BRITISH STANDARD

BS EN
13090:2000

Means for resealing threaded joints of gas pipework in buildings

The European Standard EN 13090:2000 has the status of a British Standard

ICS 23.040.80; 91.140.40

National foreword

This British Standard is the official English language version of EN 13090:2000.

The UK participation in its preparation was entrusted to Technical Committee PSE/2, Gaskets, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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Summary of pages

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English version

Means for resealing threaded joints of gas pipework in buildings

Matériaux pour la réétanchéité des raccords filetés des tuyauteries de gaz dans les bâtiments

Mittel zum nachträglichen Abdichten von Gewindeverbindungen in Gas-Leitungsinstallationen in Gebäuden

This European Standard was approved by CEN on 25 September 2000.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 108 " Sealing materials and lubricants for gas appliances and gas equipment", the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by April 2001, and conflicting national standards shall be withdrawn at the latest by April 2001.

Annex A is informative.

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.

Introduction

Threaded joints of old interior gas piping systems may become unsound, because, for example, in former times parallel/parallel threaded joints were sealed by the application of natural fibers (e.g. hemp, flax) in combination with unsuitable sealing materials. These joints were sound as long as the distributed gas was wet and thus kept the natural fibers in a swollen condition. However, the joints began to leak when subsequently dry gas was introduced and the fibres consequently shrank.

Sealants specified in this European Standard are suitable for sealing leaky threaded joints, but not corroded or broken pipes. It is therefore recommended that the leakage rate of the gas installation, under distribution pressure, is determined prior to resealing. If the leakage rate is greater than e.g. 5 l/h then this is normally an indication of corrosion or other severe pipe damage. This should be repaired before the installation is treated with the sealant.

General recommendations for the design, construction, testing, operation, and maintenance of gas pipework in buildings are specified in EN 1775.

All pressures referred to in this Standard are gauge pressures.

1 Scope

This European Standard specifies the properties and the test methods of sealants used to reseal threaded joints of metallic gas pipework in buildings operated at a maximum allowed operating pressure of 100 mbar (such sealants hereafter are referred to as "sealants").

> Note Gas pipework in buildings is in accordance with EN 1775 the pipework between the point of delivery and the inlet connection to the gas appliance.

This Standard is applicable to sealants for threaded joints of metallic gas pipework, in buildings, carrying fuel gases of the 1st family (town gas), 2nd family (natural gas), and 3rd family (liquefied petroleum gases (LPG)) (see EN 437) but not including liquefied petroleum gases in the liquid state.

Sealing materials for the installation of metallic threaded joints are specified in EN 751.

2 Normative References

This European Standard incorporates by dated or undated reference, 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 (including amendments).

EN 437	*Test gases - Test pressures - Appliance categories*
EN 549:1994	*Rubber materials for seals and diaphragms for gas appliances and gas equipment*
EN 751-1	*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	*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	*Sealing materials for metallic threaded joints in contact with 1st, 2nd, and 3rd family gases, and hot water* - Part 3: *Unsintered PTFE tapes*
EN 1775	*Gas suply - Gas pipework for buildings - Maximum operation pressure ≤ 5 bar - Functional recommendations*
EN 10242	*Threaded pipe fitting in malleable cast iron*
prEN 10255:1996	*Non-alloy steel tubes suitable for welding or threading*
ISO 7-1	*Pipe threads where pressure-tight joints are made on the* threads - Part 1: *Dimensions, tolerances and designation*

3 Terms and definitions

For definitions concerning gas pipework in buildings reference is made to EN 1775.

4 Requirements

4.1 Requirements to be met by the sealant as received

4.1.1 Effect on metals

Sealants shall not cause any corrosion of any metal pipe material.

4.1.2 Effect on seals

Sealants shall not impair elastomer seals according to EN 549:1994. This requirement is not relevant for anaerobic sealants.

4.1.3 Effect on combustion behaviour of fuel gases

Sealants shall not impair the combustion of fuel gases in gas appliances or the operation of safety, control or metering equipment.

4.2 Requirements to be met by the sealant after assembly

4.2.1 Sealing properties

Gas piping systems sealed by sealants shall be sound under the conditions laid down in 6.2.1.

4.2.1.1 Effect of gas condensate on sealants

The sealing properties of sealants shall not be impaired by gas condensates.

4.2.1.2 Effect of vibration

The sealing properties of sealants shall not be impaired by the effect of vibrations.

4.2.2 Disassembly of joints

It shall be possible to disassemble resealed joints, using commercial tools, without damaging any of the threads.

5 Test material and documentation

5.1 Test material

The manufacturer or supplier shall submit sufficient quantities (about 10 l) of the sealant to the test laboratory.

5.2 Documentation

The following documents shall be submitted to the test laboratory:

a) Description of the sealant.

b) Application and handling instructions including preparatory procedures such as soundness test, disconnection of gasmeters and appliances, cleaning of the pipework; application of the sealant by e.g. the filling, spraying or wicking method, removal of surplus sealant; final soundness test and re-establishment of the gas supply.

c) Appropriate health and safety data sheets conforming to the requirements of the country of use.

6 Test methods

6.1 Test of sealants as received

6.1.1 Test of corrosiveness

The corrosiveness of the sealant shall be tested using copper, copper-zinc alloy, zinc and low carbon steel strips each 75 mm long, 13 mm wide and not less than 0,5 mm thick. Mechanically abrade both faces and the edges of each strip to obtain a uniform finish free from defects. Polish each strip with emery paper (grade No. 400) and then clean with successive pads of cotton wool until a fresh pad remains unsoiled after use. Wash each strip with acetone and allow it to dry. Use clean forceps for all further handling of the strips.

Coat 50 mm of one side of each of two test strips of the same metal with sealant. Lay one strip, treated side up, on a horizontal surface and place the other with an overlapping of the coated 50 mm directly on top, treated side down. Hold in position with a (200 ± 10) g weight. Store the test strips for (336 ± 2)h at (20 ± 5) °C and then separate them - if necessary after warming up. The cleaned surfaces of the test strips shall show no pitting due to the effect of the sealant, but changes in the color and clouding of the polished surfaces shall be acceptable.

6.1.2 Test of effect on seals

The effect of the sealant on seals used for interior gas pipework shall be tested in accordance with 7.6 of EN 549:1994 by assessing the swelling caused by the sealant (instead of pentane) and the behaviour at subsequent drying of specimens made from nitrile butadiene rubber (NBR) with an IRHD hardness of 75 ± 5 which satisfy the requirements laid down in EN 549:1994. The increase in mass due to swelling shall not exceed 10 % and the change in hardness shall not exceed 10 IRHD. The decrease in mass after drying shall not be in excess of 5 % and the change in hardness shall not be in excess of 10 IRHD.
This test is not relevant for anaerobic sealants.

6.1.3 Test of effect on the combustion behaviour of fuel gases

To test the effect of the sealant on the combustion behaviour of fuel gases, 100 ml of sealant shall be filled into a Woulf bottle with a capacity of approx. 500 ml. The gas inlet pipe shall run through the central bottle tube and shall end (5 ± 1) mm above the liquid level. The gas outlet pipe shall end at least 50 mm above the liquid level. Air shall be removed from the bottle by purging the bottle with natural gas. Following purging, the pilot of a conventional instantaneous water heater and a thermo-electric flame supervision device shall be connected to the outlet using a short glass, metal or PTFE tubing and shall be adjusted properly.

The length of the pilot flame shall then be measured at a given pressure. Following 72 h of continuous operation at (20 ± 5) °C, the function of the pilot and the thermo-electric flame supervision device shall be tested and the length of the pilot flame shall be measured. Further the nozzle, the burner, the temperature sensor and the thermo-electric flame supervision device shall be examined for deposits.

6.2 Test of sealants in test assemblies

6.2.1 Test of sealing properties

6.2.1.1 Preparation of test assemblies

The test shall be performed on test assemblies prepared from new unused threaded joints. The parts specified in table 1 are required for the preparation of the test assemblies.

Table 1 - Parts list for test assemblies

Quantity	Part	Thread	Designation
16	Thread pipe	R $1^1/_2$	prEN 10255:1996 DN 40 welded, medium series; length: ≈ 100 mm
14	Socket	Rp $1^1/_2$	EN 10242
4	Socket, reducing	Rp $1^1/_2$ x $^1/_2$	EN 10242
8	Steel bar	-	Length: ≈ 150 mm width: ≈ 20 mm thickness: ≈ 2 mm

Cut threads R $1^1/_2$ following the pattern of ISO 7-1 on both ends of the pipe sections in two different ways. One thread - afterwards used for the connection of the different test assemblies - shall be cut in full accordance with ISO 7-1. After screwing these threads by hand into the sockets used for connection of the test assemblies $2^1/_2 \pm {}^1/_2$ fully cut threads shall still be visible. The second thread shall be more deeply cut. After screwing these threads, to be tested afterwards, into the sockets used for the preparation of the test assemblies $^1/_4$ to $^3/_4$ of a fully cut thread shall still be visible. The different threads on each pipe section shall be clearly marked to avoid confusion. Remove cutting oil before assembly by cleaning all threads successively with toluene and acetone in an ultrasonic bath. The steel bars are longitudinally and symmetrically welded on each of 8 sockets with the length of the bars on both sockets sides being the same. The pipe sections bearing the more deeply cut thread shall be hand assembled with these sockets using hemp, 0,3 g dried for not less than 72 h over silica gel.

To reach an equal leakage rate of both joints of each test assembly the leakage rate of the assemblies shall first be reduced to about 30 ml/min (1,8 l/h) at a test pressure of 150 mbar by screwing both pipe sections equally deeply into the sockets. After that, one pipe shall be loosened until the leakage rate of the test assembly has risen to 50 ml/min (3 l/h). The end of the steel bar on the socket shall thereupon be welded to the loosened pipe to fix its position. The second pipe shall then also be loosened to obtain a total leakage rate across the test assembly of (85 ± 5) ml/min (5 l/h) and the position of the second pipe shall also be fixed by welding. The overlap between the pipe sections and sockets shall be about 6 threads.

Note 1 The thermal stress to which the assemblies are exposed by the above welding operations shall be minimized and the distance between each pipe/bar weld and the socket shall not be less than 60 mm.

Note 2 Test assemblies which are not treated by sealant promptly after preparation shall be stored in a desiccator over silica gel to prevent the hemp from swelling due to the absorption of moisture from ambient air.

6.2.1.2 Sealing

The test assemblies prepared in accordance with 6.2.1.1 shall be treated with the sealant in accordance with the instructions of the sealant manufacturer. Safety goggles and impervious protective gloves shall be worn when handling the materials and sealing the test assemblies.

6.2.1.2.1 Sealing by the filling method

If not otherwise specified by the sealant manufacturer sealing shall be affected as follows. Connect the 8 test assemblies in two lines of 4 test assemblies using the remaining sockets and PTFE tape according to EN 751-3 to seal the threaded joints. For sealants applied by complete filling of gas pipework the ends of these two lines are to be fitted with the reducing sockets. With the lines fixed vertically the upper ends are then fitted with stopcocks while the lower ends are connected to a pressure vessel.

Pour sufficient sealant to fill both lines into the pressure vessel. After closing the pressure vessel the two lines of test assemblies are slowly filled with the sealant under a slight pressure of about 0,2 bar which overcomes the hydrostatic pressure of the sealant in the lines. When the lines have been completely filled with the sealant and the overflow no longer contains any air bubbles close the stopcocks and pressurize the system at the pressure required by the manufacturer for the specified time.

After the sealing the pressures shall be released and the lines shall be drained according to the manufactures instructions. Then air shall be passed with a flow rate of (100 ± 10) l/h for (120^{0}_{-5}) h at a temperature of (20 ± 5) °C through both lines.

6.2.1.2.2 Sealing by the spraying method

For sealants applied by the spraying method the ends of the two lines of test assemblies (see 6.2.1.2.1) shall be vertically fixed and connected symmetrically by two R $1^{1}/_{2}$ T-fittings to a horizontal connection line with a third T-fitting in the middle. The upper ends of the two lines of test assemblies shall be fitted with reducing sockets and closed by stop cocks. The two T-fittings at the lower end of the two lines shall be closed by plugs.

The T-fitting in the connection line shall be connected to a S-shaped DN 40 pipework consisting of three horizontal sections of 5 m length each, which are connected by two vertical pipes of 0,25 m length and four elbow-fittings (see figure 1). The sealant shall be sprayed into the pipe system at the lower end of the S-shaped pipework according to the manufacturers instruction. An appropriate knock-out vessel to precipitate any remaining sealant dropplets followed by a filter are used to remove surplus sealant from the gas stream which is then conducted to a hood or vent. After the application the two lines of test assemblies shall be drained - if appropriate - and the residual sealant hardened or cured according to the manufacturers instructions.

6.2.1.2.3 Sealing by wicking or capillary flow

For sealants applied from the outside of the threaded joints of gas pipework and which penetrate the threads by wicking or capillary flow the test arrangement for the filling method (6.2.1.2.1) may be used (without the pressure vessel). It depends on the manufacturers application instructions whether the sealant shall be applied to the test assemblies under gas pressure. If the manufacturer specifies that the sealant can be applied to gas pipework under the normal distribution pressure, then the test assemblies have to be pressurized with nitrogen to 100 mbar during both the sealing procedure and the drying or hardening period specified by the manufacturer.

The sealing of the two vertically fixed lines of test joints is performed according to the manufacturers instructions. However, it is not permissible to turn the lines for the sealing of the lower threaded joints.

6.2.1.3 Soundness test

After the two lines of test assemblies have been sealed according to 6.2.1.2 the test assemblies shall carefully be disconnected from each other without stressing the sealed threaded joints under test and closed by rubber plugs or end caps. Each test assembly is separately tested for leaks under a test pressure of 150 mbar with a device capable of measuring leakage rates of ≤ 2 ml/h. The temperature of the test assembly during the soundness test shall not vary more than ± 0,5 °C to avoid any significant disturbance of the measurement. The temperature influence may be further lessend by inserting a plastic cylinder into the test assemblies. Each specimen shall be deemed to be tight if the leakage rate does not exceed 10 ml/h at a test pressure of 150 mbar.

If the leakage rate across one specimen is higher than this leakage rate, then said specimen shall not be used for further testing. If the leakage rate across a second specimen is higher than the specified leakage rate, the test shall be deemed to have been failed. In all tests required under 6.2.1.3 through 6.2.1.6, no more than one specimen shall leak at a rate higher than 10 ml/h. Only for one of 8 test assemblies a leakage rate up to 30 ml/h is permitted throughout all successive tests.

All test assemblies shall be successively tested according to 6.2.1.4 to 6.2.1.6.

6.2.1.4 Aging test

The test assemblies shall be heated to (50 ± 2) °C for 1000 h during which air heated by passage through a heat exchanger inside the oven to (50^{2}_{5}) °C shall be passed through the test assemblies at a flow rate of (100 ± 10) l/h. The soundness of the test assemblies shall thereafter be tested in accordance with 6.2.1.3.

6.2.1.5 Test of resistance against gas condensate

Following the test of aging resistance in accordance with 6.2.1.4, all test assemblies shall be filled with iso-octane and stored in vertical positions for a period of (72^{0}_{2}) h at a temperature of (20 ± 5) °C. After that period, the iso-octane shall be removed from the test assemblies and air shall be passed through the test assemblies at a temperature of (50 ± 2) °C for a period of (120^{0}_{2}) h at a flow rate of (100 ± 10) l/h. The soundness of the test assemblies shall then be tested in accordance with 6.2.1.3.

6.2.1.6 Test of vibration resistance

Following the test of condensate resistance in accordance with 6.2.1.5, all test assemblies shall be fitted with reducing sockets provided with a DN 15 nipple on which a bearing (ball race) shall be mounted.

Clamp the other end of the test assemblies successively in a rotating chuck (see figure 2). Suspend a (5000 ± 50) g mass from a spring (spring constant approx. 5000 Nm^{-1}) attached to the bearing. Rotate each test assembly at a rotation frequency of (700 ± 20) min^{-1} for a period of (30 ± 1) min. Repeat the soundness test according to 6.2.1.3.

6.2.2 Dismantling

The steel bars for the connection of sockets and pipe sections of two randomly selected test assemblies shall be sawed off and the joints of said test assemblies shall be disassembled without heating using commercial tools. Following disassembly, all threads shall be inspected for damage.

7 Marking

Sealant containers shall be clearly and indelibly marked in the language of the country of destination with the following information:

a) Manufacturer's or supplier's name and/or registered trade mark.

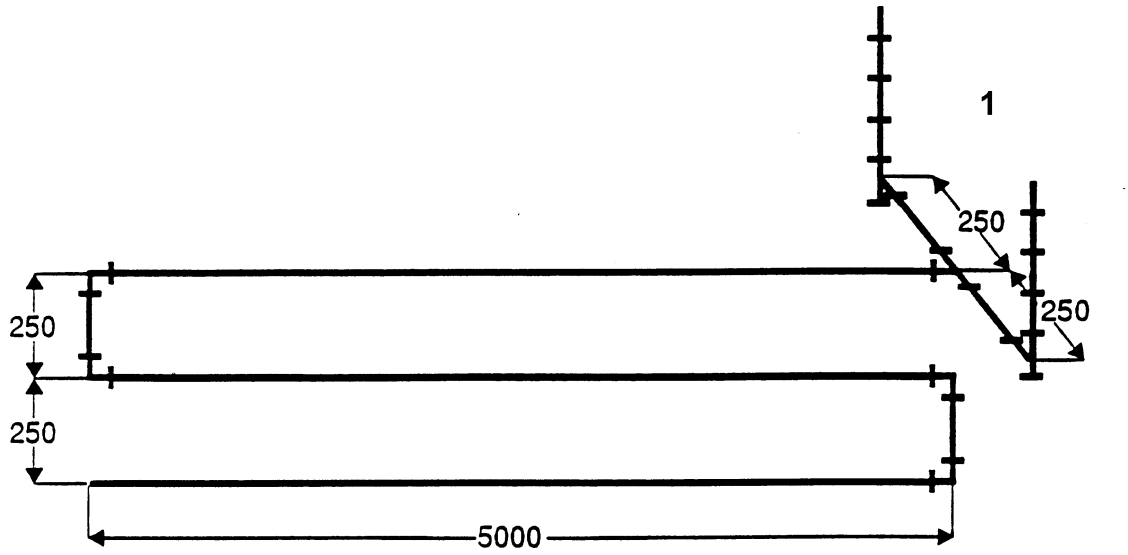
b) Designation of sealant.

c) Appropriate handling and safety labelling conforming to the requirement of the country of use.

d) Unique identification mark providing traceability (e.g. a batch number) and production date or "use by" date (if applicable).

The above information and instruction for use shall also be contained in the relevant manufacturer's technical data sheet.

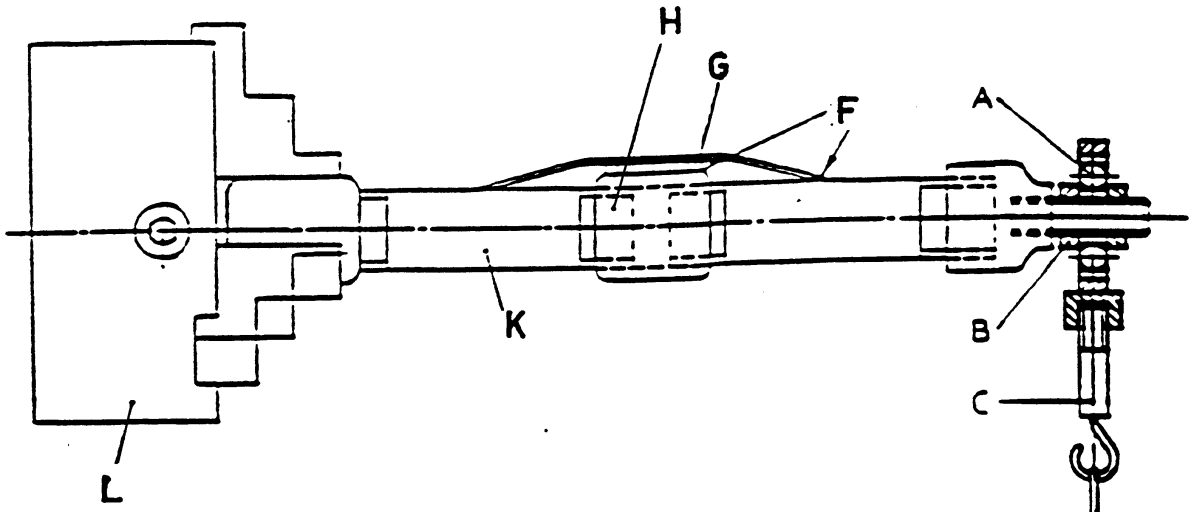
Dimensions in mm



Key

1 test pieces

Figure 1 - Test arrangement for sealing by the spraying method according to 6.2.1.2.2



Key

A	Ball race
B	Nut
C	Attachement
D	Spring
E	Mass
F	welded
G	Strip
H	Socket
K	Test piece
L	Rotable chuck

Figure 2 - Vibration rig

Annex A (informative)
A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/CENELEC member.

This European Standard does not fall under any Directive of the EC.
In the relevant CEN/CENELEC countries these A-deviations are valid instead of the provisions of the Eurpean Standard until they have been removed.

Italy
General

The use of any kind of liquid or mastic for the resealing of leaking installations is forbidden by official regulations.

Germany
Scope

The method is not permitted for LPG installations.

Switzerland
Scope

The method is only permitted for covered pipes and not for in sight installed gas pipes.

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