

Version
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English version

Approval requirement 186

Press fittings for joining copper pipes



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Preface Kiwa

This approval requirement (AR) is approved by the Board of Experts (BoE) GASTEC QA, in which relevant parties in the field of gas related products are represented. This Board of Experts supervises the certification activities and where necessary require the GASTEC QA approval requirement to be revised. All references to Board of Experts in this GASTEC QA approval requirement pertain to the above-mentioned Board of Experts.

This AR will be used by Kiwa Nederland BV in conjunction with the GASTEC QA general requirements and the KIWA regulations for certification.

In this AR is established which requirements a product and the requestor/ certificate holder of the GASTEC QA product certificate should meet and the matter to which Kiwa evaluates this.

Kiwa has a method which is established in the certification procedure for the execution of:

- The investigation for provisioning and maintaining a GASTEC QA product certificate based on this AR.
- The periodic evaluations of the certified products for the purpose of maintaining a provided GASTEC QA product certificate based on this AR.

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1 Introduction

1.1 General

This GASTEC QA approval requirement (AR) in combination with the GASTEC QA general requirements, is applied by Kiwa as the basis for the issuing and maintaining the GASTEC QA product certificate for press fittings for joining copper pipes.

With this product certificate, the certificate holder can demonstrate to his or her customers that an expert independent organization monitors the production process of the certificate holder, the quality of the product and the related quality assurance.

Next to the requirements established in this AR and the general requirements, Kiwa has additional requirements in the sense of general procedural requirements for certification, as laid down in the internal certification procedures.

This GASTEC QA approval requirement replaces the version of November 2019.

List of changes:

- The scope and approval requirement has been adjusted in line with EN 1254-7 for gas applications.
- These approval requirements have been fully reviewed textually.
- Paragraph 3.2 has been adjusted; the list of materials is removed.
- The paragraph on tube abutment has been removed, its included in EN 1254-7
- Paragraph 3.3.6 has been adjusted, the table and figures are removed.
- Chapter 4 has been adjusted in line with the tests / requirements of EN 1254-7.
- Change of paragraphs.
- Update of referenced documents.

The product requirements are changed.

1.2 Scope

This approval requirement applies to metal press fittings for tensile resistance joining of annealed (R220), half-hard (R250) or hard (R290) copper pipes, with a maximum diameter of 108 mm according to GASTEC QA approval requirements 5.

The press fittings shall be used for indoor and outdoor gas installations for the transport of gaseous fuels in accordance with the 2nd and 3rd family gasses according to EN 437.

For indoor use the maximum operating pressure is 200 mbar, for outdoor use the maximum operating pressure is 5 bar. The applicable operating temperature is -20 to 70 °C.

The specific functional recommendations for application of these fittings are described in the requirements and measuring methods of NEN 1078, NEN-EN 15001-1, NEN-EN 15001-2, NEN 7244-6, NEN-EN 12007, other national and international norms and/or regulations.

2 Definitions

In this approval requirement, the following definitions are applicable:

Board of Experts (BoE): The Board of Experts GASTEC QA.

Maximum operating pressure (MOP): Maximum pressure that a component is capable of withstanding continuously in service under normal operating conditions.

See also the definitions mentioned in the GASTEC QA general requirements.

3 Material and product requirements

This chapter contains the material and product requirements that the raw materials, materials and products used shall meet.

3.1 General

The press fitting can consist of multiple metal parts. These parts shall be welded or soldered in the factory. The composition and dimensions of the press fittings shall comply with the construction drawings of the manufacturer.

The manufacturer shall declare the application and use of the fittings, the MOP, the use of inserts and the type of copper tubes applicable to be applied. This information shall also be put in the instructions.

3.2 Materials

Fittings bodies shall be made from copper or copper alloys selected from materials either specified in European copper and copper alloy product standards or registered by CEN/TC 133, provided that the fittings of this materials meet the functional requirements of this approval requirement.

3.2.1 Rubbers

Rubbers parts shall comply with EN 549, minimum type B2 for indoor use or comply with EN 682, type GAL or GBL for outdoor use.

3.3 Construction

3.3.1 General

The press fittings shall be clean on the inside and the outside. The press fittings shall be free of burrs and defects. Sharp corners or sides on the outside of the press fitting shall be avoided. The sealing shall be made by a rubber ring.

The press fitting is joined by means of a press machine which is prescribed by the fitting manufacturer.

3.3.2 Pressing

The material can be treated by the manufacturer to prevent cracks in the material during pressing the fitting for installation.

3.3.3 Connection threads

Gastight connection threads shall meet the requirements of EN 10226-1.

3.3.4 Spanner across flats

Spanners across flats shall be in accordance with ISO 272.

3.3.5 Wall thickness press fitting

The wall thickness of the press fittings shall be declared by the manufacturer and shall be verified with the detail and construction drawings.

3.3.6 *Supporting sleeve*

Press fittings suitable for use of annealed copper tubes (R220) can be provided with a supporting sleeve. This supporting sleeve can be integrated to the fitting body or a loose part. The supporting sleeve shall be provided with means to control its position in the pipe.

4 Performance requirements and test methods

In addition to the requirements of EN 1254-7 for gas application, the following requirements shall be met.

4.1 General

The press fittings shall be assembled according to the instructions of the manufacturer. If required for testing, special tools shall be supplied by the manufacturer. The fittings shall be assembled and tested with the tubes as specified by the manufacturer.

Unless otherwise stated, the fittings to be tested shall be assembled with the relevant copper tubes in accordance with the manufacturer's instructions and the minimum nominal wall thickness stated in EN 1254-7, annex B according to the temper.

For the requirements to be met, additionally to requirements of EN 1254-7, the tests shall be carried out in threefold (on three press fittings per DN) on both the smallest DN, the largest DN and a diameter in the middle.

The dimensions of the press fittings shall be checked with a proper measuring tool with a maximal measurement uncertainty of 0.05 mm.

The appearance and finishing shall be visually checked.

4.2 Resistance to high pressure

After a press fitting, assembled according to the instructions of the manufacturer, has been tested at high pressure, the press fitting shall be leak tight at 23 °C according to paragraph 4.3.2.

4.2.1 Test method & samples

The test samples shall be composed of a press fitting and two pieces of tube of each 350 mm length. Three press connection will connect the two pieces of tube. On the other tube free end an end cap is mounted.

Apply an air pressure boost of $5 \pm 2\%$ bar for 10 ± 1 seconds to the press fitting.

Next carry out the leak tightness test at 23 °C according to paragraph 4.3.2.

4.3 Leak tightness

The press fitting shall be tested for leak tightness at temperatures of 23 ± 2 °C, -20 ± 3 °C and 70 ± 3 °C.

No leakages shall occur under these circumstances and the press fitting shall not be shifted.

The test shall be performed according to paragraph 4.3.2, 4.3.3 and 4.3.4.

4.3.1 Test samples

The test samples shall be composed of a press fitting with on both sides a free length of tube of 350 mm. The free end of one tube is connected to the test installation. On the other tube free end an end cap is mounted.

4.3.2 Leak tightness at 23°C

1. Connect the test sample to a test installation which is capable to maintain an air pressure of 3 bar $\pm$ 2 %.
2. Apply the pressure of 3 bar $\pm$ 2 % and maintain the pressure for at least 15 minutes.
3. Check during the test time of 15 minutes the leak tightness by emerging the press fitting in water. Possible pressure built up because of the water above the fitting shall be compensated.

4.3.3 Leak tightness at -20°C

1. Connect the test sample, tested in 4.3.2 in a test installation which is capable to maintain an air pressure of 3 bar $\pm$ 2 %.
2. Place the test sample in a climate cabinet at a temperature of -20 $\pm$ 3°C.
3. Condition the test sample for at least 4 hours.
4. Apply the pressure of 3 bar $\pm$ 2 % and maintain the pressure for at least 15 minutes.
5. Check during the test time of 15 minutes the leak tightness by emerging the press fitting in a liquid of the same temperature. Possible pressure built up because of the liquid above the fitting shall be compensated.
6. Repeat the leak tightness test at 23 °C according to 4.3.2 after the sample is conditioned for at least 4 hours at 23 $\pm$ 2°C.

4.3.4 Leak tightness at 70°C

1. Connect the test sample, tested in 4.3.3 in a test installation which is capable to maintain an air pressure of 3 bar $\pm$ 2 %.
2. Place the test sample in a climate cabinet at a temperature of 70 $\pm$ 3°C.
3. Condition the test sample for at least 4 hours.
4. Apply the pressure of 3 bar $\pm$ 2 % and maintain the pressure for at least 15 minutes.
5. Check during the test time of 15 minutes the leak tightness by emerging the press fitting in water of the same temperature. Possible pressure built up because of the water above the fitting shall be compensated.
6. Repeat the leak tightness test at 23 °C according to 4.3.2 after the sample is conditioned for at least 4 hours at 23 $\pm$ 2°C.

4.4 Resistance against torsion

The press fitting shall resist 10 circumferential displacements at a temperature of 23 ± 2 °C. No leakage shall occur under these circumstances and the press fitting shall not be shifted.

4.4.1 Test samples and test method

Assemble the test pieces according to figure 1.

1. Install the test piece in an installation according to figure 1, which is capable to maintain an air pressure of $3 \text{ bar} \pm 2\%$.
2. Apply an air pressure of $3 \text{ bar} \pm 2\%$.
3. Apply 10 circumferential displacements of 4 ± 1 ° with a frequency of $1 \pm 0,2$ Hz at a temperature of 23 ± 2 °C
4. Check the leak tightness of the press fitting during the 10 circumferential displacements for at least 15 minutes by means of applying a suited soap solution.
5. Remove the circumferential displacements.
6. Check the leak tightness of the press fitting after the 10.000 circumferential displacements for at least 15 minutes by means of applying a suited soap solution.

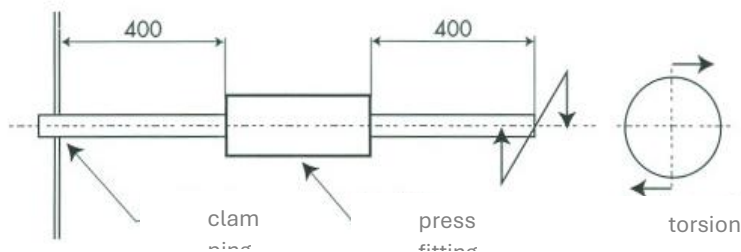


Figure 1: test assembly for testing the resistance against torsion.

5 Marking and instructions

5.1 Marking

In addition to EN 1254-7, article 8, the following marking shall be added:

- The production code.
- GASTEC QA, GASTEC QA logo or punch mark. This also applies for the supporting sleeve if used.
- If the press fitting is suitable for gas, the fitting shall be marked with the word 'GAS' or a yellow marking.
- The internal support shall be marked with the diameter x wall thickness.

The marking shall preferably be written on the fittings, if this is not possible, the marking shall be on the smallest packaging.

5.2 Instructions

The manufacturer shall supply the documentation regarding the assembly and installation of the press fittings. The documentation also shall mention for which type of tubes the press fittings are suitable. The manufacturer shall also provide information on the use of which pressing tools and which pressing jaws (incl. profile).

This information shall be provided either with the product or with a digital link (e.g. QR-code) on the smallest packaging.

If supporting sleeves are necessary for use of annealed copper tubes (R220) the manufacturer shall describe the supporting sleeve and the assembly procedure in technical documents accompanying the product.

6 Quality system requirements

The requirements for the quality system are described in the GASTEC QA general requirements. An important part of this are the requirements for drawing up a risk analysis (e.g., an FMEA) of the product design and the production process in accordance with chapters 3.1.1.1 and 3.1.2.1. This risk analysis shall be available for inspection by Kiwa.

7 Summary of evaluation

This chapter contains a summary of the evaluation to be carried out during:

- The initial product assessment;
- The periodic product verification;

7.1 Evaluation matrix

Description of requirement	Clause EN 1254-7	Investigation within the scope of		
		Initial product assessment	Product verification	
			Inspection	Frequency
Scope	1	X		
Materials	1	X	X	Once a year
Internal pressure	4.1.2	X	X	Once a year
Tightness	4.2			
Integrity of fabricated fitting bodies or having an “as cast” microstructure	4.2.1	X		
Leak tightness under internal pneumatic pressure	4.2.3.1	X	X	Once a year
Resistance to pull out	4.2.3.2	X	X	Once a year
Leak tightness under vibration	4.2.3.3	X		
Leak tightness under static flexural force	4.2.3.4	X		
Leak tightness under temperature cycling	4.2.3.5	X		
Leak before press	4.2.3.6	X	X	Once a year
Press fitting with elastomeric seals for gas application inside buildings	4.2.3.7	X		
Press fitting with elastomeric seals for fuel gas application outside buildings	4.2.3.8	X		
Leak tightness at high temperature	4.2.3.9	X		
Durability	4.5			
Durability of internal pressure: Resistance to stress corrosion	4.5.1	X		
Durability of tightness:	4.5.2			
Resistance to dezincification	4.5.2.1	X		
Wall thickness of threaded portions of adaptor fittings	4.6	X	X	Once a year
Dimensions of tail pipe ends for swivel fittings	4.7	X	X	Once a year
Dimensions of gas union connectors	4.8	X	X	Once a year
Threaded end dimensions	4.9	X	X	Once a year
Other adapter ends	4.10	X		
Bore dimensions	4.11	X	X	Once a year
Identity of elastomeric sealing material	4.13	X		
Tube abutment	4.14	X	X	Once a year
Alignment of the fitting ends	4.15	X	X	Once a year
Shapes for tightening systems	4.16	X	X	Once a year
Surface condition	4.17	X	X	Once a year

Description of requirement	Clause EN 1254-7	Investigation within the scope of		
		Initial product assessment	Product verification	
			Inspection	Frequency
Plated or coated surfaces	4.18	X		
Designation	7	X		
Marking, labelling and packaging	8	X	X	Once a year
Additional requirements GASTEC QA AR 186				
General	3.1	X	X	Once a year
Materials	3.2	X	X	Once a year
Rubbers	3.2.1	X	X	Once a year
Construction	3.3	X		
General	3.3.1	X	X	Once a year
Pressing	3.3.2	X		
Connection threads	3.3.3	X	X	Once a year
Spanner across flats	3.3.4	X		
Wall thickness press fitting	3.3.5	X	X	Once a year
Insert	3.3.6	X		
Functional requirements	4			
Resistance to high pressure	4.2	X	X	Once a year
Leak tightness	4.3	X	X	Once a year
Resistance against torsion	4.4	X		
Marking	5.1	X	X	Once a year
Documentation	5.2	X	X	Once a year

8 List of referenced documents and source

8.1 Standards/ normative documents

Number	Title	Version *
ISO 272	Fasteners -- Hexagon products -- Widths across flats	1982
EN 549	Rubber materials for seals and diaphragms for gas appliances and gas equipment	2019 + A2: 2024
EN 682	Elastomeric seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids	2002 +A1: 2025
EN 1254-7	Copper and copper alloys - Plumbing fittings - Part 7: Press fittings for use with metallic tubes	2021
EN 1254-20	Copper and copper alloys - Plumbing fittings - Part 20: Definitions, thread dimensions, test methods, reference data and supporting information	2021
EN 10226-1	Pipe threads where pressure tight joints are made on the treads – Part 1: Taper external threads and parallel internal threads - Dimensions, tolerances and designation	2004

*) If no date of issuance is specified in this column, the current version of the document applies.

8.2 Source of informative documents

Number	Title	Version *
EN 437	Test gasses – test pressures – appliance categories	2021
EN 12007-1	Gas infrastructure - Pipelines for maximum operating pressure up to and including 16 bar - Part 1: General functional requirements	2012
EN 15001-1	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	2023
EN 15001-2	Gas supply systems - 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 2: Detailed functional requirements for commissioning, operation and maintenance	2023
NEN 1078	Supply for gas with an operation pressure up to and including 500mbar – Performance requirements – new estate	2024
NEN 7244-6	Gas supply systems - Pipelines for maximum operating pressure up to and including 16 bar - Part 6: Specific functional requirements for service lines	2018
DVGW G5614:	Unlösbare Rohrverbindungen für metallene Gasleitungen; Pressverbinder	2013

General requirements GASTEC QA

Approval requirement 5 Copper tubes

*) If no date of issuance is specified in this column, the current version of the document applies.