KE 212
September 2018

Approval requirement 212

Multilayer piping systems for outdoor gas installation

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Foreword

This GASTEC QA 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 will be used by Kiwa Nederland BV in conjunction with the GASTEC QA general requirements and the KIWA regulations for product certification. This regulation details the method employed by Kiwa during product 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 outdoor gas installation for the transport of gaseous fuels.

1.2 Scope

This approval requirement specify 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 NEN-EN 437.
Maximum operating pressure 500 mbar.
Operating temperature -20 °C up to 40 °C.

2 Definitions

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

Approval requirement/ Evaluation Guideline: the agreements made within the Board of Experts on the subject of certification.

Board of Experts: The Board of Experts Gastec QA.

Supplier: the party that is responsible for ensuring that the products meet and continue to meet the requirements on which the certification is based.

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

Product requirements: requirements made specific by means of measures or figures, focusing on (identifiable) characteristics of products and containing a limiting value to be achieved, which limiting value can be calculated or measured in an unequivocal manner.

Other definitions can be found in ISO 18225.

3 Product requirements

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
Additional requirement conform 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 NEN-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, instructions and packaging

4.1 Marking of the pipe

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

- Gastec QA or Gastec QA logo
- 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 18225:2012
- Intended use
- Gastec QA or Gastec QA logo

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 have to be mentioned on the fitting.

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				
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 198, 3.2.1	X	X	Once a year
Outer layer of yellow pipes	AR 198, 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 198, 3.3.2	X	X	Once a year
Metal fittings	AR 198, 3.3.3	X	X	Once a year
Installation	AR 198, 3.3.4	X		
Transition fittings	AR 198, 3.3.5	X	X	Once a year
Elastomers	AR 198, 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 198			
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 437: 2003+A1: 2009	Test gases- test pressure – appliance categories
EN 1333: 2006	Flanges and their joints - Pipework components - Definition and selection of PN
EN-ISO 6708: 1995	Pipe components - Definition and selection of DN (nominal size)
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: 2014	Ductile iron pipes, fittings and accessories - Epoxy coating (heavy duty) of ductile iron fittings and accessories - Requirements and test methods
EN 682: 2002	Elastomeric seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids
EN-ISO 9001: 2008 +C1: 2009	Quality management systems – Requirements
EN 10208-1: 2009	Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 1: Pipes of requirement class A
EN-ISO 6892-1: 2009	Metallic materials – tensile testing – part 1: method at room temperature.
NEN 7231: 2011	Kunststofleidingsystemen voor gasvoorziening – hulpstukken van slagvast polyvinylchloride (slagvast PVC) – eisen en beproevingsmethoden.
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

7.2 Source

Parts of the text of this approval requirement have been based on ISO 18225 and ISO 17885.