

**AR 209**

May 2019

Dutch version

# Approval requirement 209

Steel press fittings for steel pipes



**Trust  
Quality  
Progress**

# Foreword

This GASTEC QA (Dutch version) Approval requirement has been approved by the Board of Experts product certification 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 GASTEC QA Approval requirement (Dutch version) will be used by Kiwa Nederland BV in conjunction with the GASTEC QA general requirements and the KIWA regulations for certification.

This approval requirement is a translation from the Dutch validated version and can only be used as a supporting document.

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# 1 Introduction

## 1.1 General

This GASTEC QA approval requirement in combination with the GASTEC QA general requirements include all relevant requirements, which are adhered by Kiwa as the basis for the issue and maintenance of a GASTEC QA certificate for steel press fittings for steel pipes

This GASTEC QA approval requirements replace the GASTEC QA approval Requirements 209 “Steel press fittings for steel pipes” from April 2017.

List of changes:

- Update to the new format for GASTEC QA approval requirements
- These approval requirements have been fully reviewed textually.

The product requirements have not changed.

## 1.2 Scope

This approval requirement applies to steel press fittings for use in combination with steel pipes in accordance with NEN-EN 10255, NEN-EN 10305-1/-2/-3, NEN-EN 10216-1, NEN-EN 10217-1 with a maximum pipe outer diameter of 114,3 mm (4”).

The press fitting is joined by means of a press machine which is prescribed by the fitting manufacturer. The press fittings are intended to be used for indoor gas installations for 2<sup>nd</sup> and 3<sup>rd</sup> family gasses according to NEN-EN 437 with a maximum operation pressure of 5 bar (MOP) at an ambient temperature of -15 °C to +50 °C.

Note: Dutch installation guidelines shall be consulted for the conditions for using steel pipes in gas installations.

## 2 Definitions

In this approval requirement, the following terms and definitions are applicable:

**Board of Experts:** The Board of Experts Gastec QA.

**Fitting:** product to be used in a piping system for permanently connecting pipes to each other.

**Fitting assembly:** steel press fitting with steel pipes

**Leak tight:** a product is considered leak tight under the following conditions:

- If the test fluid is a liquid, visually detectable leakage from any external surface is not permitted.
- If the test fluid is a gas:
  - 1) no bubbles from any external surface and breaking the surface of the water are permitted;
  - 2) no continuous formation of bubbles is permitted when the product is coated with a leak detection fluid.

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

**Manufacturer:** the party that produces the product. (not necessary the supplier).

**Nominal diameter:** nominal diameter of the fitting expressed as nominal outside diameter of the connection pipe.

**Pipe size:** Outside diameter of the pipe expressed in mm or inch according to table below.

Metric	10,2	13,5	17,2	21,3	26,9	33,7	42,4	48,3	60,3	76,1	88,9	114,3
Inch	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"

**Test piece:** fitting under test.

# 3 Product requirements

## 3.1 Material requirements

The fitting material shall be demonstrable suitable for its application (pressure, ambient temperature range, corrosion resistance, long term behaviour) and shall be specified according to the relevant material standard.

The suitability of the material can be demonstrated by providing test reports or by reference to relevant product standards of similar products in which the material is specified as being suitable for use.

## 3.2 Surface condition

When visually inspected, fittings shall be free from sharp edges, burrs or signs of corrosion.

## 3.3 Plated or coated surfaces

Plated or coated surfaces shall not impair the performance of the fitting.

## 3.4 Adaptor fittings

The fitting may be provided with a threaded connection on one side of the fitting. Threaded connections are allowed up to 2" thread size and shall comply with NEN-EN 10226-1.

Alternative connections are allowed as long as they are in compliance with relevant standards and common practice in Dutch gas installations

## 3.5 Rubber sealing

Rubber parts used for sealing shall comply with NEN-EN 549 type A2 or NEN-EN 682 type GAL or GBL

## 3.6 Tube abutment

The fitting shall be provided with an abutment to limit the pipe insertion and to ensure that the pipe is past the clamping and sealing part of the fitting.

# 4 Performance requirements and test methods

## 4.1 General

Test shall be performed at an ambient temperature ( $23\text{ °C} \pm 2\text{ °C}$ ) unless otherwise stated.

All tests shall be performed per size group on three sample of one size unless otherwise stated.

In case the pipe diameters are specified in inches, the closest size in millimetres shall be chosen.

### 4.1.1 Size groups

Fittings are divided in the following size groups:

Size group	1	2	3	4
Fitting size (mm)	10,2 – 17,2	17,2 – 33,7	33,7 – 60,3	60,3 – 114,3

Table 1

### 4.1.2 Samples

Samples shall be mounted according to the instruction of the manufacturer using pressing equipment supplied by the manufacturer.

The test shall be performed using the steel pipes as specified by the manufacturer by reference to the applicable EN standard. If multiply types of steel pipe are specified, the tests shall be performed using these types of pipe.

Test shall be performed with the minimum wall thickness of the steel pipe as specified by the manufacturer of the fitting.

## 4.2 Hydrostatic strenght

The press fitting shall be able to withstand a pressure of 24 bar for 48 hours without deformation or displacement between fitting and pipe.

The test piece shall consist of the fitting or fittings to be tested connected to a pipe of 200 mm on both sides of the fitting. One end of the pipe shall be fitted with an end cap to seal of the assembly.

The pipe is marked in order to verify displacement after testing.

The assembly is filled with water and the test pressure shall be applied to the assembly. After the test the assembly is visually checked for displacement and deformation.



### 4.3 Leak tightness

At an internal pressure of 25 mbar, 110 mbar and 1,1 x maximum operating pressure (MOP) with a minimum of 3 bar the press fitting assembly shall be leak tight for 10 minutes.

The test piece shall consist of the fitting or fittings to be tested connected to a pipe of 200 mm on both sides of the fitting. One end of the pipe shall be fitted with an end cap to seal of the assembly.

Apply the test pressure to the test assembly. During the duration of the test the assembly is visually inspected for leakage. The test is repeated with the second and third test pressure.

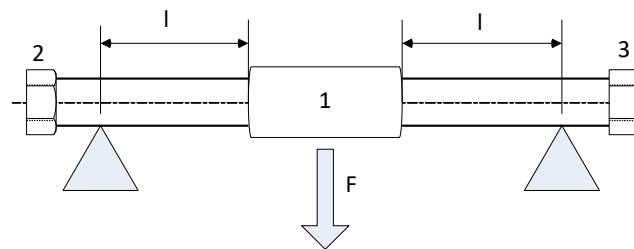
### 4.4 Leak tightness under static flexural strength

After being submitted to a bending force (see table 2) the fitting assembly shall be leak tight and shall show no deforming and displacement between pipe and fitting. The bending force shall be applied for 1 hour. During the test the fitting assembly shall be pressurized to 1,1 x maximum operating pressure (MOP) with a minimum of 3 bar and remain leak tight.

Pipe size (mm)	10,2	13,5	17,2	21,3	26,9	33,7	42,4	48,3	60,3	76,1	88,9	114,3
Pipe size (inch)	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
Force F (N)	80	110	131	172	229	297	384	442	562	720	850	1105

Table 2

The test set up shall be according to figure 1.



- 1 fitting
- 2 connection for supply gas pressure
- 3 end cap
- l 1000 mm

Figure 1

During the test the assembly is visually inspected for leakage. After removing the bending force, the assembly is visually checked for displacement and deformation, the leak tightness is determined according to paragraph 4.3.

#### 4.5 Resistance to pull-out

After being submitted to an axial tensile force the fitting assembly shall be leak tight and shall show no deformation and displacement between pipe and fitting.

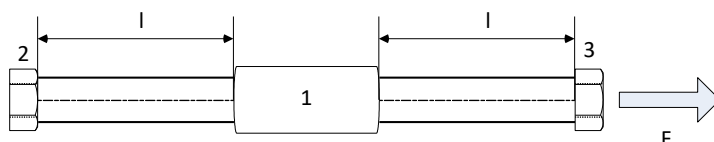
Calculation of the tensile force:

$$F = \frac{\pi \times d_n^2 \times p_D \times 1,5}{4}$$

F force expressed in newton (N)  
d<sub>n</sub> nominal diameter of the pipe in millimetres (mm)  
p<sub>D</sub> maximum operation pressure MOP in megapascal (MPa)

The tensile force shall be applied for 1 hour. During the test the fitting assembly shall be pressurized to 1,1 x maximum operating pressure (MOP) with a minimum of 3 bar.

The test piece shall be according to figure 2.



1 fitting  
2 connection for supply gas pressure  
3 end cap  
l 200 mm

Figure 2

After removing the pulling force, the assembly is visually checked for displacement and deformation, the leak tightness is determined according to paragraph 4.3

#### 4.6 Leak tightness after temperature cycling

Using an oven, a fitting assembly is submitted to a temperature of 50 °C for one hour after which it is cooled down to room temperature. This cycle is repeated 6 times.

Following the 6 cycles the fitting assembly is placed at -15 °C for 24 hours after which it is brought back to room temperature.

After being submitted to a temperature cycle test the fitting assembly shall be leak tight and shall show no displacement between pipe and fitting. The test piece shall be according to figure 2.

After the temperature cycling the leak tightness is determined according to paragraph 4.3.

#### 4.7 Resistance to dynamic load

The fitting assembly shall be submitted to a dynamic load of  $1 \times 10^6$  cycles with a frequency of  $10 \pm 1$  Hz and an amplitude according to table 3.

Pipe diameter (mm)	Amplitude (mm)
$\leq 42,4$	$5 \pm 0,5$
$> 42,4$	$3,5 \pm 0,5$

Table 3

After being submitted to the dynamic load the fitting assembly shall be leak tight and shall show no displacement between fitting and pipe.

The test pieces and test set up shall be according to figure 3. The dynamic load shall be applied. During the test the test piece shall be pressurised up to 300 mbar.

After the test the test pieces are visually checked for displacement and the leak tightness of the complete test pieces is determined according to paragraph 4.3.

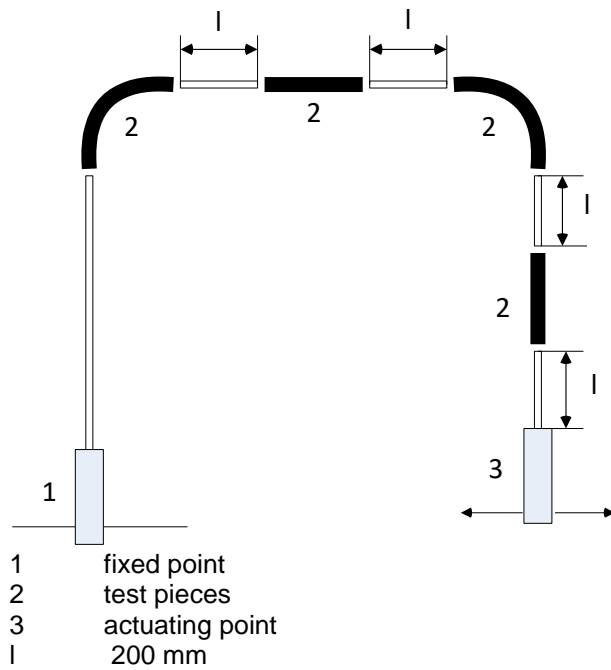


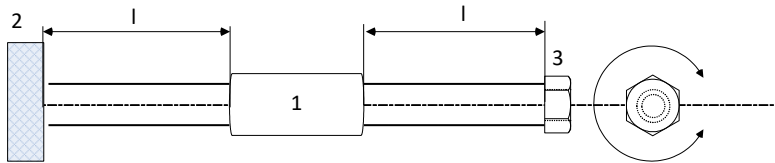
Figure 3

#### 4.8 Resistance against torsion

The fitting assembly shall be submitted to 10.000 circumferential displacements of  $4 \pm 1^\circ$  with a frequency of 1 Hz. After being submitted to the circumferential displacements the fitting assembly shall be leak tight and shall show no displacement between fitting and pipe.

The test piece and test set up shall be according to figure 4. The torsion load shall be applied. During the test the test piece shall be pressurised up to 300 mbar.

After the assembly is visually checked for displacement and the leak tightness of the complete test piece is determined according to paragraph 4.3.



- 1 test piece
- 2 fixed point
- 3 actuating point
- l 400 mm

Figure 4

#### 4.9 Leak before press

When according to manufacturer's specification the fitting shall leak before pressing the following test shall be performed.

At an internal pressure of 25 mbar, 110 mbar and 1,1 x maximum operating pressure (MOP) with a minimum of 3 bar the press fitting assembly shall clearly show signs of leakage when using a leak detection fluid.

The test piece shall be according to figure 2.

Apply the test pressure to the test assembly. During the duration of the test the assembly is visually inspected for leakage. The test is repeated with the second and third test pressure.

# 5 Marking, instructions and packaging

## 5.1 Marking

The fitting shall be durably marked with the following information:

- The GASTEC QA word mark or logo\*
- The name or trade mark of the manufacturer.
- The external diameter of the pipe which is to be connected.\*
- The production date (this may be in code).\*
- The word mark GAS or a yellow marking.
- Maximum operating pressure.

\* This information may be placed on the smallest packaging in which the fittings are packed.

## 5.2 Instructions

The supplier shall provide instructions. These instructions shall be in the Dutch language and shall contain information about:

- The use and installation of the product.
- The type of pipes including minimum wall thickness for which the press fittings are suitable.
- The type (jaw type and pressing equipment) of equipment that shall be used for pressing.
- The conditions under which it shall be used.
- How it can be determined if the product is correctly installed.
- The way the product shall be stored.

## 5.3 Packaging

The product including the associated components required for its assembly shall be packaged individually. Special storage or handling conditions shall be specified on the packaging. The packaging shall protect the product from dirt, dust and other contaminants during transport and storage until the point of use where the packaging will be removed.

## 6 Quality system requirements

The supplier shall make a risk assessment of the product and production process according to chapter 3.1.1.1 and 3.1.2.1 of the GASTEC QA general requirements. The risk assessments shall be available to Kiwa for review.

# 7 Summary of tests

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

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

## 7.1 Test matrix

Description of requirement	Clause	Test within the scope of		
		Initial product assessment	Product verification	
			Verification	Frequency
<b>Product requirements</b>	<b>3</b>			
Material requirements	3.1	X		
Surface condition	3.2	X	X	Once a year
Plated or coated surfaces	3.3	X	X	Once a year
Adaptor fittings	3.4	X	X	Once a year
Rubber sealing	3.5	X		
Tube abutment	3.6	X		
<b>Performance requirements</b>	<b>4</b>			
Hydrostatic strength	4.2	X		
Leak tightness	4.3	X	X	Once a year
Leak tightness under static flexural strength	4.4	X		
Resistance to pull-out	4.5	X	X	Once a year
Leak tightness after temperature cycling	4.6	X		
Resistance to dynamic load	4.7	X		
Resistance against torsion	4.8	X	X	Once a year
Leak before press	4.9	X		
<b>Marking</b>	<b>6</b>			
Marking	5.1	X	X	Once a year
Instruction	5.2	X	X	Once a year
Packaging	5.3	X	X	Once a year

# 8 List of referenced documents and source

## 8.1 Standards / normative documents

All normative references in this Approval Requirement refer to the editions of the standards as mentioned in the list below.

NEN-EN 437: 2003+A1: 2009	Test gases- test pressure – appliance categories
NEN-EN 10255: 2004 + A1: 2007	Non-alloy steel tubes for welding or threading – technical delivery conditions
NEN-EN 10305-1: 2016	Steel tubes for precision applications – technical delivery conditions – part 1 seamless cold drawn tubes
NEN-EN 10305-2: 2016	Steel tubes for precision applications – technical delivery conditions – part 2 welded cold drawn tubes
NEN-EN 10305-3: 2016	Steel tubes for precision applications – technical delivery conditions – part 3 welded cold sized tubes
NEN-EN 10216-1: 2013	Seamless steel tubes for pressure purposes – technical delivery conditions – part 1: non-alloy steel tubes with specified room temperature properties
NEN-EN 10217-1: 2002+A1: 2005	Welded steel tubes for pressure purposes – technical delivery conditions – part 1: non-alloy steel tubes with specified room temperature properties.
NEN-EN 10226-1: 2004	Pipe threads where pressure tight joint are made on the thread – part 1 taper external threads and parallel internal threads- dimensions, tolerances and designation
NEN-EN 549: 1995	Rubber materials for seals and diaphragms for gas appliances and gas equipment
NEN-EN 682: 2002+A1: 2005	Elastomeric seals – materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids

## 8.2 Source

Parts of the text of this approval requirement have been based on EN 1254-7 and DVGW G 5614