

KE 212

January 2025

Approval requirement 212

Multilayer piping systems for outdoor gas installation



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Foreword

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.

Approved by the Board of Experts: Month date, year

Accepted by Kiwa Nederland B.V.: Month date, year

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The use of this approval requirement by third parties, for any purpose whatsoever, is only allowed after a written agreement is made with Kiwa to this end

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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 multilayer piping systems for outdoor gas installation for the transport of gaseous fuels.

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 September 2018.

List of changes:

- This approval requirement has been adapted to the new layout of GASTEC QA approval requirements.
- The approval requirement is fully textually reviewed.
- The list of reference standards has been adjusted.

The product requirements have not changed.

1.2 Scope

This approval requirement specifies the requirements for multilayer piping systems for outside buildings intended to be used for gas supply of gaseous fuels of the 2nd and 3rd family according to EN 437.

Maximum operating pressure 500 mbar.
Operating temperature -20 °C up to 40 °C.

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.

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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

Multilayer piping systems for outdoor gas supply shall meet the requirements of: ISO 18225, "Plastic piping systems – Multilayer pipe systems for outdoor gas installations - Specifications for systems.

In addition, the following requirements and interpretations shall be met:

3.2 Pipes

3.2.1 Color of pipes

The outer layer of pipes shall be yellow.

3.2.2 Outer layer of yellow pipes

For yellow outer layers reference materials may be used where the original pigment has been exchanged for yellow. The long-term pressure strength of these materials with a new pigment shall be equal to the original reference material, according to ISO 18225, Clause 4.4.1.

3.3 Fittings

The reference in ISO 18225, clause 5 to ISO 10838 (all parts) should be replaced by ISO 17885, Plastic piping systems – Mechanical fittings for pressure piping systems – Specification (this standard replaces all parts of ISO 10838)

3.3.1 Construction

The fittings for multilayer pipes shall be able to make a mechanical connection with the multilayer pipe by pressing or clamping.

3.3.2 Plastic fittings

Plastic body materials for fittings can be chosen from table 1 of ISO 17885. Contrary to ISO 17885, PVDF and PPSU fittings are suitable for the use of outdoor gas. The fitness for purpose shall be conform clause 3.4 of this approval requirement.

3.3.3 Metal fittings

Metal body material for fittings can be chosen from table 2 of ISO 17885. Other metal materials can be used if proven to meet the requirements of ISO 17885

3.3.4 Installation

No torn during installation on the pipe, aluminium layer, and welded seam. No damage of the pipe and fitting by use of tools and aids for installation of the fitting. Additionally, the fitting shall not induce twisting of pipes during assembly.

3.3.5 Transition fittings

Transition to other piping systems (e.g. copper, PE or steel) shall be made by one of the following methods;

1. Thread according to EN 10226-1 (or ISO 7-1).
 - a. Male thread is conical (R)
 - b. Female thread is straight (Rp)
2. Compression fitting for joining copper tubes according to approval requirement 35.
3. Solder fittings (with copper tube) according to approval requirement 6.

3.3.6 Elastomers

Rubber seals shall comply with EN 682 class GAL or GBL.

3.4 Fitness for purpose

The reference in ISO 18225, clause 6 to ISO 10838 (all parts) should be replaced by ISO 17885, Plastic piping systems – Mechanical fittings for pressure piping systems – Specification (this standard replaces all parts of ISO 10838).

3.4.1 Diameter classes

The diameter classes in table 1 shall be used. These classes are used to establish the number of test samples as referred to in: ISO 17885, table 7: Test scheme for mechanical fitting assemblies.

Table 1 - Diameter classes

Diameter classes	1	2	3
External diameter (mm)	$D_e < 75$	$75 \leq D_e < 250$	$250 \leq D_e \leq 630$

4 Marking

4.1 Marking of the pipe

The product shall be marked according to ISO 18225, with the following modification:

- GASTEC QA, GASTEC QA logo or punch mark.
- Internal fluid is not mandatory.

4.2 Marking on the fitting

The product shall be marked with the following information:

- Manufacturer or trademark.
- Fluid to be conveyed or yellow marking.
- Body material.
- Nominal diameter(s) d_n to which the fitting is intended to joint.
- Production charge or code.
- Reference to ISO 18225.
- Intended use.
- GASTEC QA, GASTEC QA logo or punch mark.

In case it is not possible to mark the product it is allowed to provide the marking on the smallest package. At least the production charge or code and manufacturer trade shall be mentioned on the fitting.

5 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.

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6 Summary of evaluation

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

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

6.1 Evaluation matrix

Description of requirement	Clause	Test within the scope of		
		Initial product assessment	Product verification Verification	Frequency
Multilayer Pipes				
General	ISO 18225, 4.1.1	X	X	Once a year
Reprocessable materials	ISO 18225, 4.1.2	X	X	Once a year
Metallic materials	ISO 18225, 4.1.3	X	X	Once a year
General characteristics				
General	ISO 18225, 4.2.1	X		
Multilayer pipe construction	ISO 18225, 4.2.2	X		
Minimum design coefficient/pressure	ISO 18225, 4.2.3	X		
Dimensions of pipes				
General	ISO 18225, 4.3.1	X	X	Once a year
Dimensions	ISO 18225, 4.3.2	X	X	Once a year
Mechanical properties				
Long-term hydrostatic strength	ISO 18225, 4.4.1	X		
Resistance to RPC	ISO 17885, 4.4.2	X		
Strength of the weld line of M pipe	ISO 18225, 4.4.3	X		
Resistance to slow crack growth	ISO 18225, 4.4.4	X		
Structural performance	ISO 18225, 4.4.5	X		
Physical properties				
General	ISO 18225, 4.5.1	X		
Resistance to gas constituents	ISO 18225, 4.5.2	X		
M-pipes	ISO 18225, 4.5.2	X		
OIT	ISO 18225, 4.5.2	X		Once a year
Resistance to weathering	ISO 18225, 4.5.2	X		
Color of the pipes	AR 212, 3.2.1	X	X	Once a year
Outer layer of yellow pipes	AR 212, 3.2.2	X		
Fittings				
Fitting reference standards	AR 212, 3.3	X		
Dimensions	ISO 18225, 5.3	X	X	Once a year
Manufacturers declaration for the field application	ISO 17885, 4	X		
Materials				
Plastic materials	ISO 17885, 5.1	X	X	Once a year
Metal materials	ISO 17885, 5.2	X	X	Once a year
Lubricants and/or greases	ISO 17885, 5.4	X	X	Once a year
General characteristics				
Appearance	ISO 17885, 6.1	X	X	Once a year
Color	ISO 17885, 6.2	X	X	Once a year
Ultraviolet protection	ISO 17885, 6.3	X		
Threads	ISO 17855, 6.4	X	X	Once a year
Transition fittings to metal pipes	ISO 17885, 6.5	X	X	Once a year
Combined fittings	ISO 17885, 6.6	X	X	Once a year
Geometrical characteristics	7	X		

Physical characteristics				
Evaluation of the MRS value of the plastic materials	ISO 17885, 8.1	X		
Verification of long-term behavior of the plastic materials	ISO 17885, 8.2	X		
Specific material characteristics of fitting materials	ISO 17885, 8.3	X		
Application-related characteristics	ISO 17885, 8.4			
Resistance to gas constituents	ISO 17885, 8.4.2	X		
Stress corrosion resistance	ISO 17885, 8.4.2	X		
Performance requirements				
General	ISO 17885, 9.1	X		
Pressure resistance of the fitting body	ISO 17885, 9.2	X		
Plastic fittings	AR 212, 3.3.2	X	X	Once a year
Metal fittings	AR 212, 3.3.3	X	X	Once a year
Installation	AR 212, 3.3.4	X		
Transition fittings	AR 212, 3.3.5	X	X	Once a year
Elastomers	AR 212, 3.3.6	X	X	Once a year
Fitness for purpose				
Leak tightness under internal pressure	ISO 17885, 9.3.3.1	X		
Long-term pressure test for leak tightness under internal pressure	ISO 17885, 9.3.3.2	X	X	Once a year
Resistance to plastic pipe/pipe or pipe/fitting assemblies to tensile loading at 23 °C	ISO 17885, 9.3.3.3	X	X	Once a year
Resistance to end load at 80 °C	ISO 17885, 9.3.3.5	X		
Leak tightness after temperature cycling	ISO 17885, 9.3.3.6	X		
Leak tightness under internal pressure while subjected to bending	ISO 17885, 9.3.3.7	X		
Flow rate pressure drop relationship	ISO 17885, 9.3.3.11	X		
Resistance to stress corrosion	ISO 17885, 9.3.3.12	X		
	AR 212			
Marking on the pipe	4.1	X	X	Once a year
Marking on the fitting	4.2	X	X	Once a year

7 List of referenced documents and source

7.1 Standards / normative documents

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

EN 682: 2002 + A1: 2005	Elastomeric seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids
EN 1092-2: 2023	Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges
EN 1333: 2006	Flanges and their joints - Pipework components - Definition and selection of PN
EN 10226-1: 2004	Pipe threads where pressure tight joints are male on the treads – Part 1 taper external threads and parallel internal threads.
EN 14901: 2014	Ductile iron pipes, fittings and accessories - Epoxy coating (heavy duty) of ductile iron fittings and accessories - Requirements and test methods
ISO 7-1: 1994+Cor 1: 2007	Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation
ISO 3183: 2019	Petroleum and natural gas industries - Steel pipe for pipeline transportation systems
ISO 6708: 1995	Pipe components - Definition and selection of DN (nominal size)
ISO 6892-1: 2019	Metallic materials – tensile testing – part 1: method at room temperature.
ISO 17885: 2021	Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications
ISO 18225: 2012	Plastics piping systems - Multilayer piping systems for outdoor gas installations - Specifications for systems
NEN 7231:2020	Plastics piping systems for gas supply - Fittings of modified poly(vinyl chloride) (modified-PVC) - Requirements and test methods

7.2 Source of informative documents

EN 437: 2021	Test gases- test pressure – appliance categories
NEN 1078: 2024	Supply for gas with an operating pressure up to and including 500 mbar - Performance requirements - New estate
General requirements GASTEC QA	
Approval requirement 6	Plumbing fittings with ends for capillary soldering, capillary brazing and/ or threaded connections
Approval requirement 35	Compression fittings for joining copper pipes

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