

**AR 156**

May 2019

validated Dutch version

# Approval requirement 156

Socket and transition pieces made of PE for PVC/CPE and copper gas pipes



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# 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.

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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 socket and transition pieces made of PE for PVC/CPE and copper pipes.

This GASTEC QA approval requirements replace the GASTEC QA approval requirements 156 "Schuif en overgangstukken van PE voor PVC/CPE en koperen gasleidingen" dated March 1996 and amendment A1 of March 2012.

List of changes:

- Update to the new format GASTEC QA approval requirements
- All general requirements have been deleted and included in the GASTEC QA general requirements document
- These approval requirements have been fully reviewed textually
- Change in paragraphs

The product requirements have not changed

## 1.2 Scope

This approval requirements describes the requirements for socket and transition pieces for making a non-end load connection with PVC/CPE pipes and PVC/CPE and copper pipes used with an operating pressure of up to 200 mbar. The diameter of the PVC/CPE pipe to be connected is  $\leq 50$  mm and the copper pipe  $\leq 42$  mm.

## 2 Definitions

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

**Board of experts:** The Board of Experts GASTEC QA

**Gas:** natural gas or an equivalent gas with a temperature that usually does not exceed 20 ° C.

**Pressure:** static overpressure relative to atmospheric pressure

**Socket piece:** coupler with its parts with which a non-end load-resistant connection can be made in a PVC / CPE pipe.

**Transition socket piece:** a coupler according to the above with a connection option on one side with a copper tube

**Insertion depth:** distance between the place where the end of the pipe can be inserted and the rubber seal

## 3 Product requirements

### 3.1 Material

#### 3.1.1 *Compound*

The PE material of which the socket pieces are made shall comply with EN 1555-1. The applied type of compound shall be declared by the manufacturer.

#### 3.1.2 *Re-used material*

Re-used material, coming from own production of the manufacturer of socket pieces, can be processed if the material is not mixed with other materials other than the original compound during processing. The material still shall comply with the material requirements. The manufacturer shall provide notes of the process of re-used material in the production run.

### 3.2 Construction

#### 3.2.1 *General*

The manufacture shall declare in the user manual what the intend use, applied medium, maximal working pressure and suitable materials are. In practice, following the assembly instructions, reliable connections shall be able to be made.

The socket pieces shall be made by means of mechanical processing of PE-pipe. The PE-pipe shall comply with GASTEC QA approval requirement 8 except for the dimensions. The mechanical processing shall be executed such that it has no negative influence on the functioning of the socket piece.

#### 3.2.2 *Fulfillment*

The insertion part of the socket piece shall be provided with a rubber sealing (ring or cuff). The construction shall be such that with sliding in the pipe according to the instructions of the manufacturer, the sealing shall not be moved.

Sharp transitions that can cause notching shall be prevented.

#### 3.2.3 *Appearance and finish*

The socket pieces shall be internally and externally smooth and shall not show any groves, dents, blisters or other irregularities.

Connection ends shall be flat and square.

### 3.2.4 Connection options

Example of a socket piece for connecting PVC/CPE pipes with the same nominal outside diameters:

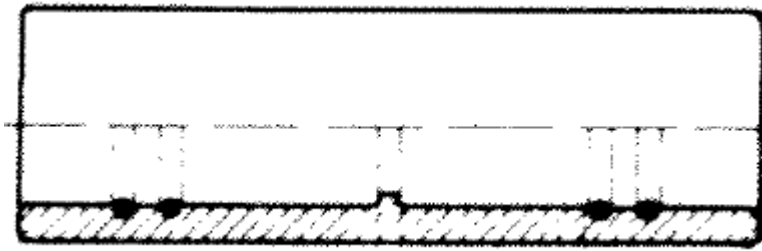


Figure 1

Example of a socket piece for connecting PVC/CPE pipes with different nominal outside diameters (in case of a transition slide piece PVC/CPE to copper):



Figure 2

Example of a socket piece for creating a transition connection. With this construction the pipes can slide together (PVC/ CPE to copper):



Figure 3



### 3.2.5 **Dimensions and admissible deviations**

The shape of socket pieces is not documented, with in mind that the socket pieces shall be suitable for making a connection with pipes of PVC/CPE and/ or copper, considering the dimensional tolerances and characteristics according to GASTEC QA approval requirements 5 and 10.

#### 3.2.5.1 *Wall thickness*

Diameter of the pipe to be connected		Minimal wall thickness in mm
PVC/ CPE	Copper	
20	15	3,5
25	22	3,5
32	28	5,0
40	35	5,5
50	42	5,5

Table 1: minimal wall thickness

#### 3.2.5.2 *Extending length*

The insertion depth shall be at least 80 mm.

#### 3.2.5.3 *Inside diameter*

The average inside diameter of the socket piece shall not be smaller than the maximum allowable outside diameter of the pipe to be connected.

## 4 Performance requirements and test methods

### 4.1 General

Samples needed for testing shall be at least 15h old. The tests shall be carried out in triplicate unless otherwise specified, with a representative choice of different sizes from the range of socket pieces to be made.

The tests shall be carried out with approved pipe types in accordance with GASTEC QA approval requirement 5 or 10.

In the case of a socket piece according to figure 3, the copper pipe shall be inserted at least 80 mm during the test.

The dimensions of the socket pieces shall be checked with suitable measuring tools with a measuring inaccuracy of at most 0.1 mm. The values shall meet those of paragraph 3.2.5 and the values specified by the manufacturer.

The socket pieces shall be visually assessed for appearance. The marking applied to the socket pieces shall be checked. The test samples shall be made without the use of lubricants or other.

### 4.2 Leak tightness of the connections

#### 4.2.1 *Leak tightness at internal air pressure*

The connections of the socket pieces with pipes of PVC/CPE or copper (in case of a transition socket piece at on side copper) shall be able to resist, at a temperature of  $23 \pm 2$  °C, an internal air pressure of  $25 \pm 2$  mbar and consecutively an internal air pressure of  $500 \pm 10$  mbar without showing leakage.

##### *Test method*

The sample exists out of a socket piece connected with the corresponding PVC/CPE pipe or copper pipe. The free length of the pipe shall be at least 250 mm.

During the test, the test sample shall be checked for leakage by immersing the test sample at  $100 \pm 10$  mm in a water bath. Subject the sample at a temperature of  $23 \pm 2$  °C during  $15 \pm 1$  minutes at an internal air pressure of  $25 \pm 2$  mbar. Next, increase the pressure to  $500 \pm 10$  mbar and maintain this pressure for  $15 \pm 1$  minutes.

#### 4.2.2 Leak tightness with deformation of the PVC/CPE pipe

The connections of socket pieces with pipes of PVC/CPE or copper (in case of a transition socket piece at on side copper) shall be able to resist, at a temperature of  $23 \pm 2$  °C and a diametrical deformation of the PVC/CPE pipe of 10 % on a distance of  $0,5 d_e$  (diameter pipe) from the socket end, an internal air pressure of  $25 \pm 2$  mbar and consecutively an internal air pressure of  $500 \pm 10$  mbar without showing leakage.

##### Test method

Assemble the test pieces as described in paragraph 4.2.1.

Apply on  $0,5 \pm 0,1 d_e$  from the socket end a diametrical deformation of the PVC/CPE pipe(s). Maintain this deformation during the test. With a transition socket piece the copper pipe does not need to be deformed.

Perform the test according to paragraph 4.2.1.

#### 4.2.3 Leak tightness during bending

The connections of socket pieces with pipes of PVC/CPE or copper (in case of a transition socket piece at on side copper) shall be able to resist, at a temperature of  $23 \pm 2$  °C during and after applying a force F according to table 2 on a distance of  $10 \pm 0,5 d_e$  from the socket end, an internal air pressure of  $25 \pm 2$  mbar and consecutively an internal air pressure of  $500 \pm 10$  mbar without showing leakage.

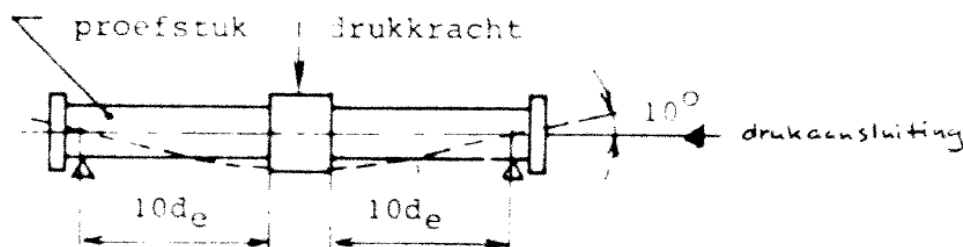
$d_e$		Force "F" in N
PVC/ CPE	Copper	
20	15	85
25	22	120
32	28	150
40	35	190
50	42	220

Table 2: Force on distance  $10 d_e$

##### Test method

The sample shall exist from a socket piece connected with the corresponding PVC/CPE pipe or copper pipe. The free length of the pipes shall be at least  $10 d_e$  for both PVC/CPE as copper pipe.

Apply, at  $23 \pm 2$  °C, a force F according to table 2 on the sample at a distance of  $10 \pm 0,5 d_e$  from the end of the sliding piece. The force shall be applied evenly. Maintain this situation during the test.



Perform the test according to paragraph 4.2.1, however the sample will not be placed in a bath and leakage shall be determined with a soap solution.

#### **4.2.4 Leak tightness with under pressure**

The connections of socket pieces with pipes of PVC/CPE or copper (in case of a transition sliding piece at on side copper) shall be able to resist, at a temperature of  $23 \pm 2$  °C during 2 hours, an external water pressure of  $10 \pm 1$  kPa without water leakage occurring.

##### *Test method*

Apply the test pieces as described in paragraph 4.2.1.

Subject the test pieces, at a temperature of  $23 \pm 2$  °C for at least 2 hours, to an external water pressure of  $10 \pm 1$  kPa. Then increase the water pressure to  $80 \pm 5$  kPa and maintain this pressure for at least 2 hours. Check after the test if there was been water leakage.

#### **4.3 Strength of the sliding piece**

The socket piece shall be able to resist, at a temperature of  $23 \pm 2$  °C, during 15 minutes a hydraulic pressure of  $30 \pm 1$  bar without showing deformations or leakage.

##### *Test method*

Mount the socket piece in an installation that can at least resist a pressure of 30 bar.

Apply an internal pressure of  $30 \pm 1$  bar to the sample and maintain this for  $15 \pm 1$  minutes. Measure the water pressure with a precision manometer according to NEN 927. Keep during the test, the direction of the manometer on  $\pm 2\%$  constant. Check if the socket piece shows deformations or leakages.

#### **4.4 Influence of heating on the sliding pieces**

Socket pieces shall not show, after exposure for  $60 \pm 5$  minutes to air or glycerine at a temperature of  $110 \pm 2$ °C and the following cool down to a temperature of  $23 \pm 2$  °C, a change in length of more than 3%.

##### *Test method*

Determine the length of the, for this test used, socket piece with an accuracy of 0,1 mm. The sample shall be placed in an oven or bath with glycerine for  $60 \pm 5$  minutes at a temperature of  $110 \pm 2$ °C. The placement of the sample shall be such that the change in length is impeded as little as possible. After being cooled down to a temperature of  $23 \pm 2$  °C, the length will be measured again.

# 5 Marking and instructions

## 5.1 Marking

On the socket pieces shall be durably and clearly marked with the following information:

- GASTEC QA or the GASTEC QA logo
- Name or trademark of manufacturer
- Compound in code
- Nominal connection size and type of the to be connected pipes
- Production period, eventually in code which is accessible for the customer

The to be applied marking cannot have any negative influence on the characteristics of the socket piece.

## 5.2 Instructions

The manufacturer shall supply a user manual in the Dutch language with the socket pieces.

The assembly instructions shall contain at least the information that with a socket piece according to figure 3, the copper pipe shall be inserted at least 80 mm.

## 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
Material	3.1	X		
Compound	3.1.1	X	X	Each year
Construction	3.2	X		
General	3.2.1	X		
Fulfilment	3.2.2	X		
Finish and appearance	3.2.3	X		
Connection possibilities	3.2.4	X		
Dimensions	3.2.5	X	X	Each year
Leak tightness at internal air pressure	4.2.1	X	X	Each year
Leak tightness with deformation of the PVC/CPE pipe	4.2.2	X	X	Each year
Leak tightness during bending	4.2.3	X		
Leak tightness at under pressure	4.2.4	X	X	Each year
Strength of the socket pieces	4.3	X	X	Each year
Influence of heating on the socket pieces	4.4	X		
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.

EN 1555-1:2010	Plastic piping systems for the supply of gaseous fuels – Polyethylene (PE) – Part 1: General
GASTEC QA approval requirement 5	Copper pipes
GASTEC QA approval requirement 10	Pipes of high-impact polyvinylchloride (PVC-HI)