

AR 191

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Validated Dutch version

Approval requirement 191

Maximum flow rate safety valves



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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 maximum flow rate safety valves.

This GASTEC QA approval requirements replace the GASTEC QA approval requirements 191 "Maximum flow rate safety valves" dated January 2001 and amendment A1 from March 2012.

List of changes:

- Update to the new format GASTEC QA approval requirements
- All general requirements have been deleted and included in the GASTEC QA general requirements document
- These approval requirements have been fully reviewed textually
- Change in paragraphs

The product requirements have not changed.

1.2 Scope

The requirements in this approval requirement are applicable to maximum flow rate safety valves for gas installations, whether or not consisting of a composite product, that are suitable for a maximum operating pressure of 100 mbar natural gas.

2 Definitions

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

Board of Experts: The Board of Experts GASTEC QA

3 Product requirements

3.1 Composition and use

The composition, dimensions and tolerances of the maximum flow safety valves shall correspond to those accepted by GASTEC and certified construction drawings.

The functioning of the component in which the maximum flow safety valve is installed shall not disturb the operation of this valve.

The component in which the maximum flow safety valve is installed shall meet relevant GASTEC QA approval requirements.

The maximum flow safety valve shall enter the component in such a way are arranged so that the valve is secured against displacement.

3.2 Materials

The materials shall be able to withstand the mechanical, chemical and thermal influences occurring during use. The materials shall be chosen in such a way that they do not influence each other negatively. The manufacturer shall provide a statement that confirms this.

The body in which the maximum flow safety valve is installed shall be made of the following metals:

- copper alloys excluding aluminium - bronze;
- grey cast iron excluding laminar cast iron;
- forged steel and cast steel;
- stainless steel.

The manufacturer shall be able to submit a statement that confirms this, including material specification.

Rubber sealing materials shall be resistant to the action of natural gas and the components that can separate from the gas. Rubber components shall comply with EN 549, minimum temperature class A2.

Lubricants shall not be used.

Springs and other moving parts shall be sufficiently protected against corrosion. The manufacturer shall provide a statement that confirms this.

Plastics are permitted as an application for the closing member. The manufacturer shall provide a to submit a statement that confirms this, including material specification.

3.3 Construction

The construction of the maximum flow safety valve shall be of such a design that a safe and efficient operation is guaranteed without the need for maintenance.

The maximum flow safety valve shall be internally and externally clean, free from burrs and free from defects. External sharp corners and edges shall be avoided.

The wall thickness of the body in which the maximum flow safety valve is mounted shall be at least 1 mm.

It is permitted to provide the maximum flow rate safety valve, ex works, at the inlet and outlet side with one of the following connections:

- Compression fittings for connections of copper pipes according to GASTEC QA approval requirement 35.
- Fittings, couplings and components for solder and screw connections in accordance with GASTEC QA approval requirement 6
- Union couplers according to NEN 2541, NEN 2542, NEN 2543, NEN 2544, NEN 2545 and NEN 3084.
- Press fittings for joining copper according to GASTEC QA approval requirement 186. The thread dimensions of the connection ends shall comply with ISO 7. (R or Rp)

4 Performance requirements

4.1 General

All tests shall be carried out at 23 ± 2 °C. Tests shall be carried out using air pressure. The measured values shall be traced to 15 °C and 1013 mbar.

4.2 External gas tightness

The body, in which the maximum flow rate safety valve is placed, shall be leak tight at 25 and 100mbar pressure according to paragraph 4.2.1.

4.2.1 Test method

The maximum flow rate safety valve shall be connected to a leakage measurement system with an inaccuracy of 5 cm³/h. The external gas tightness of the connection shall be measured with an air pressure of 25 and 100mbar during 900 ± 10 sec. Qualify the maximum flow rate safety valve as gas tight if no leakage greater than 50 cm³/h is measured,

4.3 Closing flow

The flow at which the safety valve closes is minimal 10 and maximal 30% more than the normal flow as provided by the manufacturer. The test shall be carried out according to paragraph 4.3.1.

4.3.1 Test method

Place the combined product in which the maximum flow rate safety valve is placed in a set up according to figure 1. The valve shall be mounted according to the installation instructions of the manufacturer. In case multiple mounting positions are possible, the test will be repeated in the least favourable position.

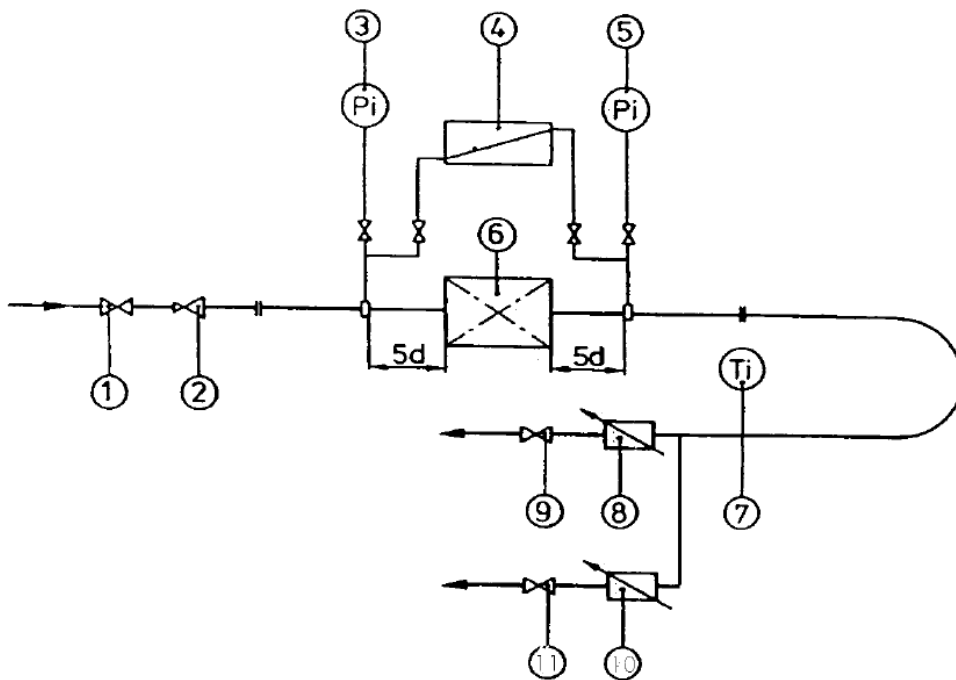


Figure 1

- 1) Valve
- 2) Pressure regulator inlet pressure
- 3) Manometer inlet pressure
- 4) Pressure difference manometer
- 5) Manometer outlet pressure
- 6) To be tested maximum flow rate safety valve
- 7) Temperature meter
- 8) Flow measurement with an inaccuracy of 3% R_{dg}
- 9) Control valve
- 10) Leak meter with an inaccuracy of 5% R_{dg}
- 11) Control valve

Close the control valve (11). Apply with the help of the pressure regulator (2) an inlet pressure of 100 mbar (± 2 mbar) at nominal flow by using the control valve 9. Open the control valve 9 until the maximum flow rate safety valve closes, hereby on the flow meter (8) the closing flow is being read. The nominal flow of the measure pipe shall be taken from table 2.

Nominal size DN (mm)	Inner diameter of the measure pipe (D) in mm
10	13
15	16
20	22
25	28
32	35
40	41
50	52

Table 2

4.3.2 Conversion of air flow

For the conversion the following formula is applied:

$$V_N = V \frac{P_a + P}{1013} \times \frac{288}{273 + t}$$

In which:

- V_N = amount of air under standard circumstances in m³/h
 V = amount of air in m³/h during measuring
 P_a = atmospheric pressure in mbar (absolute pressure)
 P = test pressure in mbar (overpressure)
 t = temperature of air °C

4.4 Leakage (internal leakage)

The leakage at full closing of the valve shall not exceed 3,0 l/h. The leakage rate will be determined according to paragraph 4.4.1.

4.4.1 Test method

Place the combined product in which the maximum flow rate safety valve is placed in a set up according to figure 1. Close the control valve (11). Apply with the help of a pressure regulator (2) an inlet pressure of 25 mbar and 100 mbar (± 2 mbar) at nominal flow (this is set by using control valve (9)). Open the control valve (9) until the valve closes. After the valve is closed, open control valve (11). Following control valve (9) is closed. Measure the leakage with a leak meter (10).

4.5 Repeated resetting

After repeated (10 times) closing and opening of the valve shall meet the requirements in paragraph 4.3 and 4.4.

4.5.1 Test method

Place the combined product in which the maximum flow rate safety valve is placed in the set up according to figure 1. The maximum flow rate safety valve is mounted according to the instructions of the manufacturer.

In case multiple mounting positions are possible, the test will be repeated in the least favourable position. Close the control valve (11). Apply with the help of a pressure regulator (2) an inlet pressure of 25 mbar and 100 mbar (± 2 mbar) at nominal flow.

Perform the steps 1 up to and including 4

- 1) Open the control valve (9) gradually until the valve closes
- 2) Close the control valve (11)
- 3) Wait till the valve is opened or reset the valve
- 4) Repeat steps 1 up to and including 3 until the maximum flow rate safety valve is closed 10 times.

Then test the valve according to paragraph 4.3 and 4.4

4.6 Pressure loss

The measured pressure loss, determined with air as medium, over the safety valve shall correspond with the by the manufacturer declared maximum pressure loss. In this graphic is included the pressure loss in mbar plotted against the flow in air under normal circumstances m^3/h c.q. in kW equivalent for natural gas determined according to paragraph 4.6.1.

4.6.1 Test method

Place the combined product in which the maximum flow rate safety valve is placed in a set up according to figure 1. In this set up the maximum flow rate safety valve is mounted following the installation instructions of the manufacturer.

In case multiple mounting positions are possible, the test will be repeated in the least favourable position. Close the control valve (11). Apply with the help of a pressure regulator (2) an inlet pressure of 100 mbar (± 10 mbar).

Open the control valve (9) till the maximum flow rate safety valve closes. During the process of opening and closing, the flow meter (8) shall provide a flow corresponding to the flow as declared by the manufacturer. This process will be included in a graphic in which the pressure loss in mbar is plotted against the flow in air under normal circumstances in m^3/h c.q. in kW equivalent for natural gas.

4.7 Bending and torsional moment

The combined product in which the maximum flow rate safety valve is placed shall, depending on the nominal connection size, after being tested at a bending moment (MF) and a torsional moment (MT) according to table 1, in unloaded condition comply with paragraphs 4.2, 4.3 and 4.4.

DN	MF1 (Nm)	MF2 (Nm)	MT1 (Nm)	MT2 (Nm)
6	25	12	15	12
8	30	15	20	15
10	50	20	35	20
12	65	25	55	25
15	85	30	75	30
20	125	40	100	40
25	200	50	125	50
32	250	64	160	64
40	300	80	200	80
50	450	100	250	100

Table 1

4.7.1 Test method

The pipes used with this test shall be, conform ISO 65, medium series and have a length of 1 meter. Place the combined product in which the maximum flow rate safety valve is placed, with the pipes, in a set up according to figure 2. Apply a bending moment according to table 1 for 10 seconds. Remove the bending moment and test the product according to paragraphs 4.2, 4.3 and 4.4. Next, apply a bending moment according to table 1 for 900 seconds. Remove the bending moment and test the product according to paragraphs 4.2, 4.3 and 4.4.

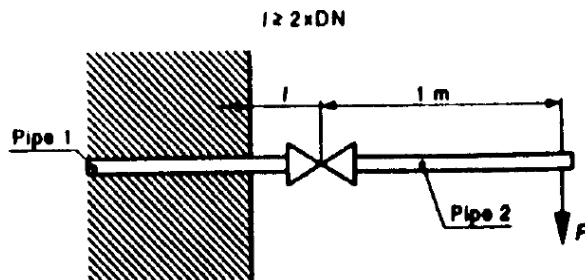


Figure 2

Place the combined product in which the maximum flow rate safety valve is placed, provided with pipes in a set up as described in figure 3. Apply a torsional moment according to table 1 for 10 seconds. Remove the torsional moment and test the product according to paragraph 4.2.1, 4.3.1 and 4.4.1. Next, apply a torsional moment according to table 1 for 900 seconds. Remove the torsional moment again and test the product according paragraphs 4.2, 4.3 and 4.4.

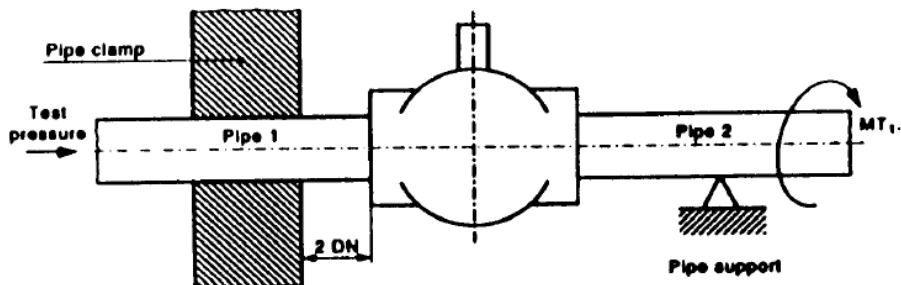


Figure 3

4.8 Plastic closing mechanism

After placing the maximum flow rate safety valve with a plastic closing mechanism in an oven during 240 hours at a temperature of 100° C the valve shall comply with paragraphs 4.3 and 4.4.

4.8.1 Test method

Place the combined product in which the maximum flow rate safety valve is placed in an oven with a temperature of 100 ± 3 °C during 240 ± 2 hours. Test the product then according to paragraphs 4.3 and 4.4.

5 Marking and instructions

5.1 Marking

On the maximum flow rate safety valve or on the combined product the following information shall be clearly and durably mentioned:

- GASTEC QA or the GASTEC QA logo
- Name or mark of manufacturer or trademark
- Type of maximum flow rate safety valve
- Maximal working pressure
- Nominal connection size at the inlet and outlet side of the maximum flow rate safety valve
- Flow direction

5.2 Instructions

The documentation in the Dutch language shall be provided with a proper installation manual of the maximum flow rate safety valve itself. At least the following points shall be included:

- A graphic in which pressure loss in mbar is placed against the flow in kW equivalent to natural gas
- Mounting position

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
Composition and use	3.1	X	X	Once a year
Materials	3.2	X	X	Once a year
Construction	3.3	X	X	Once a year
External gas tightness	4.2	X	X	Once a year
Closing flow	4.3	X	X	Once a year
Leakage (internal leakage)	4.4	X	X	Once a year
Repeated resetting	4.5	X		
Pressure loss	4.6	X		
Bending and torsional moment	4.7	X		
Plastic closing mechanism	4.8	X	X	Once a year
Marking and instructions	5	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.

EN 437:2018

Test gases- test pressure – appliance categories