

AR 172

September 2019

validated Dutch version

Approval requirement 172

Prefab indoor pipes



**Trust
Quality
Progress**

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.

Kiwa Nederland B.V.

Wilmersdorf 50
Postbus 137
7300 AC Apeldoorn

Tel. 088 998 33 93
Fax 088 998 34 94
info@kiwa.nl
www.kiwa.nl

© 2017 Kiwa N.V.

All rights reserved. No part of this book may be reproduced, stored in a database or retrieval system, or published, in any form or in any way, electronically, mechanically, by print, photoprint, microfilm or any other means without prior written permission from the publisher.

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

Contents

Foreword		1
Contents		2
1	Introduction	4
1.1	General	4
1.2	Scope	4
2	Definitions	5
3	Product requirements	6
3.1	Composition and use	6
3.2	Materials	6
3.2.1	Protection pipe	6
3.2.2	Gas carrying pipe	6
3.2.3	Annealing process	6
3.3	Construction	7
3.3.1	Size combinations	7
3.3.2	Connections	7
3.3.3	Pipe ends	7
3.3.4	Inserts	7
3.3.5	Gasrestriction	7
4	Performance requirements and test methods	8
4.1	Test annealed part of the copper pipe	8
4.2	Test of the non-annealed end of the copper pipe	8
4.3	Test repeated bending of the copper pipe	8
4.4	Location measurement of transition areas annealed / non-annealed pipe sections	9
4.5	Test on strength and density of the composite product	9
5	Marking and instructions	10
5.1	Marking	10
5.2	Instructions	10
6	Quality system requirements	11
7	Summary of tests	12
7.1	Test matrix	12
8	List of referenced documents and source	13

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 prefab indoor pipes.

This GASTEC QA approval requirements replace the GASTEC QA approval requirements 172 "Prefab binnenleidingen" dated February 2019.

List of changes:

- Paragraph 3.3.2 is adjusted to the right class of soldering material
The product requirements have not changed.

1.2 Scope

The requirements in this approval requirement apply to prefabricated indoor pipes from copper pipes with a nominal connection size DN 15 up to and including 28, provided with a protection pipe of polyethene.

De placement of these indoor pipes is described in:

- NEN 1078: "Voorziening voor gas met een werkdruk tot en met 500 mbar - Prestatie-eisen - Nieuwbouw"
- NPR 3378: "Praktijkrichtlijn gasinstallaties - Sectie gasleidingen - Deel 5: Gasleidingen - Aanleg - Leidraad bij NEN 1078 en NEN 8078"

2 Definitions

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

Board of Experts: The Board of Experts Gastec QA.

Compression joint: connecting structure for copper pipes, whereby a compression or cutting ring made of metal is used for sealing the pipe

Indoor pipe: gas pipe in a parcel that starts behind the end of the outlet of the gas meter or at an equivalent place and which ends in one or more connection points

Natural gas: Flammable gas or gas mixture for domestic and / or industrial use

Nominal diameter: numerical value (DN) for the connection dimensions of components in pipeline systems

Nominal pressure: numerical measure (PN) for pressure in pipe system components

Protection pipe: conductor / protective pipe for service lines to bridge inaccessible and / or damp rooms

3 Product requirements

3.1 Composition and use

The composition and dimensions of the prefab indoor pipes shall correspond with the by the manufacturer supplied detail drawings.

A prefab indoor pipe may be constructed out of the following parts:

- Copper pipe as gas carrying pipe according to GASTEC QA approval requirement 5
- Polyethene pipe as protection pipe according to GASTEC QA approval requirement 8
- Copper or bronze soldering fittings according to GASTEC QA approval requirement 6
- Compression fittings according to GASTEC QA approval requirement 35
- Support / inserts

3.2 Materials

3.2.1 Protection pipe

The protection pipe shall be made of polythene in the sizes DN 25, DN 32 or DN 40 in the class SDR 17,6.

3.2.2 Gas carrying pipe

The gas carrying pipe shall be made of annealed copper in the sizes DN 15 with wall thickness 1 mm, DN 22 with wall thickness 1,1 mm or DN 28 with wall thickness 1,2 mm in the quality half-hard.

3.2.3 Annealing process

The copper pipe as described above shall be, by means of a standardized process, annealed as such that both ends over a length 90^{+10}_0 mm still meet the requirement half-hard. The length of the transition zone annealed-not annealed shall not exceed 100 mm.

The copper at the inside of the pipe shall not oxidize during annealing. Oxidation occurred at the outside of the pipe shall be removed. After the annealing process, the copper shall meet the requirements in paragraph 4.1 and 4.2.

3.3 Construction

3.3.1 Size combinations

The inside diameter of the protection pipe shall be at least 6 mm greater than the outside diameter of the gas carrying indoor pipe. A prefabricated indoor pipe shall, based on this, be composed in one of the below size combinations:

- Gas pipe DN 15 with PE-protection pipe DN 25, SDR 17,6
- Gas pipe DN 22 with PE- protection pipe DN 32, SDR 17,6
- Gas pipe DN 28 with PE- protection pipe DN 40, SDR 17,6

3.3.2 Connections

In gas carrying copper pipes with a length up to 7,5 meter no connections are allowed.

In longer gas carrying copper pipes connections are allowed. The number of connections shall be reduced to a minimum by applying pipes with the maximal standard length of 7,5 meter. The connection shall consist out of a capillair hard soldering connection.

Hard soldering shall comply with ISO 17672: 2016, class CuP286. The to be applied flow agent cannot affect the material of the pipe or connection.

For the PE-protection pipe connections are not allowed.

3.3.3 Pipe ends

The pipe ends shall be, one side, be finished in one of the following ways:

- Cut smooth and square on the longitudinal axis. The pipe ends shall comply with the dimensions and admissible tolerances according to GASTEC QA approval requirement 5.
- With by means of a hard-soldering attached copper or bronze one-piece fitting (capillair x R thread). The copper or bronze fitting shall comply with GASTEC QA approval requirement 6.
- With by means of a compression fitting (compression x gas thread). The compression fitting shall comply with GASTEC QA approval requirement 35.

3.3.4 Inserts

The inner space between copper tube and end PE-protection pipe on both sides shall be provided with an insert, which suits as a fixed point for a mounting bracket.

3.3.5 Gasrestriction

Any leaked gas in the protection pipe shall be able to be detected in the room (s) where the inner pipe ends. On the other hand, the influx of liquids from outside into the protection pipe shall be prevented. An integral construction in combination with the requirement in section 3.3.4 is permitted.

4 Performance requirements and test methods

4.1 Test annealed part of the copper pipe

The material properties of the semi-rigid copper pipe (paragraph 3.2.3) shall be tested after the annealing process with regard to tensile strength, elongation at break and diameter expanding according to GASTEC QA approval requirement 5, soft quality.

4.2 Test of the non-annealed end of the copper pipe

The material properties of the half-hard part of the copper pipe (section 3.2.3) shall be tested after annealing of the middle part with respect to tensile strength, elongation at break and diameter expanding according to GASTEC QA approval requirement 5, quality half-hard. It is permissible for sampling of the tensile tests, because of the minimum length of the tensile test samples, to leave a longer part of the tube ends annealed.

4.3 Test repeated bending of the copper pipe

The soft copper pipe section shall be able to be bent manually over the bending radii mentioned below and shall also continue to meet the GASTEC QA approval requirements 5. Smaller bending samples are permitted provided that the PE protection pipe does not buckle, and the copper pipe continues to comply with section 4.3. No kinking symptoms may occur during the test; the ovality of the tube shall not exceed 10% D.

R = 500 mm for pipe size DN 15

R = 600 mm for pipe size DN 22

R = 600 mm for pipe size DN 28

Perform the number of permitted bends, as specified by the manufacturer, plus 2 over 135° of the annealed copper pipe section. After testing, the material properties with regard to tensile strength, elongation at break and diameter expanding shall be tested according to GASTEC QA approval requirement 5, soft quality.

4.4 Location measurement of transition areas annealed / non-annealed pipe sections

Three test rings (*a*, *b* and *c*) with a width of 20 mm shall be taken from both ends of the tube. The places where the rings shall be taken from are:

- Test ring *a*: the first 20 mm of both pipe ends
- Test ring *b*: the part between 70 and 90 mm from the original beginning of both pipe ends
- Test ring *c*: the part between 200 and 220 mm from the original beginning of both pipe ends

The test rings shall be pressed 35% of the external diameter on a pressure bench at a speed of 10 mm / min. The measured value of the test rings, in N / mm, shall meet the following requirements:

- *a1* shall be considerably higher than *c1*
- *a2* shall be considerably higher than *c2*
- *a1* or *a2* may be a maximum of $0.5 (a1 + a2) \times 1.05$
- *a1* or *a2* may be a minimum of $0.5 (a1 + a2) \times 0.95$
- *b1* can be $a1 \times 1.05$ at most
- *b1* can be at least $a1 \times 0.95$
- *b2* can be $a2 \times 1.05$ at most
- *b2* can be at least $a2 \times 0.95$

4.5 Test on strength and density of the composite product

Composite gas-conducting copper inner pipes shall be able to withstand an internal air pressure of $1^{+0.5}_{-0}$ bar for a minimum of 15 minutes. The construction shall not show any leaks.

All measurements shall be carried out at 23 ± 5 °C. Pressures shall be measured using a precision manometer according to NEN 927, class 1. Testing shall be carried out in triplicate. Control is carried out by immersion in water.

5 Marking and instructions

5.1 Marking

On a prefab indoor pipe, the following marking shall be durably placed:

- GASTEC QA logo, word or trademark
- Name or trademark manufacturer
- Nominal size pipe diameters
- Standard length
- Smallest admissible bending radius
- Nominal pressure
- Production period.

5.2 Instructions

The manufacturer shall provide clear assembly instructions in the Dutch language for installing the prefab indoor pipes in houses and buildings.

The documentation shall contain instructions regarding the method of bending and the number of allowed bends and wall and floor transits. Also, it shall contain instructions on fixing to floors or walls and the tests for strength and leak tightness.

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
Product requirements	3			
Composition and use	3.1	X	X	Each year
Materials	3.2			
Protection pipe	3.2.1	X	X	Each year
Gas carrying pipe	3.2.2	X	X	Each year
Annealing process	3.2.3	X	X	Each year
Construction	3.3			
Size combinations	3.3.1	X	X	Each year
Connections	3.3.2	X	X	Each year
Pipe ends	3.3.3	X	X	Each year
Inserts	3.3.4	X	X	Each year
Gas restrictions	3.3.5	X	X	Each year
Performance requirements	4			
Test annealed part of the copper pipe	4.1	X		
Test of the non-annealed end of the copper pipe	4.2	X		
Test repeated bending of the copper pipe	4.3	X	X	Each year
Location measurement of transition areas annealed / non-annealed pipe sections	4.4	X		
Test on strength and density of the composite product	4.5	X	X	Each year
Marking and instructions	5			
Marking	5.1	X	X	Each year
Instructions	5.2	X		

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.

NEN 1078: 2018	Voorziening voor gas met een werkdruk tot en met 500 mbar - Prestatie-eisen - Nieuwbouw
NPR 3378-5: 2018	Praktijkrichtlijn gasinstallaties - Sectie gasleidingen - Deel 5: Gasleidingen - Aanleg - Leidraad bij NEN 1078 en NEN 8078
GASTEC QA approval requirement 5: 2019	Copper tubes
GASTEC QA approval requirement 6: 2019	Plumbing fittings with ends for capillar soldering and/or thread connections
GASTEC QA approval requirement 8: 2018	Polyethylene pipes for carrying gaseous fuels
GASTEC QA approval requirement 35: 2019	Compression fittings for joining copper pipes