AR 70
january 2025

Approval requirement 70

Mechanical fittings for plastic piping systems.

CONCEPT

Trust
Quality
Progress

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

CONCEPT

Kiwa Nederland B.V.
Wilmersdorf 50
P.O. Box 137
7300 AC Apeldoorn
The Netherlands

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

© 2025 Kiwa Nederland BV.
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 approval requirement by third parties, for any purpose whatsoever, is only allowed after a written agreement is made with Kiwa to this end

2530 60324

Contents

CONCEPT

CONCEPT

1 Introduction

1.1 General

This GASTEC QA approval requirement (AR) 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 mechanical fittings for plastic piping systems.

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 requirements replaces the GASTEC QA approval requirements 70, dated April 2021.

Overview of changes:

- Correction of values in table 1
- Updated footnotes of table 6 making it possible to certify full end load mechanical fittings in diameters greater than DN 63
- Test requirements have been adapted with reference to the relevant test standards
- Update of bibliography

The product requirements have not changed.

1.2 Scope

The approval requirements specify the requirements for mechanical fittings made of for polyethylene (PE) and polyvinylchloride (PVC-HI) plastic piping systems for the supply of gaseous fuels of the 2nd and 3rd family according to EN 437.

De mechanical fittings can be full-end-load or non-end-load and made from plastic or metal. The maximum operating temperature is -20 °C to 40 °C.

The maximum operating pressure for each application is mentioned in the table below.

Type of pipe	MOP	MOP NEN 7244	Application and use
PE 80 SDR 17.6	4.8 bar	4 bar	Main- and serviceline
PE 80 SDR 11	8 bar	4 bar	Main- and serviceline
PE 100 SDR 17.6	6 bar	4 bar	Main- and serviceline
PE 100 SDR 11	10 bar	8 bar	Main- and serviceline
PVC-HI SDR 41	4.5 bar	200 mbar	Main- and serviceline

Table 1: MOP (mathematic and according to NEN 7244) for each pipe type

CONCEPT

2 Definitions

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

Appearance, signs of damage: Visible deformation, broken parts and signs of cutting and boring which are not in the design of any component of the unused fitting.

Board of Experts (BoE): The Board of Experts GASTEC QA.

End-load resistance: Resistance to end load transmitted via the connecting pipe and generated by internal pressure, pipeline internal interference, and thermally induced stress in any combination.

Full-end-load resistance: Combination of component and joint design and characteristics such that under any load the plastic pipe will fail first.

High impact PVC (PVC-HI): A mixture of an un-plastified polyvinylchloride with a high impact modifier.
Maximum operating pressure (MOP): Maximum pressure that a component is capable of withstanding continuously in service under normal operating conditions.

Mechanical fittings: fittings for assembling plastics pipes with each other, which includes one or more compression zones to provide pressure integrity, leak tightness and resistance to end loads.

Non-end-load resistance: Lack of resistance to axial loads without additional external mechanical axial support.

SDR: Standard Dimension Ratio.

Transition fittings: A construction element which is designed to join a plastics pipe on one side and another pipe material on the other side.

See also the definitions mentioned in the GASTEC QA general requirements.

CONCEPT

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 Field of application for mechanical fittings

The manufacturer shall declare, depending on the intended use, the medium supplied, the Maximum Operating Pressure (MOP), installation and operating temperature limits and the pipe material(s) to be jointed to the mechanical fittings. Also, the use of an insert, the end load resistance class, the corrosion resistance, the use of lubricants or greases, ash content for glass reinforced materials as applicable shall be declared. This information shall be included in the installation manual of the fitting in the Dutch language.

3.2 Materials

3.2.1 General

The suitability of the materials below can be demonstrated by providing test reports or by reference to relevant product standards of similar products in which the material is specified as being suitable for use.

3.2.2 Plastic materials

The compound/formulation used to manufacture any plastic components of the mechanical fitting intended for use above-ground shall be able to withstand ultraviolet radiation, the manufacturer shall declare that the fittings are protected to the effects of ultraviolet radiation.

Pressure-bearing components shall be produced from virgin materials, own reprocessable material or a combination of virgin and own reprocessable material. Recycled materials shall not be used. For glass reinforced materials, only virgin materials shall be used.

3.2.3 Metal materials

The metal materials for producing mechanical fittings shall be demonstrable suitable for its application (pressure, ambient temperature range, long term behavior) and shall be specified by the manufacturer according to the relevant material standard.

The metal materials for producing mechanical fittings should be corrosion resistant or should be protected against corrosion, according to their intended end-use conditions unless otherwise stated in manufacturer’s declaration (see paragraph 3.1).

3.2.4 Elastomers

The type of elastomeric sealing used in mechanical fittings shall be in accordance with EN 682, type GAL or GBL.

CONCEPT

3.3 Appearance

When viewed without magnification, the internal and external surfaces of fittings shall be smooth, clean and shall have no scoring, cavities and other surface defects.

No component of the fitting shall show any signs of damage, scratches, pitting, bubbles, blisters, inclusions or cracks.

The transitions in shapes or dimensions shall be without sharp edges to avoid the effects of notch.

For injecting moulded fittings, the edges of chambers (e.g., for sealing components) shall be rounded.

Edges in the chambers of the mechanical fittings shall not damage the rubber sealings or result in unacceptable stress in the fitting which affect the functionality and lifetime of the mechanical fitting.

3.4 Colour

The color of PVC-HI mechanical fittings shall be yellow, preferably RAL 1004 according to NEN 3050. The color of PE mechanical fittings shall comply EN 1555-3.

3.5 Construction

The mechanical fittings should have an end stop for the pipe when inserted into the mechanical fitting to avoid passing through the fitting. Only when the functional application of the fitting specially requires the absence of an end stop this can be accepted after assessing the product on their related aspects/requirements. The manufacturer shall than include information related to the insertion depth in their instructions (5.2).

Parts of mechanical fittings produced from (moulded) PE material can be assembled by butt-welding. The butt-welding shall be in accordance with approval requirement 200.

Rubber elements used in the mechanical fittings to make a coupling with the pipe shall be fixated, as declared by the manufacturer, to avoid movement of the rubber elements.

The construction of the fixation shall be made to withstand normal installation forces and without pushing the rubber element out of the construction. This aspect shall be tested in accordance with NEN 7231 Annex A.

3.5.1 Inserts

For connecting a full-end-load resistant mechanical fitting with PE pipes an insert is required. The insert shall be supplied with the fitting or separate available.

The insert shall be rigid and provide support over the entire compression area. The insert shall not displace in longitudinal direction after assembly.

An insert shall be available with the mechanical fitting for each combination of diameter and SDR series of the intended pipe with which it is assembled.

After installation of the insert, the pipe shall show no signs of damage, scratches or cracks. The material of the insert shall be fit for purpose.

The minimal and maximum internal bore diameter of the pipe shall be stated by the manufacturer in his installation manual.

CONCEPT

The insert shall support the pipe from the beginning of the pipe end to at least 0.3 x D_{mean} past the clamp construction of the fitting.

When necessary to cut thread or grooves in the pipe for mounting the fitting, it is only allowed on parts of the pipes without tangential stress due to inner pressure.

3.5.2 Connections

Connection (e.g., threads, flanges and butt- or electrofusion welding) shall be in accordance with the relevant GASTEC QA approval requirements and/or national or international standards.

3.5.3 Transition couplers

Transition couplers from plastic pipe to steel pipe, steel coated pipe, copper pipes or PE spigot fittings ends are allowed. These pipes shall fulfil the relevant GASTEC QA approval requirements.

3.5.4 Twisting

The mechanical fitting shall not induce twisting of pipes during assembly.

3.6 Geometrical aspects

3.6.1 General

Mechanical fittings and inserts shall meet the dimensions and tolerances of the technical drawings supplied by the manufacturer. These drawings shall be added to the certification report of the certification body and used for annual product verification.

For non-end-load fittings made of PVC-HI and PE the additional requirements of clause 3.6.3 or 3.6.4 shall be fulfilled.

3.6.2 Pipes for mechanical fittings

Mechanical fittings for connecting PVC pipes shall be manufactured with such dimensions and within such tolerances as will permit their use with pipes conforming GASTEC QA approval requirements 10 (based on NEN 7230) .

Mechanical fittings for connecting PE pipes shall be manufactured with such dimensions and within such tolerances as will permit their use with pipes conforming GASTEC QA approval requirements 8 (based on EN 1555-2).

3.6.3 Non-end-load fittings made of PVC-HI

Dimensions and tolerances of non-end-load mechanical fittings made of PVC-HI for connecting PVC-HI pipes shall meet shall meet the geometrical specifications of the manufacturer and the requirements of NEN 7231.

3.6.4 Non-end-load fittings made of PE

Dimensions and tolerances of non-end-load mechanical fittings made of PE for connecting PVC-HI pipes shall meet the geometrical specifications of the manufacturer.
Taken into account will be the allowable minimum depth of the pipe insertion and wall thickness, according to table 2 and 3.

CONCEPT

Connection size (mm)	Minimum depth of insertion (mm) [1)]
63	40
75	42
90	44
110	47
160	54
200	60
[1)] *distance between the stop and the rubber sealing*.	

Table 2: Depth of insertion of the pipe for fittings made of PE.

Connection size (mm)	Minimum wall thickness fitting (e_1) (mm)	Minimum wall thickness in welding area (e) (mm)	Maximum length of the welding area (L) (mm)
63 – 110	10	7	14
160	13	10	17
200	14	13	9

Table 3: Minimum wall thickness for fittings made of PE.

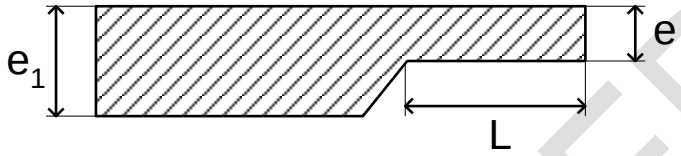

Figure 1: cross section of the pipe wall at the side of the butt weld.

In any section of the socket the difference between the largest and smallest measured inner diameter of the socket shall not exceed 0.007 x d_e (d_e = nominal outer diameter of the corresponding pipe) the accuracy of the calculated value is 0.1 mm.

The deviation of the given angle for bends and elbows shall not exceed 3°.

3.6.5 Insert dimensions

The minimum wall thickness of Polyethylene (PE) pipes with a DN ≤ 32 mm used in existing gas distribution systems in the Netherlands can vary in the sizing. The sizing which will be followed are mentioned in EN 1555-2 “Plastic piping systems for the supply of gaseous fuels – Polyethylene (PE) – Part 2: Pipes” version 2021. For wall thickness with SDR 17.6 EN 1555-2 verion 2010 will be followed, see also table 4

DN	EN 1555-2-2021, Table 2		EN 1555-2-2010, Table 2	
	Wall thickness		Wall thickness	
	SDR 17	SDR 11	SDR 17.6	
25 mm	2.3 mm	3.0 mm	2.0 mm	
32 mm	2.3 mm	3.0 mm	2.0 mm	

Table 4: Minimum wall thickness of existing gas distribution systems.

Inserts of fittings intended to be used in existing gas distribution systems (e.g., repair fittings) shall, for the mentioned DN sizes, accommodate with table 4.

3.7 Physical aspect

3.7.1 Plastic material

The physical aspects of plastic material shall meet the requirements of ISO 17885: 2021 clause 8.1 (evaluation of the MRS value) and 8.2 (verification of the long-term behavior).

CONCEPT

3.7.2 Material related characteristics

Fitting material shall meet the requirement of table 5.

Plastic materials				
Material	**Aspect**	**Requirement**	**Parameters**	**Test method**
PVC-HI (injection moulded)	Vicat softening temperatur e	> 74 °C	50 °C/h	ISO 2507-2
	Influence of heating	ISO 6993-2 ISO 6993-3	150 °C	ISO 580:2005 (Method A)
	K-value	> 57	Dissolution in THF	ISO 13229
PVC-HI (produced from pipe)[a]	DCMT	No visual damage at 15 °C	Immersion in dichloromethane 30 minutes	EN 580
PE	OIT	≥ 20 min.	200°	ISO 11357-6
	MFR	± 20% difference on the batch and the fitting	190°/5 kg	ISO 1133-1
	Influence of heating	≤ 3% (≤ 5% for bend and T-pieces) No signs of bubbles and cracks	110 ± 2 °C 60 ± 5 minutes	
POM	MFR	≤ 4 g/10 min	190°/2.16 kg	ISO 1133-1
PA	Viscosity number	ISO 17885 Annex D		
	Ash content	ISO 17885 Annex D		
PPSU	MFR	± 30% difference on the batch and the fitting	365 °C/5 kg (alternative condition: 360 °C/10 kg)	ISO 1133-1
Metal materials				
Material	**Aspect**		**Test method**	
CU alloys	Dezincification resistance		Manufacturer has to confirm corrosion resistance, according to ISO 6509, for specific application where the dezincification resistance is required	
FE alloys	Corrosion resistance		Manufacturer has to declare corrosion resistance for specific application or has to define how the end-user has to provide a proper corrosion protection.	
[a] PVC-HI fittings made of pipe shall meet the following aspects of NEN 7230 before production of the fitting: appearance, material, heating and hydrostatic pressure.				

Table 5: Material related characteristics of the fitting

3.7.3 Resistance to gas constituents

Gas bearing fittings material shall be resistance to gas constituent in accordance with ISO 17885: 2021, clause 8.4.2.

CONCEPT

4 Performance requirements and test methods

This chapter contains the performance requirements and associated test methods that the products shall meet. This chapter also specifies the limit values, if applicable.

4.1 Test samples

The tests shall be carried out on pipe and fitting assembled in accordance with the manufacturer's instructions. The tests shall include all types of joint design.
The pipe(s) used in the test assemblies shall conform to the corresponding product standard (see AR 8 or AR 10).

A test assembly contains a (straight) fitting with a connected plastic pipe on both ends with a free length of 250 mm, unless otherwise stated in the test methods.

All tests are performed on three test assemblies.

PVC-HI non-end-load fittings shall be assembled without the use of lubricants or greases on PVC-HI pipes according to AR10 (based on NEN 7230).

NOTE Since there are PE (polyethylene) materials such as PE 63, which are available only in some markets, the testing under performance requirements are also applicable and if the products meet these requirements, they can be approved for the particular use.

4.2 Summary of test.

For initial testing (type testing), all relevant characteristics shown in table 6 should be carried out per sizegroup , of each pressure classes (PN) and connection type.

Size groups for execution of the tests:

	1	2	3	4	5
Pipe diameter (mm)	≤ 40	>40 - ≤63	>63 - ≤110	>110 - ≤250	>250

Some of the performance requirements and test methods mentioned in the following paragraphs are based on ISO 17885:2021.

CONCEPT

Characteristic	Fitting		Test method
	Full-end-loaded	Non-end-loaded	Clause
Pressure resistance of the plastic fitting body	X	X	4.3
Leak tightness under internal pressure	X	X	4.4
Leak tightness under external pressure	X	X	4.5
Long-term hydrostatic strength	X	X	4.6
Tensile load at 23 °C	X	--	4.7
Tensile load on the weld at 23 °C [a]	X	X	4.8
Tensile load after relaxation	X	--	4.9
Tensile load at 0 °C	X	--	4.10
End load at 80 °C [b,]	X	--	4.11
Tensile load 800h [b]	X	--	4.12
Leak tightness after temperature cycling	X	X	4.13
Leak tightness while subjected to bending [b,f]	X	X	4.14
Angular deflection / deformation [b,c]	--	X	4.15
Resistance to impact at 0 °C	X	X	4.16
Repeated assembly [e]	X	--	4.17
Flow rate / pressure drop	X	X	4.18
Stress corrosion [d]	X	X	4.19

X Applicable
-- not tested or not applicable
[a] Only valid for welded fittings
[b] Test of joint design. Normally performed on uniaxial fitting assemblies
[c] Only valid for elastomeric sealing ring type sockets
[d] Only valid for fittings containing brass components
[e] When applicable
[f] Not valid for transition fittings

Table 6: summary of test

4.3 Pressure resistance of the fitting body

To fulfill requirement of 4.3, Pressure resistance of the fitting body, clause 9.2 of ISO 17885:2021 will be followed and complete with positive outcome.

4.4 Leak tightness under internal pressure.

To fulfill requirement of 4.4, Leak tightness under internal pressure, clause 9.3.3.1 of ISO 17885:2021 will be followed and complete with positive outcome.
In addition to clause 9.3.3.1 of ISO 17885:2021, taken into account will be the test parameters included in the table below.

.

Fitting material	**Test medium**	**Test duration**	**Test temperature**	**Test pressure**
All (except PVC-HI full-end-load fittings)	Air or inert gas	1h low pressure followed by 1h high pressure	20 ± 5 °C	25 mbar followed by 1.5 x MOP
PVC-HI, full-end-load fittings	Air or inert gas	15 minutes	0 °C	0-400 mbar

Table 7: Test parameters leak tightness under internal pressure

If the required test pressure is above 6 bar, water may be used as test medium. If air or inert gas is used above 6 bar, special safety precautions should be considered.

CONCEPT

4.5 Leak tightness under external pressure.

When the test assemblies of clause 4.1 are tested according to the test method below, the test assemblies shall be leak tight.

4.5.1 Test method:

Subject the assembled test specimens (system) to an external water pressure of 10 ± 1 kPa for 2 hours.
Subsequently, subject the same system to an external water pressure of 80 ± 8 kPa for 2 hours.
The temperature of the water shall be 23 ± 2 °C.

Pipes made of PVC-HI assembled to the test samples shall be deformed 10 ± 2 % at a distance of d_n ± 2 mm of the fitting.

Check the system on leak tightness .

4.6 Long-term hydrostatic strength

To fulfill requirement of 4.6, Long-term hydrostatic strength, clause 9.3.3.2 of ISO 17885:2021 will be followed and complete with positive outcome.
Non-end-load fittings shall be tested with end caps intended for that purpose (see ISO 1167).

4.7 Tensile load at 23 °C

To fulfill requirement of 4.7, Tensile load at 23 °C, clause 9.3.3.3 of ISO 17885:2021 will be followed and complete with positive outcome.

4.8 Tensile load on the weld at 23 °C

When the fitting that are assembled by welding is tested in accordance with ISO 13953, the fitting shall not show any sign of brittle fractures in the welding zone.

The tensile testing shall be done at a temperature of 23 ± 2 °C and a speed of 5 ± 1 mm/min on three straight fittings.

4.9 Tensile load after relaxation

When the test assemblies are conditioned for 1000 (+72/-0) hours in water at 60 ± 0.5 °C and followed by 16 hours at 23 °C ± 2 °C in air, the test assemblies shall meet the requirements of clause 4.7.

4.10 Tensile load at 0 °C

When the fitting and pipes are conditioned at least for 16 hours at 0 ± 2 °C and mounted at 0 ± 2 °C, the test assemblies shall be placed in a tensile machine within 2 minutes at 23 ± 2 °C.
The test assemblies shall resist a tensile force which result in yield of the pipe. The tensile speed shall be (0.1 ± 0.05) x L in mm/min.

Where

L is the free length of the pipe (3 x d_n) (mm)
PE pipes according to AR 8 (based on EN 1555-2) with a maximum yield strength of 24.8 N/mm^2.

CONCEPT

None of the following shall occur:

- Pull out of the pipe

Positioning of the fitting and the pipe shall not be considered as pull-out.

4.11 End load at 80 °C

To fulfill requirement of 4.11, End load at 80 °C, clause 9.3.3.5 of ISO 17885:2021 will be followed and complete with positive outcome.

4.12 Tensile load 800h

When the test assemblies are tested according to ISO 19899 and the constant end load *F*(N) is calculated from formula:

$$F = 10 \times \pi/4 \times (d_n^2 - (d_n - 2e_n)^2)$$

Where

d_n is the nominal outside diameter of the pipe (mm).
e_n is the nominal wall thickness of the pipe (mm)

None of the following shall occur:

- Breaking of the pipe or fitting.
- Pull-out of the pipe.
- Leakage before and after the test.

The accuracy of the load shall be 5%.

Perform a leak tightness test at 10 ± 1 kPa before placing the end load at the test assemblies and at the end of the test, before removing the end load. Determine leakage by using a soap solution.

4.13 Leak tightness after temperature cycling

To fulfill requirement of 4.13, Leak tightness after temperature cycling, clause 9.3.3.6 of ISO 17885:2021 will be followed and complete with positive outcome.

4.14 Leak tightness under internal pressure while subjected to bending

To fulfill requirement of 4.14, Leak tightness under internal pressure while subjected to bending, clause 9.3.3.7 of ISO 17885:2021 will be followed and complete with positive outcome.

4.15 Angular deflection and deformation

4.15.1 Test pieces

The test piece is a straight fitting with connected pipe on both sides. The free length of the pipe on both sides of the fitting is 5 x d_e. See also ISO 17885 clause 9.3.3.9.

4.15.2 Apparatus

The apparatus must be able to install a test assembly and is preventing the axial displacement of the pipes out of the fitting. The apparatus has a construction to make an

CONCEPT

angular deflection between the fitting and the pipe and diametric deformation at distance d_e ± 2 mm on the pipe.

4.15.3 Leak tightness under internal pressure with angular deflection and deformation

When the test assemblies are tested according to table 8, the test assemblies shall be leak tight during the test.

Test	Angular displacement (°)	Deformation (mm)	Pressure (bar)	Time ± 20% (min)
Leak tightness	0	0	0.025 ± 0.005	10
Leak tightness	0	0	1 ± 0.02	10
Depressurize	0	0	0	5
Apply deformation	0	10 ± 2%	0	
Leak tightness	0	10 ± 2%	0.025 ± 0.005	10
Leak tightness	0	10 ± 2%	1 ± 0.02	10
Depressurize	0	0	0	5
Apply angular displacement	5 ± 1°	0	0	
Leak tightness	5 ± 1°	0	0.025 ± 0.005	10
Leak tightness	5 ± 1°	0	1 ± 0.02	10
Depressurize	0	0	0	5
Apply deformation	0	10 ± 2%	0	
Apply angular displacement	5 ± 1°	10 ± 2%	0	
Leak tightness	5 ± 1°	10 ± 2%	0.025 ± 0.005	10
Leak tightness	5 ± 1°	10 ± 2%	1 ± 0.02	10
Depressurize	0	0	0	5
Leak tightness	0	0	0.025 ± 0.005	10
Leak tightness	0	0	1 ± 0.02	10

Table 8: Parameters for leak tightness under internal pressure with angular deflection and deformation.

4.15.4 Leak tightness at external water pressure and mechanical load

When the test assemblies are tested according to table 9, the test assemblies shall be leak tight during the test.

Test	Angular displacement (°)	Deformation (mm)	Pressure external (bar)	Time ± 20% (min)
Leak tightness	0	10 ± 2%	0.8 ±0.02	120

Table 9: Parameters for leak tightness under external pressure with angular deflection and deformation.

4.16 Resistance to impact at 0 °C

When the test pieces are tested in accordance with ISO 3127 and table 10 with a mass with a spherical nose diameter of 25 ± 0.5 mm, only two failures are allowed in 100 strokes. If no failure occurs after 60 strokes the test can be stopped and the test pieces meet the requirements.

CONCEPT

All strokes shall be performed random on the test piece, including on the injection point, seams and (sharp) edges.

T-pieces shall be supported by a flat plate in such a position where all sockets are in a horizontal plane. All other positions should be supported by a V-block. Sockets shall only be supported in axial direction.

Note 1: for reducer fittings a mass is used according to the connection size of the socket. Strokes at the transition of the reducer shall be performed with a mass according to the smallest connection size.

Note 2: The bottom of endcaps with a profiled bottom shall be excepted for resistance to impact at 0 °C

Connection size (DN) (mm)	Mass (g)	Height (mm)
50	750 (+5 / -0)	2000 (+5 / -0)
63	1000 (+10 / -0)	
75	1250 (+10 / -0)	
90	1500 (+15 / -0)	
110	1750 (+15 / -0)	
125	2000 (+15 / -0)	
160	2500 (+15 / -0)	
≥200	3000 (+15 / -0)	

Table 10: Parameters for resistance to impact at 0 °C.

4.17 Repeated assembly

When the test assemblies are ten times mounted and demounted according to the instructions of the manufacturer, the test assemblies shall be leak tight according to clause 4.4.

Test assembly: One straight fitting with on both sides a pipe. The free length of plastic pipes shall be at least 250 mm and for metal pipes at least 100 mm.

Note: This test shall be carried out if repeated assembly is declared by the manufacturer

4.18 Flow rate / pressure drop

To fulfill requirement of 4.18, Flow rate / pressure drop, clause 9.3.3.11 of ISO 17885:2021 will be followed and complete with positive outcome.

4.19 Stress corrosion

To fulfill requirement of 4.19, Stress corrosion test, clause 9.3.3.12 of ISO 17885:2021 will be followed and complete with positive outcome.

CONCEPT

5 Marking, instructions and packaging

5.1 Marking

Plastic fittings shall be colored in accordance with clause 3.4or clearly marked as a fitting for gas application conform the scope of this approval requirements.

Metal fittings shall be marked by punch or cast or a non-erasable method to the product for gas application conform the scope of this approval requirements.

Fittings shall be marked in a clear and permanent method with the following aspects:

- Name of the manufacturer;
- The name or logo of GASTEC QA quality mark*;
- Material*;
- Nominal connection size(s);
- The maximum operating pressure for which the fitting is designed*;
- SDR class and PE or PVC application*;
- Production date or code*;
- D_{mean} x wall thickness on separate inserts and packages up to and including 32 mm. From 32 mm D_{mean} and SDR class for PE pipe*;

*This information may be on the product, on a label attached to the product or on the smallest packaging.

5.2 Instructions

The manufacturer shall supply an installation manual with the fittings in the Dutch language and in the language of the country in which the product will be used. The installation manual shall at least consist of the following:

- Use of lubricants or greases;
- The insertion depth (when the absence of the end stop is related to the functionality of the product;
- Use of inserts;
- If suitable for repeated assembly;

5.3 Packaging

Fittings and additional components required for its assembly can be packed in bulk or individual. The packaging shall prevent deterioration and contaminations of the fittings and additional components.

Packaging shall have information with the manufacturer’s name, type of fitting, nominal diameter of the pipe, number of fittings and storage conditions.

CONCEPT

6 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.

CONCEPT

7 Summary of evaluation

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

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

7.1 Evaluation matrix

Description of requirement	Clause	Test within the scope		
		Initial Product assessment	Product verification	
			Verification	Frequency
General aspects				
Field of application	3.1	X		
Materials	3.2			
General	3.2.1	X	X	Once a year
Plastic materials	3.2.2	X	X	Once a year
Metal materials	3.2.3	X	X	Once a year
Elastomers	3.2.4	X	X	Once a year
Appearance	3.3	X	X	Once a year
Colour	3.4	X	X	Once a year
Construction	3.5	X		
Inserts	3.5.1	X		
Connections	3.5.2	X		
Transition couplers	3.5.3	X		
Twisting	3.5.4	X		
Geometrical aspects	3.6			
Fittings	3.6.1	X	X	Once a year
Pipes for mechanical fittings	3.6.2	X	X	Once a year
Non-end-load fittings made of PVC-HI	3.6.3	X	X	Once a year
Non-end-load fittings made of PE	3.6.4	X	X	Once a year
Insert dimensions	3.6.5	X	X	Once a year
Physical aspects	3.7			
Plastic material	3.7.1	X		
PVC-HI – Vicat	3.7.2	X	X	Once a year
PVC-HI – Influence of heating	3.7.2	X	X	Once a year
PVC-HI – K-value	3.7.2	X	X	Once a year
PVC-HI – DCMT	3.7.2	X	X	Once a year
PE – OIT	3.7.2	X	X	Once a year
PE – MFR	3.7.2	X	X	Once a year
PE – Influence of heating	3.7.2	X	X	Once a year
POM – MFR	3.7.2	X	X	Once a year
PA – Viscosity number	3.7.2	X	X	Once a year
PA – Ash content	3.7.2	X	X	Once a year
PPSU – MFR	3.7.2	X	X	Once a year
CU alloys – Dezincification resistance	3.7.2	X	X	Once a year
FE alloys – Corrosion resistance	3.7.2	X	X	Once a year
Resistance to gas constituents	3.7.3	X		

CONCEPT

Description of requirement	Clause	Test within the scope		
		Initial Product assessment	Product verification	
			Verification	Frequency
Performance requirements				
Pressure resistance of the plastic body material	4.3	X		
Leak tightness under internal pressure	4.4	X	X	Once a year
Leak tightness under external pressure	4.5	X		
Long-term hydrostatic strength	4.6	X	X	Once a year
Tensile load at 23 °C	4.7	X	X	Once a year
Tensile load on the weld at 23 °C	4.8	X	X	Once a year
Tensile load after relaxation	4.9	X		
Tensile load at 0 °C	4.10	X		
End load 80 °C	4.11	X		
Tensile load 800h	4.12	X		
Leak tightness after temperature cycling	4.13	X		
Leak tightness while subjected to bending	4.14	X		
Angular deflection / deformation	4.15	X	X	Once a year
Resistance to impact at 0 °C	4.16	X	X	Once a year
Repeated assembly	4.17	X		
Flow rate / pressure drop	4.18	X		
Resistance to corrosion	4.19	X		
Marking, instructions and packaging	5			
Marking	5.1	X	X	Once a year
Instruction	5.2	X		
Packaging	5.3	X		

CONCEPT

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 682:2002 + A1	*Elastomeric seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids*
EN 1555-2:2021	*Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 2: Pipes*
NEN 3050:1972/C1:2002	*Identification colours for pipes conveying fluids in liquid or gaseous condition in land installations and on board ships*
NEN 7200:2017	*Plastics pipelines for the transport of gas, drinking water and waste water - Buttwelding of PE pipes and PE fittings*
NEN 7230:2020	*Plastics piping systems for gas supply - Pipes of high-impact poly(vinyl chloride) (PVC-HI) - Requirements and test methods*
NEN 7231:2020	*Plastics piping systems for gas supply - Fittings of modified poly(vinyl chloride) (modified-PVC) - Requirements and test methods*
NEN 7240:2011	*Plastics piping systems for gas supply - Tensile resistant couplings of high-impact poly(vinyl chloride) (PVC-HI) - Requirements and test methods*
ISO 580:2005	*Plastics piping and ducting systems - Injection-moulded thermoplastics fittings - Methods for visually assessing the effects of heating*
ISO 1133-1:2011	*Plastics - Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics - Part 1: Standard method*
ISO 1167-1:2006	*Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 1: General method*
ISO 1167-3:2007	*Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 3: Preparation of components*
ISO 1167-4:2007	*Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 4: Preparation of assemblies*
ISO 2507-2:2017	*Thermoplastics pipes and fittings - Vicat softening temperature - Part 2: Test conditions for unplasticized poly(vinyl chloride) (PVC-U) or chlorinated poly(vinyl chloride) (PVC-C) pipes and fittings and for high impact resistance poly (vinyl chloride) (PVC-HI) pipes*

CONCEPT

ISO 3127:2017	*Thermoplastics pipes - Determination of resistance to external blows - Round-the-clock method*
ISO 3458:2015	*Plastics piping systems - Mechanical joints between fittings and pressure pipes - Test method for leaktightness under internal pressure*
ISO 3503:2015	*Plastics piping systems - Mechanical joints between fittings and pressure pipes - Test method for leaktightness under internal pressure of assemblies subjected to bending*
ISO 6509-1:2014	*Corrosion of metals and alloys - Determination of dezincification resistance of copper alloys with zinc - Part 1: Test method*
ISO 6957:1988	*Copper alloys - Ammonia tests for stress corrosion resistance*
ISO 9080:2012	*Plastics piping and ducting systems - Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation*
ISO 11357-6:2018	*Plastics - Differential scanning calorimetry (DSC) - Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*
ISO 13229:2011	*Thermoplastics piping systems for non-pressure applications - Unplasticized poly(vinyl chloride) (PVC-U) pipes and fittings - Determination of the viscosity number and K-value*
ISO 13951:2015	*Plastics piping systems - Test method for the resistance of plastic pipe/pipe or pipe/fitting assemblies to tensile loading*
ISO 13953:2001/ Amd 1:2020	*Polyethylene (PE) pipes and fittings - Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*
ISO 17885:2021	*Plastics piping systems - Mechanical fittings for pressure piping systems - Specifications*
ISO 17778:2015	*Plastics piping systems - Fittings, valves and ancillaries - Determination of gaseous flow rate/pressure drop relationships*
ISO 19899:2010	*Plastics piping systems - Polyolefin pipes and mechanical fitting assemblies - Test method for the resistance to end load (AREL test)*

8.2 Source of informative documents

Approval requirement 131	*GASTEC QA product certificate for Polyethylene (PE) fittings for use in impact resistant Polyvinyl chloride (PVC) piping systems for the supply of gaseous fuels*
EN 437:2021	*Test gases - Test pressures - Appliance categories*
General requirements GASTEC QA	

CONCEPT