

BRL 52204
8-06-2023

Assessment Directive

for the KOMO-(technical-approval-with) product certificate for

Plastics piping systems for drainage and sewerage with or without pressure – Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP)



Validated by the BoE on 10-03-2023

Accepted by the KOMO Quality and Review Committee (KKTC) on 18-05-2023

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Preface

This KOMO® Assessment Directive (BRL) has been drawn up by the Kiwa Board of Experts Leidingsystemen van Kunststof (LSK), in which the relevant parties in the field of plastics piping and fittings are represented. This Board also supervises the certification activities based on this BRL and where necessary requires this BRL to be revised. All references to the Board of Experts (BoE) in this BRL pertain to the above mentioned Board of Experts.

This BRL will be used by certification bodies who have a license agreement with the KOMO Foundation in connection with the established certification procedures. This BRL details the requirements an applicant or an existing holder of a KOMO certificate shall comply with, and the method employed by the evaluating certification body. The certification procedure established by the certification body includes a description of the working method as employed by the certification body in the implementation of:

- (pre)certification tests required for granting and renewing a KOMO product certificate based on the present BRL;
- periodic assessments for the maintenance of a previously issued product certificate based on the present 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 test methods set by the Board of Experts.

In the BRL the following parts have been changed:

- The arrangement of the chapters has been revised to comply with the new (Dutch) KOMO template;
- EN 14364 has been replaced by EN-ISO 23856 and therefore reference to the new standard EN-ISO 23856 is made, which includes the following major updates: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;
- In accordance with the latest updates of CEN/TS 14632, the following has been changed:
 - Resistance to abrasion is not applicable anymore and deleted from the BRL;

Resistance to chemical attack as audit test covers resistance to ring deflection under wet conditions and the latter is not applicable as an audit test anymore.

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1 Introduction, general provisions, and general requirements

1.1 Introduction

Based on the prerequisites specified in this KOMO® BRL, a KOMO® technical-approval-with-product certificate is issued with accompanying KOMO® product certificates. The KOMO® technical-approval-with-product certificate concerns plastics piping systems for drainage and sewerage with or without pressure – glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) and the accompanying KOMO® product certificates concern the products for drainage and sewerage with or without pressure – glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP). The (technical-approval-with-) product certificate enables the certificate holder to establish that an independent authorized certification body supervises the certificate holder's production and quality control processes and the quality of the product produced under certificate. Therefore, it may be assumed that the product has the characteristics as established in this BRL.

Certification bodies that have been accredited for this product scope by the Dutch Accreditation Council (or have applied for such accreditation) and have a license agreement with the KOMO® Foundation shall use the requirements of this BRL for processing an initial application and for the further maintenance of a KOMO® technical-approval-with-product certificate for plastic piping systems for drainage and sewerage with or without pressure – glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP).

In addition to the requirements of this BRL, certification bodies impose additional requirements concerning the general certification procedure detailed in their Regulations for Product Certification.

1.2 Scope and area of application

1.2.1 Scope

The subject of certification in relation to this BRL are underground piping systems made from reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP). The piping systems are intended to be used for the discharge of drainage water and sewerage with or without internal pressure. The piping systems to be certified consist of pipes and fittings.

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) Manufactured 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.

1.2.2 Field of application

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 drainage, sewerage, with or without pressure and is in agreement with the scope of EN-ISO 23856.

The BRL is applicable to pipes, fittings and their joints of nominal diameters from DN 100 to DN 4000, which are intended to be used for the conveyance of surface or sewage 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.

1.3 Validity

This version of the BRL replaces the version dated 2016-12-19. All KOMO® certificates that have been issued based on that version of the BRL will expire after six months of validation of this version of the BRL. New KOMO® (technical-approval-with-) product certificates based on the aforementioned previous version of this BRL may be issued at the very latest of three months after this version of the BRL is validated.



The validity of the KOMO® (technical-approval-with-)product certificate is in principle unlimited. Validity may be limited (terminated), among other reasons, due to:

- A revision of this BRL,
- Non-compliance by the certificate holder to meet his obligations.

1.4 Relation with Legislation and Rules and Regulations

1.4.1 European Construction Products Regulation (No. CPR, EU 305/2011)

There is no harmonized European standard applicable to the products referred to in this BRL.

1.5 Requirements to be imposed on conformity assessing institutions

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

- EN-ISO/IEC 17020 for inspection bodies;
- EN-ISO/IEC 17021-1 for certification bodies that certify management systems;
- EN-ISO/IEC 17025 for laboratories;
- EN-ISO/IEC 17065 for certification bodies certifying products, processes, and services.

This requirement is considered to be fulfilled when a certificate of accreditation can be submitted, issued either by the Board of Accreditation (RvA) or 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 submitted, the certification body shall itself assess whether accreditation criteria are fulfilled.

1.6 KOMO (technical-approval-with-) product certificate

Based on this BRL the following certificates can be issued:

- KOMO® technical-approval-with-product certificates, and
- KOMO® product certificates.

For the following systems a technical-approval-with-product certificate can be issued:

- GRP piping systems according to chapters 3, 4, 5 and 6 in which the GRP pipes and fittings are reviewed as a unique system in their combination.

For the following type of products a product certificate can be issued:

- GRP pipes according to § 3.1, § 3.2, § 3.4, § 5.1, § 5.2, § 5.3, § 5.4 and chapter 6;
- GRP fittings according to § 3.1, § 3.2, § 3.4, § 5.1, § 5.2, § 5.3, § 5.5 and chapter 6.

The (technical-approval-with-) product certificate to be issued shall be in accordance with the model (technical-approval-with-) product certificate as published for this version of the BRL on the KOMO website (www.komo.nl).

1.7 Markings of the products

Marking details shall be printed or formed directly on the products 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:

- KOMO® logotype or KOMO® word mark followed by the number of the KOMO® technical-approval-with-product certificate without specifying the version;
- Number of this BRL i.e. BRL 52204 or EN-ISO 23856.

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:

- KOMO® logotype or KOMO® word mark followed by the number of the KOMO® technical-approval-with-product certificate without specifying the version;
- Number of this BRL i.e. BRL 52204 or EN-ISO 23856.



The KOMO logo type shall be applied as follows:



The KOMO word mark shall be applied as follows:

KOMO®

After issuance of the KOMO® technical-approval-with-product certificate this KOMO® logo/KOMO® word mark may also be used by the certificate holder in public communications with regard to their certified activities, as specified in the "Rules and Regulations for the use of the KOMO® marks" as published on the KOMO® website.



2 Terminology

For an explanation of the terminology used in this BRL for certification, please go to the glossary on the website of the KOMO Foundation (www.komo.nl).

2.1 Terms and definitions

The terms and definitions according to chapter 3 of EN-ISO 23856 are applicable.

General terms and definitions are also provided on the KOMO website.

Further, in this BRL the following terms and definitions apply:

- **IQC scheme (IQC):** A description of the quality inspections carried out by the certificate holder as part of his quality system.
- **Certificate holder:** The party responsible for ensuring that the products continuously meet the requirements of this BRL.

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	Assessment Directive	Beoordelingsrichtlijn
BoE	Board of Experts	College van Deskundigen
CvD-LSK	Board of Experts – Plastic Piping Systems	College van Deskundigen – Leidingssystemen Kunststof
CB	Certification body	Certificatie instelling
RvA	Dutch accreditation council	Raad voor 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
	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



Abbreviation or symbol	Term	
	English	Dutch
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
$\alpha_{x,creep,wet}$	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
	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	Trekvast mof en spie-eind verbinding



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

3.1 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 piping system to be certified according to this BRL.

The raw materials and additives used in the production, shall comply with the requirements of § 3.2 and shall be recorded by the certificate holder in the design (see § 3.3) of the piping system, by means of a technical specification. The assessment of conformity to these requirements shall be done by the CB.

Each intended change to these parameters shall be reported to the CB 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 / certificate holder has more production locations, the applicant / certificate holder shall specify which production locations are to be certified.

3.2 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 and fitting may also incorporate aggregates.

3.2.1 Reinforcement

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

3.2.2 Resin

3.2.2.1 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.

3.2.2.2 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.

3.2.3 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.

3.2.4 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 certificate holder.

3.2.5 Elastomers

Each elastomeric material of the sealing component shall conform to the applicable requirements of BRL 2013 (class 1).

The certificate holder 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.

3.2.6 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.

3.2.7 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 ± 2) °C.



3.3 Design of the GRP piping system

3.3.1 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 § 4.2 apply.

Aside from recording the raw materials to be used (see § 3.1), 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 according to KOMO® assessment directive BRL 2013.

The conformity of the design to the requirements shall be done by the CB.

3.3.2 Demonstration of soundness of the GRP piping system design

The certificate holder 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 certificate holder 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 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 certificate holder shall declare its Type Test Groups in his quality plan, see also § 7.2.

3.3.3 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)	Nominal pressure class (PN)	Nominal pressure class (PN)
1	8	20
2,5	10	25
4	12,5	32
6	16	-



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

3.3.4 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 certificate holder. The certificate holder 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 certificate holder.

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

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

3.3.5 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.

3.4 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.

3.5 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 of 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 § 7.10 (Table 8).



4 Requirements for the GRP piping system

4.1 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 requirements are only applicable in relation to the KOMO® technical-approval-with-product certificate.

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

A specification of the applicable nominal sizes, the classification (nominal pressure(s) and nominal stiffness(es)), the temperature profile and the parts to be used, are recorded in the KOMO® technical-approval-with-product certificate.

4.2 Requirements and test methods for the joints

4.2.1 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 § 4.3.

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

4.2.2 Joint requirements

Joint performance shall conform to the requirements of § 7.2 and § 7.3 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	



Joint type / standard	Properties to be tested	
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		

The approved type(s) of joints shall be specified in the KOMO® technical-approval-with-product certificate.

4.3 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.

4.4 Installation instructions

The certificate holder 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 the CB. A reference to the installation instructions is made in the KOMO® technical-approval-with-product certificate.

4.5 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 test matrix of § 7.10 (Table 8).



5 Requirements for the GRP products

5.1 General

This chapter covers the 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 and fittings are produced from unsaturated polyester resin (UP). The piping system consists of pipes and fittings.

A specification of the applicable nominal sizes, the classification (nominal pressure(s) and nominal stiffness(es)) shall be included in the KOMO® (technical-approval-with-) product certificate.

The conformity of the previously mentioned to the requirements is to be determined by the CB.

5.2 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).

5.3 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.

5.4 Requirements and determination methods for pipes

5.4.1 General

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

5.4.2 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 certificate holder shall demonstrate to the CB 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.

5.4.3 Geometrical characteristics

5.4.3.1 Determination of dimensions

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

5.4.3.2 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 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.

The applicable pipe series and approved diameter range shall be specified in the KOMO® product certificate.

5.4.3.3 Total wall thickness

The minimum total wall thickness, including the inner layer, shall be declared by the certificate holder 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 certificate holder.

5.4.3.4 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 certificate holder and 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 certificate holder may use its own test procedure. The test procedure shall be approved by the certification body and shall be implemented in the certificate holder's quality system (IQC-scheme).

5.4.3.5 Winding angle

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

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

5.4.3.6 Length

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

5.4.3.7 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.

5.4.3.7.1 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 .

5.4.3.7.2 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 leaktightness is maintained.

5.4.3.7.3 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 .

5.4.3.8 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.



5.4.3.8.1 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 de average outer diameter d_u .

5.4.3.8.2 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 .

5.4.4 Material composition of the pipe

See § 3.2.4 of this BRL.

5.4.5 Mechanical characteristics

In Table 5 the required mechanical characteristics 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.
Long-term resistance to failure pressure. Extrapolation procedure.	ISO 7509 ISO 10928	As stated in § 5.3.7 of EN-ISO 23856.
Resistance to chemical attack for the inside of a section in a deflected condition (only for septic sewers)	ISO 10952	As stated in clause 5.4 of EN-ISO 23856

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

The approved pressure and initial ring stiffness classes shall be specified in the KOMO® technical-approval-with-product certificate.

5.5 Requirements and determination methods for fittings

5.5.1 General

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

5.6 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.



5.7 Processing instructions

The certificate holder shall provide processing instructions in the Dutch and/or English language. The instructions shall contain specific information regarding the storage, safety, transport and if applicable specific installation and maintenance guidelines. These aspects are checked by the CB. A reference to the processing instructions is made in the KOMO® product certificate.

5.8 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 § 7.10 (Table 8).



6 Requirements for certificate holders and internal quality control

6.1 General

The management of the certificate holder is responsible at all times for the quality of the production process, internal quality control, and the quality of the product. The internal quality control shall meet the requirements laid down in this chapter.

The certificate holder shall inform the CB of any change(s) in the production process, product specification(s) and/or processing instructions prior to their implementation.

6.2 Internal quality control/quality plan

The certificate holder shall have implemented an internal quality control scheme (IQC-scheme).

This scheme shall clearly establish:

- Which aspects are subject to inspections carried out by the organization of the certificate holder or an external organization contracted by them,
- Which methods are employed to carry out these inspections,
- The frequency of these inspections,
- How these inspection results are recorded and archived.

The IQC-scheme shall at least include the following main groups:

- Control of measuring equipment,
- Incoming (material) inspection,
- Process control,
- Product control,
- Internal transport and storage,
- Delivery,
- Procedures for:
 - Processing of complaints,
 - Processing of non-conformities and follow-up of the corrective actions.

This IQC-scheme shall be based on the IQC-scheme as published on the website of the scheme provider and detailed in such a way that it provides sufficient confidence to the CB that the requirements as laid down in this BRL are being continuously satisfied.

Internal quality control shall enable the certificate holder to demonstrate that the requirements laid down in this BRL are being continuously met.

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 § 7.3. The manufacturer shall detail in his IQC-scheme the laboratory conditions for 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.

6.3 Competence of personnel

The certificate holder 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 9001:2015, § 7.2.

6.4 Archiving

The documents and registrations mentioned in this BRL shall be archived for a period of at least 7 years or longer in case legislation so requires.

Remark: In case products are delivered under the Dutch Law "Quality assurance" (Wet Kwaliteitsborging (Wkb)), then the documents and registrations mentioned shall be stored for a period of at least 20 years.



7 External conformity assessments

7.1 General

The certification body shall carry out a pre-certification for the purpose of granting a KOMO® (technical-approval-with-) product certificate. After issuance of the KOMO® (technical-approval-with-) product certificate, the CB will carry out periodic inspections.

For the assessment of conformity the required test pieces shall be manufactured by the 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.

7.2 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.

7.3 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.

7.4 Initial investigation for the KOMO® technical-approval-with-product certificate

The applicant of the KOMO® technical-approval-with-product certificate states which products – as parts of the system to be certified – are to be listed in the KOMO® technical-approval-with-product certificate to be issued. The applicant provides all relevant information of these products for the purpose of drafting the product specification and the proclamation of the product characteristics as is to be incorporated in the KOMO® technical-approval-with-product certificate to be issued.

For the purpose of issuing the KOMO® technical-approval-with-product certificate the CB will perform an initial investigation in the framework of which:

- The certification body shall initially determine the performance of the system in the application according to § 4 of this BRL,
- The certification body shall determine if the applicant, by means of his internal quality control, is able to continuously demonstrate that the products have the properties and show the performance as are stated in § 3 and § 5 of this BRL.
Assessment of the production process and the final product are part of this process.
- The certification body evaluates if the operational methods of the internal quality assurance comply with the requirements of § 6 of this BRL.

When applicable, documents provided by the applicant pertaining to the product and / or the internal quality assurance shall be assessed to ensure that the results meet the requirements as laid down in this BRL.

Based on the initial investigation a report is drafted on the basis of which a technical-approval-with-product certificate either can or cannot be issued.

The test matrix of § 7.10 (Table 8) lists which aspects are under review for the initial investigation.

7.5 Initial investigation for the KOMO® product certificate

For the different parts (pipes and fittings) of the piping system to be certified, separate product certificates can be issued.



The applicant of the product certificate states which products are to be listed on the product certificate to be issued. The applicant provides all relevant information of these products for the purpose of drafting the product specification and the proclamation of the product characteristics as is to be incorporated in the product certificate to be issued.

For the purpose of issuing the KOMO® product certificate the CB will perform an initial investigation in the framework of which:

- The certification body shall determine if the applicant is able to continuously manufacture products that have the properties and show the performance requirements as are stated in § 3.1, § 3.2, § 3.4 and § 5 of this BRL. Assessment of the production process and the finished product are part of this process.
- The certification body evaluates if the operational methods of the internal quality assurance comply with the requirements of § 6 of this BRL.

When applicable, the documents provided by the applicant pertaining to the product and / or the internal quality assurance shall be assessed to ensure that the results meet the requirements as laid down in this BRL.

Based on the initial investigation a report is drafted on the basis of which a product certificate either can or cannot be issued.

The test matrix of § 7.10 (Table 8) lists which aspects are under review for the initial investigation.

7.6 Type and frequency of periodic inspections

After issuing the product certificate, the certification body shall carry out periodic inspections at the certificate holders' to verify compliance with their obligations. The Board of Experts will decide the type, scope, and frequency of the periodic inspections.

At the time this BRL is entering into effect, the frequency has been determined on 2 annual periodic inspections per production location.

The audit program includes the type and frequency of the period inspections. These are related to:

- The production specification laid down in the certificate;
- The production process of the certificate holder;
- The certificate holder's IQC-scheme;
- The results of the inspections performed by the certificate holder;
- The correct method of marking of the certified products;
- Compliance with the required procedures;

and compliance of the requirements laid down in this BRL is verified.

The audit program with the aspects to be checked during the periodic inspections is specified in the test matrix of § 7.10 (Table 8).

The results of each assessment carried out, shall be recorded in a traceable manner in a report by the certification body.

7.7 Product changes / production technique changes

7.7.1 General

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

- the manufacture process;
- the 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 certificate holder may propose changes that could affect the quality of the certified products to the CB for approval. Only after the CB has demonstrably approved such changes may these changes be implemented by the certificate holder.

Note: 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, 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	7.7.2.1
Initial specific ring stiffness	ISO 7685	7.7.2.2
Initial resistance to ring deflection	ISO 10466	7.7.2.3
Initial failure pressure	ISO 8521	7.7.2.4
RLTT resistance to failure pressure	ISO 7509	7.7.2.5
RLTT resistance to chemical attack (strain corrosion)	ISO 10952	7.7.2.6
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	7.7.2.1
Initial specific ring stiffness	ISO 7685	7.7.2.2
Initial resistance to ring deflection	ISO 10466	7.7.2.3
Initial failure pressure	ISO 8521	7.7.2.4
RLTT resistance to failure pressure	ISO 7509	7.7.2.5
Joint performance tests	CEN/TS 14632	7.7.2.7

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

7.7.2 Test methods

7.7.2.1 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.

7.7.2.2 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.

7.7.2.3 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, if applicable separation of the thermoplastic liner from the structural wall and, if applicable, separation of the thermoplastic liner from the structural wall.

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

7.7.2.4 Initial failure pressure

The initial failure pressure shall be determined according to ISO 8521. The results shall be evaluated in accordance with CEN/TS 14632.

7.7.2.5 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.

7.7.2.6 RLTT resistance to chemical attack (strain corrosion)

The RLTT shall be carried out on six test pieces in conformity with the test procedures described in CEN/TS 14632, Annex D.2.2 and ISO 10952. The RLTT shall use the same basis as that used for TT i.e. failure times at specified strain levels. The test solution shall be a sulphuric acid solution at a concentration of 0,5 mol/l. This shall be introduced into the test pieces within 2 h of deflecting in accordance with ISO 10952. This is the zero time from which the long-term properties are determined. The results shall be evaluated in accordance with CEN/TS 14632, Annex D3.

7.7.2.7 Joint performance tests

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

7.8 Non-conformities

7.8.1 Weight of non-conformities

When weighing non-conformities in the frame of the supervision after granting the product certificate by the certification body, a distinction will be made between:

- Non-conformities that might directly have a negative impact on the quality of the product (critical non-conformities),
- "Other" non-conformities (non-critical non-conformities).

7.8.2 Follow-up of non-conformities

A certification body will do follow-ups of non-conformities as follows:

- The certification body shall be able to finalize processing critical non-conformities within the time frame established by the certification body; this period shall not exceed 3 months,
- The certification body shall be able to finalize processing non-critical non-conformities within the time frame established by the certification body; this period shall not exceed 6 months.

7.8.3 Sanction procedures

The weighing and follow-ups of non-conformities and the sanction policy have been established in an interpretation document pertaining to this BRL, which is published on the website of the plan administrator.

7.9 Temporary production and/or delivery stop

If no certified products are (temporarily) produced and/or delivered for a period longer than 6 months, the validity of his KOMO® (attest-with-) product certificate can be (temporarily) suspended at the request of the certificate holder. Such a suspension can be granted by the certification body for a maximum period of 3 years, whereby the production site shall be inspected annually but without sampling for the yearly testing.

After the suspension has been granted the certificate holder can request that the suspension be terminated earlier. Prior to the resumption of the production and delivery under product certificate, an additional assessment and sampling for the yearly tests shall be carried out to ensure that all requirements of this BRL are still being met and that the suspended status can be converted into a valid status.

7.10 Summary of tests and inspections (test matrix)

Table 8 contains a summary of the tests and inspections to be carried out in the event of certification.



Table 8 – Test matrix

Description of requirement	Clause BRL	Tests within the scope of:		
		Pre-certification	Surveillance by CB after issue of the certificate	
			inspection	Frequency
Markings of the products	1.7	x	x	1 / year
Requirements imposed on the materials and the design of the GRP piping system				
General	3.1	x	x	1 / year
Materials	3.2	x	x ^{a)}	1 / year
Design of the GRP piping system	0	x	x ^{a)}	1 / year
Processing instructions	3.4	x	x	1 / year
Requirements imposed on the performances in the application				
General	4.1	x		
Requirements and test methods for the joints	4.2	x	x ^{b)}	1 / 5 years
Retention of the elastomeric sealing element	4.3	x		
Installation instructions	4.4	x	x	1 / year
Requirements imposed on the product				
General	5.1	x		
Elapsed or extrapolated time for determination of the long-term properties, (x)	5.2	x		
Temperature effects	5.3	x		
Requirements and determination methods for pipes	5.4	x	x ^{c)}	1 / 5 years
Requirements and determination methods for fittings	5.5	x		
Requirements for certificate holders and internal quality control				
General	6.1	x		
Internal quality control/quality plan	6.2	x	x	1 / year
Competence of personnel	6.3	x	x	1 / year

- a) Requirement is compared with the for this aspect ascertained values that are listed in the certificate holder's IQC scheme.
- b) Requirement that is part of audit testing according to § 7.3.
- c) Requirement that is part of audit testing for the following aspects:
- i) Amount of constituents, § 7.7.2.1;
 - ii) Creep under wet condition (RLTT), CEN/TS 14632, Annex D;
 - iii) Long term failure pressure (RLTT), § 7.7.2.5;
 - iv) Resistance to strain corrosion (RLTT), § 7.7.2.6.

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.

7.11 Inspection of the quality system

The quality system will be checked by the CB on the basis of the IQC scheme.



8 Requirements for the certification body

8.1 General

The certification body shall have a procedure that establishes the general rules employed for certification processes.

8.2 Certification staff

Certification staff involved can be categorized as follows:

- Certification assessor/Reviewer: in charge of preparing the design and documentation assessments, assessment of applications, and review of the conformity assessments,
- Location assessor: in charge of external conformity assessments at the certificate holders' location,
- Decision maker: responsible for deciding whether the certificate holder can be certified on the basis of the pre-certification tests carried out and for the continuity of certification based on the inspections carried out and for taking decisions on the need for corrective actions.

8.2.1 Qualification requirements for certification staff

Qualification requirements for the certification staff consist of qualification requirements for the staff executing the certification activities as laid down in Table 9. The competency of the certification staff involved shall be recorded in a traceable manner.

Table 9 – Qualification requirements for certification staff

Competencies	Certification assessor/ Reviewer	Location assessor	Decision maker
Basic competencies			
<ul style="list-style-type: none"> • Knowledge of business processes • Be able to assess professionally 	<ul style="list-style-type: none"> • Higher vocational education level work and intellectual level • 1 year of relevant experience 	<ul style="list-style-type: none"> • Intermediate vocational education level work and intellectual level • 1 year of relevant experience 	<ul style="list-style-type: none"> • Higher vocational education level work and intellectual level • 5 years of relevant experience of which at least 1 year in certification activities
Auditing competencies	N/A.	<ul style="list-style-type: none"> • Training in auditing competencies • Participation in at least 4 periodic inspections, with a minimum of 1 periodic inspection carried out independently under supervision 	N/A
Technical competencies			
Relevant knowledge of: <ul style="list-style-type: none"> • The technology for the manufacture of the products to be inspected, the execution of the processes and the providing of services • The way products are applied, processes carried out and services provided. • Existing defects that appear when using the product, during the execution of the processes as well as shortcomings in provision of services. 	Knowledge of one of the following disciplines: <ul style="list-style-type: none"> • Minimum of 1 year experience in manufacturing, testing, inspection and / or installation, • including two initial investigations under supervision OR Internal training, including two initial investigations under supervision.	Knowledge of one of the following disciplines: <ul style="list-style-type: none"> • Minimum of 1 year experience in manufacturing, testing, inspection and / or installation, • including two inspections under supervision OR Internal training, including three inspections under supervision.	N/A
Specific technical competencies	<ul style="list-style-type: none"> • Detailed knowledge of the BRL 	<ul style="list-style-type: none"> • Detailed knowledge of the BRL 	N/A

8.2.2 Qualification of the certification personnel

Certification personnel shall be demonstrably qualified by testing their knowledge and skills against the abovementioned requirements. If qualification takes place based on other criteria, this shall be documented.

The authority regarding the qualification shall be established in the quality system of the certification body.



8.3 Communications about the pre-certification test and periodic inspections

The certification body will record the results of the pre-certification tests and periodic inspections in an unequivocal report. Such report shall satisfy the following requirements:

- **Completeness:** the report will include a substantiated report of the grade of conformity determined with regard to the requirements laid down in this BRL,
- **Traceability:** the results on which statements are based shall be recorded in a traceable manner.

8.4 Decisions regarding the KOMO® (technical-approval-with-) product certificate

The decision with regard to grant a (technical-approval-with-) product certificate or imposing measures regarding the (technical-approval-with-) product certificate shall be based on the results recorded in the file.

The results of an initial investigation and, in case of a critical non-conformity, periodic assessments shall be evaluated by a reviewer.

Based on the performed review the decision-maker determines if:

- The (technical-approval-with-) product certificate can be granted;
- Sanctions shall be imposed;
- The (technical-approval-with-) product certificate has to be suspended or withdrawn.

The reviewer and the decision-maker shall not have been involved in the process of preparing the results based on which the decision is being made.

The decision shall be recorded in a traceable manner.

8.5 Reporting to the Board of Experts

The certification body will annually present a report to the Board of Experts about the activities carried out and the respective results with regard to the (technical-approval-with-) product certificates based on this BRL. This report shall include at least the following matters:

- The number of inspection audits executed in relation to the minimum frequency,
- The number of pre-certification tests executed,
- Results of the inspection audits,
- Measures imposed in case of detected non-conformities,
- Complaints received from third parties about certified products.

8.6 Interpretation of requirements

The Board of Experts may establish the interpretation of the requirements of this BRL in one or more interpretation document(s). Interpretation documents are available for/from members of the BoE, certification bodies and the certificate holders who carry out activities based on this BRL.

Interpretation documents are published on the website of the certification body.

Every certification body that makes use of this BRL is under the obligation to employ the interpretations laid down in such documents.



9 List of standards

9.1 Public legislation

Law/regulation	Title
Wkb	Wet Kwaliteitsborging (Law Quality assurance) (coming into force per 1 January 2024)

9.2 Normative documents

Standard ¹⁾	Title
ASTM D 2563-08:2015	Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.
BRL 2013:2012 + Amdt.:2014	Assessment directive for the KOMO® product certificate for vulcanized rubber products for cold and hot non-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 2220:2011	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-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
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.
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.



Standard ¹⁾	Title
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 18851:2015	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes and fittings – Test method to prove the structural design of fittings
ISO 10928:2016	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes and fittings – Methods for regression analysis and their use.
ISO 10952:2021	Plastics piping systems – Glass-reinforced thermosetting plastics (GRP) pipes and fittings – Determination of the resistance to chemical attack for the inside of a section in a deflected condition
<ol style="list-style-type: none">1. For dated references the edition cited applies.2. Verification if normative documents are still up-to-date is carried out annually. Modifications of the applicable normative documents will be published on the services page on the website of the certification body which publishes the BRL.	