

Assessment Guideline

for the KOMO product certificate for

TPE PIPE JOINT SEALS FOR NON-PRESSURE
WASTE WATER AND DRAINAGE PART-2: SEALS



Determined for by CvD on the 11th of March 2022

Accepted by KOMO Quality and Assessment Committee
on: 14th of June 2022

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BRL 2020-2

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**ASSESSMENT GUIDELINE
FOR THE KOMO PRODUCT CERTIFICATE FOR
TPE PIPE JOINT SEALS FOR NON-PRESSURE WASTE WATER AND DRAINAGE
PART-2: SEALS**

Determined by the CvD LSK on. 11-03-2022

Accepted by the KOMO Testing and Quality Commission on 14-06-2022



Preface

This KOMO Assessment Guideline (BRL) has been drawn up by the Board of Experts (CvD) "Plastic piping systems" (Leidingsystemen Kunststof, CvD-LSK) which counts with representatives from the interested parties on the subject matter of this BRL. This Board also supervises the certification activities based on this BRL and will make any necessary adjustments. All references to the Board of Experts 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 must 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.

In the BRL the following parts have been changed:

- The entire document has been transferred to the latest KOMO format (version 7-2021).
- Other changes include:
 - Updated specification for the tensile properties
 - Updated specification for the stress relaxation
 - Table in Attachment A has been updated with new specification of tensile strength, elongation at break and stress relaxation
 - New tables added in Attachment A for TPE with an overview of requirements for products containing a weld or made out of two TPE material.
 - New Attachment B - Preparation of test pieces out of end products (updated version of previous known Annex E, which was missing in the previous version of this BRL dated October 25th of 2016).
 - Updated Model IQC Scheme in Attachment C
 - New Attachment D - Inspection and Test matrix (this table was presented in chapter 6 – Summary of tests and inspections - in the previous version of this BRL).

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1 Introduction, general provisions, and general requirements

1.1 Introduction

Based on the regulations laid down in this KOMO Assessment Guideline (BRL) a KOMO product certificate is issued for TPE seals to be used in pipe joints for non-pressure waste water and drainage. This product certificate enables the certificate holder to prove their clients that an expert, independent organization supervises the certificate holder's production process, the quality of the product and its respective quality control. Thus, it may be assumed that the product has the characteristics as established in the present BRL.

The requirements determined in this BRL are used by the certification bodies, which have been accredited as such by the Board of Accreditation, or have presented an application, and who have a license agreement with the KOMO Foundation, employed when processing an application for the issuance and maintenance of a KOMO product certificate for TPE seals to be used in pipe joints for non-pressure waste water and drainage

In addition to the requirements laid down in this BRL, certification bodies impose additional requirements in the sense of general procedure requirements for certification, as established in their internal certification procedures.

1.2 Subject matter and area of application

1.2.1 Subject matter

The different types of TPE seals which have been manufactured from TPE are intended for use in piping systems for non-pressure drainage and sewerage at temperatures up to 45 °C, intermittently up to 90 °C.

The following types of seals can be defined:

- Solid TPE seals: a seal consisting of TPE material
- TPE seals out of two types of TPE: a seal having more than 1 type of TPE material.
- TPE attached to TPE or other materials (no sealing function, i.e. a back-up ring).

1.2.2 Area of application

The application area is specified as follows:

- Standardised ring seal sockets in PVC, PP or PE pipes in outside building drainage and sewage systems according to:
 - EN 1401-1, EN 1852-1, CEN/TS 14578;
 - EN 13476-1.
- Standardised ring seal sockets in PVC, PP or PE pipes in inside building soil and waste water systems according to:
 - EN 1329-1 and EN 1451-1.

These joints include both joints between pipes and joints between pipes and fittings.¹

¹ For other applications than mentioned here a more explicit testing could be necessary to assure the function of the seals.

1.3 Validity

This revision of the BRL replaces the version dated October 25th of 2016.

All KOMO product certificates that have been issued based on that version of the BRL will remain in effect.

New certificates may be issued based on the previous version of this BRL until the end of 2023

The KOMO product certificate does not expire.

Validity may be limited (terminated), among other reasons, because of:

- A modification of this Assessment Guideline,
- Incompliance with the certificate holder's obligations.



1.4 Relation with Legislation and Rules and Regulations

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

The Harmonized European standard EN 681-2 is applicable to the products covered by this BRL. Statements included in product certificates issued based on this BRL shall not be used to replace the CE-markings and/or corresponding Declaration of Performance.

1.5 Requirements to be imposed on conformity assessing institutions

With regard to the requirements laid down in this Assessment Guideline, the applicant may submit, in the scope of external inspections, reports issued by conformity assessing institutions to prove that the requirements of this BRL are being satisfied. It must be demonstrated that the respective analysis/inspection/test and/or assessment reports have been drawn up by a body that complies with the respective applicable accreditation norm with regard to the subject matter,

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

An organization will be considered as compliant with these criteria if an accreditation certificate for the respective subject matter can be submitted, issued by the Board of Accreditation (RvA) or another accreditation organization which has been accepted as a member of a multilateral agreement on the subject of mutual recognition and acceptance of accreditation, which have been drawn up within the EA, IAF and ILAC. If no accreditation certificate can be submitted, the certification organization itself will assess if compliance is given to the accreditation criteria.

1.6 KOMO product certificate

KOMO product certificates will be issued based on this BRL. Statements included in these product certificates are based on chapters, 3, 4 and 5 of this BRL.

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

1.7 Markings and specifications

The following shall be applied to the products[#] or packaging:

- KOMO logo or KOMO word mark followed by the certificate number without specifying the version,
- Name of certificate holder,
- Production date/ (the year of manufacturing and preferable the quarter),
- The nominal dimension or dimensions,
- On the product, if possible, the material should be marked at least as TPE but preferably using the letter coding according to the nomenclature used in ISO 18064 (e.g. TPV, TPS),
- On the packaging the material should be marked at least as TPE but preferably using the letter coding according to the nomenclature used in ISO 18064 (e.g. TPV, TPS).

The KOMO logo type must be applied as follows:



The KOMO word mark must be applied as follows:

KOMO®



After issuance of the KOMO product certificate this KOMO logo/KOMO word mark may be also 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.

If the dimensions of the products are such that the indications applied to them may impair the product, the products may be marked per package in consultation with the manufacturer, the buyer and the certification body. Fittings with co-injected seals shall be marked according to the requirements in the Assessment Guideline for the fitting.



2 Terminology

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

In the Assessment Guideline the following terms have the following meanings:

- **TPE material:** Thermoplastic elastomer made from a polymer or blend of polymers that does not require vulcanization or crosslinking during processing, yet has elastic and rubberlike properties, at its service temperature. These properties disappear at processing temperature, so that further processing is possible, but return when the material is returned to its service temperature;
- **Board of Experts (CvD):** The Board of Experts “Plastics Piping Systems (LSK)”;
- **Supplier:** the party that is responsible for ensuring that the products meet and continue to meet the requirements embodied in this Assessment Guideline;
- **IQC scheme (Internal Quality Control scheme):** a description of the quality inspections carried out by the supplier as part of his quality system;
- **Product requirements:** requirements made specific by means of measures or figures, focusing on (identifiable) characteristics of products and containing a limiting value to be achieved, which limiting value can be calculated or measured in an unequivocal manner.;
- **Determination methods:**
 - Pre-certification tests: tests in order to ascertain that all the requirements recorded in the Assessment Guideline are met;
 - Inspection 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 Assessment Guideline;
- **Initial tests:** The test to determine if all requirements are met as stated in the BRL;
- **Inspection tests:** the assessment tests which are performed after issuing the certificate in order to determine if the certified products are meeting the requirements continuously.



3 Requirements for products and/or materials to be processed

3.1 General

This chapter includes the requirements for the characteristics of the employed raw materials, materials, and products used for the production of the products to be certified according to this BRL.

3.2 TPE material

The TPE material shall demonstrably comply with the requirements as specified in KOMO Assessment Guideline BRL 2020-1.

If the product/material is delivered in accordance with a product certificate based on the above mentioned Assessment Guideline, the certificate holder may assume that this requirement is being met.

3.3 Processing instructions

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



4 Requirements the product must meet

4.1 General

This chapter includes the requirements a product must meet, converted to the product characteristics of TPE seals to be used for the production of pipe joints for non-pressure waste water and drainage as well as the determination methods and the limit values to determine that these requirements are being met.

At setting the requirements the uncertainties of the measurements are taken into account. This implies that drawing conclusions whether requirements are fulfilled these uncertainties do not need to be weighted anymore. These requirements will form part of the technical specification of the product, which will be included in the product certificate.

Concerning to requirements set out in this chapter regarding the essential characteristics there will be no initial audit and there won't be a declaration recorded in the product certificate.

4.2 Product characteristics

4.2.1 General

The TPE seals shall be suitable for the intended purpose. The design, the type(s) of TPE selected and the construction shall be such that, with regard to the type of application, a good (non-leaking) sealing of the joints under normal circumstances is assured.

The properties in table-1, table-2, table-3 and table-4 of attachment A must be determined on test pieces prepared out of TPE seals.

Depending on the dimensions of the seals it is allowed and can be necessary to take test pieces with other (smaller) dimensions than those prescribed in the mentioned test standards. The sample preparation shall be carried out according to Attachment B: "Preparation of test pieces out of end products".

Product certificate

Special chemicals if applicable under 4.2.3 are mentioned in the product certificate.

4.2.2 Types of TPE seals

Depending on the type of TPE seal the applicable requirements are determined and verified.

4.2.2.1 Solid TPE seals

The TPE seals shall fulfil the requirements of this Assessment Guideline in 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.2.7 and 4.2.8.

4.2.2.2 TPE seals out of two types of TPE

If both types of TPE take part in the sealing function they both shall fulfil all requirements in this Assessment Guideline (4.2.2.3, 4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.2.7 and 4.2.8).



4.2.2.3 TPE attached to TPE or other materials

This chapter is only applicable for TPE seals that are attached to TPE or other materials.

Limit Value

Besides the other requirements of this Assessment Guideline(4.2.3, 4.2.4, 4.2.5, 4.2.6, 4.2.7 and 4.2.8) the adhesion between TPE and the other material shall be at least 100 N/25 mm. If no measurement can be conducted the TPE should tear and not detach when it is tried to separate the bond by a peel test.

Determination method

Test the adhesion between TPE and the other material in a way similar to ISO 813. In cases where the rigid parts are too small for a real test based on ISO 813 the TPE should fulfil a peel test under an angle of about 90 ° whereby it is tried to separate the TPE from the other material.

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly testing when applicable.

4.2.3 Specific requirements

The TPE material shall be resistant to any chemicals that waste water can contain under usual circumstances and in the usual concentrations.

Limit Value

In case there are additional requirements, these shall be laid down by mutual agreement of the manufacturer and the buyer.

Determination method

If necessary, the resistance to chemicals must be determined according to a procedure suitable for the purpose, see for instance ISO 1817.

Pre-certification test and periodic inspection

If requirements have been agreed this aspect is checked at the initial assessment. This aspect is also compared on the basis of IQC inspection (indirectly by controlling the ingredients) with the aspect found for approval.

4.2.4 Appearance

Limit Value

The appearance of the TPE seals shall comply with ISO 9691 whereby the sealing zone shall be free of all surface imperfections other than bloom. Outside of the sealing zone no major imperfections are allowed.

Determination method

The appearance aspect of a random selection of a number of (at least 5) TPE seals is reviewed against the criteria as laid down in ISO 9691.



Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly inspections. During inspections this aspect is only controlled visually. In case of reasonable doubt samples will be taken and sent to an accredited laboratory for determination of this property.

4.2.5 Homogeneity

Limit Value

The TPE seals may not contain foreign bodies and shall be free of imperfections and defects such as cracks, entrapped air, bubbles or other irregularities as described in ISO 9691.

Determination method

Take a random selection of at least five seals and cut them in flat slices or parts of 1 to 2 mm in thickness. Stretch those seals 100 % and judge if the material does not contain foreign bodies and is free of imperfections and defects such as cracks, entrapped air, bubbles or other irregularities as described in ISO 9691.

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly inspections. During inspections this aspect is only controlled visually. In case of reasonable doubt samples will be taken and sent to an accredited laboratory for determination of this property.

4.2.6 Dimensions

Limit Value

The nominal measurements of the TPE seals and the acceptable deviations shall be in accordance with the figures stated by the manufacturer and they shall be laid down in a drawing. Tolerances shall be specified from the appropriate classes of ISO 3302-1. For dimensions of O-rings also reference could be made to NEN-ISO 3601-1.

Determination method

Determine the dimensions by means of appropriate measuring equipment (see ISO 23529).

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly inspections (IQC) when applicable.

4.2.7 Physical and mechanical properties of the TPE seals

4.2.7.1 General

Unless stated otherwise, tests shall be carried out at a temperature of 23 °C according to ISO 23529. The allowed tolerances for all mentioned test durations and test temperatures shall be according to ISO 23529. For tests carried out at the production location, a temperature between 15 °C and 30 °C is allowed.



4.2.7.2 Hardness

Limit Value

The hardness concerned shall be reported to the inspection body as nominal hardness. The tolerance range for the TPE is ± 5 IRHD.

The difference in hardness (the difference between the highest and lowest value measured) of a seal shall not exceed 5 IRHD.

Determination method

Determine the hardness according to ISO 48-2. (see also Attachment B).

The hardness should be determined on an original surface (unmachined).

Only in the case where the form and the dimensions of the ring do not allow measurement according to the standard mentioned previously, or in case of a check measurement (non-destructive), the apparent hardness shall be determined in a way which both parties (buyer and manufacturer) have agreed upon. In that case the following issues must be laid down and submitted to the inspection body: the nominal apparent hardness plus the corresponding tolerance, the method of measurement and the place(s) of measurement.

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly testing.

4.2.7.3 Mechanical properties

Limit Value

The seal passes the requirements on tensile strength if one of the two requirements for tensile strength is met (either directly $\geq 2,5$ MPa or ≥ 60 % of the value measured on the material in flow direction (BRL 2020-1).

The seal passes the requirements on Elongation at break if one of the two requirements for elongation at break is met (either directly ≥ 200 % or ≥ 80 % of the value measured on the material in flow direction (BRL 2020-1).

Determination method

The tensile strength and elongation at break shall be determined by the method specified in ISO 37, using type-4 dumb-bells (see also Attachment B).

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly testing.



4.2.7.4 Compression set

Limit Value

The compression set shall meet the requirement of $\leq 40\%$.

Determination method

The measurement shall be carried out as far as possible in the direction of the compression of the seal in service. Determine the compression set by the method specified in ISO 815-1 using the small test piece (see also Attachment B). The test conditions are 24 hours at 70 °C.

Where the cross section is too small to obtain compression buttons from the product, as an alternative to moulding buttons, the tension set of test sheets may be determined using the method specified in ISO 2285 with strain 50 %. For this alternative test method the same test conditions (except strain) and requirements apply as used for the determination of the compression set.

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly testing.

4.2.7.5 Stress relaxation

Limit Value

The stress relaxation shall meet the requirement of $\leq 22\%$ after 7 days of testing or $\leq 28\%$ after 21 days of testing or $\leq 32\%$ after 100 days of testing.

Determination method

The stress relaxation shall be determined by the method specified in ISO 3384-1, method B at 23 °C. Where the cross section is too small to obtain compression buttons from the product the stress relaxation in tension may be determined using method A specified in ISO 6914. For this alternative method the same requirements are applicable (see also Attachment B).

Stress relaxation values measured after different times of exposure shall be plotted as a function of time on a logarithmic or linear scale to facilitate the interpretation of the test data. As the curve of TPE materials is not following a straight-line on a logarithmic time scale a linear regression method should not be used over the whole range of the curve. Instead, a linear regression method should be used over the last decade of the curve to calculate the stress relaxation.

Per sample 3 measurements are required. The median value of these 3 measurements shall be reported as a round number.

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly testing.



4.2.7.6 Stress fall

Limit Value

The stress fall shall meet the requirement of $\leq 30\%$.

Determination method

The stress fall shall be determined based on method A given in ISO 6914. The procedures of ISO 6914 are applicable for the equipment (Clauses 5 and 6), test pieces (Clause 7) and conditioning (Clause 8).

The procedure given below is applicable for the test and the calculation of the results.

Start the test at a standard laboratory temperature, either $(23 \text{ or } 27 \text{ }^\circ\text{C}) \pm 2 \text{ }^\circ\text{C}$, following the procedure for method A of ISO 6914. After 48 h increase the temperature quickly to $(70 \pm 1) \text{ }^\circ\text{C}$. This can be done either by heating up the oven or by carefully moving the test rig to an oven preheated to $(70 \pm 1) \text{ }^\circ\text{C}$. The temperature should be constant at $70 \text{ }^\circ\text{C}$ within 10 min. After (65 ± 5) min return the test piece to the starting temperature (quickly cool down the oven or return the test rig). After another 47 h repeat the procedure. After the second period at $70 \text{ }^\circ\text{C}$, keep the test piece at the standard laboratory temperature $(23 \text{ or } 27 \text{ }^\circ\text{C}) \pm 2 \text{ }^\circ\text{C}$ for at least 48 h.

Theoretically the stress will follow a horizontal line after having been for 1 h at a higher temperature, until the line of the initial decrease in stress is crossed. If the 1 h period was enough to have this effect the drop in stress after the second period will be zero. The second period is introduced to make sure the process is completed. The stress fall is determined by taking the difference between the last value before the first transfer to $70 \text{ }^\circ\text{C}$ and the value at $23 \text{ }^\circ\text{C}$ or $27 \text{ }^\circ\text{C}$ at the end of the test. The principle is shown in Figure 1. It can be useful to use linear regression to determine the value just before the first period at $70 \text{ }^\circ\text{C}$. The line after the second period at $70 \text{ }^\circ\text{C}$ should be almost horizontal.

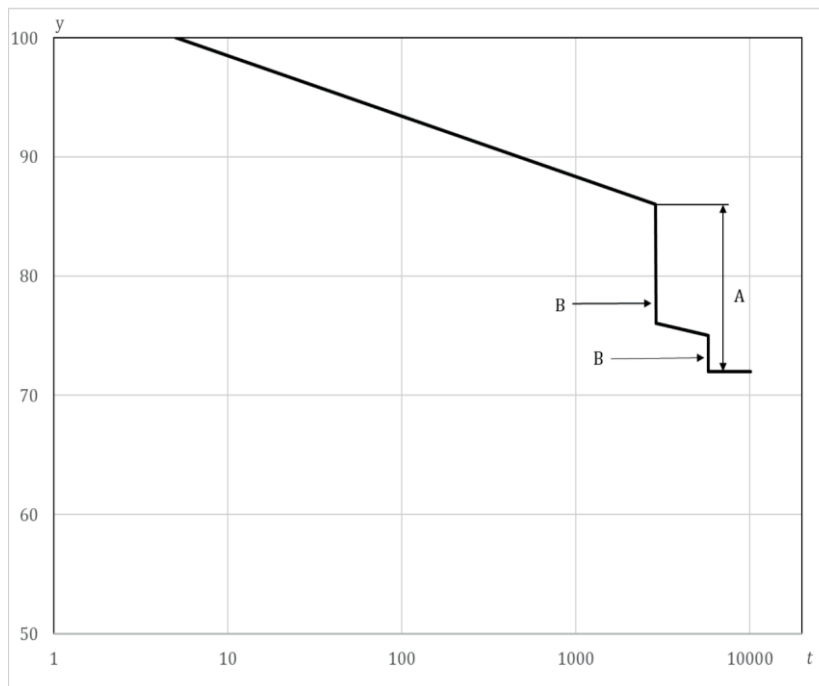


Figure 1: Example of relaxation curve and definition of stress fall

Key

- t time in minutes (logarithmic)
- y relative stress in percent
- A stress fall
- B 1 h at $70 \text{ }^\circ\text{C}$

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly testing.



4.2.8 Properties for special type of products

4.2.8.1 General

This chapter is only applicable for TPE seals that contain a weld or for seals which are made of two different TPE compounds. The behaviour at elongation should fulfil the requirements in 4.2.8.3 and/or 4.2.8.4.

4.2.8.2 Number of welds

Limit Value

A TPE ring made of an extruded profile or cord shall not contain more than one weld, possible joints between different TPE compounds excluded, except by agreement between the manufacturer and the client. A ring made of two TPE compounds shall not contain more than one weld in the direction of the outline of the product.

Determination method

Visually check for the number of welds.

Pre-certification test and periodic inspection

If the seal contains more than one weld the seal cannot be certified according to this BRL.
To be checked at the initial assessment.

4.2.8.3 Behaviour at elongation for TPE seals with a weld

Limit Value

The weld shall not crack or contract when tested before and after ageing.

Determination method

Elongate two TPE seals with a weld with a tensile speed of 500 mm/min to 100 % elongation. Such agreement has to be reported to the inspection body. Keep the rings in an elongated state for at least 30 seconds. In case of a TPE seal made of welded coextruded profile or cord having a soft TPE and a hard plastic part (fig. 2A), a TPE part with the weld of at least 100 mm length is first cut off from the hard part (fig. 2B), and then tested (fig. 2C).

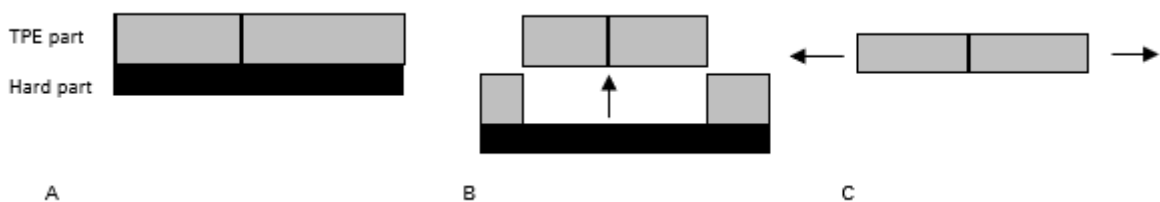


Figure 2. Test of behaviour at elongation on coextruded welded profile or cord

After ageing for 168 hours at 70 °C in accordance with ISO 188 the above test is repeated.

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly testing.

4.2.8.4 Behaviour at elongation for TPE seals made from two TPE compounds

Limit Value

The joint shall not crack or contract when tested before and after ageing.



Determination method

Elongate two test pieces containing the joint between the two materials with a tensile speed of 500 mm/min to 100% elongation. Keep the test pieces in an elongated state for at least 30 seconds.

After ageing for 168 hours at 70 °C in accordance with ISO 188 the above test is repeated.

Pre-certification test and periodic inspection

To be checked at the initial assessment and during yearly testing.



5 Requirements for certificate holders and internal quality control

5.1 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 must meet the requirements laid down in this chapter.

5.2 Internal quality control

The certificate holder must have an internal quality control scheme used by them (IQC-scheme).

This scheme must 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,
- If and if affirmative, the inspection results are recorded.

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

- Control of measuring equipment,
- Incoming (material) inspection
- Process control
- Product inspection,
- Internal transportation and storage,
- Delivery,
- Procedures for:
 - The handling of non-conforming products,
 - Processing of complaints,
 - Processing of non-conformities and the follow-up of corrective measures,
 - Control of the work instructions and inspection forms used.

This IQC-scheme must be based on the IQC-scheme model included in attachment C, and detailed in such a way that the CI generates sufficient confidence that the requirements laid down in this this Assessment Guideline are being continuously satisfied.

Internal quality control must enable the certificate holder to demonstrate that the requirements laid down in this Assessment Guideline are being continuously satisfied.

5.3 Document management

The documents and inspection reports referred to in this BRL shall be retained for a minimum period of 7 years or longer if so required by legislation.



6 External conformity assessments

6.1 General

The certification body will carry out a pre-certification for the purpose of granting a KOMO product certificate. After issuance of the KOMO product certificate, the certification body will carry out periodic inspections. See also Attachment C for more information.

6.2 Pre-certification test

The applicant of the product certificate will specify which products they want to be included in the product certificate to be issued. The applicant will provide all relevant information on these products for the formulation of the product specification and the declaration on the product characteristics, as they will be included in the product certificate to be issued.

The certification body will perform a pre-certification test for the purpose of issuing a product certificate in which:

- The certification body will assess if the applicant is able, by means of their internal quality control, to guarantee that the products will continuously have the characteristics, respectively perform as established in chapters 3 and 4 of this BRL. Assessment of the production process and the finished product are part of this.
- The certification body will assess if the operational system of the internal quality control meets the requirements laid down in chapter 5 of this BRL.

If applicable, it will be verified if the submitted documents with regard to the product and/or the internal quality control and the results specified in those documents, meet the requirements of this Assessment Guideline.

The certifying body will ascertain that the statements comply with the requirements laid down in this Assessment Guideline with regard to the essential product characteristics, as included in attachment ZA of the harmonized European norm

A report will be made on the pre-certification test, based on which the product certificate may or may not be granted.

6.3 Type and frequency of periodic inspections

After issuing the product certificate, the certification body must 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 with a minimum of one per year.

At the time this Assessment Guideline is entering into effect, the frequency has been determined on 4 annual periodic inspections. In case the quality system of the supplier is certified on the basis of ISO 9001 or IATF 16949, the frequency is set at 2 inspection visits per year.

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

- 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 Assessment Guideline is verified.

The audit program is included in this BRL/published on the plan administrator's website.

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

The certifying body will ascertain that the statements comply with the requirements laid down in this Assessment Guideline with regard to the essential product characteristics and the corresponding elements of the internal quality control, as specified in annex ZA of the harmonized European standard.



6.4 Shortcomings

6.4.1 Classification of shortcomings

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

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

Aspects considered as critical shortcomings are listed in the following table:

Aspect	Reference BRL 2020-2	Critical
Material certificate BRL 2020-1	3.2	x
Adhesion	4.2.2.3	x
Appearance	4.2.4	x
Homogeneity	4.2.5	x
Dimensions	4.2.6	x
Compression set	4.2.7.4	x
Stress relaxation	4.2.7.5	x
Stress fall	4.2.7.6	x

6.4.2 Follow-up of shortcomings

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

- The certification body must be able to finalize processing critical shortcomings within the time frame established by the certification body; this period shall not exceed 6 months,
- The certification body must be able to finalize processing non-critical shortcomings within the time frame established by the certification body; this period shall not exceed 12 months.

6.4.3 Sanction procedures

The weighing and follow-ups of shortcomings and the sanction policy have been established in an interpretation document pertaining to this Assessment Guideline, which is published on the website of the plan administrator on the page for [KOMO Certification and Testing for Rubbers and Adhesives](#) with the title "[Sanction policy](#)".

6.5 Suspension of product certificate

If (temporarily) there is no production or products cannot be delivered, in case of a stop of 6 months, at the request of the certificate holder, the validity of their KOMO product certificate may be (temporarily) suspended. Such a suspension may be granted by the certification body for an infinite period of time under condition of 1 inspection audit per year.

After suspension has been granted, a certificate holder may request the suspension be lifted earlier than anticipated.

In case the period of suspension exceeds 1 year prior to restarting production and delivery as per the product certificate, testing must be carried out to ensure that all requirements laid down in this Assessment Guideline are still being met, after which the status of suspension may be converted into a valid status.



7 Requirements for the certification body

7.1 General

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

7.2 Certification staff

Certification staff involved can be divided 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: in charge of making decisions with regard to pre-certification tests carried out and about continuity of certification based on performed inspections.

7.2.1 Competency criteria for certification staff

Qualification requirements for the certification staff consist of qualification requirements for the staff executing the certification activities as laid down in the following table. The competency of the involved certification staff must be demonstrably established.

Competencies	Certification assessor Reviewer	Location assessor	Decision maker
Basis competencies			
<ul style="list-style-type: none"> • Knowledge of business processes • Be able to assess professionally 	<ul style="list-style-type: none"> • Higher vocation thinking and working level (BSc) • 1 year of relevant experience 	<ul style="list-style-type: none"> • Intermediate technical thinking and working level • 2 years of relevant experience 	<ul style="list-style-type: none"> • Higher vocational thinking and working level (BSc) • 5 years of relevant experience of which at least 1 years in certification activities
Auditing competencies	N/A.	<ul style="list-style-type: none"> • Training in auditing competencies • Participation in at least 4 periodic visits, with a minimum of 3 periodic visits 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. 	Relevant technical higher vocation education work and intellectual level. Knowledge of one of the following disciplines: <ul style="list-style-type: none"> • Sealing materials At least 1 year of experience in product testing, inspection and or in the installation trade including: <ul style="list-style-type: none"> • 2x inspections under supervision Or internal training course including: <ul style="list-style-type: none"> • 2x inspections under supervision 	Intermediate technical vocation education work and intellectual level. Knowledge of one of the following disciplines: <ul style="list-style-type: none"> • Sealing materials At least 1 year of experience in production, testing, inspection and or in the installation trade including: <ul style="list-style-type: none"> • 3x inspections under supervision. • 1x independent inspection Or internal training course including: <ul style="list-style-type: none"> • 3x inspections under supervision. • 1x independent inspection. • 2 of years working in the installation trade	N/A
Specific technical competencies	<ul style="list-style-type: none"> • Specific knowledge / skills N/A 	<ul style="list-style-type: none"> • Specific knowledge/ skills N/A 	N/A



7.2.2 Qualification certification personnel

Qualification personnel must be demonstrably qualified by testing their knowledge and skills against the abovementioned requirements. If qualification takes place based on other criteria, this must be put down in writing.

The authority with regard to qualification must be established in the quality system of the certification body.

7.3 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 must satisfy the following requirements:

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

7.4 Decisions about the KOMO product certificate

The decision to grant a product certificate or imposing measures with regard to the product certificate must be based on the results laid down in the file.

The results of a pre-certification test and a periodic inspection (in case of a critical shortcoming) must be assessed by a reviewer.

Based on the review carried out, the decision maker will determine if:

- The product certificate can be granted,
- Sanctions must be imposed,
- The product certificate must be suspended or cancelled.

The reviewer and the decision makers must not have been involved in the process of preparing the results, based on which the decision is being made.

The decision must be recorded in a traceable manner.

7.5 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 product certificates based on this Assessment Guideline. This report must include at least the following matters:

- The number of inspections performed versus the determined frequency,
- The number of performed pre-certification tests,
- Results of assessments,
- Measures imposed in case of detected shortcomings,
- Complaints received from third parties about certified products.

7.6 Interpretation of requirements

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

Interpretation documents are published on the website of the plan administrator.

Every certification body that makes use of this Assessment Guideline is under the obligation to employ the interpretations laid down in it.



8 List of documents

8.1 Public law and Rules and Regulations

European Construction Products Regulation EU 305/2011

8.2 Normative documents

This Assessment Guideline remits to the following normative documents:

Standard	Title
EN 681-2:2000+A2:2005	Elastomeric seals – Materials requirements for pipe joint seals used in water and drainage applications – Part 2: Thermoplastic elastomers
ISO 37:2017	Rubber, vulcanised or thermoplastic - Determination of tensile stress - strain properties
ISO 48-2:2018	Rubber, vulcanised or thermoplastic - Determination of hardness (hardness between 3010 and 85100 IRHD)
ISO 188:2011	Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests
ISO 815-1:2019	Rubber, vulcanized or thermoplastic -- Determination of compression set -- Part 1: At ambient or elevated temperatures
ISO 1817:2015	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids
ISO 2285:2019	Rubber, vulcanized or thermoplastic — Determination of tension set under constant elongation, and of tension set, elongation and creep under constant tensile load
ISO 3302-1:2014 tolerances	Rubber – Tolerances for products – Part 1: Dimensional
ISO 3384-1:2019	Rubber, vulcanized or thermoplastic -- Determination of stress relaxation in compression -- Part 1: Testing at constant temperature
ISO 3601-1:2012	Fluid power systems - O-rings - Part 1: Inside diameters, cross-sections, tolerances and designation codes
ISO 6914:2021	Rubber, vulcanized; Determination of ageing characteristics by measurement of stress at a given elongation Rubber, vulcanized or thermoplastic - Determination of ageing characteristics by measurement of stress relaxation in tension
ISO 9691:1992	Rubber – Recommendation for the workmanship of pipe joint rings – Description and classification of imperfections



ISO 23529:2016 Rubber - General procedures for preparing and conditioning test pieces for physical test methods

Remarks:

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 draw up the Assessment Guideline.

8.3 Informative documents

This Assessment Guidelines remits to the following documents for information purposes:

Standard	Title
ISO 813:2019	Rubber, vulcanized or thermoplastic - Determination of adhesion to a rigid substrate - 90 degree peel method
ISO 18064:2014 terms	Thermoplastic elastomers -- Nomenclature and abbreviated terms
EN-ISO 9001:2015	Quality management systems -- Requirements
IATF 16949:2016	Quality management system requirements for automotive production and relevant service parts organizations.
CEN/TS 14578:2013	Plastics piping systems for water supply or drainage and sewerage - Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) - Recommended practice for installation
EN 1329-1:2014	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 1: Specifications for pipes, fittings and the systems
EN 1401-1:2019	Plastics piping systems for non-pressure underground drainage and sewerage - Unplasticized poly(vinyl chloride) (PVC-U) - Part 1: Specifications for pipes, fittings and the systems
EN 1451-1:2017	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) - Part 1: Specifications for pipes, fittings and the system
EN 1852-1:2018	Plastics piping systems for non-pressure underground drainage and sewerage - Polypropylene (PP) - Part 1: Specifications for pipes, fittings and the system
EN 13476-1:2018	Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 1: General requirements and performance characteristics

**ATTACHMENT A: Summary of the material requirements for TPE seals***Table-1: requirements for TPE seals to be used in waste water and drainage piping systems that are attached to TPE or other materials.*

Property	Dimension	Method	Requirement	Reference
Adhesion	N	BRL 2020-2	100 N / 25 mm	4.2.2.3

Table-2: requirements for TPE seals to be used in waste water and drainage piping systems

Property	Dimension	Method	Requirement	Reference
Chemical resistance	-	ISO 1817	Only by mutual agreement between the manufacturer and the buyer	4.2.3
Appearance	-	ISO 9691	The sealing zone shall be free of all surface imperfections other than bloom. Outside of the sealing zone no major imperfections are allowed.	4.2.4
Homogeneity	-	ISO 9691	No foreign bodies, free of imperfections and defects such as cracks, entrapped air, bubbles or other irregularities	4.2.5
Dimensions	-	ISO 23529 ISO 3302-1 ISO 3601-1	Dimensions should be determined by means of appropriate measuring equipment. Tolerances shall be specified from the appropriate classes. The nominal measurements and the acceptable deviations shall be in accordance with the figures stated by the manufacturer and they shall be laid down in a drawing	4.2.6
Physical & Mechanical properties	-	BRL 2020-2	See table-4	4.2.7

Table-3: requirements for TPE seals to be used in waste water and drainage piping systems that have a weld and/or are made with two different compounds.

Property	Dimension	Method	Requirement	Reference
Number of welds	NA	BRL 2020-2	≤ 1	4.2.8.2
Behaviour at elongation for products with a weld before ageing	NA	BRL 2020-2	No crack or constrain	4.2.8.3
Behaviour at elongate for products with a weld after ageing	NA	BRL 2020-2 ISO 188	No crack or constrain	4.2.8.3
Behaviour at elongation for products made with two different TPE compounds	NA	BRL 2020-2	No crack or constrain	4.2.8.4
Behaviour at elongation for products made with two different TPE compounds after ageing	NA	BRL 2020-2 ISO 188	No crack or constrain	4.2.8.4

Table-4: physical and mechanical requirements for TPE seals to be used in waste water and drainage piping systems



Property	Dimension	Method	Requirement	Reference
Hardness	IRHD	ISO 48-2	± 5	4.2.7.2
Tensile strength (on the seal test piece)	MPa	ISO 37	≥ 2,5 or ≥ 60 % of value measured on the material in flow direction of the TPE material determined on standard testsheets	4.2.7.3
Elongation at break (on seal test piece)	%	ISO 37	≥ 200 or ≥ 80 % of value measured on the material in flow direction of the TPE material determined on standard testsheets	4.2.7.3
Compression set 24 h, 70 °C	%	ISO 815-1	Max. 40	4.2.7.4
Stress relaxation 100 days at 23 °C (*) or 21 days at 23 °C (*) or 7 days at 23 °C (*)	%	ISO 6914 or ISO 3384-1	Max. 32 Max. 28 Max. 22	4.2.7.5
Stress fall after 168 h at 23 °C with 2 times 1 h at 70 °C	%	BRL 2020-2 4.2.7.6	Max. 30	4.2.7.6

(*) One of the 3 mentioned requirements should be met.

7 days test: if the result after 7 days is ≤ 22 % the test can be stopped and the material has passed the requirements for this aspect; if the result after 7 days is ≥ 26 % the test can be stopped and the material has not passed the requirements for this aspect; if the results after 7 days is between 22 % and 26 % the test can continue to 21 days.

21 days test: if the result after 21 days is ≤ 28 % the test can be stopped and the material has passed the requirements for this aspect; if the material is ≥ 30 % the test can be stopped and the material has not passed the requirements; if the material is between 28 % and 30 % the test can continue to a maximum of 100 days.

100 days test: if the result after 100 days is ≤ 32 % the material has passed the requirements for this aspect; if the result is > 32 % the material has not passed the requirements for this aspect.



ATTACHMENT B: Preparation of test pieces out of end products

Preparation of test pieces out of end products it is often not possible to prepare test pieces having all the dimensions as prescribed in the standard.

Still knowing about the properties of the actual products is useful because they have to function well in practice. Therefore, it is decided for this BRL that some deviations with respect to the dimensions are to be allowed.

Most end products are rings. By using a knife the TPE part can be separated from other materials if present. From that point further preparation can be done using the techniques given in ISO 23529. By selecting the appropriate shape and part of the product for preparing the test pieces the following things should be kept in mind:

- For hardness also small pieces can be used by taking the micro method of ISO 48-2. Take care to keep an original surface (unmachined).
- For tensile strength and elongation, ISO 37 specifies different test pieces. For BRL 2020-2 only ring test pieces or type 4 dumb-bells are allowed.
- Furthermore, having a constant cross section of the parallel section is the most important. Using thinner test pieces (> 0,7 mm) or missing a few parts of the clamping sections will hardly influence the results as long as failure stays within the parallel section. This combined with the possible smaller test pieces make that almost every end product can be tested.
- Compression set is a material property which is not very sensitive to dimensions of the test pieces. Taking rectangular test pieces lead to the same results. Combined with the possibility of stacking up to three layers almost every product can be tested. In case of too thin material available the test pieces can be scaled down to a smaller thickness. Then of course other spacers have to be applied to get a compression of about 25 %. More important than having a compression of exact 25 % is knowing the compressed height exactly. It is known that a compression between 20 and 30 % will lead to the same results.
- For the change in volume the thickness is more important than the length or width. Also here it is not really necessary to have complete flat test pieces. Often parts of the full products can be used without having different results.
- For stress relaxation more or less the same applies as with compression set, although the exact deformation is of no importance.
- For ozone resistance it is important to have none machined surfaces. Here, for small products, taking full sections of the products is often better and giving more realistic results then trying to get the test pieces as mentioned in the standard.
- For all preparations it goes that after preparation the test pieces should be conditioned at least 16 hours before testing.

In case if the preparation of test pieces from a seal is not possible it can also be allowed to use standardized test specimen that have been moulded in the same mould as the product. They must have a geometry that can be related to the actual product. This standardized test piece should not represent the best possible outcome out of the moulded shot and should therefore be located at the end of the injection channel. The injection channel should be equivalent to the channels used for the products. Depending on the product geometry the moulding of dumb-bells can be allowed having the best thickness fit of either 2 mm (type-2 dumb-bell) or 1 mm (type-4 dumb-bell). The minimum thickness of a standardized test piece (should be >0,7 mm).



ATTACHMENT C: Model IQC-Schedule

<p align="center"><u>IQC-schedule</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 Assessment Guideline(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 ISO 9001¹⁾?</p>	
<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: yes, documented in:QM</p>	<p>If yes, by which certification body: If yes, is the certification body accredited for the particular scope of certification? In case the QMS is not certified according to ISO 9001:</p> <ul style="list-style-type: none"> • Working instructions, test instructions and procedures are documented as follows: • The following procedure for dealing with <u>complaints</u> applies: • The following procedure for <u>nonconformity review</u> applies: 	
<p><u>Inspection and test records</u> All records shall be maintained for a minimum of 15 years.</p>		
<p><u>Specific agreements/comments/explanations</u></p>	<p>Signature of the manufacturer/supplier: Date :</p>	

¹⁾ In case the QMS is 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 in principle not have to be further filled-out except for the frequency of tests/inspections (to be approved by Kiwa) 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, producers, 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 (name and location) file
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 (name and location) file
F.1 Packaging/storage/ transportation etc				

Specific agreements/comments/explanations:



Raw materials list (not required to fill-out this appendix in case reference can be made to other Kiwa certification agreement)			Appendix I Date:
<p>I.1 The product is built-up of the following raw materials:</p> <p>a) In case of products made from ready-made raw materials: listing of name and/or unique code of the raw material(s);</p> <p>b) In case of products made from own compounded raw materials: reference to raw material/compound sheets which are (only) available at the production location and which have to be authenticated by Kiwa (e.g. by the Kiwa inspector);</p> <p>c) In case of composed products (e.g. plastics fitting body, with separate nut, clamp ring and rubber sealing ring): of each part a specification according to a) or b) (whatever applicable).</p> <p>- -</p> <p>- -</p> <p>- -</p> <p>- -</p> <p>- -</p> <p>- -</p> <p>- -</p>			
List of technical drawings			Appendix II Date:.....
Drawing title and number	Drawing date	Drawing title and number	Drawing date



ATTACHMENT D: Inspection and Test matrix

The table below contains a summary of the tests and inspections to be carried out in the event of certification. The following definitions are used:

- **Initial tests:** The test to determine if all requirements are met as stated in the BRL.
- **Inspection:** the assessment tests which is held after issuing of the certificate in order to determine if the certified products are meeting the requirements continuously; thereby is also noted at what frequency inspections by the certifying institute (CI) are needed.

Table-5: Inspection and test matrix

Description of the requirement	Article BRL 2020-2	Tests within the scope of		
		Initial assessment	Supervision by certification body after granting of the certificate	
			Inspection ¹	Frequency
Marking of the product	1.7	X	X	1x / year
Certified TPE material	3.2	X	X	1x / year
Adhesion between TPE and other material if applicable	4.2.2.3	X	X ²	1x / year
Specific requirements regarding chemical resistance	4.2.3	X	X ²	1x / year
Appearance	4.2.4	X	X ³	1x / year
Homogeneity	4.2.5	X	X ³	1x / year
Dimensions	4.2.6	X	X	1x / year
Hardness	4.2.7.2	X	X	1x / year
Mechanical properties*	4.2.7.3	X	X	1x / year
Compression set	4.2.7.4	X	X	1x / year
Stress relaxation	4.2.7.5	X	X	1x / year
Stress fall	4.2.7.6	X	X	1x / year
Behaviour at elongation before and after ageing for TPE materials that contain a weld and/or are made from two TPE compounds	4.2.8.2 4.2.8.3 4.2.8.4	X	X	1x / year

* The tensile strength and elongation at break

1) In case of significant changes in the production process the product requirements shall be evaluated again (to be decided by the certification body).

2) This aspect is compared on the basis of IQC inspection (indirectly by means of direct related parameters) with the aspect found for approval.

3) This aspect is only controlled visually during the inspection. In case of reasonable doubt samples will be taken and sent to an accredited laboratory for determination of this property.