

BRL K17605

2023-06-08

Evaluation Guideline

for the Kiwa-(technical-approval-with) product certificate for
Plastics piping systems for water supply with or without
pressure – Glass-reinforced thermosetting plastics (GRP)
based on unsaturated polyester resin (UP)



**Trust
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Progress**

Preface

This Evaluation Guideline (BRL) has been accepted by the Kiwa Board of Experts Water Cycle (CWK), in which all relevant parties in the field of “Plastics piping systems for water supply with or without pressure – Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP)” are represented. The Board of Experts also supervises the certification activities and where necessary requires the BRL to be revised. All references to Board of Experts in this BRL pertain to the above mentioned Board of Experts.

This BRL will be used by Kiwa in conjunction with the Kiwa Regulations for Certification.

The product requirements and test methods comply with the requirements listed in EN-ISO 23856. The aspects of the assessment of conformity comply with CEN/TS 14632. This BRL includes additional requirements and test methods set by the Board of Experts.

In the BRL the following parts have been changed:

- EN 1796 has been replaced by EN-ISO 23856 and therefore reference to the new standard EN-ISO 23856 is made, which includes the following major updates:
 - Reducing factors for dry creep (alpha) and ageing (beta) according to NEN 7037 are not applicable anymore and deleted from the BRL;
 - Resistance to shock or impact is not applicable anymore and deleted from the BRL;
 - Reference to ISO 7509 instead of EN 1447 for determination of long-term resistance to internal pressure.
- The arrangement of the chapters has been harmonized with KOMO BRL 52204.

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Validation

This evaluation guideline has been validated by Kiwa on 31-5-2023

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1 Introduction

1.1 General

This Evaluation Guideline (BRL) includes all relevant requirements which are employed by Kiwa when dealing with applications for the issue and maintenance of a Kiwa-(technical-approval-with) product certificate for products used for water supply with or without pressure – Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP).

This BRL replaces BRL-K17605, dated 2016-10-06. The quality declarations issued and based on that BRL will lose their validity after 12 months of validation of this BRL.

The product requirements and test methods comply with the requirements listed in EN-ISO 23856. The aspects of the assessment of conformity comply with CEN/TS 14632. This BRL includes additional requirements and determination methods set by the Board of Experts.

For the performance of its certification work, Kiwa is bound to the requirements as included in EN-ISO/IEC 17065 “Conformity assessment – Requirements for bodies certifying products, processes and services”.

1.2 Field of application/scope

The products are intended to be used for underground piping systems and its components made from glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) intended to be used for water supply (drinking or raw), with or without pressure. In a pipework system, pipes and fittings of different nominal pressure and stiffness ratings may be used together.

The BRL is applicable to pipes, fittings and their joints (flexible or rigid) of nominal diameters from DN 100 to DN 4000, which are intended to be used for the conveyance of tap water at temperatures up to 50 °C.

In this application, the products are not intended for use under continuously varying load i.e. cycling loads with a frequency of at least 1 cycle per minute varying between two load levels.

Pipes can be made according to different processes, e.g.: centrifugal casting, continuous filament winding or cross filament winding.

Fittings can be made using any of the following techniques:

- 1) Fabricated from straight pipe;
- 2) Moulded by:
 - i) filament winding;
 - ii) tape winding;
 - iii) contact moulding (hand lay-up);
 - iv) hot or cold press moulding.

This BRL is applicable to joints which are or are not intended to be resistant to axial loading:

- 1) Socket-and-spigot (either integral with pipe or sleeve coupling) or mechanical joint.
- 2) Locked socket-and spigot joint;
- 3) Cemented or wrapped joint;
- 4) Bolted flange joint.

Rubber sealing elements may be used as part of the joints.

1.3 Acceptance of test reports provided by the supplier

If the supplier provides reports from test institutions or laboratories to prove that the products meet the requirements of this BRL, the supplier shall prove that these reports have been drawn up by an institution that complies with the applicable accreditation standards, namely:

- EN-ISO/IEC 17020 for inspection bodies;
- EN-ISO/IEC 17021-1 for certification bodies certifying management systems;
- EN-ISO/IEC 17024 for certification bodies certifying persons;
- EN-ISO/IEC 17025 for laboratories;
- EN-ISO/IEC 17065 for certification bodies certifying products.

Remark:

This requirement is considered to be fulfilled when a certificate of accreditation can be shown, issued either by the Board of Accreditation (RvA) or by one of the institutions with which an agreement of mutual acceptance has been concluded by the RvA. The accreditation shall refer to the examinations as required in this BRL. When no certificate of accreditation can be shown, Kiwa shall verify whether the accreditation standard is fulfilled.

1.4 Quality declaration

The quality declaration to be issued by Kiwa is described as a Kiwa (technical-approval-with) product certificate.

A model of the certificate to be issued on the basis of this BRL has been included for information as Annex I.

2 Terminology

2.1 Terms and definitions

In this BRL, the following terms and definitions apply:

- **Board of Experts:** the Board of Experts Water Cycle (CWK).
- **Certification mark:** a protected trademark of which the authorization of the use is granted by Kiwa, to the supplier whose products can be considered to comply on delivery with the applicable requirements.
- **Drinking water:** water intended or partly intended for drinking, cooking or food preparation or other domestic purposes, but does not include hot water.
- **Evaluation Guideline (BRL):** the agreements made within the Board of Experts on the subject of certification.
- **Initial investigation:** tests in order to ascertain that all the requirements recorded in the BRL are met.
- **Inspection (audit) tests:** 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 BRL.
- **IQC scheme (IQC):** a description of the quality inspections carried out by the supplier as part of his quality system.
- **Private Label Certificate:** A certificate that only pertains to products that are also included in the certificate of a supplier that has been certified by Kiwa, the only difference being that the products and product information of the private label holder bear a brand name that belongs to the private label holder.
- **Pre-certification tests:** Tests in order to ascertain that all the requirements recorded in the BRL are met.
- **Product requirements:** requirements made specific by means of measures or figures, focussing on (identifiable) characteristics of products and containing a limiting value to be achieved, which can be calculated or measured in an unequivocal manner.
- **Supplier:** the party that is responsible for ensuring that the products meet and continue to meet the requirements on which the certification is based.
- **(Technical-approval-with-) 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.

In addition, the terms and definitions given in EN-ISO 23856 and CEN/TS 14632 are applicable.

2.2 Abbreviations and symbols

In this BRL, the abbreviations and symbols given in EN-ISO 23856 and CEN/TS 14632 and listed in Table 1 apply. The following English terms shall be translated to Dutch as follows:

Table 1 – Abbreviations and symbols in English and Dutch

Abbreviation or symbol	Term	
	English	Dutch
BRL	Evaluation Guideline	Beoordelingsrichtlijn
BoE	Board of Experts	College van Deskundigen
CvD-LSK	Board of Experts – Plastic Piping Systems	College van Deskundigen – Leidingsystemen Kunststof
CB	Certification body	Certificatie instelling
RvA	Dutch accreditation council	Raad voor de accreditatie
	Supplier	Leverancier
IQC scheme	Internal quality control scheme	Intern kwaliteitsbewakingsschema
UP	Unsaturated polyester	Onverzadigde polyester
GRP	Glass reinforced thermosetting plastics	Met glas versterkte thermohardende kunststof
	Filament winding	Kruislings wikkelen
	Tape winding	Tape wikkelen
	Centrifugally cast	Centrifugaal gegoten
	Contact moulding hand lay-up	Handlamineren

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Abbreviation or symbol	Term	
	English	Dutch
	Hot or cold press moulding	Warm of koud persen
	Cemented joint	Gelijmde verbinding
	Wrapped joint	Gelamineerde verbinding
	Fitting	Fitting, hulpstuk
	Joint	Verbinding
	Locking key	Borgsnoer
DN	Nominal size	Nominale afmeting
DN-ID	Nominal size, internal diameter	Nominale afmeting, binnendiameter
DN-OD	Nominal size, external diameter	Nominale afmeting, buitendiameter
PN	Nominal pressure	Nominale druk
SN	Nominal stiffness	Nominale stijfheid
CE	CE-marking	CE-markering
	Product investigation	Toelatingsonderzoek
	Certification	Certificatie
S	Ring stiffness	Ringstijfheid
S ₀	Initial ring stiffness	Initiële ringstijfheid
TT	Type testing	Type testing
AT	Audit test	Audit test
BRT	Batch release test	Batch release test
PVT	Process verification test	Proces verificatie test
RLTT	Reduced long-term test	Verkorte lange duur test
d _m	Mean diameter	Gemiddelde diameter
d _i	Mean internal diameter	Gemiddelde binnendiameter
d _u	Mean outer diameter	Gemiddelde buitendiameter
e	Wall thickness	Wanddikte
e _{0,tot}	Mean total wall thickness	Gemiddelde totale wanddikte
e _{eff}	Mean structural layer thickness	Gemiddelde effectieve wanddikte
ω	Winding angle	Wikkelhoek
α _{x,creep,wet}	Wet creep factor	Natte kruipfactor
S _{x,wet}	Calculated long-term ring stiffness	Berekende lange duur ring stijfheid
R _{RF}	Re-rating factor	Herwaarderingsfactor
σ _{LA} [*] , σ _{LB} [*] , σ _{LC} [*] . subscript A, B, C denote the method of test used	Initial longitudinal tensile strength	Initiële longitudinale treksterkte
σ _{cA} [*] , σ _{cB} [*] , σ _{cC} [*] . subscript A, B, C denote the method of test used	Initial circumferential tensile wall strength	Initiële tangentiële treksterkte
	Nominal length	Werkende lengte
	Rubber seal (lock) joint	Mof en spie verbinding met rubber dichtingselement
	Double bell coupler	Dubbele mof en spie verbinding met rubber dichtingselement
	Adhesive bonded joints	Lijmverbindingen
	Flange joints	Flensverbindingen
	Laminated joints	Laminaatverbindingen
	Flexible joint	Flexibele verbinding
	Rigid joint	Starre verbinding
	End-load-bearing	Trekvast
	Non-load-bearing	Niet-trekvast

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Abbreviation or symbol	Term	
	English	Dutch
	Fixation of the elastomeric sealing element The preservation of the elastomeric sealing element in the groove while pushing the spigot end into the socket	Fixering van het rubberdichtingselement In de groef houden van het rubberdichtingselement bij het inschuiven van het spie eind in de mof
D	Draw	Longitudinale verplaatsing
T	Total draw	Totale longitudinale verplaatsing
M	Misalignment	Verkeerde uitlijning
δ	Angular deflection	Vrije hoekverdraaiing
	Socket-and-spigot (either integral with pipe or sleeve coupling) or mechanical joint	Mof en spie-eind (hetzij integraal met buis of klemkoppeling) of mechanische verbinding.
	Locked socket-and spigot joint	Trekvaste mof en spie-eind verbinding

3 Procedure for granting a Kiwa-(technical-approval-with) product certificate

3.1 Initial investigation

The initial investigation to be performed based on the (product) requirements as contained in this BRL, including the test methods, comprises of the following:

- 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 remaining procedures.

3.2 Granting the Kiwa-(technical-approval-with) product certificate

After finishing the initial investigation, the results are presented to the Decision Maker (see § 9.2) for evaluation. The Decision Maker evaluates the results and decides whether the certificate can be granted or if additional data and / or tests are necessary.

3.3 Investigation into the product and / or performance requirements

Kiwa will investigate the products to be certified on the basis of the certification requirements in this BRL.

The necessary samples will be taken by or on behalf of Kiwa.

3.4 Production process assessment

When assessing the production process, it is checked whether the manufacturer is able to continuously produce the products that meet the certification requirements.

The assessment of the production process takes place during the ongoing work at the manufacturer.

The assessment also includes at least:

- The quality of raw materials, half-finished products and end products;
- Internal transport and storage.

3.5 Contract assessment

If the supplier is not the manufacturer of the products to be certified, Kiwa will assess the agreement between the supplier and the manufacturer.

This written agreement, which is available for Kiwa, includes at least that accreditation bodies, product managers and Kiwa shall be granted access to observe the certification activities being carried out on these products.

4 Requirements for the design and materials used in GRP piping system

4.1 General

This chapter contains the requirements pertaining to the design as well as the raw materials and semi-finished products used for the production of the products to be certified according to this BRL.

The raw materials and additives used in the production shall comply with the requirements of § 4.2 and shall be recorded by the supplier in the design (see § 4.3) of the piping system, by means of a technical specification. The conformity to these requirements shall be done by Kiwa.

Each intended change to these parameters shall be reported to Kiwa who can then evaluate whether the change can influence the attested performance(s) to such an extent that a re-evaluation of said performance(s) can be required.

When the applicant / supplier has more production locations, the applicant / supplier shall specify which production locations are to be certified.

4.2 Materials

The pipe or fitting shall be constructed using chopped and/or continuous glass filaments, strands, or rovings, mats, or fabric, glass or synthetic veils, and polyester resin with or without fillers and if applicable additives necessary to impart specific properties of the resin. The pipe or fitting may also incorporate aggregates.

4.2.1 Reinforcement

The glass used for the manufacture of the reinforcement shall be one of the types listed in EN-ISO 23856.

4.2.2 Resin

4.2.2.1 Resin Type

The scope of this BRL shall be limited to the manufacture of rigid components made from thermosetting resins (GRP components). Typical resins are polyester and vinyl ester.

4.2.2.2 Temperature of deflection

The resin used in the structural layer shall have a temperature of deflection of at least 70 °C when the test specimen is tested in accordance with method A of EN-ISO 75-2.

4.2.3 Particle size aggregates

The particle size of aggregates and fillers shall not exceed 1/5 of the total wall thickness of the pipe or fitting or 2,5 mm, whichever is the lesser.

4.2.4 Constancy of the material composition

The constancy of the material composition of the wall construction of the product shall be determined according to ISO 7510. The following constituents can be distinguished: resin, aggregate and filler and type and arrangement of the glass layers. The difference in mass of each constituent of two samples, taken in two diametrically opposite places in one cross-section shall not exceed 5%, when based on the lowest value determined.

The masses of the glass, aggregates and resin of a component shall be determined according to ISO 7510 and shall be declared by the supplier.

4.2.5 Elastomers

Each elastomeric material of the sealing component shall conform to the applicable requirements of BRL K17504 (class 1).

The supplier shall prove the proper mounting of the elastomeric seal and the GRP component(s) by means of drawings detailing all the dimensions and tolerances of the components.

4.2.6 Locking key

The locking key of the rigid locked joint with elastomeric sealing ring shall be made of a pressure and shear resistant material e.g., polyvinylchloride, polyamide or of an equivalent material . In the latter case the equivalency shall be proved, either by documentation or by testing.

4.2.7 Metals

Where metal components are used, there shall be no evidence of corrosion of the components after the fitting has been immersed in an aqueous sodium chloride solution, 30 g/l for seven days at $(23 \pm 2) ^\circ\text{C}$.

4.3 Design of the GRP piping system

4.3.1 General

The GRP piping system is to be designed for a life time expectancy of at least 50 years and at specified nominal pressure and temperature profile within the application. The piping system shall remain (water)tight and therefore the requirements of § 5.2 apply.

Aside from recording the raw materials to be used (see § 4.1), the design shall specify the diameters with their respective wall thicknesses of the products to be certified and records of other relevant geometrical characteristics. In case rubber sealants are used, then the type of rubber(s) is(are) to be specified along with the hardness and dimensions of the rubber seals. The rubber sealing elements shall be certified in accordance with Kiwa BRL K17504.

4.3.2 Demonstration of the soundness of the GRP piping system design

The supplier shall demonstrate to the certification body that the design and manufacturing of pipes, fittings and arrangements for the joints are in accordance with relevant design practices that results in a mechanical performance of the fitting or joint equal to or greater than that of a straight GRP-UP pipe of the same pressure and stiffness rating when installed in a piping system and, if appropriate, supported by anchor blocks or encasements.

The quality management system of the supplier shall document the procedures for designing and manufacturing the pipes, fittings and joints. It shall also include the results of testing programs to verify performance and establish the range for which the test results are applicable and the validity of the design procedures and their applicability across the product range.

It is likely that multiple tests will be required to qualify the full range of PN and DN for any given combination of fitting or joint configuration and loading condition and these results shall be documented as part of the quality management system.

The quality management system shall document the fabricated fitting and joint design procedures including materials, material properties, sequence of attaching and reinforcing layups, the process for applying layups and quality control procedures during and after fabrication for the entire range of fittings produced.

Remark: The soundness of the design procedure can be demonstrated by means of a (validated) calculation program.

In order to keep the total test burden within acceptable limits but at the same time to control the use of test data beyond their limits of application, the concept of Type Test Groups is used in this BRL. The supplier shall declare its Type Test Groups in his quality plan, see also § 8.2.

4.3.3 Classification of the GRP piping system design

The designed GRP piping system shall be classified according to nominal size (DN) and nominal pressure (PN) and joint type (e.g. flexible joint, rigid joint) according to EN-ISO 23856.

In addition, pipes shall include nominal stiffness (SN) in their classification (see Table 2).

Table 2 – Nominal stiffness class (SN)

Nominal Stiffness Class (SN) N/m ²	Nominal Stiffness Class (SN) N/m ²
630	5000
1250	10000
2500	-

Remarks:

- Nominal stiffness classes higher than 10000 N/m² can be required in special piping systems like casings for wells subject to external load and/or offshore piping subject to possible large water heads, piping systems under runways of airports.
- In Europe it is common practice to classify stiffness on the basis of the initial stiffness.

The nominal pressure (PN) shall conform to one of those given in Table 3.

Table 3 – Nominal pressure class (PN)

Nominal Pressure Class (PN) bar	Nominal Pressure Class (PN) bar
1	12,5
2,5	16
4	20
6	25
8	32
10	-

Remark: Components marked PN 1 are non-pressure (gravity) components.

4.3.4 Wall construction design

The wall construction of the products consists of:

- inner layer (liner);
- structural layer;
- outer layer;

and shall consist of the following constituents in the individual layers, when appropriate:

- glass fibre reinforcement;
- thermosetting polyester resin;
- fillers;
- Aggregates.

The wall construction (the sequence and composition of the individual layers comprising the pipe or fitting) shall be documented by the supplier. The supplier shall translate the product design into detailed process specifications in order to control the amount and placement of material components.

The specifications of the constituents and semi-finished products shall be part of the IQC scheme of the supplier.

The minimum total wall thickness, including the inner layer, shall be declared by the supplier and shall not be less than 3 mm.

The inner, structural and outer layer shall comply with the requirements of EN-ISO 23856.

4.3.5 Structural design of fitting

The structural design of a fitting shall be demonstrated according to ISO 18851.

The required test parameters are set by the standard and make reference to this international standard, i.e. EN-ISO 23856.

4.4 Processing instructions

The raw materials, materials and semi-finished products employed shall be applied/processed in accordance with the corresponding processing instructions and / or application conditions.

5 Requirements for the GRP piping system

5.1 General

This chapter details the requirements pertaining to the performance of the GRP piping system in its application as well as the test methods to evaluate whether these requirements are met.

The nominal sizes including their classification (nominal pressure(s) and nominal stiffness(es)), the temperature profile and the parts to be used, are recorded in the Kiwa technical-approval-with-product certificate.

5.2 Requirements and test methods for the joints

5.2.1 General

For the connections of the GRP piping system, the following types of joints, with or without end load, can be used:

- 1) Socket-and-spigot (either integral with pipe or sleeve coupling) or mechanical joint;
- 2) Locked socket and spigot joint;
- 3) Cemented or wrapped joint;
- 4) Bolted flange joint.

Rubber sealing elements may be used as part of the joints, see also § 5.3.

A specification of the jointing types shall be recorded in the Kiwa technical-approval-with-product certificate.

5.2.2 Joint requirements

Joint performance shall conform to the requirements of chapter 7 of EN-ISO 23856.

A summary of tests required for the various types of joints is given in Table 4.

Table 4 – Summary of tests required for various types of joints

Joint type / standard	Properties to be tested	
Flexible non-end-load-bearing joints with elastomeric sealing rings. (ISO 8639)	Initial leakage – initial pressure	
	External pressure differential – negative pressure	
	Misalignment and draw	Positive static pressure
		Positive cyclic pressure
	Angular deflection and draw	Initial pressure
Positive static pressure		
Flexible end-load-bearing joints with elastomeric sealing rings. (ISO 7432)	Initial leakage – initial pressure	
	External pressure differential	Maintained pressure
		Positive cyclic pressure
	Short duration resistance – Maintained pressure	
	Resistance to bending	Preliminary hydrostatic pressure
Maintained hydrostatic pressure		
Wrapped or cemented joints. (ISO 8533)	Internal leakage – initial pressure	
	External pressure differential – negative pressure	
	Resistance to bending and pressure	Preliminary pressure
		Maintained pressure
		Positive cycling pressure
Short duration resistance – maintained pressure		
Bolted flange joints. (ISO 8483)	Initial leakage – initial pressure	
	External pressure differential – negative pressure	
	Resistance to bending and pressure	Preliminary pressure
		Maintained pressure
	Resistance to internal pressure	Maintained pressure
		Positive cyclic pressure
Short duration resistance – maintained pressure		

5.3 Retention of the elastomeric sealing element

If elastomeric sealing elements are used, their retention in the socket shall be assessed as follows:

The elastomeric sealing element is mounted inside the socket in accordance with the manufacturer's instructions. The spigot end of a pipe is then inserted into the socket without taking any measures to centre the pipe. The pipe shall have a length of at least 3 meters. It shall be possible to insert the pipe into the socket without displacing the elastomeric sealing element out of the groove.

5.4 Installation instructions

The supplier shall provide installation instructions in the Dutch and/or English language. The instructions shall contain specific information regarding the storage, safety, transport, processing temperature, construction of the joints and specific installation guidelines. These aspects are checked by Kiwa. A reference to the installation instructions is made in the Kiwa technical-approval-with-product certificate.

5.5 Initial investigation and periodic assessment

The GRP piping system to be certified shall undergo an initial investigation in order to assess whether the performance requirements detailed in this chapter are met. After certification the GRP piping system shall also be subject to periodic assessments. Both the initial investigation and the periodic assessments are detailed in the investigation matrix of § 8.8 (Table 8).

6 Requirements for the GRP products

6.1 General

This chapter covers requirements for the products (pipes, fittings and couplings) as well as the test methods and the acceptance criteria for these requirements.

In case that a specific property or specification is applicable to the product certificate, it will be stated as such in the clause.

The pipes, fittings and couplings are produced from unsaturated polyester resin (UP). The piping system can consist of pipes and fittings only i.e. without couplings or pipes and couplings only i.e. without fittings.

A specification of the applicable nominal sizes, the classification (nominal pressure(s) and nominal stiffness(es)) shall be included in the Kiwa product certificate.

6.2 Regulatory requirements

6.2.1 Requirements to avoid deterioration of the quality of drinking water

Products and materials which (may) come into contact with drinking water or warm tap water, shall not release substances in quantities which can be harmful to the health of the consumer, or negatively affect the quality of the drinking water. Therefore, the products or materials shall meet toxicological, microbiological and organoleptic requirements as laid down in the currently applicable "Ministerial Regulation materials and chemicals drinking water and warm tap water supply", (published in the Government Gazette). Consequently, the procedure for obtaining a recognised quality declaration, as specified in the currently effective Regulation, has to be concluded with positive results.

Products and materials with a quality declaration, e.g. issued by a foreign certification institute, are allowed to be used in the Netherlands, provided that the Minister has declared this quality declaration equivalent to the quality declaration as meant in the Regulation.

6.3 Elapsed or extrapolated time for determination of the long-term properties, (x)

The subscript x, in for example $S_{x,wet}$, denotes the elapsed or extrapolated time for which the long-term property is to be determined. Unless otherwise specified, the long-term properties shall be determined at 50 years (438 000 h).

6.4 Temperature effects

When properties are determined at $(23 \pm 5) ^\circ\text{C}$ their values are applicable to products used at temperatures up to, and including, $35 ^\circ\text{C}$. For service temperatures over $35 ^\circ\text{C}$ type tests have to be carried out, at least at the design service temperature $+5/0 ^\circ\text{C}$, to establish re-rating factors for all properties used in design.

6.5 Requirements and test methods for pipes

6.5.1 General

The pipes shall conform to the requirements of chapter 5 of EN-ISO 23856.

6.5.2 Appearance of pipes

Both internal and external surfaces shall be free from irregularities, which can impair the ability of the component to conform to the requirements of this BRL.

The supplier shall demonstrate which irregularities are allowable defects, repairable defects, and defects which shall impair the ability of the component to conform to the requirements of this BRL.

Remark: Classifying visual defects in glass-reinforced plastics laminate parts could be carried out according to ASTM D 2563-08.

6.5.3 Geometrical characteristics

6.5.3.1 Determination of dimensions

Measurements shall be made in accordance with § 5.2 of EN-ISO 23856.

6.5.3.2 Diameter

The diameter of the GRP-UP pipes shall be designated by nominal size (DN) in accordance with one of the following two series listed in EN-ISO 23856:

- **Series A** - which specifies the internal diameters in millimetres (mm), DN-ID;
- **Series B** - which specifies the external diameters in millimetres (mm), DN-OD.

Note: In standardising the diameters of (GRP-UP) pipes, difficulties are encountered because of the varying methods of manufacture (e.g. filament winding, centrifugal casting or contact moulding). GRP-UP pipes are typically produced by controlling either the internal diameter, or the external diameter to a fixed value.

Tolerances on the internal diameter or external diameter shall conform to EN-ISO 23856.

6.5.3.3 Total wall thickness

The minimum total wall thickness, including the inner layer, shall be declared by the supplier and shall not be less than 3 mm.

The wall construction comprises an:

- inner layer;
- structural layer;
- outer layer.

The inner layer shall comprise one of the following:

- a thermosetting resin layer with or without aggregates or fillers and with or without reinforcement of glass or synthetic filaments;
- a thermoplastic liner.

The wall construction shall be declared by the supplier.

6.5.3.4 Thickness of structural layer (e_{eff}) and inner and outer layers

The thickness, including tolerances, of the structural layer (and when applicable its individual layers), inner and outer layer shall be declared by the supplier and shall be determined as follows. Cut a piece of cross section from the pipe (or fitting) and measure the thicknesses of the separate layers using a magnifying glass with a minimum magnification of seven and an accuracy of 0,1 mm.

Alternatively, the supplier may use its own test procedure. The test procedure shall be approved by the certification body and shall be implemented in the supplier's quality system (IQC scheme).

6.5.3.5 Winding angle

When applicable, the winding angle of the pipes, including tolerance(s), for each type is recorded in the quality system of the supplier.

The winding angle is determined using a representative glass filament and the following equation:

$$\tan \omega = a/b$$

where:

a is the outside circumference of the pipe

b is the pitch of the winding

6.5.3.6 Length

The pipe shall conform to the requirements of § 5.2.3 of EN-ISO 23856.

6.5.3.7 Sockets and spigots formed at the pipe or formed on the pipe end provided with an elastomeric sealing

The socket-spigot joint may be end-load bearing or not end-load bearing, depending on the practical situation. The dimensions and tolerances of the socket, the spigot, sealing element and locking key shall be recorded on drawings.

6.5.3.7.1 Out-of-roundness of the socket with end-load bearing joint with elastomeric sealing element

Measure at one cross-section, at the place where the elastomeric sealing is located, the largest and the smallest internal diameter.

In any cross-section of the socket, the difference between the largest and smallest internal diameter may not exceed 0,007 times the average inner diameter d_i .

6.5.3.7.2 Out-of-roundness of the socket with not end-load bearing joint with elastomeric sealing element

Measure at one cross-section, at the place where the elastomeric sealing is located, the largest and the smallest internal diameter at maximum draw.

In any cross-section of the socket, the difference between the largest and smallest internal diameter may not exceed 0,007 times the average inner diameter d_i .

Remark: Maximum draw (i.e. total draw) of flexible joints means: the maximum permissible displacement of the spigot in the socket, whereby the leak tightness is maintained.

6.5.3.7.3 Out-of-roundness of the spigot for elastomeric sealing elements

Measure at the groove for the elastomeric sealing the largest and the smallest external diameter and determine from this the out-of-roundness.

In any cross-section of the spigot, the difference between the largest and smallest external diameter may not exceed 0,007 times the average outer diameter d_u .

6.5.3.8 Sockets and spigots formed on the pipe for the purpose of bonded joints

The dimensions and tolerances of the internal diameter of the socket, external diameter of the spigot, insertion depth and conical shape, as well as the dimensions of the socket and spigot shall be recorded on drawings.

6.5.3.8.1 Out-of-roundness of the spigot

At midway of the spigot the difference between the largest and the smallest measured external diameter shall not exceed 0,007 times the average outer diameter d_u .

6.5.3.8.2 Out-of-roundness of the socket

The socket is always manufactured at the factory and the tolerances of the dimensions, among which the out-of-roundness, shall be recorded on drawings, taking into account the volume that could be taken by the adhesive making the connection.

In any cross-section of the socket, the difference between the largest and smallest external diameter may not exceed 0,007 times the average inner diameter d_u .

6.5.4 Material composition of the pipe

See § 4.2.4 of this BRL.

6.5.5 Mechanical characteristics

In Table 5 the required mechanical characteristics of a pipe are listed.

Table 5 – Mechanical characteristics: test method and requirement

Characteristic	Test method	Requirement
Initial ring stiffness	ISO 7685	Declaration of nominal stiffness (SN)
Long-term ring stiffness under wet conditions and calculation of the wet creep factor	ISO 10468	As stated in § 5.3.2 of EN-ISO 23856:
Resistance to initial ring deflection	ISO 10466	As stated in § 5.3.3 of EN-ISO 23856.
Long-term resistance to ring deflection under wet conditions	ISO 10471	As stated in § 5.3.4 of EN-ISO 23856.
Initial longitudinal tensile strength	ISO 8513, method A or B	As stated in § 5.3.5 of EN-ISO 23856.
Initial failure pressure	ISO 8521, method A, B, C, D, E or F	As stated in § 5.3.6 of EN-ISO 23856.

Characteristic	Test method	Requirement
Long-term resistance to failure pressure. Extrapolation procedure.	ISO 7509 ISO 10928	As stated in § 5.3.7 of EN-ISO 23856.

The tests listed in Table 5 shall be performed and evaluated according to § 5.3 of EN-ISO 23856.

6.6 Requirements and test methods for fittings and couplings

6.6.1 General

Fittings and couplings shall comply with the requirements of chapter 6 of EN-ISO 23856.

6.6.2 Dimensions and tolerances

The relevant dimensions (i.e. diameter, angle, radius, length, laying length, body length, concentric/eccentric, wall thickness, etc.) and tolerances of fittings shall conform to the appropriate requirements according to chapter 6 of EN-ISO 23856.

Dimensions and tolerances shall be specified in drawings.

6.7 Protection of products during storage and transport

The products shall be protected during storage and transport to prevent contamination of all product-parts intended to be in contact with drinking water.

See for information Annex III.

6.8 Marking of the products

6.8.1 General

Marking details shall be printed or formed directly on the pipe in such a way that the marking does not initiate cracks or other types of failure. If printing is used, the colouring of the printed information shall differ from the basic colouring of the product and such that the markings shall be readable without magnification.

Marking of pipes

For pipes up to DN 600, the marking shall be on the outside of each pipe. For pipes with DN 600 or greater the marking shall be either on the inside or on the outside surface of the pipes and shall comply with § 5.5 of

EN-ISO 23856 as well as the following shall be applied to the products:

- Number of this BRL, i.e. BRL K17605 or EN-ISO 23856.
- Certificate number.

Marking of fittings (including couplings)

Marking details shall be printed or formed directly on the fitting and/or coupling in such a way that the marking does not initiate cracks or other types of failure. If printing is used, the colouring of the printed information shall differ from the basic colouring of the product and such that the markings shall be readable without magnification.


The marking details shall be on the outside of each product and comply with § 6.7 of EN-ISO 23856 as well as the following shall be applied to the products:

- Number of this BRL, i.e. BRL K17605 or EN-ISO 23856.
- Number of the technical-approval-with product certificate.

Remark: Pipe is supplied by the factory with a coupling installed on one end. Pipe and coupling may also be supplied separately upon request.

6.8.2 Certification mark

After concluding a Kiwa certification agreement the certified products shall, beside the marks indicated in clause 6.9.1, be indelible marked with:

- the certification mark: KIWA 

6.9 Initial investigation and periodic assessment

The GRP piping system to be certified shall undergo an initial investigation in order to assess whether the performance requirements detailed in this chapter are met. After certification, the GRP

piping system shall also be subject to periodic assessments. Both the initial investigation and the periodic assessments are detailed in the test matrix of § 8.8 (Table 8).

7 Requirements in respect of the quality system

This chapter contains the requirements which shall be met by the supplier's quality system.

7.1 Manager of the quality system

The supplier shall appoint a Quality Systems Manager who shall report directly to the director.

7.2 Internal quality control/quality plan

The supplier shall have an internal quality control scheme (IQC scheme) which has been implemented within the organisation. The following shall be demonstrably recorded in this IQC scheme:

- the aspects that are checked by the supplier;
- the methods used to perform such inspections;
- the frequency of these inspections;
- the manner of recording and archiving the inspection results.

This IQC scheme shall be in the format of the model IQC scheme as included in Annex II.

The manufacturer shall describe in his quality plan the limits used to define a batch for testing purposes. Typically, a quality control batch consists of products of a particular diameter, stiffness class and pressure class.

A batch may be released for supply when all the relevant Batch Release Tests (BRT's) and inspections have been carried out and the requirements have been met. If one or more items fail one or more tests or inspections, then the retest procedures detailed in CEN/TS 14632 shall be used.

The manufacturer shall detail in his quality plan a Process Verification Test (PVT) procedure and the frequency with which they are carried out. The frequency of these tests shall complement the frequency of audit tests (AT), if applicable – see § 8.4. The manufacturer shall detail in his IQC-scheme the laboratory conditions (e.g. temperature and relative humidity) at which BRT's and PVT's shall be carried out.

Note: The purpose of PVT tests is to assess the conformity of the long-term properties of the product.

7.3 Control of test and measuring equipment

The supplier shall verify the availability of necessary test and measuring equipment for demonstrating product conformity with the requirements in this BRL.

When required the equipment shall be calibrated periodically. The calibration status of each equipment shall be traceable by means of a unique identification number.

The supplier shall keep records of the calibration results.

If the equipment is out of calibration then the supplier shall review the validity of the data previously recorded by that equipment.

7.4 Procedures and working instructions

The supplier shall be able to submit the following:

- procedures for:
 - dealing with products showing deviations;
 - corrective actions to be taken if non-conformities are found;
 - dealing with complaints about products and/or services delivered;
- the working instructions and inspection forms used.

7.5 Competence of personnel

The supplier shall include in his quality plan the education, training and/or work experience of the personnel involved in the production of the certified products.

It is recommended to demonstrate competence of the laminators by certifying them in accordance with:

- EN-ISO/IEC 17024 or;
- DVS 2220 or;
- EN-ISO 9001, § 6.2.

8 Summary of tests and inspections (assessment of conformity)

8.1 General

This chapter contains a summary of the tests and inspections to be carried out in the event of certification:

- **Pre-certification:** the investigation necessary to determine whether all requirements of the BRL are fulfilled;
- **Inspection visit:** the surveillance inspections carried out after issue of the certificate to ensure that the certified products continuously fulfil the requirements of this BRL. The inspections are carried out by Kiwa according to the indicated frequency;
- **Inspection of the quality system of the supplier:** inspection with regard to the correct implementation of the IQC-scheme and procedures.

The conformity assessment shall comply with CEN/TS 14632.

The manufacturer shall describe in his quality plan and IQC scheme all relevant procedures relating to BRT and PVT.

8.2 Type test groups

A type test (TT) group consists of a range or family of products made such that the results of the long-term type tests are applicable to all products in the group. A pipe type test group for example shall contain products:

- manufactured by the same process;
- with the same material specifications;
- with the same pipe wall construction (i.e. the sequence of layers, layer compositions, material properties);
- design method;
- tested with the same loading condition (end load bearing or not end load bearing).

The quality management system shall document all process details that could influence type test performance. The quality management system shall document the complete product design method and demonstrate how the results of the type tests are used to establish product designs and pipe type test groups.

8.3 Reference conditions for TT and AT

The reference conditions for type testing and audit testing, such as:

- 1) temperature;
- 2) properties of the water for testing;
- 3) loading conditions;
- 4) pre-conditioning;
- 5) measurements of dimensions;

shall be in conformance with the requirements listed in EN-ISO 23856, § 4.5.

8.4 Audit testing

Those characteristics specified in CEN/TS 14632:2012, § 6.3 shall be audit tested at the given minimum sampling frequency.

8.5 Quality control tests

The supplier shall describe in his quality plan the limits used to define a batch for testing purposes. For details see CEN/TS 14632:2012, § 6.4.

8.6 Assessment of conformity

For the assessment of conformity the required test pieces shall be manufactured by the supplier (certificate holder) using the same manufacturing process, raw material formulation and design conditions as used during the normal manufacturing process.

It is not allowed to manufacture the test pieces for the assessment of conformity at different production locations.

8.7 Product changes / production technique changes

8.7.1 General

To determine the effect of e.g. a product change or change in production technique (process), the required test pieces may be manufactured at various production locations provided that:

- the manufacture process;
- raw material formulation;
- design of the test piece;

at the various production locations is the same.

Table 6 details the tests to be performed in case of a material change.

The supplier may propose changes that could affect the quality of the certified products to Kiwa for approval. Only after Kiwa has demonstrably approved such changes may these changes be implemented by the supplier.

Remark: Definitions of changes in material, design and process are listed in CEN/TS 14632 Annex B.

The effects of changes shall be determined according to CEN/TS 14632:2012, Annex C.

Table 6 – Test to be performed for material changes

Property to be tested	Standard	Clause of BRL
Amount of constituents (material composition)	ISO 7510	§ 8.7.2.1
Initial specific ring stiffness	ISO 7685	§ 8.7.2.2
Initial resistance to ring deflection	ISO 10466	§ 8.7.2.3
Initial failure pressure	ISO 8521	§ 8.7.2.4
RLTT resistance to failure pressure	ISO 7509	§ 8.7.2.5
RLTT creep under wet conditions	ISO 10468	CEN/TS 14632, Annex D

Tests to be performed to changes in design, process or joint materials are listed in Table 7.

Table 7 – Test to be performed for changes in design, process and joint materials

Property to be tested	Standard	Clause of BRL
Amount of constituents (material composition)	ISO 7510	§ 8.7.2.1
Initial specific ring stiffness	ISO 7685	§ 8.7.2.2
Initial resistance to ring deflection	ISO 10466	§ 8.7.2.3
Initial failure pressure	ISO 8521	§ 8.7.2.4
RLTT resistance to failure pressure	ISO 7509	§ 8.7.2.5
Joint performance tests	CEN/TS 14632	§ 8.7.2.6

The proposed change shall be implemented only when the applicable requirements detailed in the BRL are fulfilled.

8.7.2 Test methods

8.7.2.1 Amount of constituents (material composition)

The resin, glass, aggregate and filler contents and the type and arrangement of the constituent glass layers shall be determined according to ISO 7510.

A difference of more than 10% between the results before and after the proposed change, requires a new product investigation of the product or type test, whichever is applicable, to be carried out. The results before the change refer to the declared values.

8.7.2.2 Initial specific ring stiffness

The initial specific ring stiffness shall be determined in accordance with ISO 7685 and shall not be less than the declared SN classification.

8.7.2.3 Initial resistance to ring deflection

The initial resistance to ring deflection shall be determined in accordance with ISO 10466 and shall fulfil the requirements of EN-ISO 23856 clause “Initial resistance to failure in a deflected condition”. This means that after testing the test pieces shall be free from bore cracks and are without structural failure: i.e. interlaminar separation, tensile failure of the glass fibre reinforcement, buckling of the pipe wall and if applicable, separation of the thermoplastic liner from the structural wall.

The results shall be evaluated in accordance with CEN/TS 14632.

8.7.2.4 Initial failure pressure

The initial circumferential tensile wall strength shall be determined according to ISO 8521.

The results shall be evaluated in accordance with CEN/TS 14632.

8.7.2.5 RLTT resistance to failure pressure

The RLTT shall be carried out on six test pieces according to ISO 7509.

The internal pressure levels shall be selected from the relevant pressure design curve derived in accordance with the relevant procedures described in ISO 10928 for the following expected times to failure: 100 h, 600 h and 2 000 h.

Two test pieces shall be tested at each of the three determined pressures.

The results shall be evaluated in accordance with CEN/TS 14632, Annex D.3.

8.7.2.6 Joint performance tests

Joint performance shall comply with CEN/TS 14632, § 6.2.3.

8.8 Investigation matrix for type testing and inspections

During the pre-certification, type tests shall be performed to determine whether the product meets the specified performance and product requirements. The requirements that shall be fulfilled in order to qualify for certification are listed in , in the column pre-certification of Table 8. After certification Kiwa shall periodically inspect the manufacturer for compliance with this BRL.

In case the product or production process changes significantly, the performance requirements must be determined once again as listed in § 8.5.

Table 8 – Investigation matrix

Description of requirement	Clause BRL	Tests within the scope of:		
		Pre-certification	Surveillance by CB after issue of the certificate	
			inspection	Frequency
Requirements imposed on the materials and the design of the GRP piping system				
General	4.1	x	x	1 / year
Materials	4.2	x	x ^{a)}	1 / year
Design of the GRP piping system	4.3	x	x ^{a)}	1 / year
Type test groups	8.2	x	x ^{a)}	1 / year
Reference conditions for TT and AT	8.3	x	x ^{a)}	1 / year
Reference conditions for BRT and PVT	8.3	x	x ^{a)}	1 / year
Processing instructions	4.4	x	x	1 / year
Requirements imposed on the GRP piping system				
General	5.1	x		
Requirements and test methods for the joints	5.2	x	x ^{b)}	1 / 5 years
Retention of the elastomeric sealing element	5.3	x		
Installation instructions	5.4	x	x	1 / year
Requirements imposed on the GRP products				
General	6.1	x		
Requirements to avoid deterioration of the quality of drinking water	6.2.1	x	x	1 / year
Elapsed or extrapolated time for determination of the long-term properties, (x)	6.3	x		
Temperature effects	6.4	x		
Requirements and test methods for pipes	6.5	x	x ^{c)}	1 / 5 years
Requirements and test methods for fittings and couplings	6.6	x		
Protection of products during storage and transport	6.7	x	x	1 / year
Marking of the products	6.8	x	x	1 / year
Requirements in respect of the quality system				
Manager of the quality system	7.1	x	x	1 / year
Internal quality control/quality plan	7.2	x	x	1 / year
Control of test and measuring equipment	7.3	x	x	1 / year
Procedures and working instructions	7.4	x	x	1 / year
Competence of personnel	7.5	x	x	1 / year

- a) Requirement is compared with the for this aspect ascertained values that are listed in the supplier's IQC scheme.
- b) Requirement that is part of audit testing in accordance with § 8.4.
- c) Requirement that is part of audit testing for the following aspects:
- i) Amount of constituents, § 8.7.2.1;
 - ii) Creep under wet condition (RLTT), CEN/TS 14632, Annex D;
 - iii) Resistance to ring deflection (RLTT), CEN/TS 14632, Annex D;
 - iv) Long term failure pressure (RLTT), § 8.7.2.5;

Remark:

Reduced long-term type tests (RLTT) as detailed in CEN/TS 14632 may be used for satisfying the relevant audit test requirements, as well as proving that products still conform to the original specifications. Reduced long-term tests can thus be used as a comparison with existing long-term data, but not as a basis for a new design.

8.9 Inspection of the quality system

The quality system shall be assessed by Kiwa on the basis of the IQC scheme.

The inspection contains at least those aspects mentioned in the Kiwa Regulations for Product certification. See also Chapter 7.

9 Agreements on the implementation of certification

9.1 General

Beside the requirements included in this BRL, the general rules for certification as included in the Kiwa Regulations for Product Certification shall also apply.

In particular these are:

- the general rules for conducting the pre-certification tests, in particular:
 - the way suppliers are to be informed about how an application is being handled;
 - how the investigation is conducted;
 - the decision to be taken as a result of the pre-certification tests.
- the general rules for conducting inspections and the aspects to be audited,
- the measures to be taken by Kiwa in case of Non-Conformities,
- the measures taken by Kiwa 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 measures taken by Kiwa.

9.2 Certification staff

The staff involved in the certification may be categorized as follows:

- Certification assessor (**CAS**): responsible for carrying out the pre-certification tests and assessing the site assessors' reports;
- Site assessor (**SAS**): responsible for carrying out external inspections at the supplier's works;
- Decision maker (**DM**): responsible for deciding whether the supplier can be certified on the basis of the pre-certification tests carried out and for continuing the certification based on the external inspections carried out and for taking decisions on the need for corrective actions.

9.2.1 Qualification requirements

The qualification requirements for all personnel of a certification body performing certification activities shall consist of:

- the requirements in accordance with EN-ISO/IEC 17065, and
- any extra qualification requirements set by the Board of Experts for the subject matter of this BRL

Education and experience of the certification personnel as detailed in Table 9 shall be recorded in a traceable manner.

Table 9 – Qualification requirements for certification personnel

Basic requirements	Evaluation criteria
Knowledge of company processes Requirements for conducting professional audits on products, processes, services, installations, design and management systems.	<i>Relevant experience: in the field</i> SAS, CAS : 1 year DM : 5 years inclusive 1 year with respect to certification Relevant technical knowledge and experience on the level of: SAS : High school CAS, DM : Bachelor
Competence for execution of site assessments. Adequate communication skills (e.g. reports, presentation skills and interviewing technique).	SAS : Kiwa Audit training or similar and 4 site assessments including 1 autonomous under review.
Execution of initial examination	CAS : 2 initial applications under review.
Execution of review	CAS : evaluation of 3 reviews

Technical competences	Evaluation Criteria
Education	General: Education in one of the following technical areas: • Engineering.
Relevant testing knowledge	General: • Training (general and scheme specific) including measuring techniques.
Experience - specific	CAS • 2 complete applications self-reliant (to be evaluated by PM) SAS • 2 inspection visits together with a qualified SAS
Skills in performing witnessing	SAS Internal training witness testing

Legenda:

- Certification assessor (**CAS**)
- Decision maker (**DM**)
- Product manager (**PM**)
- Site assessor (**SAS**)

9.3 Qualification

The qualification of the Certification staff shall be demonstrated by means of assessing the education and experience in accordance with the above mentioned requirements. In case staff is to be qualified on the basis of deflecting criteria, written records shall be kept.

The authority to qualify staff rests with the:

- **PM**: qualification of **CAS** and **SAS**;
- management of the certification body: qualification of **DM**.

9.4 Report initial investigation

The certification body records the results of the initial investigation in a report. This report shall comply with the following requirements:

- completeness: the report provides conclusions on all requirements included in the BRL;
- traceability: the findings on which the conclusions have been based shall be recorded and traceable;
- basis for decision: the **DM** shall be able to base his decision on the findings included in the report.

9.5 Decision for granting the certificate

The decision for granting the certificate shall be made by a qualified Decision maker who has not been involved in the pre-certification tests. The decision shall be recorded in a traceable manner.

9.6 Layout of quality declaration

The product certificate shall be in accordance with the model included in Annex I.

9.7 Nature and frequency of third party audits

The certification body shall carry out inspection audits to ensure that the supplier complies with his obligations. The Board of Experts decides on the inspection frequency to be observed.

When this BRL came into effect, the frequency was determined at two inspection audits on site per year for suppliers with a quality management system certified in accordance with EN-ISO 9001 for their production and where the IQC scheme forms an integral part of the quality management system.

In case the production of the supplier is not certified according to EN-ISO 9001, the frequency of the inspection audits on site shall be increased to three per year.

The audit program on site shall cover at least:

- the product requirements;
- the production process;
- the suppliers IQC scheme and the results obtained from inspections carried out by the supplier;
- the correct way of marking certified products;
- compliance with required procedures;
- handling complaints about products delivered.

For suppliers with a private label certificate the frequency of inspection audits amounts to one audit per year. These audits are conducted at the site of the private label certificate holder and focusses on the extra aspects inserted in the IQC scheme and the results of the control performed by the private label holder. The IQC scheme of the private label holder shall refer to at least:

- the correct way of marking of the certified products;
- compliance with required procedures for receiving and final inspection;
- the storage of products and goods;
- handling complaints.

The results of each audit shall be recorded by Kiwa in a traceable manner in a report.

9.8 Non conformities

When the certification requirements are not met, measures are taken by Kiwa in accordance with the sanctions policy as written in the Kiwa Regulation for Certification.

9.9 Report to the Board of Experts

De certification body shall report annually to the Board of Experts regarding the certification activities performed with regard to the certificates based on this BRL. In this report the following aspects are included:

- mutations in number of issued certificates (granted/withdrawn);
- number of inspection audits executed in relation to the required minimum;
- results of the inspections;
- required measures for established non-conformities;
- complaints received about certified products.

9.10 Interpretation of requirements

The Board of Experts may record the interpretation of requirements of this BRL in a separate interpretation document.

10 Titles of standards

10.1 Public legislation

Dutch Government Gazette (“Staatscourant”) dated 1 July 2017	Regulation on materials and chemicals drinking water and warm tap water supply (“Materialen en Chemicaliën drink-en warm tapwatervoorziening”)
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10.2 Standards / normative documents

Standard	Title
ASTM D 2563 08:2015	Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.
BRL K17504:2018	Vulcanised rubber products for cold and hot drinking water applications
CEN/TS 14632:2012	Plastics piping systems for drainage, sewerage and water supply, pressure and non-pressure – Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) – Guidance for the assessment of conformity
DVS 2220 *	Qualification testing of plastics laminators and adhesive bonders. Laminates as well as laminate and adhesive-bonded joints between GFRPs (UP-GF and EP-GF).
EN 1447:2009+A1:2010	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes – Determination of long-term resistance to internal pressure
EN-ISO 75-2:2013	Plastics – Determination of temperature of deflection under load – Part 2: Plastics and ebonite.
EN-ISO 9001:2015	Quality management systems - Requirements
EN-ISO 23856:2021	Plastics piping systems for pressure and non-pressure water supply, drainage or sewerage - Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin
EN-ISO/IEC 17020:2012	Conformity assessment – General criteria for the operation of various types of bodies performing inspection.
EN-ISO/IEC 17021-1:2015	Conformity assessment – Requirements for bodies providing audit and certification of management systems – Part 1: Requirements
EN-ISO/IEC 17024:2012	Conformity assessment – General requirements for bodies operating certification of persons.
EN-ISO/IEC 17025:2018	General requirements for the competence of testing and calibration laboratories.
EN-ISO/IEC 17065:2012	Conformity assessment – Requirements for bodies certifying products, processes and services
ISO 7432:2021	Glass-reinforced thermosetting plastics (GRP) pipes and fittings – Test methods to prove the design of locked socket-and-spigot joints, including double-socket joints, with elastomeric seals.
ISO 7509:2015	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes – Determination of time to failure under sustained internal pressure
ISO 7510:2017	Plastics piping systems – Glass-reinforced plastics (GRP) components – Determination of the amounts of constituents.
ISO 7685:2019	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes – Determination of initial specific ring stiffness.
ISO 8483:2019	Glass-reinforced thermosetting plastics (GRP) pipes and fittings – Test methods to prove the design of bolted flange joints.

BRL-K17605 Plastics piping systems for water supply – Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP)

Standard	Title
ISO 8513:2016	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes – Determination of longitudinal tensile properties.
ISO 8521:2020	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes – Test methods for the determination of the apparent initial circumferential tensile strength.
ISO 8533:2019	Glass-reinforced thermosetting plastics (GRP) pipes and fittings – Test methods to prove the design of cemented or wrapped joints.
ISO 8639:2016	Glass-reinforced thermosetting plastics (GRP) pipes and fittings – Test methods for leaktightness and proof of structural design of flexible joints
ISO 10466:2021	Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) pipes – Test method to prove the resistance to initial ring deflection.
ISO 10468:2018	Glass-reinforced thermosetting plastics (GRP) pipes – Determination of the long-term specific ring creep stiffness under wet conditions and calculation of the wet creep factor.
ISO 10471:2018	Glass-reinforced thermosetting plastics (GRP) pipes – Determination of the long-term ultimate bending strain and the long-term ultimate relative ring deflection under wet conditions.
ISO 10928:2016	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes and fittings – Methods for regression analysis and their use.

* When no date of issue has been indicated, the latest version of the document is applicable

Annex I Model certificate (example)



Product certificate
KXXXXX/XX

Issued *yyyy-mm-dd*

Replaces

Page *1 of 1*

CERTIFICATE

Pipes and fittings made of glass-reinforced polyester for the transport of drinking water with or without pressure

STATEMENT BY KIWA

With this product certificate, issued in accordance with the Kiwa Regulations for Certification, Kiwa declares that legitimate confidence exists that the products supplied by

Name supplier

as specified in this product certificate and marked with the Kiwa[®]-mark in the manner as indicated in this technical approval-with-product certificate may, on delivery, be relied upon to comply with Kiwa evaluation guideline BRL-K17605 "Water supply with or without pressure - GRP based on unsaturated polyester resin" dated dd-mm-yyyy.

Within the framework of this technical approval-with-product certificate Kiwa does not impose any inspections with regard to the production of other parts of the plastics piping system, nor the manufacturing of the plastics piping system itself.

Ron Scheepers
Kiwa

Publication of this certificate is allowed.

Advice: consult www.kiwa.nl in order to ensure that this certificate is still valid.

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Company
Name supplier
Address supplier

T: Phone number
E: Email
I: [www.](http://www.kiwa.nl)



Certification process consists of initial and regular assessment of:

- quality system
- product

Annex II Model IQC-scheme (informative)

<p><u>IQC scheme</u> <u>INTERNAL QUALITY PLAN</u></p>	<p>Manufacturer / supplier : Production location address :</p>	<p>Number of appendices:</p>
<p><u>Field(s) of application</u> <u>According to BRL(s)</u></p>		
<p><u>Number of production shifts:</u></p>	<p><u>Quality manual, procedures and working instructions</u> Is the Quality Management System (QMS) certified according to EN-ISO 9001¹⁾? If yes, by which certification body: If yes, is the certification body accredited for the particular scope of certification? The following procedure for dealing with <u>complaints</u> applies: In case the QMS is not certified according to EN-ISO 9001:</p> <ul style="list-style-type: none"> • Working instructions, test instructions and procedures are documented as follows: • The following procedure for <u>nonconformity review</u> applies: 	
<p><u>Quality Control</u> Total number of employees in QC department : Number of QC-operators per shift : If no QC-inspections are carried out during night shifts, state the QC procedure(s)/instruction(s) to be followed: , documented in:</p>		
<p><u>Inspection and test records</u> All records shall be maintained for a minimum of years.</p>		
<p><u>Specific agreements/comments/explanations</u></p>		<p>Signature of the manufacturer/supplier: Date :</p>

¹⁾ In case the QMS is EN-ISO 9001 certified and covers the scope of the product certificate(s), reference to the applicable procedure(s) on the next pages is sufficient and the tables A till F do not have to be further filled-out except for the frequency of tests/inspections (to be approved by CB) in tables B, C and D.

A. Calibration of measuring and test equipment				
Applicable procedure(s) nr(s):				
Equipment to be calibrated	Calibration aspect	Calibration method	Calibration frequency	Calibration file (name and location)
B. Raw material and additives				
Applicable procedure(s) nr(s):				
B.1 Receipt				
For each delivery of raw material or additives data with respect to dates, manufacturers, types and quantities are recorded as follows:				
B.2 Entry control				
Type of raw material	Inspection aspect	Inspection method	Inspection frequency	Registration file (name and location)

C. Batch release tests per machine (including in-process and finished product testing) Applicable procedure(s) nr(s): Production process(es):				
Type of product	Type of test	Test method	Test frequency	Registration file (name and location)

Specific agreements/comments/explanations:

D. Process verification tests Applicable procedure(s) nr(s):				
Type of product	Type of test	Test method	Test frequency	Registration file (name and location)

E. Control of nonconforming and/or rejected products Applicable procedure(s) nr(s):				
E.1 Method of registration				
E.2 Method of identification				
E.3 Method of nonconformity review and disposition				

F. Inspection with regard to packaging, storage and transportation of the finished product Applicable procedure(s) nr(s):			
Inspection aspects	Inspection method	Inspection frequency	Registration file (name and location)
F.1 Packaging, storage and transport			

List of technical drawings			Appendix II Date:.....
Drawing title and number	Drawing date	Drawing title and number	Drawing date

Annex III Prevention of contamination (informative)

Products for transport of drinking water: Guidance for prevention of contamination during transport and storage

Importance of a hygienic operation

A hygienic operation is since decades an important issue for the transport and distribution of drinking water in the Netherlands.

The impact of pollution can have serious consequences for the water distribution¹⁾ (normally chlorine is not used) and require substantial efforts to clean the system.

The “guideline for installation of PVC-U piping systems” published in 1983, covers this aspect in chapter § 4.2: “Opslag’ van de ‘Richtlijnen voor de aanleg van hoofdleidingen van ongeplastificeerd polyvinylchloride (PVC) voor het transport van drinkwater”.

Also, the hygiene aspect is mentioned in the Dutch “Hygiëne code Drinkwater; Opslag, transport en distributie”, 2010, including manuals for installers.

As a result of the Hygienic code, a wide range of courses have been made available for the parties concerned (installers, personnel of water companies, etc.).

Last but not least the “Hygiëne code” is also mentioned in the drinking water legislation of 1 July 2011 and is therefore part of the Dutch law.

Protection of the used products

The ‘Hygiëne code Drinkwater; Opslag, transport en distributie” details the aspect of hygienic working. Here actions for all parts used such as pipes, fittings and valves in the complete system, from construction until operation are described.

The emphasis here is on “prevention”. Also, the preparation of the mains for the actual drinking water transport is important.

For all products coming from the production location, until installation in the drinking water system the same “preventive” measurements should be taken²⁾, in order to prevent pollution.

Therefore, manufacturers should implement a procedure in order to prevent the pollution of certified (drinking water) products during production, transport and storage.

Requirements for the protection of products

For all preventive (protective) actions taken to protect the products against pollution it is important that the protection will last for the complete process of storage, transport and again storage.

Remark:

¹⁾ mostly this is microbiological contamination coming from the surrounding area on macro- and micro scale (like dust, but also faeces and dead animals).

²⁾ “protection” is the combination of packaging and closing the pipe/fitting ends.

Protection requirements: General

The packaging used depends on the product itself (shape, dimensions, etc.).

Some packaging solutions are:

- a plastic bag (in a box) for small fittings (couplings, rings, rubber seals);
- Protection fill with inserted bubbles in combination with tape for big(ger) fittings;
- the combination of bags of GRP material or crimp-foil and the use of a box for smaller parts;
- endcaps of stern material of plastics bags for the pipe mouth (where the complete pipe package is wrapped in foil).

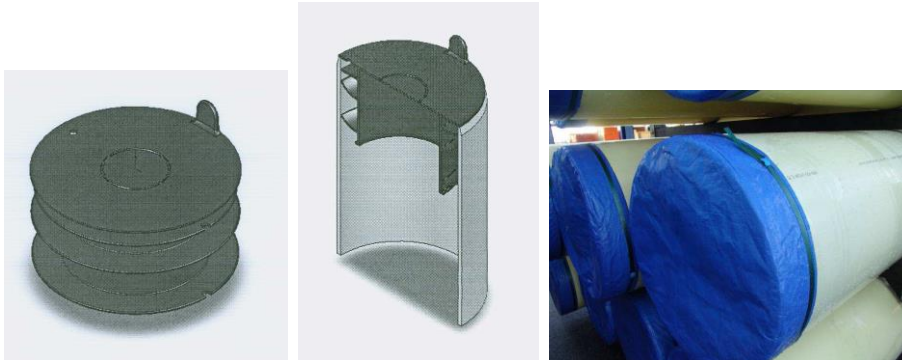
Protection requirements: Pipes

In 2007 representatives of the manufacturers of plastic pipes and the water companies, organized in the commission 'Onderhandelings Commissie Kunststoffen' (OCK), prepared guidelines to improve the packaging quality. This resulted in the following recommendations:

The end cap is unmovably fixed in the pipe by using flaps in a labyrinth structure that allows air to enter but prevents pollution.

The end cap is developed for a 110 mm PVC pipe but can also be developed for other diameters (50, 63, 75, 90, 160, 200 and 250 mm), and for all other pipe materials.

For the protection of the pipe ends for 315, 400, 500 and 630 mm PVC pipes a GRP foil with tape can be used (see the pictures below).



For smaller diameters this solution is not recommended.