English translation

AR 34
July 2024 Dutch version

Approval requirement 34

Flexible hose assemblies

Trust
Quality
Progress

Foreword Kiwa

This, translated from Dutch, 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, translated from Dutch, 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.

This, translated from Dutch, AR, is used as supporting document. In case of doubt of interpretation of this AR, the Dutch version is leading.

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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 flexible hose assemblies.

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 version of September 2018.

List of changes

- These approval requirements have been fully reviewed textually.
- Requirement and test method for resistance against uniform corrosion has been added.
- The quality system requirements have been added.
- The definitions and list of referenced documents has been updated.

1.2 Scope

This approval requirement describes the requirements with regard to flexible hose assemblies for use in installations for natural gas according to EN 437 with a pressure of no more than 200 mbar in accordance with the NPR 3378-11 Code of Practice.

2 Definitions

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

Austenitic stainless steel: Stainless steel (SS) is an iron alloy and has a high corrosive resistance. The addition of alloying elements provides specific properties. Austenitic stainless steel belongs to 1 of the 4 main groups of stainless steel. Austenitic stainless steel is characterized by nickel and chromium as the main alloying elements.

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

Flexible hose assembly: rubber hose with reinforcement lining (in accordance with GASTEC QA approval requirements 43) with a detachable coupling on one side and with a coupling for connection to the appliance on the other.

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

Leak tightness: A product is considered as being leak tight when the following requirements are met:

- If the test fluid is a liquid, visually detectable leakage is not permitted.
- If the test fluid is a gas:
    - When submerged in water no bubbles are permitted.
    - When using a leak detection fluid, no continuous formation of bubbles is permitted.

Stress corrosion: Type of corrosion caused by control stresses (via operations) and the simultaneous action of a corrosive medium. Stress corrosion cracking is a consequence of stress corrosion cracking.

Uniform corrosion: Type of corrosion due to a natural interaction between a material and its environment. Oxygen corrosion is the most visible form of corrosion.

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

3 Material and product requirements

This chapter contains the requirements for the properties of the raw materials, materials and semi-products used during the production of the products to be certified under this AR (e.g., support bushes).

3.1 Material

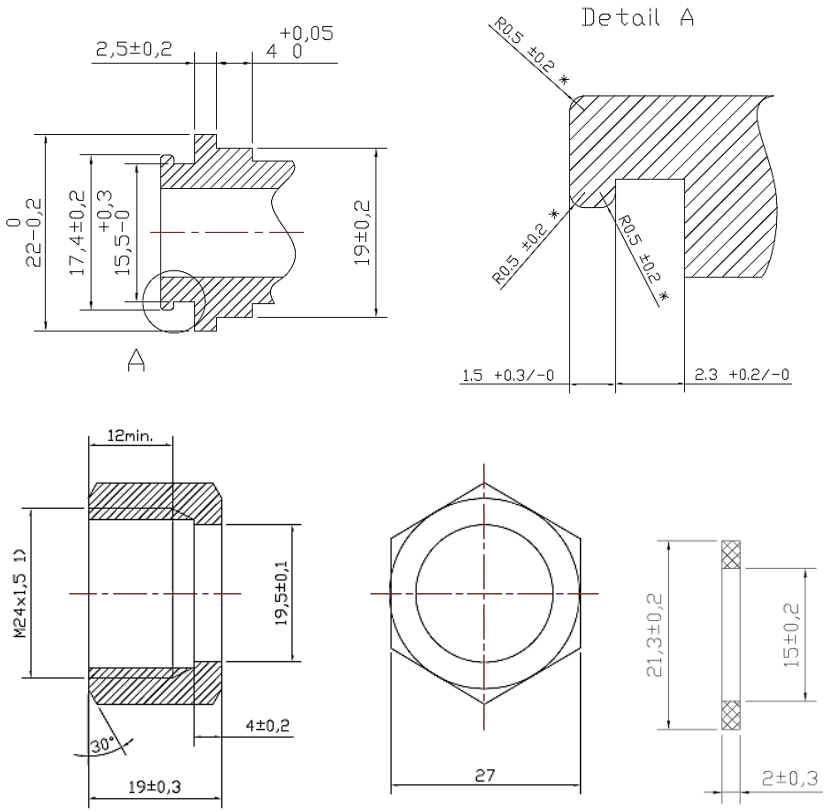
The rubber hose shall consist of a rubber inner layer, one or more reinforcement linings (fabrics or yarn) and a rubber outer layer. The rubber hose may have an intermediate layer. The rubber hose shall comply with GASTEC QA approval requirements 43.

Plastic is not permitted as part of the construction of the hose assembly.

Rubber seals shall comply with EN 549, with a temperature class of at least A2.

3.2 Construction

The hose assembly shall be provided with a detachable coupling on at least one side to connect to the connection valve in accordance with the figures below.



If the hose assembly is provided with a detachable coupling on one side, the coupling on the other side shall comply with the relevant GASTEC QA approval requirements or, if no approval requirements are available, the relevant national or international standards.

If the coupling has spanner flats, the spanner width shall be in accordance with the series specified in the ISO 4032.

The attachment of the rubber hose to the construction parts of the hose assembly shall be such that the ends of the rubber hose are fully enclosed.

The attachment of the rubber hose to the construction parts of the bendable hose assembly shall be such that the coupling can only be disassembled in a destructive manner.

The couplings and any clamping bushes shall be smooth, undamaged and without sharp edges.

3.3 Dimensions

3.3.1 Nominal inner diameter

The nominal inner diameter of the hose assembly shall at least be 9 mm.

3.3.2 Length

The total length of the hose assembly shall be between 200 mm and 600 mm with as lower limit 200 mm and a tolerance of ±20 mm. The length of the assembly shall be mentioned on the product or packaging.

Lengths up to 2 meters are permitted with additional specification on the packaging and/or manual.

4 Performance requirements and test methods

This chapter contains the performance requirements and associated test methods that the products shall meet. This chapter also specifies the limit values, if applicable.

4.1 General

All tests shall be performed at an ambient temperature of 23 ± 5 °C on samples with a length of 600 mm ± 30 mm with couplings unless stated otherwise. One hose assembly shall be used per test unless specified otherwise.

Leak tightness tests are performed using air. No deformation or damage shall occur to the product during testing.

4.2 Stress corrosion resistance

All parts shall be resistant to stress corrosion.

For stainless steel parts the magnesium chloride test shall be performed according to paragraph 4.2.1. After exposure there shall be no visual signs of cracks using a magnification of 5 times.

Parts made from copper alloys shall be tested by an ammonium chloride test according to ISO 6957 (pH 9.5). No visual signs of cracks shall be observed with a magnification of 10 to 15 times.

4.2.1 Test method

The parts shall be degreased using acetone.

Dissolve 1000 g $MgCl_2$ $6H_2O$ per 500 ml distilled water, or proportional amounts thereof. There shall be sufficient fluid to completely immerse the assembly.

Heat a vessel to 130 ± 2 °C and place the tube in the fluid for 108 hours let the fluid cool down to 70°C ± 2 ºC and leave the tube for 60 hours.

It can be necessary that a small amount of magnesium chloride or distilled water must be added in order to reach the 130°C. Make sure that the heating takes place uniformly (avoid bumps and jolts).

The visual assessment of sample takes place with the aid of a 5 times magnifying glass.

4.3 Uniform corrosion resistance

All parts shall be resistant against uniform corrosion. Parts made by a type of Austenitic RVS 300 series are exempt of this requirement due to the material characteristics related to the requirement of uniform corrosion.

All other metal materials shall be assessed according to paragraph 4.3.1 of this AR.

4.3.1 Test method

The uniform corrosion shall be assessed by performing the salt spray test according to ISO 9227, with a liquid according to paragraph 5.2.2 and a test duration of 168h.

The flexible hose assemblies will be exposed to the salt spray test unassembled (but capped).

After completion of the salt spray test, the flexible hose assembly will be assembled, and the leak tightness will be assessed according to paragraph 4.4. The sample will pass if the product is mountable and leak tight.

4.4 Leak thightness

The hose assembly shall be leak tight for 300 seconds when the internal pressure is 300 mbar.

4.4.1 Test method

The hose assembly shall be sealed on one side and the air pressure shall be increased up to 300 mbar on the other side. No leakage shall be observed for 300 seconds using a soap solution or leak detection solution.

4.5 Determination of pressure loss

The loss of pressure over the hose assembly shall not be more than 0.9 mbar with regard to a flow of 1.1 $m(n)^3/h$ (normal conditions).

4.5.1 Test method

A set-up in accordance with figure 1 shall be used to determine the loss of pressure over the hose assembly. The air flow rate shall be set to 1.1 $m(n)^3/h$ at an inlet pressure of 25 mbar by using a control valve on the outlet side. The loss of pressure measured over the hose assembly may not be more than 0.9 mbar.

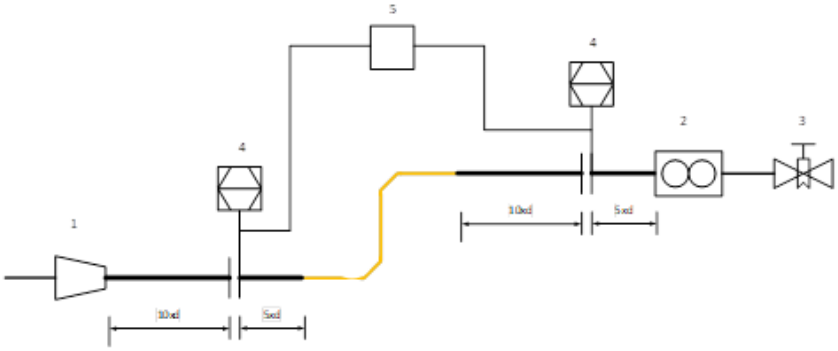


Figure 1

1 = inlet pressure regulator
2 = flow meter
3 = control valve outlet
4 = pressure meter
5 = pressure differential meter

4.6 Resistance to pull out

The hose assembly shall be able to withstand a gradually increasing tensile load from 0 N to 200 N during 60 seconds without presenting leaks.

4.6.1 Test method

The couplings of the hose assembly shall be connected to a traction device. The tensile load shall be increased to 200 N at a speed of 50 mm per minute. This 200 N load shall be maintained for 60 seconds. Next, the hose assembly shall be disassembled and checked for leak tightness in accordance with paragraph 4.4.

4.7 Resistance against shock loads

The hose assembly shall be able to withstand a shock load of 200 N without leakage.

4.7.1 Test method

The hose assembly shall be clamped on the top side and linked to a 20 kilograms weight on the bottom side. The weight shall be lifted 500 mm and, released so that it can fall freely. Subsequent, the test shall be repeated 1 time. Then the hose assembly shall be disassembled and checked for leak tightness in accordance with paragraph 4.4.

4.8 Resistance against torsional loads

The hose assembly shall be able to withstand a torsional load as a result of a 180° rotation at temperatures ranging from 20 °C to 80 °C without leakage, becoming loose from the couplings or suffering damage that may have an impact on functionality.

After determining the resistance against the tensile load, the resistance against the torsional load shall be determined.

4.8.1 Test method

The hose assembly shall be connected with two parallel fastening points with a 180 mm center-to-center distance. The ends of the hose assembly shall be turned 180° relative to each other.

This set-up shall be maintained fully for seven days for 24 hours in an air oven. The temperature in the oven must be 80 ± 3°C for 2 hours followed by 20 ± 3°C for 2 hours, alternating.

The set-up shall be cooled down after seven days until ambient temperature is achieved. The swivel nuts may not have been loosened and the hose assembly shall not be damaged. The leak tightness shall be determined in accordance with paragraph 4.4. Next, the resistance against the tensile load shall be determined in accordance with paragraph 4.6.

4.9 Resistance against changing loads

The hose assembly shall be able to withstand an alternating load ranging from 0 N to 30 N, 1000 times without being damaged or leakage.

4.9.1 Test method

The hose assembly shall be connected to a horizontal fastening point using the loose or fixed connecting fitting. The free end shall be connecting with the 3 kilograms mass by using the hexagonal swivel nut.

This mass shall be moved upwards 1000 times with a constant speed of approximately 10 times per minute until the hose assembly is free from loads and then moved downwards until the mass is suspended from the hose assembly.

Next, the leak tightness shall be checked in accordance with paragraph 4.4.

4.10 Strenght of fittings

Couplings with a flat gasket shall be able to resist torsion with a moment of 3.5 Nm per mm of inner diameter of the hose assembly without presenting leaks or deformation.

4.10.1 Test method

The coupling of the hose assembly shall be installed on a suitable counterpart component. The coupling shall, next, be tightened with a moment that matches 3.5 Nm per mm of the inner diameter of the hose assembly.

Leak tightness shall be checked in the installed state in accordance with paragraph 4.4. Check the fitting visually for deformation.

5 Marking and packaging

5.1 Marking

The product shall include a non-removable ring that includes the following information:

- Name or identification marking of the supplier.
- GASTEC QA or the GASTEC QA logo

5.2 Packaging

Every rubber hose assembly shall be protected against possible damage during storage and transport through packaging.

If the length of the product is longer than 600 mm, the following text shall be specified on the packaging:

“Rubber hose assemblies longer than 600 mm may only be used in relation to:

- Movable appliances in the open air
- Integrated appliances
- Radiation appliances”

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 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 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
Material	3.1	X		
Construction	3.2	X	X	1x/year
Dimensions	3.3	X	X	1x/year
Nominal inner diameter	3.3.1	X		
Length	3.3.2	X		
Resistance against stress corrosion	4.2	X	X	1x/year
Uniform corrosion resistance	4.3	X		
Leak tightness	4.4	X	X	1x/year
Determination of pressure loss	4.5	X		
Resistance to pull out	4.6	X		
Resistance against shock loads	4.7	X		
Resistance against torsional loads	4.8	X	X	1x/year
Resistance against changing loads	4.9	X	X	1x/year
Strength of fittings	4.10	X		
Marking	5.1	X	X	1x/year
Packaging	5.2	x		

8 List of referenced documents

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 549: 2019+A1:2023	Rubber materials for seals and diaphragms for gas appliances and gas equipment
ISO 4032: 2023	Hexagon regular nuts (style 1) – product grades A and B
ISO 6957: 1988	Copper alloys – ammonia tests for stress corrosion resistance
ISO 9227: 2022	Corrosion tests in artificial atmospheres – Salt spray tests

8.2 Source of informative documents

EN 437: 2021	Test gases- test pressure – appliance categories
NPR 3378-11: 2018	Code of Practice gas installations – Section gas pipe work – Part 11: connecting pipe work and taps

General requirements GASTEC QA