EVALUATION GUIDELINE
K17505-1
Date of validation
Draft

Evaluation Guideline

for the Kiwa product certificate for TPE materials
for products in cold drinking water applications

Preface

This evaluation guideline has been accepted by the Kiwa Board of Experts Water Chain (CWK), wherein all the relevant parties in the field of TPE materials and products for drinking water applications are represented. This Board of Experts also supervises the certification activities and where necessary require the evaluation guideline to be revised. All references to Board of Experts in this evaluation guideline pertain to the above mentioned Board of Experts.

This evaluation guideline will be used by Kiwa in conjunction with the Kiwa-Regulations for Product Certification. This regulation details the method employed by Kiwa for conducting the necessary investigations prior to issuing the product certificate and the method of external control.

This evaluation guideline is to be assessed by the Board of Experts at least every 5 years, but at the latest on (date 5 years after validation).

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Validation
This evaluation guideline has been validated by the Director Certification and Inspection of Kiwa on Date

Contents

1 Introduction

1.1 General

This evaluation guideline includes all relevant requirements which are adhered to by Kiwa as the basis for the issue and maintenance of a certificate for TPE materials to be used for the manufacturing of products in cold drinking water applications.

For the performance of its certification work, Kiwa is bound to the requirements as included in clause 7 of ISO/IEC 17025.

For product certification of sealing products that are manufactured from (partly) TPE materials it is referred to evaluation guideline K15705-2.

1.2 Field of application / scope

The TPE materials are intended to be applied in products in cold drinking water applications, temperatures temporarily up to maximum 45 °C (see footnote [1]).

Sub group sealing elements: TPE materials that are intended to have a sealing function in elements in piping systems for the transport of cold drinking water.

Sub group non sealing: TPE materials that are intended to be applied in products or integrated parts in equipment and appliances, surface covers, etcetera without having a sealing function.
Materials that comply with the requirements for sub group sealing elements also comply with those for the sub group non sealing.

Not covered by this evaluation guideline are:
- TPE materials for connecting elements, like flexible joints, compensators and hoses;
- cellular TPE materials;
- applications in the field of food and feed.

[1] In the Netherlands the maximum allowed drinking water temperature in piping systems is 25°C.

1.3 Acceptance of test reports provided by the supplier

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

- EN-ISO/IEC 17025 for laboratories;
- EN-ISO/IEC 17020 for inspection bodies;
- EN-ISO/IEC 17065 for certification bodies certifying products;

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

The accreditation shall refer to the examination as required in this evaluation guideline. When no certificate of accreditation can be shown, Kiwa will verify whether the accreditation norm is fulfilled.

1.4 Quality declaration

The quality declarations to be issued by Kiwa are described as Kiwa product certificate.
A model of the certificate to be issued on the basis of this Evaluation guideline has been included in Annex B.

2 Terms and definitions

In this evaluation guideline the following terms and definitions are applicable:

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

Board of Experts: The Board of Experts ”CWK”.

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

IQC 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.

Pre-certification tests: tests in order to ascertain that all the requirements recorded in the Evaluation 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 Evaluation guideline.

Remark
The test matrix contains a summary showing what tests Kiwa will carry out in the pre-certification stage and in the event of inspections as well as showing the frequency with which the inspection tests will be carried out.

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

Tap water (origin NEN 1006:2002): water intended for drinking, cooking, food preparation or other domestic purposes.

TPE material: Thermoplastic material 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.

3 Procedure for granting the quality declaration

3.1 Pre certification tests

The pre certification-tests to be performed are based on the (product) requirements as included in this evaluation guideline including the test methods and contain, depending on the nature of the product to be certified:

- type testing to determine whether the products comply with the product and/or functional requirements,
- Production Process Assessment
- Assessment of the quality system and the IQC-scheme,
- Assessment on the presence and functioning of the remaining procedure

3.2 Granting the quality declaration

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

4 Requirements and test methods

4.1 General

This chapter contains the requirements to be met by the TPE material to be used later for the manufacturing of products in cold drinking water applications. 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, as included in the product certificate.
Annex A, table 8 contents a summary of the requirements.

4.2 Materials

4.2.1 General

Within the scope of this evaluation guideline all types of TPE materials may be used.

4.2.2 Colour

The colour of the TPE material is free.

4.2.3 Correct functioning

When manufacturing, no substances may be used which could impair the correct functioning or which could lead to major quality variation. See also 4.4.2.

4.2.4 Homogeneity

All ingredients shall be mixed in the TPE material homogeneously.

4.3 Fitness for contact with drinking water

To prevent deterioration of the drinking water quality, the following regulatory requirements apply.
Products and materials, which (may) come into contact with drinking water or warm tap water, are not allowed to release substances in quantities which can jeopardise the health of the consumer or the quality of the water. Therefor the products or materials have to meet the toxicological, microbiological and organoleptical requirements which are laid down in the valid “Materials and chemicals in the supply of drinking water and warm tap water Regulation” (published in the Government Gazette). This means that the procedure for obtaining a recognised quality declaration, as meant in the valid Regulation, has to be concluded with positive results.

Products and materials with a quality declaration[2], issued by e.g. a foreign certification institute, are allowed to be used in the Netherlands, provided that the Minister has declared this quality declaration equivalent to the quality declaration as meant in the Regulation.

[2] The “Regulation” (article 16) states: “A quality certificate issued by an independent certifying body in another Member State of the European Union than the Netherlands or in another signatory state to the Agreement on the European Economic Area shall be considered the equivalent of a recognised quality statement, provided the Minister deems the quality certificate of the other state in compliance with similar or better criteria than those set forth in the present Regulation.”

4.4 Functional requirements

4.4.1 General

The TPE material is considered to be resistant to any chemicals drinking water can contain under usual circumstances.

4.4.2 Effect of TPE material on other materials (e.g. of the pipe and/or fitting)

The TPE material may not contain substances that, under normal circumstances, can have an adverse effect on other materials that might be in contact during use.

Remark:
Since there is no general workable method to determine any adverse effects, it is advisable that both the manufacturer of the TPE and the manufacturer of the products establish that their products do not contain substances that can, under normal circumstances, have an adverse effect on each other.

4.5 Physical and mechanical propertiesrequirements of the TPE material

4.5.1 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 during inspection, a temperature between 15 °C and 30 °C is allowed.

4.5.2 Hardness

4.5.2.1 General

The hardness shall be suitable for the intended application of the material.
The hardness concerned shall be reported to the inspection body as nominal hardness with the tolerance range ± 5 IRHD.
The hardness shall be determined according to ISO 48 at a temperature of (23 ± 2) °C.

4.5.2.2 Hardness after ageing

After ageing according to ISO 188 for a period of 14 x 24 hours at a temperature of 80 °C the hardness may not have changed by more than 7 IRHD.

4.5.3 Mechanical properties

4.5.3.1 Tensile properties

Tensile strength and elongation at break according to ISO 37 shall meet the requirements laid down in table 1.
Dumbbell shaped test pieces of type 2 shall be used.

After ageing according to ISO 188 for a period of 14 x 24 hours at a temperature of 80 °C:
- the tensile strength may not have been changed by more than 20% and.
- the elongation at break may not have been changed by more than 30 %.

Table 1 – Tensile properties

Property	Method	Dimension	Requirement [%]
Tensile strength on sheet test piece (perpendicular to flow direction)	ISO 37	MPa	Min. 4
Tensile strength on sheet test piece (in flow direction)	ISO 37	MPa	> 70 % of value measured on sheet test piece (perpendicular to flow direction)
Elongation at break on sheet test piece (perpendicular to flow direction)	ISO 37	%	Min. 300
Elongation at break on sheet test piece (in flow direction)	ISO 37	%	> 60 % of value measured on sheet test piece (perpendicular to flow direction)

*4.5.3.2 Slow tear propagation resistance **(only for sub group sealing elements)***

Two Delft test pieces according to ISO 34-2 are bended over a mandrel with a diameter of 1,0 mm.
After 168 h at 23°C the length of the cut shall not be increased by more than 1,0 mm. Test pieces are cut perpendicular on the flow direction.

4.5.4 Compression set in air (only for sub group sealing elements)

The compression set of the TPE material determined according to ISO 815-1 (at ambient or elevated temperatures) or ISO 815-2 (at low temperatures) using the test conditions of table 2 shall not exceed the values given in this table. The small test pieces shall be used.
The compression set at low temperature shall be determined after 30 minutes of recovery.

Table 2 – Compression set

Test conditions		Maximum permanent deformation in relation to the compression in %
Temperature [°C]	Duration of compression [hours]	
-10	72	65
23	168	30
40	168	40
40	504	40
		Max change between 1 and 3 weeks at 40°C: + 5 %

4.5.5 Stress relaxation (only for sub group sealing elements)

The stress relaxation shall be determined by method A of ISO 3384-1 using the small test piece after applying mechanical and thermal conditioning (preferred method), or by the method given in ISO 6914 (alternative method).
Measurements shall be taken minimal after 3 hrs, 1, 3, 7, 14 days for the 14 day test and after 3 hrs, 1, 3, 7, 30, 100 days for the 100 days test.

The best fit straight line shall be determined by regression analysis using a logarithmic time scale. The 14 and 100 days requirements are those derived from this straight line.

The values obtained by regression shall not exceed the maximum values given in table 3.

The 100 days test shall be considered as a pre certification test. The requirement in respect of the 100 days relaxation shall also be regarded as a pre certification requirement.

Table 3 – Stress relaxation

Property	Method	Requirement [%]
Stress relaxation 336 hours at 23 °C 100 days at 23 °C	ISO 3384 or ISO 6914	 Max. 25 Max. 32

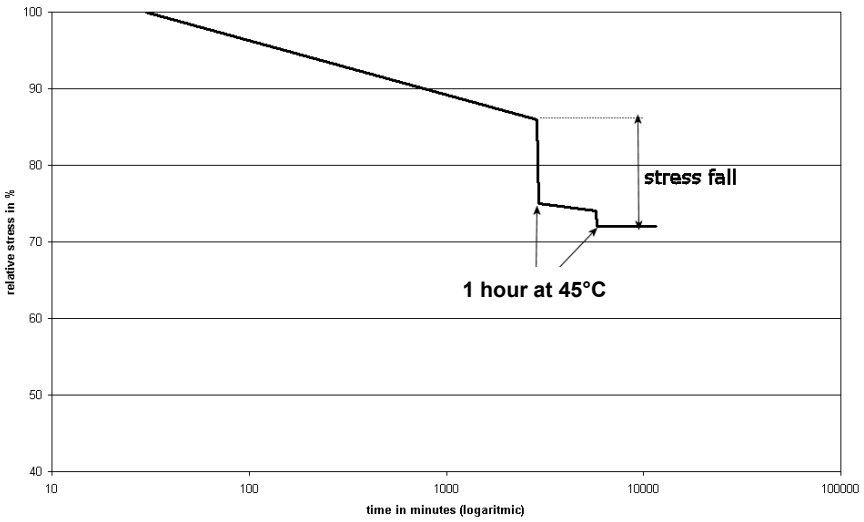
4.5.6 Stress fall (only for sub group sealing elements)

The stress fall shall be determined based on the method given in the standard ISO 6914 (preferred method), or by method A of ISO 3384-1 using the small test piece after applying mechanical and thermal conditioning (alternative method). The test is started as a normal test at 23 °C. After a period of 48 hours the test rig is carefully transferred to a temperature of 45 °C. After 1 hour the test piece is placed back at 23 °C. 47 hours later this is repeated. After the second period at 45 °C the test piece is kept at 23 °C for at least another 48 hours. The stress fall is the distance between the line before the first transfer to 45 °C and the line at 23 °C after the second transfer to 45 °C. The principle is given in figure 1.
The values obtained shall not exceed the maximum values given in table 4.

Table 4 – Stress fall

Property	Method	Requirement [%]
Stress fall 168 h at 23 °C with 2 times 1 hour at 45 °C	ISO 6914 or ISO 3384	Max. 25

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



4.5.7 Resistance to ozone attack

The TPE material shall show no cracks when tested in accordance with ISO 1431-1 method A under conditions as given in table 5.

Table 5 - Resistance to ozone attack

Concentration of ozone (pphm)	Period of exposure in hours	Temperature in °C	Elongation in %
50	48	40 ± 1	20 % ± 2 %

4.5.8 Swelling in water

The change in volume after immersion for 7 x 24 hours at 70 °C in accordance with ISO 1817 shall be within the limits -1 and +8 % (v/v).

4.7 Sampling, test material and test pieces

4.7.1 Sampling

The sample shall be representative of the product to be checked.

4.7.2 Test material

4.7.2.1 Test pieces

The test pieces required shall, in accordance with ISO 23529, be made out of test sheets.

4.7.2.2 Dimensions

The dimensions of the test sheets must be in accordance with table 6.

Table 6 - Dimensions of the required test sheets

Properties to be tested	Thickness (in mm)	Other dimensions and quantity
Tensile strength, elongation at break, ageing and resistance to ozone attack	2 ± 0,2	Sheet material, at least 225 cm² having a minimal dimension of 8 cm (i.e. 15 x 15 cm²)
Water resistance and stress fall	2 ± 0,1	Sheet material, at least 100 cm² having a minimal dimension of 5 cm (i.e. 10 x 10 cm²)
Compression set, hardness and stress relaxation	6,3 ± 0,3	Sheet material, at least 100 cm² having a minimal dimension of 5 cm (i.e. 10 x 10 cm²)

5 Marking

5.1 Certification mark

After concluding a Kiwa certification agreement the product packaging of the certified TPE material shall, beside the marks indicated in the respective standards, be indelible marked with:

- the wordmark “KIWA” and additionally the Kiwa watermark with certificate number;
- the name of manufacturer or the deposited trade mark;
- the year of manufacturing and preferably the quarter;
- the type of TPE in a letter code according to the nomenclature used in ISO 18064; e.g. TPE-V;
- the applicable sub group (“sealing elements” or “non sealing”).

6 Requirements in respect of the quality system

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

6.1 Manager of the quality system

Within the supplier's organizational structure an employee must have been appointed who is in charge of managing the supplier's quality system.

6.2 Internal quality control/quality plan

The supplier shall have an implemented and operational internal quality control scheme (IQC scheme) in place.

The following must have been demonstrably recorded in this IQC scheme:

- materials used in the product;
- which aspects are checked by the manufacturer;
- according to which methods these inspections are carried out;
- how often these inspections are carried out;
- how the inspection results are registered and stored.

This IQC-scheme shall be derived from the example format as shown in annex C. The scheme must be detailed in such a way that it provides sufficient confidence that the requirements of this Evaluation Guideline are continuously fulfilled.

6.3 Management of laboratory- and measure apparatus

The supplier must determine which laboratory- and measure apparatus are needed based on this Evaluation Guideline in order to demonstrate the product fulfils the requirements.
When applicable laboratory- and measure apparatus need to be calibrated at specified intervals.
The supplier needs to validate and register the previous measure results, when at the time of calibration is determined that the laboratory and measure devices are not operating correctly.
The apparatus in question need to be marked in such a way that can be determined what the calibration status is. The supplier is required to register the calibration results.

6.4 Procedures and working instructions

The supplier shall be able to submit procedures for:

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

6.5 Other requirements imposed on the quality system

In case the quality system of the supplier is certified on the basis of ISO 9001 or ISO/TS 16949, a combination can be made with the IQC-scheme.

7 Summary of tests and inspections

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

- Pre-certification tests;
- Inspection test as to toxicological requirements and product requirements;
- Inspection of the quality system.

The frequency with which Kiwa will carry out inspection tests is also stated in the summary.

7.1 Test matrix

Description of requirement	Article evaluation guideline	Tests within the scope of		
		Pre-certification	Supervision by Kiwa after granting of the certificate	
			Inspection[1)]	Frequency (no./year)
Toxicological requirements	4.3	X	X	1
Smell and taste	4.3	X	X	1
Colour	4.2.2	X	X[2)]	1
Correct functioning	4.2.3	X	X[2)]	1
Homogeneity	4.2.4	X	X[2)]	1
Hardness	4.5.2.1	X	X	1
Hardness after ageing	4.5.2.2	X	X	1
Tensile properties (*)	4.5.3.1	X	X	1
Mechanical properties (*) after ageing	4.5.3.1	X	X	1
Slow tear propagation resistance (**)	4.5.3.2	X	X	1
Compression set (**)	4.5.4	X	X	1
Stress relaxation (**)	4.5.5	X (100d)	X (14d) [3)]	1
Stress fall (**)	4.5.6	X	X	1
Resistance against ozone	4.5.7	X	X	1
Swelling in water	4.5.8	X	X	1x per 5 years
Marking on product	5	X	X	1

(*) Tensile strength and elongation at break
(**) Only for sub group sealing elements

1) In case of significant changes of the product or production process, compliance of the product to the performance requirements shall be determined.
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) Once in 5 years the 100 day test is to be repeated.

7.2 Inspection of the quality system

The quality system will be checked by Kiwa on the basis of the IQC scheme. The inspection contains at least those aspects mentioned in the Kiwa Regulations for Product certification.

8 Agreements on the implementation of certification

8.1 General

Beside the requirements included in these evaluation guidelines, also the general rules for certification as included in the Kiwa Regulations for Product Certification apply.

These rules are in particular

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

8.2 Certification staff

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

- Certification assessor/ Reviewer: in charge of review of the by the supplier supplied or to be supplied construction drawings and documents, admissions, reviewing of applications and the review of conformity assessments;
- Site assessor: in charge of carrying out external inspections at the supplier's works;
- Decision-maker: in charge of taking decisions in connection with the pre-certification tests performed, continuing the certification in connection with the inspections performed and making decisions on the need of corrective actions.

8.2.1 Qualification requirements

The following qualification requirements have been set by the Board of Experts for the subject matter of this Evaluation guideline:

ISO/IEC 17025	Certification assessor	Site assessor	Reviewer
Education - general	• Technical higher-level professional education • Internal training certification and Kiwa policy • Training auditing	• Intermediate-level professional education • Internal training certification and Kiwa policy • Training auditing	• Higher level professional education • Internal training certification and Kiwa policy • Training auditing
Education - specific	• for evaluation guideline relevant technical education • specific studies and training (know-how and skills)	• for evaluation guideline relevant technical education • specific studies and training (know-how and skills)	• not applicable
Experience - general	• 1 year of relevant work experience with at least 4 pre certification tests of which one carried out independent under supervision.	• 1 year of relevant work experience with at least 4 inspections of which one carried out independent under supervision	• 4 year of relevant work experience with at least 1 year in certification
Experience - specific	• Detailed knowledge of the evaluation guideline and 4 certification tests carried out on the basis of the evaluation guideline or one related.	• Detailed knowledge of the evaluation guideline and 4 inspections carried out on the basis of the evaluation guideline or one related.	• general knowledge of the evaluation guideline

The level of education and the experience of the certification staff involved should be demonstrably recorded.

8.2.2 Qualification

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

The authority to qualify staff is dedicated to:

- Decision makers: qualification of certification experts and inspectors,
- Management of Kiwa: qualification of decision makers.

8.3 Report Pre certification tests

Kiwa records the results of the pre certification tests in a report. This report shall comply with the following requirements:

- completeness: the reports verdicts about all requirements included in the evaluation guideline,
- traceability: the findings on which the verdicts have been based shall be recorded traceable,
- basis for decision: the decision maker shall be able to base his decision on the findings included in the report.

8.4 Decision for granting the certificate

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

8.5 Lay out of quality declaration

The product certificate shall be conform the model included as an annex

8.6 Nature and frequency of external inspections

The certification body shall carry out inspections at the supplier at regular intervals to check whether the supplier complies with his obligations. About the frequency of inspections the Board of Experts decides.
At the time of validation of this Evaluation Guideline this frequency was set at 4 inspection visits per year.

In case the quality system of the supplier is certified on the basis of ISO 9001, the frequency is set at 2 inspection visits per year.
If the supplier is a private label owner (identical certificate derived from a product certificate) then the frequency is set at 1 inspection per 2 year.
In case the quality system of the supplier is certified on the basis of ISO 9001 or ISO/TS 16949, the frequency is set at 2 inspection visits per year.
If the supplier is a private label owner (identical certificate derived from a product certificate) then the frequency is set at 1 inspection per 2 year.

Inspections shall invariably include:

- The IQC-scheme of the supplier and the results of tests carried out by the supplier,
- The correct marking of the certified products;
- The compliance with the required procedures.

The findings of each inspection shall be traceable recorded in a report.

8.7 Report to the Board of Experts

The certification body reports at least once a year about the certification activities performed. In this reporting, the following subjects must be addressed:

- Mutations in number of certificates (new/cancelled);
- Number of inspections carried out in relation to the fixed frequency;
- Results of the inspections;
- Measures imposed in case of non-conformities;
- Complaints received from third parties concerning certified products.

8.8 Interpretation of requirements

The Board of Experts may lay down the interpretation of this Evaluation Guideline in a separate interpretation document.

8.9 Sanction policy

The sanction policy and the weighing of shortcomings is available on the service page on the website of the certification body, which has formulated this quality assessment.

9 Standards

EN-ISO/IEC 17020:2012	Conformity assessment -- Requirements for the operation of various types of bodies performing inspection
EN-ISO/IEC 17021-1:2015	Conformity assessment -- Requirements for bodies providing audit and certification of management systems -- Part 1: Requirements
EN-ISO/IEC 17025:2005+C1:2007	General requirements for the competence of testing and calibration laboratories
EN-ISO/IEC 17065:2012	Conformity assessment -- Requirements for bodies certifying products, processes and services
ISO 37:2011	Rubber, vulcanised or thermoplastic - Determination of tensile stress - strain properties
ISO 48:2010	Rubber, vulcanised or thermoplastic - Determination of hardness (hardness between 30 and 85 IRHD)
ISO 188:2011	Rubber, vulcanised – Accelerated ageing or heat-resistance tests
ISO 815-1:2014	Rubber, vulcanized or thermoplastic -- Determination of compression set -- Part 1: At ambient or elevated temperatures
ISO 815-2:2014	Rubber, vulcanized or thermoplastic -- Determination of compression set -- Part 2: At low temperatures
ISO 1431-1:2012	Rubber, vulcanised or thermoplastic - Resistance to ozone cracking - Part 1: Static strain test
ISO 1817:2015	Rubber, vulcanised – Determination of the effect of liquids
ISO 3384-1:2011	Rubber, vulcanized or thermoplastic -- Determination of stress relaxation in compression -- Part 1: Testing at constant temperature
ISO 6914:2013	Rubber, vulcanized; Determination of ageing characteristics by measurement of stress at a given elongation
ISO 18064:2014	Thermoplastic elastomers -- Nomenclature and abbreviated terms
ISO 23529:2010	Rubber - General procedures for preparing and conditioning test pieces for physical test methods
ISO 9001:2015	Quality management systems - Requirements
ISO/TS 16949:2009	Quality management systems -- Particular requirements for the application of ISO 9001:2008 for automotive production and relevant service part organizations

Annex A. Summary of the requirements for TPE materials

Table 8: Summary of the requirements for TPE materials for use in products in cold drinking water applications

Property	Dimension	Method	Requirement
Hardness	IRHD	ISO 48	± 5
Tensile strength on sheet test piece (perpendicular to flow direction)	MPa	ISO 37	Min. 4
Tensile strength on sheet test piece (in flow direction)	MPa	ISO 37	> 70 % of value measured perpendicular to flow direction
Elongation at break on sheet test piece (perpendicular to flow direction)	%	ISO 37	Min. 300
Elongation at break on sheet test piece (in flow direction)	%	ISO 37	> 60 % of value measured perpendicular to flow direction
Slow tear propagation resistance (*)	mm	See 4.5.3.2	Max. 1,0
Compression set (*) - 72 hours, -10 °C - 168 hours, 23 °C - 168 hours, 40 °C - 504 hours, 40 °C - Change between 1 and 3 weeks at 40°C	 % % % % %	ISO 815	 Max. 65 Max. 30 Max. 40 Max. 40 Max. + 5
Volume change - 168 hours, water at 70 °C	 %	ISO 1817	 Max. -1 / +8
Stress relaxation (*) - 336h at 23°C - 100 days at 23°C	 % %	ISO 3384 (or ISO 6914)	 Max. 25 Max. 32
Stress fall (*) - 168 hours at 23 °C with 2 times 1 hour at 45 °C	 %	ISO 6914 (or ISO 3384)	 Max. 25
Ozone resistance 48 hours, 40 °C, 20 %, 50 pphm	 -	ISO 1431-1	 No cracks
Ageing 336 hours in air at 80 °C - change hardness - change tensile strength - change elongation	 IRHD % %	ISO 188	 Max. 7 Max. 20 Max. 30

(*) Only for sub group sealing elements

Annex B. Model certificate

Product certificate
K12345

Issued

Replaces 01

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TPE material

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

Company

as specified in this product certificate and marked with the Kiwa®-mark in the manner as indicated in this product certificate may, on delivery, be relied upon to comply with Kiwa evaluation guideline BRL-KK17505-1 "TPE materials for products in cold drinking water applications" – sub group sealing elements / non sealing **dated [dd-mm-yyyy]** inclusive amendment sheet dated dd-mm-yyyy.

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Publication of the certificate is allowed.

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

Supplier
Company

Tel.
Fax

PRODUCTS RvA C 002

Certification process consists of initial and regular assessment of:
- **quality system**
- **product**

2877160324

TPE material

PRODUCT SPECIFICATION

The products mentioned below belong to this technical approval-with-product certificate
xxxxx

Fitness for contact with drinking water

This product is approved on the basis of the requirements for hygienic aspects set in the "Regeling materialen en chemicaliën drink- en warm tapwatervoorziening" (“Materials and chemicals in the supply of drinking water and warm tap water Regulation”; published in the Government Gazette).

These hygienic aspects are based on two main criteria. The product shall permanently comply with:

- The product recipe approved during the assessment procedure. This recipe is not to be changed without prior approval by Kiwa according to the Kiwa approval procedure for the hygienic aspects;
- Specific product requirements for the hygienic aspects.

The recipe and specific product requirements are laid down in the for confidentiality reasons undisclosed ‘appendix hygienic aspects’ to this certificate.

MARKING

The Kiwa®-mark products are marked with the word mark “KIWA”. / "KIWA"
Place of the mark: xxxxx

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

Compulsory specifications:
Xxxxx

Method of marking:

- Non-erasable;
- visible after assembly.

APPLICATION AND USE

xxxxx

RECOMMENDATIONS FOR CUSTOMERS

Check at the time of delivery whether:

- the supplier has delivered in accordance with the agreement;
- the mark and the marking method are correct;
- the products show no visible defects as a result of transport etc.

If you should reject a product on the basis of the above, please contact:

- Company

and, if necessary,

- Kiwa Nederland B.V.

Consult the supplier’s processing guidelines for the proper storage and transport methods.

Annex C. Example model IQC schedule

See next pages

<table>
<tr><td><u>IQC-schedule</u>

<u>INTERNAL QUALITY PLAN</u></td><td colspan="2">Manufacturer / supplier :
Production location address :</td><td>Number of appendices:</td></tr>
<tr><td colspan="4"><u>Field(s) of application</u>

<u>According Evaluation Guideline(s)</u></td></tr>
<tr><td colspan="2"><u>Number of production shifts:</u></td><td colspan="2" rowspan="3"><u>Quality manual, procedures and working instructions</u>
Is the Quality Management System (QMS) certified according to ISO 9001[1)]?
If yes, by which certification body:
If yes, is the certification body accredited for the particular scope of certification?

In case the QMS is <u>not</u> certified according to ISO 9001:
• 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:</td></tr>
<tr><td colspan="2"><u>Quality Control</u>
Total number of employees in QC department :
Number of QC-operators per shift :

If no QC-inspections are carried out during night shifts, state the QC procedure(s)/instruction(s) to be followed: , documented in:</td></tr>
<tr><td colspan="2"><u>Inspection and test records</u>
All records shall be maintained for a minimum of years.</td></tr>
<tr><td colspan="2"><u>Specific agreements/comments/explanations</u></td><td colspan="2">Signature of the manufacturer/supplier:

Date :</td></tr>
</table>

[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 file (name and location)

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

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

Specific agreements/comments/explanations:

Raw materials list **(not required to fill-out this appendix in case reference can be made to the Kiwa ATA part of the certification agreement)**	**Appendix I** Date: ……

I.1 The product is built-up of the following raw materials:

a) In case of products made from ready-made raw materials: listing of name and/or unique code of the raw material(s);

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);

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).

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

Annex D. Guidance (Informative)

D.1. Explanations

D.1.1. Permanent seal under load

When applying seals in pipe joints it must be kept in mind that under the load and the own weight of the pipe, after a certain lapse of time the deformation of the ring may be such that the seal is no longer sufficient on the opposite side. The pipe manufacturer is recommended to take measures to prevent this.

D.1.2. Recommendations of a general nature

D.1.2.1. Percentage of compression

The extent, to which different types of TPE are compressed in the joints, varies. General rules cannot be given. The following factors affect the acceptable percentage of compression:

- the type of TPE and the way the rings are manufactured;
- the construction of the joint;
- the conditions (temperature, pressure, medium and additional assembly tensions).

Therefore, the type of TPE to be used must always be determined in consultation with the buyer, the pipe manufacturer and the TPE manufacturer.

D.1.2.2. Additional requirements

Sometimes it is necessary to have additional requirements, e.g. with regards to rigidity. Also, it may be useful to demand better resistance against ozone when long-term storage under extreme conditions is planned.

If additional requirements are judged necessary, the manufacturer of the pipes or attachments shall inform the TPE manufacturer and the inspection body of such requirements.

D.2. Recommendations for the storage and use of TPE materials and products

During storage and use of TPE, appropriate measures must be taken to shield off environment influences (light, air, humidity and temperature).

The preservation of quality is aided as follows.

D.2.1. Storage in a warehouse or temporary indoor storage

a. Preferably, use a separate and closed room:
   - screened against artificial and day light;
   - ventilated with air containing as little ozone as possible (ozone is produced e.g. by generators, electric motors and arc welding);
   - with an ambient temperature between 5 and 25 °C;
   - with a relative humidity between 40% and 70%;
   - free of oil, grease and other hydrocarbons and/or vapours emanating from these.

b. Keep the storage time as short as possible.
   Apply the "first in - first out" method.
   In the case of indoor storage for a period exceeding 6 months, extra measures are required despite good conditions. These include airtight package, female ends of pipes, attachments or fittings.

   Hanging or stacking may cause extra load -pressure, elongation or tensile- and thus the formation of cracks.

D.2.2. Outdoor transport and storage

It is recommended to protect the TPE materials and products as much as possible during transport or outdoor storage.

a. Keep exposure to influences of weather as short as possible and certainly protect against frost (temperature below -5 °C).
b. In the case of exposure to outdoor conditions for a period exceeding 2 weeks, extra measures are required such as packing, covering and screening against weather influences.

Always prefer indoor storage or covered outdoor storage.

D.3. Processing for assembling sealing elements

Some general preventive rules for processing are:

a. Keep attachments and ends free of dust, sand and dirt in order to prevent damage at assembly.
b. At assembly, loose seals shall be processed directly from the - possibly temporary - package.
c. TPE seals are susceptible to mechanical damage caused by sharp objects, burrs, cutting edges and undue elongation, distortion and forcing. Check the male ends of the pipes for burrs etc. prior to assembly.
d. In the case of repeated of long term arc welding in ambient air, the TPE shall be protected.
e. Avoid contact with oil, grease, petrol, etc. and their vapours.
f. Cleaning with chemical products varies for many applications; follow the instructions of the manufacturer.
g. Application of lubricants shall take place strictly according to the instructions of the manufacturer or supplier.

D.4. Seals in aboveground installations

TPE seals in aboveground installations or in permanent contact with atmospheric conditions require extra attention with regard to long term resistance.

Not all TPE compounds and/or types are suitable for long term aboveground applications. The choice of a TPE compound shall therefore be well-considered.

Certification contract

Annex E. (Informative)

Difference between requirements for certification of TPE material and for certification of TPE products (only for sub group sealing elements)

In the table beneath an overview is given on what tests are applicable for each certificate.

Table 9.

	TPE material (sheet)	Product
Evaluation guideline	**K17505-1**	**K17505-2**
Hardness	**X**	**X**
Tensile strength on test piece out of sheet material - flow direction - perpendicular to flow direction	 **X** **X**	
Elongation at break on sheet material - flow direction - perpendicular to flow direction	 **X** **X**	
Tensile strength on test piece out of product		**X**
Elongation at break on test piece out of product		**X**
Slow tear propagation resistance	**X**	
Compression set - 72 hours, -10 °C - 168 hours, 23 °C - 168 hours, 40 °C - 504 hours, 40 °C - Change between 1 and 3 weeks at 40°C	 **X** **X** **X**	 **X**
Volume change - 168 hours in water at 70°C	 **X** **X**	
Stress relaxation - 168 hours at 23°C - 100 days at 23°C - stress fall test	 **X** **X** **X**	 **X** **X**
Ozone resistance	**X**	
Ageing	**X**	
Strength of the bond (if applicable)		**X**