KE 208
Concept versie 6

GASTEC QA

Approval Requirements 208

Ductile iron wide range fittings for use with pipes of different materials.

Foreword

These GASTEC QA Approval requirements have 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.

These GASTEC QA Approval requirements will be used by Kiwa Nederland BV in conjunction with the KIWA regulations for product certification. This regulation details the method employed by Kiwa during product certification.

Approved by Board of Experts : xxx

Accepted by Kiwa Nederland B.V. : xxx

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1 Introduction

1.1 General

This approval requirement includes all relevant requirements, which are adhered by Kiwa as the basis for the issue and maintenance of a Gastec QA certificate for wide range fittings.

1.2 Scope

These requirements and test methods are applicable to wide range ductile iron fittings intended for single use with pipe components made from a number of pipe materials (ductile iron, grey iron, PVC-U, PVC HI, PE, steel, fibre-cement), for providing a leak tight seal over a wide range of pipe external diameters :

- to convey gas of the 1st, 2nd and 3rd family gasses according to Table 1 of NEN-EN 437 with a maximum operating pressure of 8 bar ;

- to be installed below ground or above ground inside a building or cabinet.

The wide range ductile iron fittings can either be end-load or non-end-load resistant allowing an angular deflection of at least 3° both during and after installation. Joint design and gasket shapes are outside the scope of this standard.

This approval requirement specifies requirements for materials, dimensions and tolerances, mechanical properties and standard coatings of ductile iron products. It covers ductile iron products cast by any type of foundry process or manufactured by fabrication of cast components, as well as corresponding joints, in a size range extending from DN 32 to DN 400, for an allowable maximum operating pressure (MOP) up to 8 bar, for ambient temperatures between:

-5 °C and +30 °C class A
-10 °C and +40 °C class B

NOTE 1 MOP may be limited depending on pipe materials effectively connected.
NOTE 2 In this document, all pressures are relative gauge pressures, expressed in bars (100 kPa = 1 bar).

1.3 Acceptance of test reports provided by the supplier

When the manufacturer provides reports from test Institutions or laboratories in order to demonstrate that the product meets the requirements of this evaluation guideline, the institute or laboratory shall meet one of the applicable accreditation norms, being;

- NEN-EN-ISO/IEC 17025 for laboratories;
- NEN-EN-ISO/IEC 17065 for certification bodies certifying products;

This requirement is being considered to be fulfilled when a certificate of accreditation can be shown, either issued by the Board of Accreditation (RvA) or one of the institutions with which the RvA an agreement of mutual acceptance has been concluded.

The accreditation shall refer to the examination as required in this approval requirement. When no certificate of accreditation can be shown, Kiwa will verify whether the accreditation norm is fulfilled or perform the examination in its own laboratory.

1.4 Quality declaration

The quality declarations to be issued by Kiwa are described as Kiwa product certificate. This product certificate has an indefinite period of validity.

2 Terms and definitions

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

Allowable operating pressure (MOP): maximum pressure that a component is capable of withstanding continuously in service under normal operating conditions.

Board of Experts: The Board of Experts Gastec QA.

Depth of engagement: distance between the end of the pipe and the face of the socket (See also 4.5.2).

Ductile iron: cast iron used for pipes, fittings and accessories in which graphite is present substantially in spheroidal form.

End-load resistance: resistance to end-load transmitted via the connecting pipe and generated by internal pressure.

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

Fitting: casting other than a pipe which allows pipeline deviation, change of direction or bore.

Flange: end of a pipe or fitting extending perpendicular to its axis, with bolt holes equally spaced on a circle.

NOTE A flange may be fixed or adjustable ; an adjustable flange comprises a ring, in one or several parts assembled together, which bears on an end joint hub and can be freely rotated around the axis before jointing.

Flanged joint: joint between two flanged ends

Gasket: sealing component of a joint

IQC scheme: a description of the quality inspections carried out by the supplier as part of his quality system.

Joint: connection between the ends of two pipes and/or fittings in which a gasket is used to effect a seal.

Joint angular deflection: angle between the axis of two connected pipeline components which a flexible joint can accommodate.

Joint gap: the largest axial distance between the ends of the two pipes to be connected, or the largest axial distance between the end of the pipe and the face of the opposite part such as flange, end cap, spigot (See also 4.5.2).

Leak tightness test pressure: pressure applied to a component in order to ensure its leak tightness.

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

Nominal size (DN): alphanumerical designation of size for components of a pipework system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections. [see EN ISO 6708]

Nominal pressure (PN): alphanumerical designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system. It comprises the letters PN followed by a dimensionless number. [see EN 1333]

NOTE All equipment of the same nominal size DN designated by the same PN number have compatible mating dimensions.

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

Outside diameter OD: outside diameter of the pipe(s) to be connected.

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.

Product evaluation: tests carried out after the certificate has been granted in order to ascertain whether the certified products continue to meet the requirements recorded in the Evaluation Guideline.

Product certificate: a document, in which Kiwa declares that a product may, on delivery, be deemed to comply with the product specification recorded in the product certificate.

Spigot: male end of a pipe or fitting.

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

Type tests: tests in order to ascertain that all the requirements recorded in the Evaluation Guideline are met.

Wide range fitting: fitting intended for use with pipes of various materials which :
- is used in a pipeline to make the connection between two spigots of pipes, fittings or valves, etc. , and,
- allows for radial and axial displacements at installation.

The wide range fittings may be provided on one end with PE or ductile iron spigot-ends, end cap or a flange connection.

NOTE Some fittings are designed such that they can be slid over the pipes in order to facilitate easy assembly.

3 Procedure for granting the quality declaration

3.1 Initial assessment

The initial assessment to be performed by Kiwa is based on the (product) requirements as included in this evaluation guideline including the test methods and contains:

- type testing to determine whether the products comply with the product and/or functional requirements,
- Production process assessment
- Assessment of the quality system and the IQC-scheme,
- Assessment on the presence and functioning of the required procedures.

3.2 Granting the certificate

After finishing the pre-certification tests the results are presented to the person deciding on granting the certificate. This person evaluates the results and decides whether the certificate can be granted by Kiwa or additional data and/or tests are necessary

3.3 Retaining the certificate

By means of verification of the product and the quality system it is determined by Kiwa if the product continues to comply with the requirements described in this document.

4 Product Requirements

4.1 Material requirements

The materials of the wide range fittings should be based on the following requirements:

Table 1. – Material requirements

	Material	**Requirements**
PE spigot	Cast iron/ PE 100	See 4.4.2.1/ 4.4.2.2
Body	Ductile cast iron	See 4.6
Clamp ring/ clamp	Ductile cast iron	See 4.6
Flanges	Ductile cast iron	See 4.6
Coating of the body (internal and external)	Epoxy or polyamide	See 4.7
Coating of bolts	Dry PTFE	See 4.7.2
Rubber	NBR	See 4.8
Bolts and nuts	Steel/ Stainless steel	See 4.9

4.2 Diameter range

The wide range fittings are defined by the minimum and maximum outside diameters of the pipes to be connected. The diameter range shall be specified by the manufacturer. Within this diameter range, the performance shall be guaranteed at the manufacturer's declared MOP.

The minimum working range of outside diameters for wide range fittings is given in Table 2.

Table 2 – Minimum working diameter range

Maximum DN of the pipes to be connected	**Minimum working diameter range (mm)**
32 < DN ≤ 100	20
100 < DN ≤ 200	23
200 < DN ≤ 300	33
300 < DN ≤ 400	41

Informative Annex A gives the outside diameters of existing pipes, according to current ISO, EN or national standards.

4.3 Surface condition and repairs

Wide range fittings shall be free from defects and surface imperfections which could lead to non-compliance with clauses 4 and 5.

When necessary, fittings may be repaired, for example by welding, in order to remove surface imperfections and localized defects which do not extend through the entire wall thickness, provided that :

- the repairs are carried out according to the manufacturer's written procedure.
- the repaired fittings comply with all the requirements of clauses 4 and 5.

4.4 Types of joints and interconnection

4.4.1 Flanged joints

Flanged joints shall be constructed in such a way that they may be attached to flanges whose dimensions and tolerances comply with EN 1092-2. This ensures interconnection between all flanged components (pipes, fittings, valves, etc.) of the same PN and DN and adequate joint performance.

Flanges may be designed to be compatible with different DN (e.g. DN 50-60-65) and/or different PN (e.g. PN 10/16).

Certain flange adaptors, especially for repair purposes, are designed to cater for flanges other than EN 1092-2. Consequently, some dimensions (e.g. thickness, bolt holes) have been designed to suit. Such flange adaptors shall not compromise functionality or compatibility with EN 1092-2 flanges.

4.4.2 Spigot connection

4.4.2.1 Cast iron spigot end

The material of the cast iron spigot end shall comply with article 4.6 and shall be part of the body of the fitting.

4.4.2.2 PE spigot

The PE spigot connection shall be PE 100 or PE 100RC[1)], SDR 11 made form material which complies with EN 1555-2 with a minimum free length according to table 3.

Table 3 – Minimum free length PE spigot

Pipe diameter (mm)	Spigot free length (mm)
63	160
90	210
110	210
160	260
200	270
250	300
315	340
400	370

[1)] At the moment of preparing this document a normative document for specifying PE 100 RC is being prepared.

4.4.3 End cap

The material of the end cap shall comply with article 4.6 and shall be part of the body of the fitting. When the end cap is provided with a threaded hole. The thread shall comply with ISO 7.

4.4.4 Flexible joints

Flexible joints, end-load and non-end-load, shall meet the performance requirements detailed in clause 5.

The manufacturer shall declare for which pipe materials the joint is end-load or non-end-load resistant

Supporting sleeves (inserts) may be necessary depending on pipe material, on pipe wall thickness, on joint design and on local authorities. They shall provide adequate support over the entire compression area of the gasket. The manufacturer shall specify the support sleeve (dimensions, material, shape) and indicate when supporting sleeves shall be used.

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4.5 Dimensional requirements

4.5.1 Wall thickness

The minimum wall thickness shall be as given in Table 4, provided that they comply to the requirements of clause 5.

Table 4 – Minimum wall thickness

Maximum DN of the pipes to be connected	**Minimum wall thickness** (mm)
32 < DN ≤ 200	4,0
200 < DN ≤ 300	5,0
300 < DN ≤ 400	6,0

4.5.2 Joint gap and depth of engagement

The manufacturer shall declare his maximum allowable joint gap, and it should be not less than the values given in Table 5.

NOTE: The maximum joint gap between the pipes or the flange to be connected may be affected by pipe contraction or expansion occurring as a result of temperature or pressure change.

The depth of engagement is related to the joint design. The manufacturer shall declare the minimum depth of engagement in the jointing instructions for each type of pipe material. The minimum depth of engagement shall be such that the pipes can support the loads imparted by the jointing system.

Table 5 – Joint gap

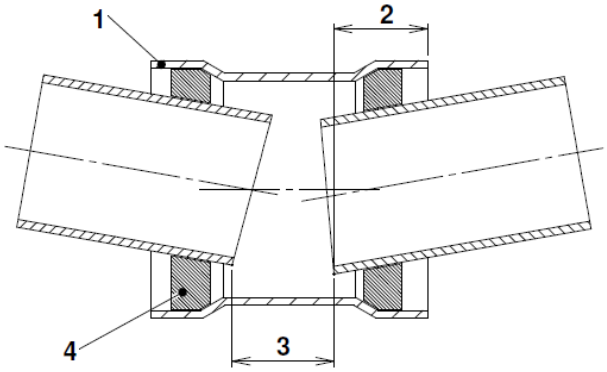
Maximum DN of the pipes to be connected	**Fitting with two joints - joint gap (mm)**	**Fitting with joint one joint - joint gap (mm)**
32 < DN ≤ 100	20	15
100 < DN ≤ 200	25	20
200 < DN ≤ 300	35	30
300 < DN ≤ 400	55	40

4.5.3 Gast iron spigot

The dimensions of the cast iron spigot shall comply with the dimension given in table 6.

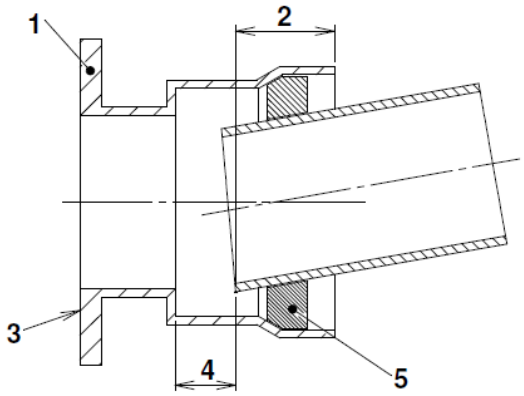
Table 6 – dimensions cast iron spigot

d_n	**outside diameter**	
	Min	**Max**
50	50	50,7
63	63	63,7
75	75	75,7
90	90	90,7
110	110	110,7
125	125	125,7
160	160	160,7
200	200	200,7
250	250	250,8
280	280	280,9
315	315	316,0
400	400	401,0



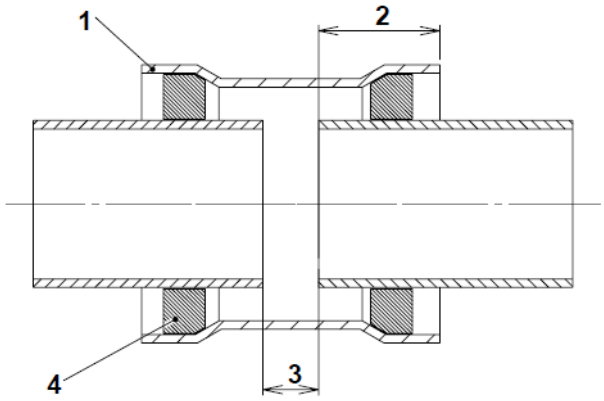
Key
1 Fitting
2 Depth of engagement
3 Joint gap
4 Joint gasket

Figure 1 – Joint gap for wide range fitting (example)



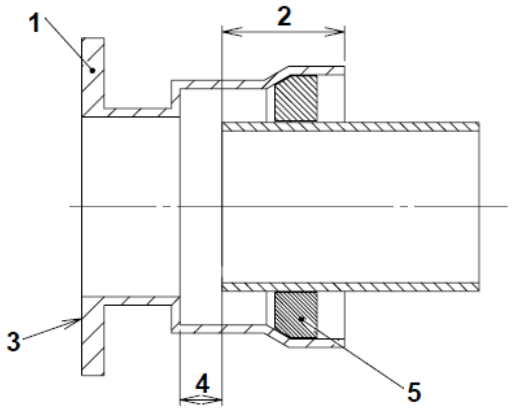
Key
1 Flange adaptor
2 Depth of engagement
3 Flange face
4 Joint gap
5 Joint gasket

Figure 2 – Joint gap for wide range flange adaptor (example)



Key
1 Fitting
2 Depth of engagement
3 Joint gap
4 Joint gasket

Figure 3 – Joint gap for wide range fitting (example)



Key
1 Flange adaptor
2 Depth of engagement
3 Flange face
4 Joint gap
5 Joint gasket

Figure 4 – Joint gap for wide range flange adaptor (example)

4.6 Mechanical properties of ductile iron

4.6.1 Tensile properties

Ductile iron fittings shall have a minimum tensile strength, R_m, of 420 MPa and a minimum elongation at fracture of 5 %. The tensile strength test shall be carried out in accordance with EN 10002-1.

4.6.2 Hardness

The Brinell hardness shall be tested in accordance with EN-ISO 6506-1 and shall not exceed 250 HB. The test shall be performed on the casting or on a sample cut from the casting.

4.7 Coatings

4.7.1 General

Unless otherwise agreed between manufacturer and purchaser, all fittings shall be delivered externally and internally coated (epoxy or polyamide). The external and internal coatings shall comply with EN 14901.

All coatings shall be works-applied.

The suitability of the coating shall be verified by performing the cathodic disbondment test according to 6.3.

4.7.2 Coating of bolts and nuts

Bolts and nuts shall be suitably protected to inhibit corrosion depending on the external conditions of use. Bolts shall be coated with PTFE (dry).

4.8 Rubber material

Rubber gasket materials shall comply with the requirements of EN682 type GA or GB for ambient temperature class A. Type GAL or GBL for ambient temperature class B.

4.9 Bolts and nuts

The mechanical properties of the bolts and nuts shall comply with NEN-EN-ISO 3506-1 and NEN-EN-ISO 3506-2 grade A2 and/or A4. the dimensional properties shall comply as a minimum with the requirements of
NEN-EN -ISO 4016 and NEN-EN- ISO 4034.

5 Performance requirements

5.1 General

In order to ensure the fitness for purpose of the wide range joints, there shall be a performance test using at least one from each of the groupings given below :

- DN 32 to DN125 (preferred around 100 mm).
- DN 150 to DN 300 (preferred around 200 mm).
- DN 350 to DN 400 (preferred around 400 mm).

One outside diameter is representative of a grouping when the performances are based on the same design parameters throughout the size range. The performance tests shall be carried out either on fitting or flange adaptor, provided the joint design is identical.

If a grouping covers products of different designs and/or manufactured by different processes, the grouping shall be sub-divided.

The product shall be tested using the smallest and largest pipe size specified by the manufacturer.

The performance tests shall be carried out using supporting sleeves (inserts) when necessary (see 4.4.4).

5.2 Wide range joints

5.2.1 General

The requirements and test conditions are summarized in Table 7. The wide range joints shall exhibit no visible leakage, deformation or displacement of the pipe sections when subjected to the tests. The displacement shall reach a stable value and cease.

5.2.2 Angular deflection

All wide range joints shall be designed to be fully flexible. The allowable angular deflection declared by the manufacturer shall be not less than 3° for DN 32 to DN 400.

5.2.3 Shear

All joints shall be performance tested with a resultant shear force of not less than 20 times the DN, in newtons, taking into account the weight of the pipe and of its contents and the geometry of the test assembly.

The shear load test condition is not required for PE pipes, due to their longitudinal flexibility.

5.2.4 Maximum joint gap

The wide range joint shall show no visible leakage with the maximum joint gap. The maximum joint gap is created between the joint and the smallest pipe diameter for which the wide range joint is suitable as declared by the manufacturer. The smallest pipe diameter is selected form the standard pipe size ranges as mentioned in appendix B.

Table 7 – Performance testing of the joints: requirements and test conditions

Test	Test requirements	Pipe sections	Test conditions
Non-end- load resistance fitting + end-load resistance fitting	- test pressure : 25 mbar, 200 mbar, 1 bar, MOP, 1,5x MOP - test duration: 5 minutes after stabilisation - no visible leakage	Stiff pipe of maximum OD	Joint deflected
End-load resistance fitting	- test pressure : 3x MOP + 5 bar (water) - test duration: 2 hours after stabilisation - no deformation, visible leakage or displacement of the pipe sections.	Stiff pipe of maximum OD	Joint deflected
			Joint aligned and maximum joint gap, with shear load
		Stiff pipe of minimum OD	Joint deflected
			Joint aligned and maximum joint gap, with shear load
End-load resistance fitting	- test pressure : 3x MOP + 5 bar (water) - test duration: 2 hours after stabilisation - no deformation, visible leakage or displacement of the pipe sections.	PVC pipe of minimum OD	Joint aligned and maximum joint gap, with shear load
End-load resistance fitting	- test pressure : 3x MOP + 5 bar (water) - test duration: 2 hours after stabilisation - no deformation, visible leakage or displacement of the pipe sections.	PE pipe of minimum OD	Joint aligned and maximum joint gap

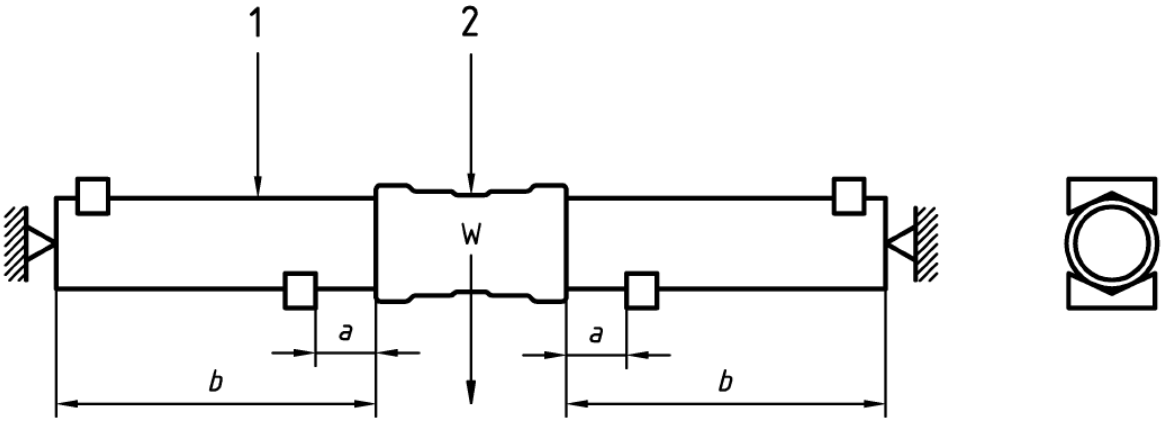
6 Test methods

6.1 Leak tightness test of joints

6.1.1 Wide range joint

The test shall be carried out on an assembled joint comprising a ductile iron fitting and two pipe sections (see figure 3).

The test apparatus shall be capable of providing suitable end and lateral restraints whether the joint is in the aligned position, deflected or subjected to a shear load. It shall be equipped with a pressure gauge with an uncertainty of ± 5 % reading.



Key
1 Pipe section
2 Ductile iron fitting

Figure 3 – Test assembly for a fitting

The pipes shall be supported by means of V shaped blocks with an angle of 120°, located at a distance a, of 0,2 x OD in mm, from the fitting face, and up to a maximum of 50 mm. The length of each pipe section, b, shall be at least 2 · OD in mm, and with a minimum of 1 m. A vertical force *W* shall be applied to the fitting.
The vertical force *W* shall be such that the resultant shear force *F* across each of the two joints is equal to the value specified in 5.2.3, taking into account the weight force *M* of the fitting and of its contents

$W = 2F - M$

Where

W is the vertical force in newtons
F is the shear force in newtons
M is the weight force in newtons.

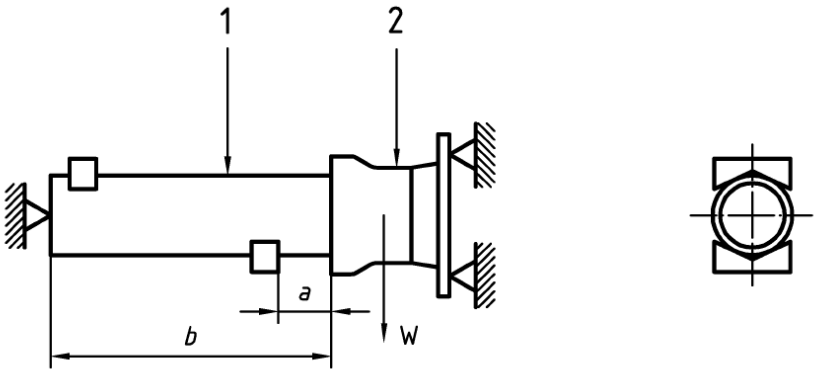
The test assembly shall be filled with air. The test shall not begin before the temperature of the test assembly has stabilized between 10 °C and 25 °C. The pressure shall be raised steadily until it reaches the test pressure given in Table 7.
For an end-load resistant joint, the test assembly, and the test procedure are identical, except that there shall be no end restraint so that the axial thrust is taken by the end-load resistant joint under test. In addition, possible axial movement of the spigot shall be monitored.

6.1.2 Flange adaptor

For a flange adaptor, half of the test apparatus shall be used (see Figure 4). The vertical force *W* applied to the flange adaptor shall be such that the resultant shear force *F* across the joint is equal to the value specified in 5.2.3, taking into account the weight force *M* of the flange adaptor and of its contents :

$W = F - M$

where
W is the vertical force in newtons
F is the shear force in newtons
M is the weight force in newtons.
The test procedure shall be as in 6.1.1.



Key
1 Pipe section
2 Flange adaptor

Figure 4 – Test assembly for a flange adaptor

6.2 Strength test of joints

For the strength test the test set as descried under 6.1.1 or 6.1.2 shall be used. The test assembly is filled with water. The test shall not begin before the temperature of the test assembly has stabilized between 10 °C and 25 °C. The pressure shall be raised steadily until it reaches the test pressure given in Table 7.

6.3 Cathodic disbondment test

For each test specimen[1)], a plastic pipe section with d = 75 mm and h = 100 mm is sealed onto the coated surface using an electrically non-conducting adhesive, making sure to effectively seal the joint. The pipe is filled with a sodium chloride solution at a concentration of c(NaCl) = 0.5 mol/L.
Before sealing, remove the coating in the middle of the test plate with a face cutter so that there is an uncoated area with a diameter of 6mm.
Cathodic polarization of the pipe is achieved with a potentiostat, setting a nominal voltage of U0.1 AgCl = -1550 mV (corresponding to UH = -1260 mV, Ukalomel ges = -1500 mV).

A similar polarization effect may also be achieved by simply causing a short circuit with a magnesium anode, provided that the voltage is approximately UH = -1200 mV.
This test lasts 30 days and is performed at a temperature of (23 ± 2) °C.

In order to determine the cathodic disbondment, make 6 radial cuts, starting from the uncoated area and proceeding to the coating surface of the cast. An hour after the end of the test, the coating is removed from the uncoated middle area with a blade.
In this context, the mean disbonded depth (= adhesion loss of the coating) is determined from the edge of the uncoated area to the adherent coating.

The following limits for the cathodic disbondment are valid: Temperature	Test duration	Cathodic disbondment
23 ± 2 °C	30 days	≤ 10 mm

1) For fittings whose shape or size make them ineligible for cathodic disbonding tests test plates may be used instead. The test plate is approx. 100 x 110 x 15 mm. It must be of the same material as the fittings to be coated. One of the flat surfaces should be moulded with "normal" foundry sand and the other with core-making sand. The side using core-making sand should be marked with the letter K in one corner during the casting process. The test plate is clamped in a DN 150 fitting in such a way that the “core side” of the test plate is on the inside. The complete test piece is blasted in this position. Clean fibre-free gloves must be used when removing test plates. The test plate is coated without the fitting.

7 Marking and instructions

7.1 Marking requirements

All fittings shall be legibly and durably marked and shall bear at least the following information :

- Manufacturer's name or mark.
- Identification of ductile iron.
- DN and PN rating of flanges when applicable.
- The minimum and maximum outside diameters (range of external diameters over which the product works).
- The GASTEC QA mark.
- MOP of the fitting.
- Production or assembling date (at least month and year) of the product

The first four markings given above shall be cast-on or cold stamped the other markings can be applied by any method, e.g. painted on the casting.

7.2 Instructions

The supplier shall provide instructions. These instructions shall be in the Dutch language and shall contain information about:

- The use and installation of the product.
  - maximum allowable joint gap.
  - minimum depth of engagement.
  - maximum allowable angular deflection.
  - pipe materials for which the fitting or the flange adaptor is intended to be used.
  - end-load or non-end-load resistance.
  - need for supporting sleeves (insert).
  - bolt torque.
- The conditions under which it shall be used.
- How it can be determined if the product is correctly installed.
- The way the product shall be stored.
- The maximum shelf life of the product.

7.3 Packaging

The product including the associated components required for its assembly shall be packaged individually. Special storage or handling conditions shall be specified on the packaging. The packaging shall protect the product from dirt, dust and other contaminants during transport and storage till point of use where the packaging will be removed.

8 Quality system requirements

This chapter contains the requirements that have to be fulfilled by the manufacturers quality system.

8.1 Manager of the quality system

Within the manufacturers organizational structure an employee must be appointed who is in charge of managing the quality system.

8.2 Internal quality control/quality plan

As part of the quality system the manufacturer must implement an internal quality control schedule (IQC-scheme).
This IQC scheme shall relate to:

- the supplied raw materials or composite materials;
- the production process;
- the end-products;
- the status of measuring and testing means;
- the internal transport, the storage and identification or manner of marking semi-manufactures and end-products.

In this IQC-scheme the following must be demonstrably recorded:

- which aspects are inspected by the manufacturer;
- according to which methods these inspections are carried out;
- how often these inspections are carried out;
- How the inspection results are registered and stored.

This IQC-schedule must be detailed in such a way that it provides Kiwa sufficient confidence that requirements will be continuously fulfilled.

8.3 Procedures and work instructions

The manufacturer must be able to submit procedures for:

- the handling of non-conforming products;
- corrective actions in case non-conformities are found;
- the handling of complaints regarding the products and / or services supplied;
- the work instructions and inspection sheets in use
- Instructions for packaging and closing of products during storage and transport.

8.4 Other Quality system requirements

The quality system of the manufacturer shall be ISO 9001 certified. The IQC scheme may be combined with the ISO 9001 quality system.

9 Summary of tests and inspections

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

- Initial assessment;
- Product verification;
- Verification of the quality system;

9.1 Test matrix

Description of requirement	Clause	Test within the scope of		
		Initial assessment	Surveillance by CI after issue of the certificate[1)]	
			Product verification	Frequency
Material	4.1	X	X	Once a year
Diameter range	4.2	X	X	Once a year
Surface conditions	4.3	X		
Types of joints	4.4	X		
Dimensions	4.5	X	X	Once a year
Mechanical properties of ductile iron	4.6	X		
Coating	4.7	X	X[2)]	Once a year
Rubber material	4.8	X		
Performance requirements of joints	5	X	X[3)]	Once a year
Marking and instructions	7	X	X	Once a year

1) In case the product or production process changes significantly a re-evaluation will be performed.
2) Either by testing or by supplying a test report proving compliance with EN 14901
3) Leak tightness test only

9.2 Verification of the quality system

The certification body shall verify if the supplier and/or manufacturer complies with its obligations. The inspection frequency is determined by the Board of experts and is set to two inspection visits per year.

The inspection visits shall at least relate to:

- The products and product specifications as specified on the certificate;
- The production process of the manufacturer;
- The IQC scheme of the manufacturer and the results of the verifications performed by the manufacturer;
- The correct way of marking the certified products;
- Compliance with the required procedures.

Multiple manufacturers of parts is possible. Depending on the risk for the final product inspection may be performed at these manufactures location.

9.2.1 Non-conformity during inspection

If during inspection of the quality system non-conformities are found, the procedure as determined by the Board of experts shall be followed.

10 Requirements for the certification body

10.1 General

The certification body shall be accredited according to NEN-EN-ISO/IEC 17065 for this approval requirement.

The certification body shall have a regulation of equal document in which the general rules for certification are laid down. These rules are in particular:

- The general rules for conducting the pre-certification tests, to be distinguished in:
  - the way suppliers are to be informed about an application is being handled,
  - how the test are conducted,
  - the decision to be taken as a result of the pre certification tests.
- The general directions for conducting inspections and the aspects to be audited,
- The measurements to be taken by certification body in case of Non Conformities,
- Measurements taken by certification body in case of improper Use of Certificates, Certification Marks, Pictograms and Logos,
- Terms for termination of the certificate,
- The possibility to lodge an appeal against decisions of measurements taken by certification body.

10.2 Certification staff

The staff involved in the certification process is sub-divided into:

- Certification assessor/ application reviewer/ reviewer: in charge of assessing design and documentation, assessment of certification requests, review of assessments;
- Site assessor: in charge of carrying out external inspections at the supplier's works;
- Decision-maker: in charge of taking the certification decision based on the pre-certification assessment and continuation of the certificate based on the verification performed.

10.3 Qualification requirements

The qualification requirements consist of:

- Qualification requirements for the certification staff of the certification body that shall fulfil the requirements of NEN-EN-ISO/IEC 17065.
- Qualification requirements for the certification staff of the certification body set by the Board of Experts for this approval requirement.

	Certification assessor/ application reviewer/ Reviewer	Site assessor	Decision maker
Basic competence			
Knowledge of business processes, skills to make professional judgments	1 year of relevant working experience. Reviewer: 3 years of relevant working experience of which at least 1 year in the field of certification.	1 year of relevant working	5 years of relevant working experience of which at least 1 year in the field of certification
Audit skills	Na	Audit training. At least 4 site assessments including 1 independent under supervision.	na
Technical competence			
Knowledge of the content of the scheme(s)	Knowledge of the approval requirement in detail.	Knowledge of the chapters related to the quality system and testing of the approval requirement in the cluster.	
For the location assessor knowledge of: • the technology used for the manufacture of the products inspected, the operation of processes and the delivery of services; • the way in which products are used, processes are operated and services are delivered; • any defects which may occur during the use of the product, any failures in the operation of the process and the relevant techniques for quality control.		A minimum of 1 year experience in manufacturing, -testing, -inspection and/or the installation business, including: 3 x coached inspections 1 x independent inspection	
For the certification assessor/ application reviewer/ reviewer Generic knowledge of • gas distribution materials • the various type of products and materials used in gas distribution; • the way the products are applied in the gas distribution system; • the critical parameters and components in the system.	A minimum of 2 year experience in manufacturing, testing, inspection or installation of gas distribution materials.		

10.4 Qualification

Certification staff must be demonstrably qualified by evaluation of education and experience of the above-mentioned requirements. Qualification of staff is done by the management of the certification body.

10.5 Report initial assessment

The certification body lays down the results of the initial assessment in a report. This report shall full fill the following requirements:

- Completeness: the report shall decide on all requirements mentioned in the approval requirement.
- Traceability: the results on which a decision is based shall be traceable.
- Basis for decision: the decision maker shall base his decision on the findings laid down in the report.

10.6 Decision for granting the certificate

The decision for granting the certificate shall be made by a qualified decision maker which has not been involved in the initial assessment. The decision shall be recorded traceable.

10.7 Nature and frequency of external inspections

The certification body shall carry out audits at the supplier and/or manufacturer at regular intervals to check whether the supplier complies with his obligations. The results of each inspection shall be traceable recorded in a report.

10.8 Interpretation of requirements

The Board of Experts may record the interpretation of requirements of these evaluation guidelines in one separate interpretation document.

10.9 Reporting to Board of experts

The certification body reports at least once a year about the certification activities. In this report the following items are to be addressed:

- Changes in the amount of certificates;
- Amount of verifications performed in relation to the set frequency;
- Result of the verifications;
- Measures imposed by non-conformities;
- Complaints received by third parties about certified products.

11 List of referenced documents

11.1 Standards / normative documents

All normative references in this Approval Requirement refer to the editions of the standards as mentioned in the list below.

NEN-EN 437: 2003+A1: 2009	Test gases- test pressure – appliance categories
NEN-EN-ISO/IEC 17065: 2012	Conformity assessment - Requirements for bodies certifying products, processes and services
NEN-EN-ISO/IEC 17025: 2005+C1: 2007	General requirements for the competence of testing and calibration laboratories
NEN-EN 1333: 2006	Flanges and their joints - Pipework components - Definition and selection of PN
NEN-EN-ISO 6708: 1995	Pipe components - Definition and selection of DN (nominal size)
NEN-EN 1092-2: 1997	Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges
NEN-EN 1555-2: 2010	Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 2: Pipes
NEN-EN-ISO 3506-1: 2009	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: Bolts, screws and studs
NEN-EN-ISO 3506-2: 2009	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 2: Nuts
NEN-EN-ISO 4016: 2011	Hexagon head bolts - Product grade C
NEN-EN-ISO 4034: 2013	Hexagon regular nuts (style 1) - Product grade C
NEN-EN-ISO 6506-1: 2014	Metallic materials - Brinell hardness test - Part 1: Test method
NEN-EN 14901: 2014	Ductile iron pipes, fittings and accessories - Epoxy coating (heavy duty) of ductile iron fittings and accessories - Requirements and test methods
NEN-EN 682: 2002	Elastomeric seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids
NEN-EN-ISO 9001: 2008 +C1: 2009	Quality management systems – Requirements
NEN-EN 10208-1: 2009	Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 1: Pipes of requirement class A
ISO 7-1: 1994+Cor 1: 2007	Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation

Appendix A: Model IQC-scheme or frame-IQC-scheme

Subject	Aspect	Method	Frequency	Registration
Incoming control supplied materials				
Production process *(equipement)*				
Finished product *(inspection)*				
Test and measurement equipment				
Logistics, storage, identification, marking of products				

Appendix B
(informative)

Outside diameters of existing pipes

Table B.1 – Outside diameters of existing pipes (in mm), according to current ISO, EN and national standards

	Ductile iron	Steel	PVC-HI	PE	Fibre-cement			
	NEN7244-4	EN 10208-1	NEN 7230	EN 1555-2	DIN 19800a			
Sizes (DN)					PN6	PN10	PN12,5	PN16
25				$25^{+0,3}_{-0}$				
32				$32^{+0,3}_{-0}$				
40				$40^{+0,4}_{-0}$				
50		$60,3^{+0,5}_{-0,5}$	$50^{+0,2}_{-0}$	$50^{+0,4}_{-0}$			83	85
63			$63^{+0,2}_{-0}$	$63^{+0,4}_{-0}$				
75			$75^{+0,3}_{-0}$	$75^{+0,5}_{-0}$		98	100	104
80	$98^{+1}_{-2,7}$	$88,9^{+0,7}_{-0,7}$						
90			$90^{+0,3}_{-0}$	$90^{+0,6}_{-0}$				
100	$118^{+1}_{-2,8}$	$114,3^{+0,9}_{-0,9}$						
110			$110^{+0,4}_{-0}$	$110^{+0,7}_{-0}$	118	120	124	130
125			$125^{+0,4}_{-0}$	$125^{+0,8}_{-0}$				
140			$140^{+0,5}_{-0}$					

	Ductile iron	Steel	PVC	PE	Fibre-cement			
	NEN7244-4	EN 10208-1	NEN 7230	EN 1555-2	DIN 19800a			
Sizes (DN)					PN6	PN10	PN12,5	PN16
150	$170^{+1}_{-2,9}$	$168,3^{+1,3}_{-1,3}$						
160			$160^{+0,5}_{-0}$	$160^{+1,0}_{-0}$	145	149	153	159
180			$180^{+0,6}_{-0}$					
200	$222^{+1}_{-3,0}$	$219,1^{+1,6}_{-1,6}$	$200^{+0,6}_{-0}$	$200^{+1,2}_{-0}$	172	178	182	190
225			$225^{+0,7}_{-0}$					
250	$274^{+1}_{-3,1}$	$273,0^{+2,0}_{-2,0}$	$250^{+0,8}_{-0}$	$250^{+1,5}_{-0}$				
300	$326^{+1}_{-3,3}$	$323,9^{+2,4}_{-2,4}$						
315			$315^{+1,0}_{-0}$	$315^{+1,9}_{-0}$	226	234	240	252
355			$355^{+1,0}_{-0}$	$355^{+2,2}_{-0}$				
400	$429^{+1}_{-3,5}$	$406,4^{+3,0}_{-3,0}$	$400^{+1,0}_{-0}$	$400^{+2,4}_{-0}$	278	286	296	308