AR 198
December 2023

Approval requirement 198

Multilayer piping systems for indoor gas installations

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Foreword

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

Approved by Board of Experts: 4 September 2018

Accepted by Kiwa Nederland B.V.: 4 September 2018

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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 Multilayer piping systems for indoor gas installations.

This GASTEC QA approval requirements replace the GASTEC QA approval requirements 198, multilayer piping systems for indoor gas installations with a maximum operating pressure up to and including 5 bar, dated 2018.

List of changes:

- Textual review
- Update of definitions
- Update of relevant standards

The product requirements have not been changed.

1.2 Scope

This approval requirement specify the requirements for multilayer piping systems for indoor gas installations for the supply of gaseous fuels of the 2nd and 3rd family according to NEN-EN 437. The maximum operating pressure is 5 bar, with an operating temperature range of -20 °C up to 60 °C and a nominal diameter up to and including 63 mm.

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 General

Multilayer piping systems for indoor gas installation shall meet the requirements of: ISO 17484-1 Plastic piping systems – Multilayer pipe systems for indoor gas installations with a maximum operating pressure up to and including 5 bar (500KPa) – Part 1: Specifications for systems.

For diameters larger than 63 mm, the requirements of ISO 18225 also have to be fulfilled.

In addition the following requirements 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 pipe; Only for M-pipe

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 17484, clause 5.4.1.

3.3 Fittings

The reference in ISO 17484-1 clause 6 to ISO 10838 (all parts) should be replaced by ISO 17885, Plastic piping systems – Mechanical fittings for pressure piping systems – Specification, except clause 9.3, Fitting assemblies.

The reference in ISO 17484-1 clause 6 to ISO 14531-3 should be replaced by ISO 17885, Plastic piping systems – Mechanical fittings for pressure piping systems – Specification, except clause 9.3, Fitting assemblies.

3.3.1 Contruction

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 indoor gas installations. The plastic fittings shall comply to 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.

In line with ISO 17885 clause 6.6, 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 549 minimum temperature class A2, or EN 682 class GAL or GBL.

3.4 Fitness for purpose

The reference in ISO 17484-1, clause 6 to ISO 10838 (all parts) should be replaced by ISO 17885, Plastic piping systems – Mechanical fittings for pressure piping systems – Specification.

3.4.1 Diameter classes

Contrary to the diameter classes in ISO 17484-1, Clause 7.1, table 2, the below defined diameter classes shall be used. These classes are used to establish the number of test samples as referred to in ISO 17484-1, table 3: Requirements for fitness purpose of joint assemblies.

Table 1 - Diameter classes

Diameter classes	1	2	3
External diameter (mm)	$D_e < 26$	$26 \leq D_e < 40$	$40 \leq D_e \leq 63$

4 Marking, instructions and packaging

4.1 Marking of the pipe

The pipe shall be marked according to ISO 17484, but with the following modification:

- Internal fluid is not mandatory on the marking;
- GASTEC QA, GASTEC QA word mark or logo.

4.2 Marking on the fitting

The product shall be marked with the following information:

- Standard reference number;
- 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;
- Material classification of pipe(s) to which connection is permissible, including reference to pipe manufacturer;
- GASTEC QA, GASTEC QA word mark or logo.

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

4.3 Instructions

The supplier shall provide instructions on how to apply and assemble the products. These instructions shall be in the Dutch language and describe that the product is GASTEC QA certified. The instructions shall further meet the requirements of ISO 17484.

4.4 Packaging

The product shall be pack in such a way that contamination or damaging is not possible.

5 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.

6 Summary of tests

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

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

6.1 Test matrix

Description of requirement	Clause	Test within the scope of		
		Initial product assessment	Product verification	
			Verification	Frequency
Multilayer pipes for indoor gas installations				
	ISO 17484-1			
Pipes	5			
Materials	5.1			
General	5.1.1	X	X	Once a year
Reprocessable material	5.1.2	X	X	Once a yaer
Metallic materials	5.1.3	X	X	Once a year
General characteristics	5.2			
General	5.2.1	X	X	Once a year
Multilayer construction	5.2.2	X	X	Once a year
Minimum design coefficient	5.2.3	X		
Dimension of pipes	5.3	X	X	Once a year
Mechanical properties	5.4			
Long-term pressure strength	5.4.1	X		
Strength of the joint line of M-pipes	5.4.2	X		
Resistance to slow crack growth of the outer layer for M-pipes	5.4.3	X		
Physical properties	5.5			
General	5.5.1	X		
Additional requirements	5.5.2			
• Resistance to gas constituent	5.5.2 Table 1	X		
• Thermal durability of the outer layer of M-pipes	5.5.2 Table 1	X		
• Oxidation induction time (OIT)	5.5.2 Table 1	X		
• Delamination: P-pipes	5.5.2 Table 1	X		
• Delamination: M-pipes	5.5.2 Table 1	X		
• Odorant permeability	5.5.2 Table 1	X		

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Additional requirements for pipes				
Color of the pipes	3.2.1	X	X	Once a year
Outer layer of yellow pipes	3.2.2	X		
Fittings for multilayer pipes for indoor gas installations				
	ISO 17885			
Manufacturers declaration for the field application	**4**	X		
Materials	**5**			
Plastic materials	5.1	X	X	Once a year
Metal materials	5.2	X	X	Once a year
Elastomers	5.3 and/or AR 198, 3.3.6	X	X	Once a year
Lubricants and/or greases	ISO 17885, 5.4	X	X	Once a year
General characteristics	**6**			
Appearance	6.1	X	X	Once a year
Color	6.2	X	X	Once a year
Ultraviolet protection	6.3	X		
Threads	6.4	X	X	Once a year
Transition fittings to metal pipes	6.5	X	X	Once a year
Combined fittings	6.6	X	X	Once a year
Geometrical characteristics	**7**	X	X	Once a year
Physical characteristics	**8**			
Evaluation of the MRS value of the plastic materials	8.1	X		
Verification of long-term behavior of the plastic materials	8.2	X		
Specific material characteristics of fitting materials	8.3	X		
Application-related characteristics	8.4			
Resistance to gas constituents	8.4.2	X		
Stress corrosion resistance	8.4.2	X		
Performance requirements	**9**			
General	9.1	X		
Pressure resistance of the fitting body	9.2	X		
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Additional requirements for fittings				
Plastic fittings	3.3.2	X		
Metal fittings	3.3.3	X		
Installation	3.3.4	X	X	Once a year
Transition fittings	3.3.5	X	X	Once a year
Elastomers	3.3.6	X		

Fitness for purpose for multilayer systems for indoor use for gas installation				
	ISO 17484-1			
Requirements for the system	**4**			
Pressure drop	4.1	X		
Bending	4.2	X		
Corrosive conditions	4.3	X		
Fitness for purpose	**7**	X		
Requirements	7.2	X		
• Long-term internal pressure test	7.2 table 3	X	X	Once a year
• Tensile load 1h	7.2 table 3	X	X	Once a year
• Tensile load 800h	7.2 table 3	X		
• Joint resistance to crushing	7.2 table 3	X		
• Impact resistance of the joint	7.2 table 3	X		
• Thermal cycling resistance	7.2 table 3	X		
• Repeated bending resistance	7.2 table 3	X		
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Fitness for purpose	3.4			
Dimension classes	3.4.1	X		
Marking, instructions and packaging				
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Marking of the pipe	4.1	X	X	Once a year
Marking of the fitting	4.2	X	X	Once a year
Instructions	4.3	X	X	Once a year
Packaging	4.4	X		

In case the product or production process changes significantly a re-evaluation will be performed.

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.

Approval requirement 6: 2019	Plumbing fittings with ends for capillary soldering, capillary brazing and/ or threaded connections
Approval requirement 35: 2019	Compression fittings for joining copper pipes
EN 437: 2021	Test gases- test pressure – appliance categories
EN 682: 2002+ A1: 2005	Elastomeric seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids
EN 1092-2: 1997	Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges
EN 14901-1: 2014+ A1: 2019	Ductile iron pipes, fittings and accessories - Requirements and test methods for organic coatings of ductile iron fittings and accessories - Part 1: Epoxy coating (heavy duty)
EN 1333: 2006	Flanges and their joints - Pipework components - Definition and selection of PN
EN 10226-1: 2004	Pipe threads where pressue tight joints are male on the treads – Part 1 taper external threads and parallel internal threads.
ISO 7-1: 1994+Cor 1: 2007	Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation
EN-ISO 3183: 2019	Petroleum and natural gas industries. Steel pipe for pipeline transportation systems
EN-ISO 6708: 1995	Pipe components - Definition and selection of DN (nominal size)
EN-ISO 6892-1: 2019	Metallic materials – tensile testing – part 1: method at room temperature

ISO 17484-1: 2014	Plastics piping systems - Multilayer pipe systems for indoor gas installations with a maximum operating pressure up to and including 5 bar (500 kPa) - Part 1: Specifications for systems
ISO 17885: 2021	Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications
NEN 7231: 2020	Kunststofleidingsystemen voor gasvoorziening – hulpstukken van slagvast polyvinylchloride (slagvast PVC) – eisen en beproevingsmethoden.