should be kept under pressure. Before commissioning, the pressure shall be checked to make sure that the pipeline section has not been damaged.

4.2 Classification of test methods

Table 1 gives the relationship between test methods, test media and the relevant subclauses within this European Standard.

Table 1 — Test medium/ test method relationship

	Water	Air or inert gas	Gas at operating pressure
Volume measuring method	4.3.2.1		
Pressure recording method	4.3.2.2	4.4.2.1	
Visual inspection method	4.3.2.3	4.4.2.2	4.4.2.2
Differential pressure measuring method		4.4.2.3	

4.3 Hydrostatic testing

4.3.1 General

Hydrostatic testing should be carried out with water. The water used for testing shall not have an aggressive effect on the pipeline components. The test section and the water shall be free of contamination, as this can impair testing and the subsequent operation of the test section. Provisions shall be made for the suitable disposal of water after testing.

A preliminary test with air or inert gas at low pressure, maximum pressure of 0,5 bar, can be performed before hydrostatic testing. This preliminary test shall not replace the tightness test.

The length of the test section will be governed by ground contours and the need to avoid excessive pressures at low points due to hydrostatic head, taking into account the materials used for the construction of the test section.

The test pressure shall be maintained at the highest point of the test section and, if necessary, be checked by using a suitable pressure gauge.

While pressurizing, the pressure shall be monitored to ensure that critical stress limits of the materials are not exceeded.

EXAMPLE Specified minimum yield strength for steel or rapid crack propagation for polyethylene. If necessary, precautions against freezing of the water should be taken.

When filling the test section with water, no air should remain at high points.

The system used for filling the test section should have sufficient water capacity available to maintain a continuous and even flow to ensure that firstly the entrained air is reduced to a minimum and secondly that it is capable of overcoming any hydraulic peak due to geographic contours.

Where practical, water should be introduced into the test section at the lowest point.

Where difficulties exist in the introduction and eventual removal of water from pipework, suitable pig dispatching and receiving stations should be fitted at the ends of the pipework.

Where the volume of ‘make up‘ water or the pressure loss is unacceptable, a check should be made of the pressure testing equipment and for any indication of leakage.

Where inspection does not reveal the source of leakage, a method mentioned in 4.5 shall be used.

4.3.2 Hydrostatic test methods

4.3.2.1 Volume measuring method

On reaching the specified test pressure, allowing pressure and temperature to stabilize, the first pressure reading shall be taken.

The test section shall be maintained at a constant pressure, and any loss in pressure shall be compensated by providing additional water. The volume of 'make up' water required shall be recorded.

4.3.2.2 Pressure recording method

On reaching the specified test pressure the test section shall be isolated from the pressure source. After allowing an adequate time for pressure and temperature to stabilize, the first pressure reading shall be taken.

The pressure shall be recorded during testing and/or noted at the beginning and end of the test period.

4.3.2.3 Visual inspection method

All pipeline components shall be exposed and freely accessible. The joints shall be free of grease, paint, coatings, protective wrappings or similar elements.

After the specified test pressure has been reached, the test section is visually inspected for any signs of leakage. The test pressure shall be maintained throughout the complete inspection.

4.3.3 Water disposal

The method for the disposal of water shall be given in the written procedure. The test section shall be emptied of water by using suitable methods.

EXAMPLE Swabbing pigs.

Consideration shall be given to drying the test section before commissioning.

4.4 Pneumatic testing

4.4.1 General

A preliminary test with air or inert gas at low pressure, maximum pressure of 0,5 bar, can be performed before burying pipework. This preliminary test shall not replace the tightness test.

The method for the removal of the air or inert gas shall be specified in the written procedure. The pressure shall be released through suitable vents in a controlled manner until the whole test section is at atmospheric pressure.

4.4.2 Pneumatic test methods

4.4.2.1 Pressure recording method

Testing shall be carried out with air or inert gas as specified in the written procedure.

On reaching the specified test pressure the test section shall be isolated from the pressure source. After allowing pressure and temperature to stabilize, the first pressure reading shall be taken.

The pressure shall be recorded during testing and/or noted at the beginning and end of the test period.

4.4.2.2 Visual inspection method

For regulating, measuring and compressor stations as well as above ground pipework of gas storage, pneumatic testing should normally be carried out at operating pressure with air, inert gas or gas. Testing of short extensions and connections, see 4.1, can be carried out with gas at operating pressure.

All pipeline components shall be exposed and freely accessible. The joints shall be free of grease, paint, coatings, protective wrappings or similar elements.

When an approved leak detection fluid or an appropriate instrument is used for the checking of tightness, it shall be specified in the written procedure. A leak detection fluid shall not have any aggressive effect on the pipeline components.

NOTE For components made of stainless steel, the level of chlorine in the leak detection fluid should be below 30 mg/l.

After the specified test pressure has been reached, the test section is visually inspected for any signs of leakage. The test pressure shall be maintained throughout the complete inspection.

4.4.2.3 Differential pressure measuring method

Testing shall be carried out with air or inert gas as specified in the written procedure.

On reaching the specified test pressure the test section shall be isolated from the pressure source. After allowing pressure and temperature to stabilize, the first pressure reading shall be taken.

Where a part of the test section cannot be completely buried, the effects of temperature variations shall be taken into account.

The reference vessel shall be maintained at similar conditions to the test section.

The reference vessel, including the differential pressure gauges, hoses and all joints, shall be tightness tested with an approved leak detection fluid prior to testing.

The reference vessel shall be isolated from the test section by means of at least two shut-off valves in series to ensure that there is no leakage between the two isolated systems.

The reference vessel shall be connected to the test section by means of a suitable differential pressure measuring system.

The pressures and temperatures shall be recorded.

4.5 Leak detection

Where the pressure test fails, further investigations to locate the leak shall be carried out as specified in the written procedure.

Several methods of leak detection are available.

EXAMPLE 1 Sectioning of the test section and retesting of the smaller sections.

EXAMPLE 2 Injection of a dye into the water to improve visual indication of leakage.

EXAMPLE 3 Injection of sulfur hexafluoride (SF_6) and tracing with a suitable detector.

EXAMPLE 4 Injection of helium and tracing with a suitable detector.

EXAMPLE 5 Injection of methane (CH_4), where the concentration is below the lower explosive limit, and tracing with a suitable detector.

EXAMPLE 6 Low pressure air or inert gas with leak detection fluid.

EXAMPLE 7 Ultrasonic methods.

4.6 Test report

A test report shall be made after satisfactory completion of the pressure testing by the authorized person responsible for the test, giving at least the following information:

— pipeline operator;

— name of the person performing the test;

— location and description of the test section;

— date of testing;

— MOP of the system;

— test method;

— test pressure level;

— test medium;

— test period;

— test result; and

— test certificates of pipeline components, if required.

5 Commissioning and decommissioning

5.1 General/planning

5.1.1 The implementation of the requirements for commissioning/decommissioning shall be performed by an authorized person.

5.1.2 The works/operations shall be prepared carefully. If necessary, a written procedure together with a plan of the work shall be prepared, see also 4.1.

5.1.3 New pipeline sections shall only be commissioned after a successful pressure test.

Under exceptional circumstances and at the discretion of the pipeline operator an existing pipeline section can be re-commissioned without further pressure testing but consideration should be given to a post commissioning survey using a suitable detector which continuously monitors for the presence of gas.

EXAMPLE 1 Flame ionization, semi-conductor.

When commissioning or decommissioning a pipeline section, direct or indirect purging can be used. For more information on purging criteria see Annex A.

5.1.4 Consideration shall be given to the specific physical characteristics of the gas purged.

EXAMPLE 2 LPG, propane/air mixtures.

5.1.5 Customers whose supplies could be affected during the operation should be advised prior to the work commencing.

5.1.6 During all purging operations:

— a metallic bond shall be installed and maintained across any separated metallic pipework involved in the purging operation and, if necessary, connected to earth;

— there shall be no smoking, naked lights or other sources of ignition present near vent points, and appropriate signs should be displayed;

EXAMPLE 3 No smoking sign.

— precautions shall be taken to prevent uncontrolled discharges of static electricity from plastic pipework;

— adequate hearing protection shall be available;

— fire extinguishers shall be available and positioned for use;

— if necessary, a sufficient number of respirators should be available at site;

— suitable protective clothing shall be worn;

— suitable communication between the operaters at the construction site shall be provided;

— once a purge has started it shall be continuous without interruption until it is completed; for large volumes the provisions of back-up compressors should be considered;

— precautions should be taken to ensure that the released volumes of gas or inert gas do not cause asphyxiation;

— care shall be taken that the velocity is sufficiently high to avoid stratification; for more information see Table A.1 and Table A.2.

5.1.7 The purging procedure is completed when a safe and acceptable gas concentration is measured at the sample test point of the vent.

5.2 Commissioning

Prior to commissioning, the complete pipeline section shall be at atmospheric pressure, and attention shall be given that no gas, gas/air or gas/inert gas-mixture can exhaust from any position other than the vent position.

The vent should be located at the far end of the pipeline section to be purged and should be attended throughout the purging operations.

Vent pipework shall:

— be metallic;

— discharge vertically into the open air normally not less than 2,5 m above ground level;

— be located at a safe distance from possible sources of ignition;

— be located where vented gas is unlikely to drift into buildings;

— include a full bore control valve and a sample test point;

— be adequately earthed if connected to plastic pipework;

— not normally include a flame trap; however, if it is considered necessary, the resulting restriction in gas velocity shall be taken into consideration.

A flexible purge hose terminating with a flame trap or a metallic end should be used to vent into the open air, where commissioning pipework terminates inside a building. The flexible hose should be firmly held or secured in place and the direction of the wind should be taken into account.

The flow of gas during purging shall be controlled by appropriate means. The pressure in the existing gas infrastructure shall not be allowed to fall below that specified in the written procedure. Where permitted, the gas flow in PE pipework can be controlled by the release of a squeeze-off.

After purging, the pipeline section shall be pressurized under controlled conditions to the operating pressure.

5.3 Decommissioning

When decommissioning a pipeline section by direct purging, the purge can be generated using a compressor to push the gas out of the vent, or by an ejector to draw the gas out of the pipeline section and draw air in through an inlet opening.

The pipeline section to be decommissioned shall be isolated from the gas infrastructure by suitable and approved methods.

EXAMPLE 1 When an ejector is used for sucking gas from the pipeline section, a double block and bleed system is used to separate it from the gas infrastructure.

EXAMPLE 2 If a compressor is used to displace gas from the pipeline section, reliable means of isolation are used in order to prevent compressed air entering the gas infrastructure.

When the gas has been vented to atmospheric pressure, the vent shall be closed and a test carried out to ensure that the pressure does not increase as a result of an unknown backfeed.

Prior to decommissioning consideration shall be given to reduce gas venting to atmosphere. In all cases venting shall be undertaken under controlled conditions.

A pipeline section that is to be taken out of service for long periods of time shall be decommissioned, disconnected from the gas infrastructure and the ends sealed.

Annex A
(informative)

Purging criteria

Table A.1, Table A.2, Table A.3 and Table A.4 give specific information relating to purging operations.

Where pipe diameters differ from those listed in the Tables A.1 to A.4, the values relating to the next larger nominal pipe diameter should be used.

For pipework of larger diameters than those in Table A.1, Table A.2 and Table A.3, the principles used to determine the associated data should be applied.

Table A.1 — Commissioning/decommissioning pipework by direct purging for natural gas

Nominal pipe diameter (mm)	**Minimum purge velocity** (m/s)	**Minimum flow rate** (m^3/min)
150	0,6	0,7
200	0,7	1,4
250	0,8	2,4
300	0,9	3,9
450	1,0	9,6
600	1,2	20,4
900	1,5	60,0
1 200	1,7	120,0
NOTE 1 The maximum purge velocity should not exceed 20 m/s to avoid turbulence and/or dust being raised. NOTE 2 Generating the purge by using a compressor is suitable up to a nominal pipe diameter of 250 mm. For larger diameters an ejector is more effective.		

Table A.2 — Commissioning/decommissioning pipework by indirect purging with nitrogen for natural gas

Nominal pipe diameter (mm)	**Minimum purge velocity** (m/s)	**Minimum flow rate** (m^3/min)
150	0,6	0,7
200	0,6	1,2
250	0,6	1,8
300	0,6	2,6
450	0,6	5,8
600	0,6	10,2
900	0,6	22,9
1 200	0,6	40,7

Table A.3 — Minimum quantity of inert gas per 100 m length of pipework for complete displacement of air or gas

Nominal pipe diameter (mm)	**Minimum quantity per 100 m length** (m^3)
100	1,3
150	3,0
200	5,0
250	8,0
300	12,0
400	20,0
450	25,0
600	45,0
750	70,0
900	100,0
1 050	135,0
1 200	175,0

Table A.4 — Minimum slug volume per length of pipework for natural gas

Length (m)	**Over 250 to 500**	**Over 500 to 1 000**	**Over 1 000 to 1 500**	**Over 1 500 to 2 500**	**Over 2 500 to 5 000**	**Over 5 000 to 10 000**
Nominal pipe diameter (mm)	**Minimum slug volume** (m^3)					
100	1	1	2	2	4	8
150	1	2	3	7	9	18
200	2	4	5	8	16	32
250	3	5	8	13	25	50
300	4	8	11	18	36	72
400	7	13	19	32	64	128
450	8	16	24	40	80	160
600	15	30	45	75	150	300

NOTE A nitrogen cylinder or a bank of cylinders with high capacity regulator delivers a maximum flow rate of 1 m^3/min. The nitrogen facility should be able to deliver the minimum flow rate, e.g. a flow rate of 2,6 m^3/min for purging a 300 mm main (see Table A.2), therefore three nitrogen cylinders each with their own high capacity regulators will be used to discharge simultaneously. For nominal diameters greater than 315 mm, it is recommended that liquid nitrogen tankers are used to achieve the necessary velocities and volumes.

Annex B
(informative)

List of CEN/TC 234 European Standards

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

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

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

EN 1918-1, *Gas supply systems — Underground gas storage — Part 1: Functional recommendations for storage in aquifers*

EN 1918-2, *Gas infrastructure — Underground gas storage — Part 2: Functional recommendations for storage in oil and gas fields*

EN 1918-3, *Gas infrastructure — Underground gas storage — Part 3: Functional recommendations for storage in solution-mined salt cavities*

EN 1918-4, *Gas infrastructure — Underground gas storage — Part 4: Functional recommendations for storage in rock caverns*

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

EN 12007-1, *Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar — Part 1: General functional recommendations*

EN 12007-2, *Gas infrastructure — 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, *Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar — Part 3: Specific functional requirements for steel*

EN 12007-4, *Gas infrastructure — Pipelines for maximum operating pressure up to and including 16 bar — Part 4: Specific functional recommendations for renovation*

EN 12186, *Gas infrastructure — Gas pressure regulating stations for transmission and distribution — Functional requirements*

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

EN 12327, *Gas infrastructure — Pressure testing, commissioning and decommissioning procedures — Functional requirements*

EN 12583, *Gas infrastructure — Compressor stations — Functional requirements*

EN 12732, *Gas infrastructure — Welding steel pipework — Functional requirements*

CEN/TR 13737 (all parts), *Implementation Guide for functional standards prepared by CEN/TC 234 Gas infrastructure*

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