



SLOVENSKI STANDARD

SIST EN 12327:2001

01-februar-2001

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

Gasversorgungssysteme - Druckprüfung, In- und Außerbetriebnahme - Funktionale
Anforderungen

Systemes d'alimentation en gaz - Essais de pression, modes opératoires de mise en
service et de mise hors service des réseaux d'alimentation en gaz - Prescriptions
fonctionnelles

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91.140.40 Sistemi za oskrbo s plinom Gas supply systems

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12327

January 2000

ICS 91.140.40

English version

**Gas supply systems – Pressure testing, commissioning and
decommissioning procedures – Functional requirements**

Systèmes d'alimentation en gaz - Essais de pression, modes
opératoires de mise en service et de mise hors service des
réseaux d'alimentation en gaz - Prescriptions fonctionnelles

Gasversorgungssysteme - Druckprüfung, In- und
Außerbetriebnahme - Funktionale Anforderungen

This European Standard was approved by CEN on 6 May 1999.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 234, 'Gas supply', 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 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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

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1 Scope

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This European Standard describes common principles for pressure testing, commissioning and decommissioning of gas supply systems as covered by the European functional standards of the Technical Committee CEN/TC 234 (see Annex B) except for pipework for buildings according to EN 1775. They have been extracted from the detailed codes of practice and operating manuals in the member countries.

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 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 supply systems. Users of this European Standard should be aware that more detailed national standards and/or codes of practice can 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 principles.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to 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
EN 1775	Gas supply - Gas pipework for buildings - Maximum operating pressure £ 5 bar - Functional recommendations

3 Definitions and abbreviations

For the purposes of this European Standard, the following definitions and abbreviations apply:

3.1

authorized person

a competent person who is appointed to fulfill a given task on gas supply systems.

3.2

competent person

a person who is trained, experienced and approved to perform activities relating to gas supply systems.

NOTE: Means of approval, if any, will be determined within each member country.

3.3

competent authority

a body authorized by the member country to ensure that the pipeline operator fulfils the requirements of this and other relevant standards.

3.4

pipeline operator

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

3.5

gas supply system

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

3.6**pipeline**

a system of pipework with all associated equipment and stations up to the point of delivery. This pipework is mainly below ground but includes also aboveground parts.

3.7**pipework**

an assembly of pipes and fittings.

3.8**design pressure (DP)**

the pressure on which design calculations are based.

3.9**operating pressure (OP)**

the pressure which occurs within a system under normal operating conditions.

3.10**maximum operating pressure (MOP)**

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

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

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3.11**maximum incidental pressure (MIP)**

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

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3.12**lower explosive limit (LEL)**

the concentration of flammable gas or vapour in air, below which the gas atmosphere is not explosive.

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3.13**strength test**

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

3.14**tightness test**

a specific procedure to verify that the pipework and/or station meets the requirements for tightness.

3.15**combined test**

a specific procedure to verify that the pipework and/or station meets the requirements for mechanical strength and tightness.

3.16**commissioning**

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

3.17

decommissioning

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

3.18

purging

a process for safely removing air or inert gas from pipework and/or pipeline components and replacing it with gas, or the reverse process. A distinction is made between the following methods:

- direct purging: the displacement of air by gas or vice versa;
- indirect purging: the displacement of air by inert gas followed by the displacement by gas or vice versa; alternatively by means of a barrier (a slug of inert gas or a pig) between the air and the gas or vice versa.

4 Pressure testing

4.1 General

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

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 follow a strength test, may be below the MIP 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, the tightness test pressure shall be at least the operating pressure of the system.

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

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 supply system;

- leak detection methods;
- release of test medium;
- disposal of water.

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 supply systems (see Annex B).

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

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

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

EXAMPLE: Polyethylene.

The test section shall be pressurized to the required level under controlled conditions. The pressure level shall be verified using a pressure gauge of minimum class 0,6 with a maximum measuring range of 1,5 times the test pressure. A recording device of 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 K.

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.

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

Care shall be taken not to overpressurize the test section beyond the specified test pressure level.

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

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

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, if necessary.

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

Pressure testing shall not be carried out against closed valves.

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

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 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 (max. 0,5 bar) may 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 shall 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.

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4.3.2.3 Visual inspection method

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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.