Development Services

From Concept to Construction

Phone: 503-823-7300 Email: bds@portlandoregon.gov 1900 SW 4th Ave, Portland, OR 97201
More Contact Info (http://www.portlandoregon.gov//bds/article/519984)

APPEAL SUMMARY

Status: Hold for additional information

Appeal ID: 22220	**Project Address:** 539 SE 59th Ct
Hearing Date: 12/11/19	**Appellant Name:** Tad Everhart
Case No.: P-003	**Appellant Phone:** 503 239 8961
Appeal Type: Plumbing	**Plans Examiner/Inspector:** McKenzie James, Jim Bechtel, Joe Blanco
Project Type: residential	**Stories:** 2 **Occupancy:** single family residential **Construction Type:** light wood structure
Building/Business Name: Everhart house/Tad Everhart Energy Advisor LLC	**Fire Sprinklers:** No
Appeal Involves: Alteration of an existing structure	**LUR or Permit Application No.:** We have not made an application for a permit. Upon approval, we will obtain a plumbing permit.
Plan Submitted Option: pdf [File 1] [File 2]	**Proposed use:** My personal residence.

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	104.3.4 of the 2017 OPSC
Requires	Building Official may approve alternative material/method if the proposed design is satisfactory and it complies with the intent of the OPSC.
Proposed Design	Installation of Showersave brand waste water heat recovery fixture to make our house more energy efficient in order to lower emissions which cause global heating.
Reason for alternative	The Showersave has multiple European test reports showing hygiene/safety is not compromised and the percentage of heat recovered from waste water to warm cold water supplied to the shower mixer valve is as high as 65%. The application to the City of Portland Alternative Technology Advisory Committee includes these reports. And the manufacturer states over 70,000 Showersave fixtures have been installed in Europe and the United Kingdom and Ireland without failure or harm to health.

APPEAL DECISION

Use of non-listed waste water heat recovery fixture: Hold for additional information.

Appellant may contact McKenzie James (503-823-7317) with questions.

Additional information is submitted as a no fee reconsideration, following the same submittal process and using the same appeals form as the original appeal. Indicate at the beginning of the appeal form that you are filing a reconsideration and include the original assigned Appeal ID number. The reconsideration will receive a new appeal number.
Include the original attachments and appeal language. Provide new text with only that information that is specific to the reconsideration in a separate paragraph(s) clearly identified as "Reconsideration Text" with any new attachments also referenced. No additional fee is required.

City of Portland, Oregon
Bureau of Development Services
Office of the Director
FROM CONCEPT TO CONSTRUCTION

Ted Wheeler, Mayor
Rebecca Esau, Director
Phone: (503) 823-7300
Fax: (503) 823-6983
TTY: (503) 823-6868
www.portlandoregon.gov/bds

To: **Tad Everhart**

From: **Alternative Technology Advisory Committee:**
Joshua Klyber (chair) Aron Faegre Bob Sweeney
Jeff Cordial David Posada

RE: **Application #13-1, Waste Water Heat Recovery Water Heater for Shower – Final Recommendation**

Date: **June 25, 2019**

Summary of Proposal: The applicant requests that the Alternative Technology Advisory Committee review a waste water heat recovery (WWHR) system for a residential shower. The proposed waste water heat recovery pipe is manufactured by Q-Blue, and the specific Q-Blue product reviewed is the Showersave.

The Showersave consists of three separate concentric pipes that replaces a vertical section of waste water piping. Waste water from the shower is conveyed from the waste water pipe above the Showersave to the waste water piping below the Showersave by the inner copper pipe.

The inner copper pipe is surrounded by a tight-fitting second copper pipe. The two are separated by three separate small gaps, which allow any wastewater leaking through the inner pipe to drain down to the bottom where periodic inspection would allow leak detection. The third copper pipe is separated from the second copper pipe by a narrow gap designed for fresh cold water flowing from the water supply to the shower head. Since copper conducts heat well, heat in the waste water is transferred to the fresh water.

Applicable Building Code Section(s): Section 104.3.4 of the 2017 Oregon Plumbing Specialty Code (OPSC) allows the building official to approve an alternative material or method of construction if the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of the OPSC. The Showersave is not UL listed, so it does not comply with the OPSC.

Please note that following the findings and recommendations of this Committee or the Bureau of Development Services Administrative Appeals Board does not waive any other state or federal requirements.

Committee Findings:

1. The Showersave will be installed per the manufacturer's instructions included in the Installation Manual attached hereto as Exhibit A.

2. Although the application was specifically for System B on page 4 of the Installation Manual, the Committee recommends approval of all three systems outlined in the Installation Manual.
3. A maintenance schedule will be created and followed to visually inspect the system periodically for leaks.
4. A full-height access panel will be installed for maintenance of the system.
5. The air admittance valve must be installed 4 inches above the shower inlet.

Final Committee Recommendation:

Based on these findings, the Alternative Technology Advisory Committee recommends approval of the use of this technology for residential purposes.

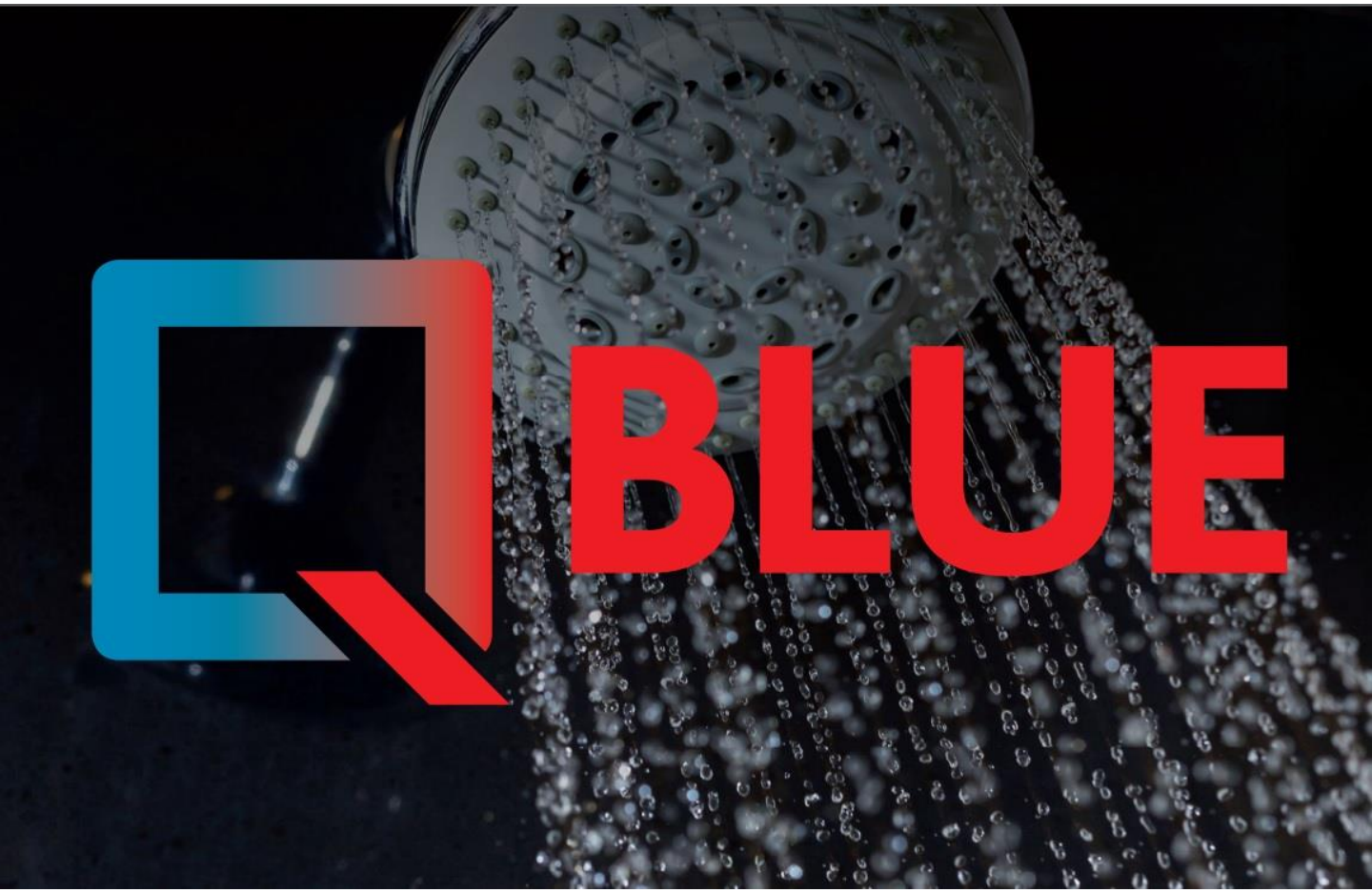
Please note: The Bureau of Development Services and the Administrative Appeal Board are not bound by the recommendations of the Committee. A favorable recommendation of a technology by the Committee does not guarantee approval of a building code appeal.

Further instructions for the applicant:

You may submit your plumbing code appeal to use this technology in a site-specific project at any time by following the instructions found on the BDS website. A plumbing code appeal must be approved by BDS to be able to use this technology in a project. Please submit a copy of this Committee recommendation with your appeal application. Please contact the Appeal Board Secretary at (503) 823-7335 if you have any additional questions about the appeal process.

Showersave®

QB1-21
QB1-16
QB1-12



Installation Manual

Showersave®QB1-21 (heat exchanger)
QB1-16
QB1-12

Contents

Showersave®QB1-21 (heatexchanger)
QB1-16
QB1-12

1.0 General Information

This Installation Manual is about installation of the Q-Blue Showersave®QB1-series. This serie contains the Showersave®QB1-21, the Showersave®QB1-16 and the Showersave®QB1-12. The way these products work is identical, only the lenghts of the heatexchangers differ. Because the lenghts of the heatexchangers differ also the efficiencys and the pressurelosses differ (see points 4.0 and 4.1 of this manual).

On average, a shower uses 60 litres of water at a temperature of between 38 and 40 °C. This shower water goes straight down the drain, wasting a great deal of heat and energy. By running the hot waste water through the Showersave QB1 this heat can be transferred to the water on it's way to the boiler and/or the cold water tap of the shower's mixer tap. The heat transfer takes place simultaneously while you shower.

1.1 Description of the heat exchanger

In fact the Showersave®QB1 contains three copper pipes, the wastewater pipe, the outer pipe and a pipe in between which is connexted to the outer pipe. This is how a double barrier is realised between waste water and tap water. The miniscule space between the pipe in between and the wastewater pipe (wastewater pipe) contains air. If the inner pipe develops a leak, this becomes visual apparent as water will drip from the heat exchanger. This double wall seperation is according to EN1717:2000 and is tested and approved by KIWA. This system is also WRAS approved.

Each Showersave®QB1 has a label (see fig. 1) with printed on it a unique serial number and also technical information. This label should always stay on the Showersave®QB1 and may not be removed. If the label is removed or not readable garantee is no longer valid.

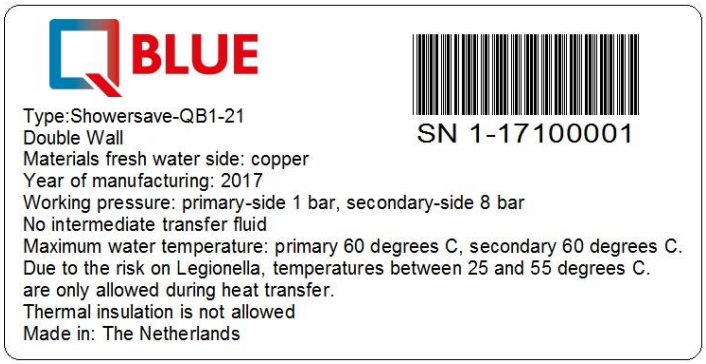


fig. 1

1.2 Safety and legionella

When no cold water is flowing up the Showersave®QB1, the temperature in the pipe should be prevented from becoming higher than 25°C. The Showersave®QB1 may therefore not be installed near heat conducting pipes, on warm surfaces or in spaces with constantly high temperatures (>25°C). The cold water pipe, connection and the outer wall of the Showersave®QB1 **may therefore not be insulated.**

1.3 Maintenance and cleaning

Generally no maintenance is required. Efficiency can decrease as a result of dirt accumulating on the inside of the Showersave®QB1. However, the waste water from the showersave flows at a high speed (>1m/s) along the inner pipes wall. This is comparable to the water speed in a dishwasher. The water flows through the pipe in 2 seconds and therefore no dirt will accumulate (normally).
If, for what reason, dirt accumulates, then a soap based cleaning agent can be used to flush the pipe. Cleaning agents based on scouring or polishing agents are not allowed, because they can stik to the wall of the pipe and reduce efficiency.
Connecting a wash basin to the Showersave®QB1 is not recommended as shaving gel and toothpaste are very sticky and could adhere to the wall of the inner pipe.

2.0 Points of attention when installing:

- The Showersave®QB1 should be mounted vertically both from frontside as from the side
- The Showersave®QB1 is a device and should therefore be mounted easily accesable, so that it can be easily installed and uninstalled
- Before the freshwater connection a non-return valve and a shut-off valve should be installed (type EA) (see afb.1 page 5)
- The Showersave®QB1 may not be mounted in an area where the temperature normally is higher than 25 °C
- The Showersave®QB1, the water pipeline and the connections may not be inslulated
- The waterconnections should be made with straight thread, so not with conical thread
- Hemp may not be used on the connections
- The tightening moment of the connection may not exceed 120 Nm (Tip : use a counter key)
- The label with the serial number and technical information may not be removed and should stay readable

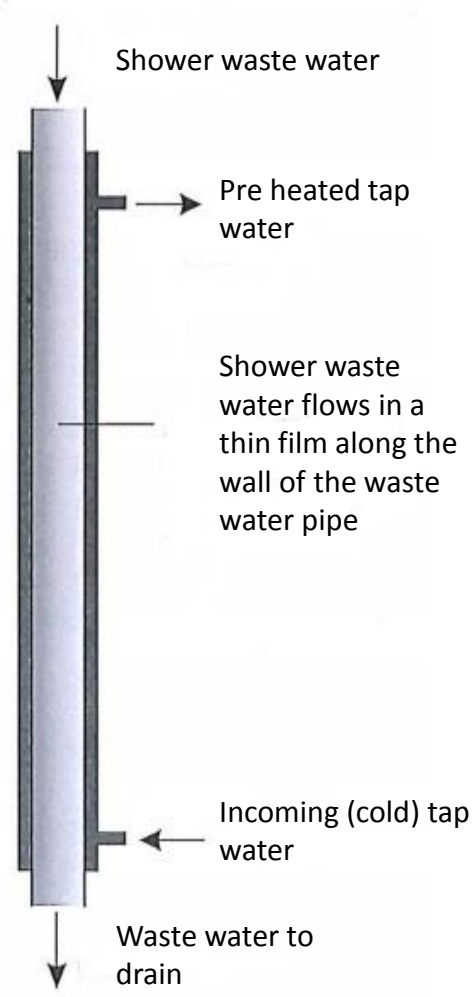
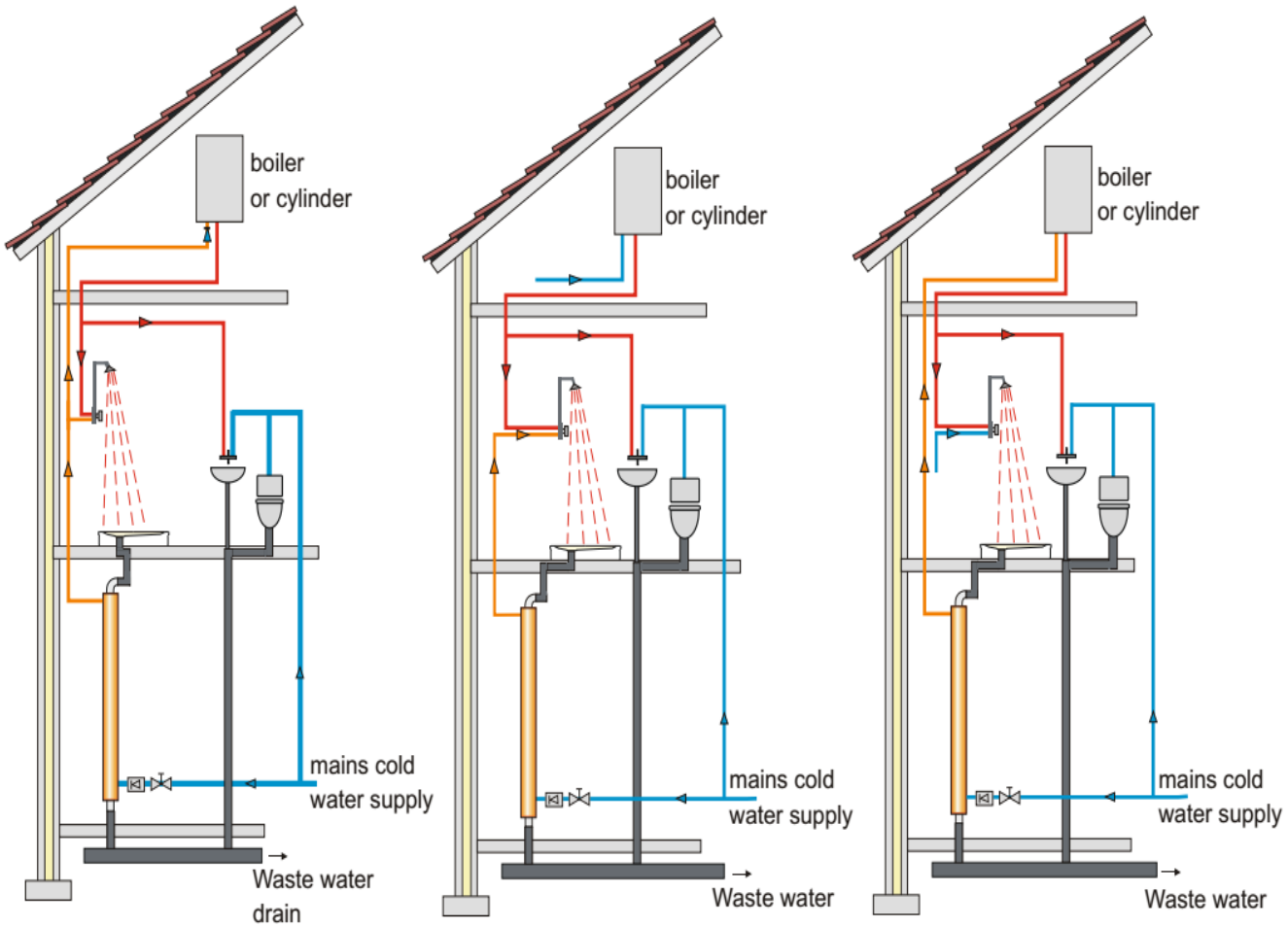


fig.2

3.0 Installation of the Showersave®QB1

3.1 Systems A, B en C

The inlet side of the Showersave®QB1 can be connected to the tap water system.
The outlet side can be installed in three different ways, namely:
System A: Combined connection to the shower mixer tap's cold water connection and the heater/boiler
System B: Connection of the cold water connection from the shower mixer
System C: Connection to the water heater/boiler



System A System B System C

fig. 3

3.2 Connections

The tap water connections should be demountable. Just before the tap water connection a non-return valve and a shut-off valve should be mounted (type EA) (see afb. 1).

Afb. 1

Extra aeration

Dearation of the Showersave®QB1 is not necessary, all air will disappear automatically because the water flows from the bottom on the top.

If aeration of the drainage area between the showerplace and the Showersave®QB1 is desired it can be achieved in two ways:

1. A connection to a relief pipe or stand pipe (with relief pipe) of the shower (see fig. 4).
2. By using an aerator. The aerator must be mounted vertically above the heat exchanger and may not be placed lower than 1 meter below the top of the shower place. The aerator can be placed on the rotator by replacing the 45 degrees bend for a T-connector (see fig. 5).
   (note: aerator is not standardly supplied)

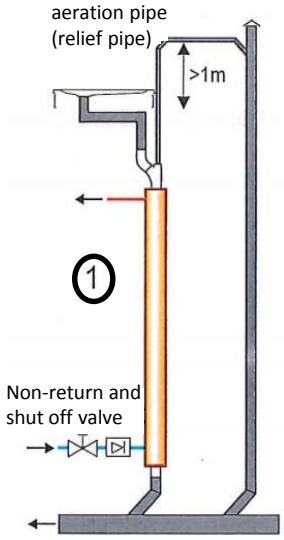


fig. 4

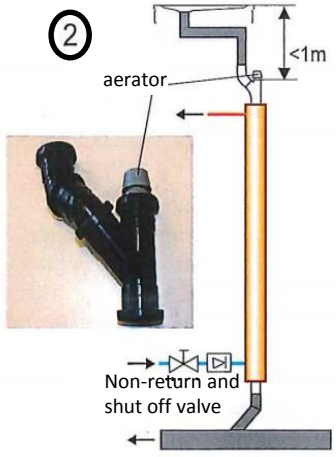


fig. 5

3.3 Positioning of the Showersave®QB1

The Showersave®QB1 is considered a device. The space it is installed in should be large enough so that inspections can be carried out properly and if necessary the Showersave®QB1 can be replaced easily. Access has to be possible without extra work. When this is not respected any garantee claim will not be valid.

Possible positions of installation are a fixed cabinet, cilinder shaft with removable panel, technical area, stair cupboard etc.
Positioning in a Electrical meter cupboard is only allowed when properly compartimented and only when accordated by local building authority.

3.4 Fixation of the Showersave®QB1

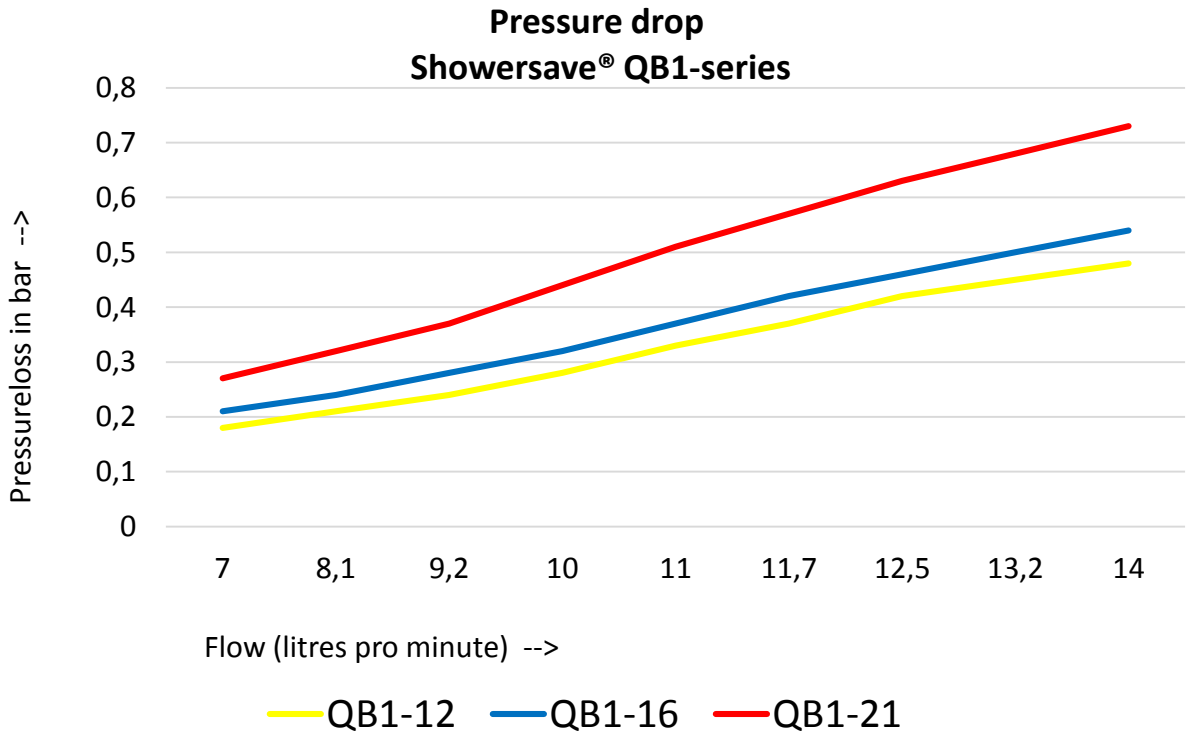
The Showersave®QB1 is mounted to the wall with two special braces (see afb. 2). It is important to take good care of that the Showersave®QB1 is mounted strictly vertical, seen from the front as from the side.

Afb. 2

4.0 Technical information of the Showersave®QB1

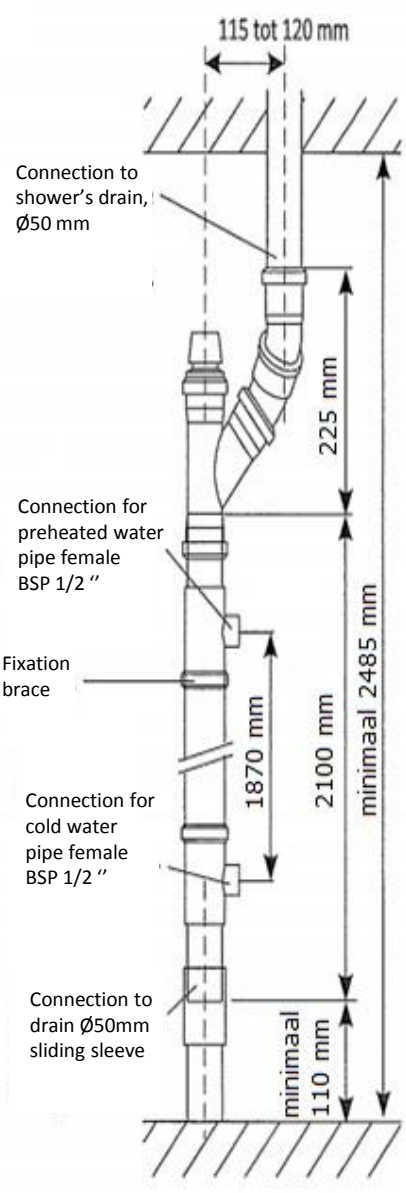
Specifications	QB1-21	QB1-16	QB1-12
Length	: 2100 mm	1680 mm	1270 mm
Weight	: 7,8 kg	6,1 kg	4,5 kg
Content water compatiment	: 0,52 liter	0,39 liter	0,28 liter
Diameter (outer) waste water connection	: 50 mm	50 mm	50 mm
Tap water connections	: G1/2"	G1/2"	G1/2"
Max. allowed tightning moment	: 150Nm	150Nm	150Nm
Max. allowed pressure wastewater	: 1 Bar	1 Bar	1 Bar
Max. allowed pressure tap water	: 8 Bar	8 Bar	8 Bar
Max. allowed temperature waste- or tap water	: 60 graden	60 graden	60 graden
Efficiency on system A en 12,5 l/min flow (*)	: 61,4%	56,1%	48,5%
Efficiency on system A en 9,2 l/min flow (*)	: 64,6%	60,1%	52,7%
(*) efficiencys measured by KIWA			

4.1 Pressureloss

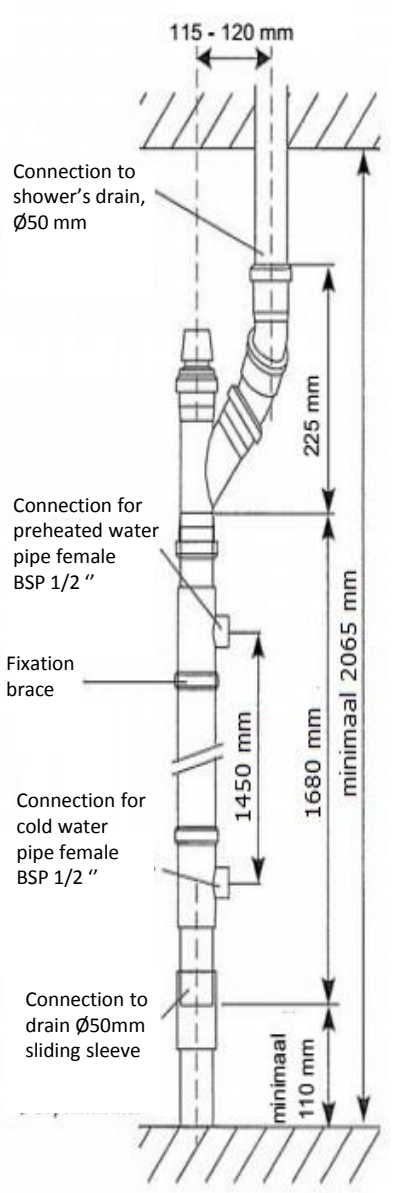


4.1 Dimensioning (sizes) for mounting of the Showersave®QB1

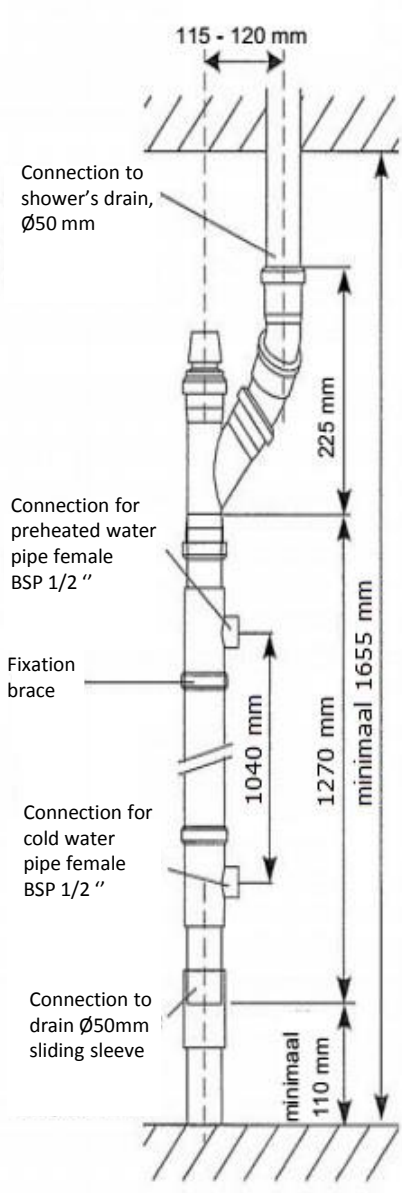
QB1-21



QB1-16



QB1-12



City of Portland, Oregon
Bureau of Development Services
1900 SW 4th Avenue, Suite 5000
Portland, Oregon 97201
(503) 823-7300

Alternative Technology Advisory Committee Application Form

For information about the Alternative Technology Advisory Committee, instructions for filling out this application form and a list of submittal requirements please see our web site at www.portlandonline.com/bds/atac

Applicant Information:
Name: Tad Everhart **Company Name:**
Email Address: tad.everhart@comcast.net
Address: 539 SE 59th Court
City: Portland **State: Oregon** **Zip Code: 97215**
Phone No.: (503) 239-8961 **FAX No.: ( )**

Project Information:
This application involves (check one):
☐ **A technology not associated with a specific project**
☐ **A specific project currently under review**
Project Address:
Tax Account number:
Building Permit No.:
LU Case No (if applicable):
X **Other (specify): Application for building permit to install in my home will be made if I am successful in obtaining a recommendation and building code appeal is successful.**

I. Overview of Technology

A. Proposed Technology: Please describe the material/product/construction method you would like to have reviewed by the committee

Waste water heat recovery pipe manufactured by Q-Blue. The specific Q-Blue product I wish to install is called the Showersave.

The Showersave is a length of 3 separate concentric pipes that replaces a vertical section of waste water piping.

Waste water from the shower is conveyed from the waste water pipe above the Showersave to the waste water piping below the Showersave by the inner copper pipe.

The inner copper pipe is surrounded by a tight-fitting second copper pipe. The two are separated only by three separate small gaps which would allow any wastewater leaking through the inner pipe to drain down to the bottom where periodic inspection would allow detection.

The third copper pipe is separated from the second copper pipe by a narrow gap designed for fresh cold water flowing from the water supply to the shower head. Since copper conducts heat well, heat in the

waste water is transferred to the fresh water.

A cross section showing the separation of waste water and fresh water by two separate continuous copper pipes is attached.

From 60% to 70% of the heat in the waste water from the shower is transferred to the cold water supply to the shower head.

Since heat in waste water simply conducts to the ground around sanitary sewer piping, it is wasted. By recycling the heat, the cold water flowing to the mixing valve for the shower is warmed. Thus, less hot water is required for the water flowing from the shower head to be at the desired temperature.

In the event the inner pipe is breached, there is no possibility that waste water will contaminate the cold water supplied to the shower because 1) it can drain down the small air void between the inner and middle pipe and 2) the middle pipe would prevent the two water streams from coming in contact. Additionally, even if the middle pipe were breached, the pressure of the cold water supply to the shower head would be greater than the pressure of the waste water.

Q-Blue's Showersave not only achieves substantially greater heat recovery than waste water heat exchangers manufactured in North America, but it includes a simple but ingenious enhancement which improves the thermodynamics. The Showersave QB1-21C includes a polymer connection piece that joins the waste water piping upstream of the Showersave with the Showersave. This connection connects a nearly-horizontal waste water pipe to the vertical Showersave, but it does this in a way that induces cyclonic flow in addition to the downward flow from gravity. Thus, the waste water's inertia ("centrifugal force") keeps it in contact with the inner wall of the copper pipe for maximum heat exchange. It is possible that this also induces turbulence in the flow which also increases heat exchange. See https://www.q-blue.nl/en/news

B. Application of Technology: Please describe the specific application of the technology. How, when and where will this technology be used?

I wish to install the Q-Blue Showersave in my family's home in Portland, Oregon as soon as the City of Portland permits as part of retrofitting our home to meet the stringent Passive House energy-efficiency standard.

C. Code Conflicts: Please describe any known building code issues related to this technology.

I am not aware of code conflicts but hope the ATAC review process will identify any code conflicts and resolve them.

Even if the City of Portland and State of Oregon plumbing codes do not clearly prohibit the Showersave, an ATAC recommendation and successful code appeal will clarify the situation.

Although the technology itself may not be prohibited, it is possible that the Showersave would be considered a plumbing fixture which must have particular independent laboratory testing, for example by Underwriters Laboratory, that the Showersave does not have. If that is the case, I hope that European independent laboratory testing and approvals can be substituted for those required by the City of Portland and State of Oregon.

II. Sustainability

A. Sustainable Elements: Describe how this alternative substantially reduces the environmental impact on the planet over similar technologies currently allowed by the code? ***Please attach any documentation that supports your answer.***

Other manufacturers produce WWHR fixtures, but they typically braze copper pipe (cold water supply to shower mixer) to a length of metal waste water pipe. I believe those WWHR fixtures may be allowed, but they are not as sustainable a technology as the Showersave's.

First, the Showersave is much more efficient. An example of the North American WWHR fixture is EcoDrain (see https://ecodrain.ca/en/products/v1000/) It claims efficiency of 46.6%. Or the PowerPipe (see http://renewability.com/#DWHR) with efficiency of 42.9%.

The Showersave has efficiency of up to 70% according to the Passivhaus Institut's independent performance certification program: https://database.passivehouse.com/en/components/list/heat_recovery

Domestic hot water is a high-performance Passive House is one of the highest uses of energy, sometimes even greater than space heating in our climate. Just as we recover the heat in stale air we exhaust with heat recovery ventilators, WWHR can save substantial amount of operating energy. And since it is a passive technology with no moving parts, unlike highly-efficient space heating and cooling mechanical equipment or renewable energy production/storage equipment, it should never need replacement.

Second, although I am not certain of this, it appears to me that the Showersave makes more efficient use of highly-conductive, but expensive, copper. Although the Showersave copper pipes' circumferences are much greater than the copper pipes in the alternatives, the length of pipe is far less.

One reason copper is expensive is that mining, refining, and other industrial processes to create copper are energy intensive. Although I have no way of quantifying the embodied energy in copper, I expect it is significant. And most mining causes environmental damage. Thus, we should make the most efficient use of copper possible. And technologies which can minimize the amount of copper may not only directly reduce environmental damage, but also indirectly reduce it by making the WWHR technology more affordable and more quickly and widely implemented.

B. Reason for Alternative: Describe why this alternative is desired?

Higher efficiency. And potentially less environmental damage embodied in the materials.

C. Comparison to Other Technologies: How does this technology provide equivalent life safety and/or fire protection than the current technologies allowed by the code?

There is no fire risk. The main risk is contamination of the fresh water supply to the showerhead. Showersave testing revealed contaminants in the copper (e.g., lead) are within limits of European health guidelines.

The risk of cross-contamination by waste water is minimized by 1) the ability of waste water to drain down between the inner and middle walls at lower pressure than the fresh water as well as 2) the separate middle wall's structural integrity.

The risk of Legionella is minimized by prohibiting installation of insulation on the highly-conductive outer wall so that cold potable water will not stay any warmer than surrounding air. Although the cold water will be in contact with piping that could conduct heat from the air in the waste water pipe, that air is typically at

or near ground temperature and warms only slowly as it rises through the home. We have retrofit our waste water piping with air admittance valves so that there is only limited air movement in the waste water lines. Thus, I estimate the air on both sides of the column of cold water in the Showersave would eventually equal the air temperature in our house. However, that temperature is not warm enough to support the growth of Legionella. And already cold water is supplied to fixtures supplying both shower and drinking water that most likely approximates the same temperature.

The Showersave installation manual is attached. Please note that it requires no insulation be placed around the Showersave. And that no hot water pipe be adjacent. These safeguards prevent temperatures in stagnant water conducive to Legionella.

In addition, the manual requires a chase be constructed around the Showersave with an inspection port so that in the event the inner copper wall is perforated, the inspector can see moisture and replace the Showersave.

We desire to install the Showersave as System B. Warming cold water flowing to the mixing valve for the shower. See https://www.q-blue.nl/en/video/system-b

III. Supporting Documentation

A. Testing Data: Describe any testing that has been performed on this technology to show how it may be able to meet code requirements. ***Please attach all available testing data.***

Attached are Dutch BRL regulations. They govern the quality of water intended for human consumption pursuant to a specific directive to the European Communities and are based on the European Communities' procedure for attesting conformity of construction products that come into contact with water intended for human consumption.

Attached is a WRAS certificate for Q-Blue's products in the UK under the BPD Limited name. BPD Limited is Q-Blue's distributor for the UK: http://www.showersave.com

WRAS is an independent organization representing the 26 organizations supplying potable water in the UK: https://www.wras.co.uk/about_us/

Q-Blue has also obtained similar approvals from KIWA (working in several European countries), ETA (in Denmark), and others.

Attached are two separate certificates from KIWA.

One certificate relates to hygiene and safety to the BRL-K 656 *KIWA Evaluation Guideline: For the Kiwa product certificate for Heat exchangers intended for the indirect heating of drinking water.* Both the certificate and the BRL-K 656 Guideline is attached.

KIWA tests to European Norms. The KIWA certificates reference the relevant European Norms. https://www.cen.eu/work/products/ENs/Pages/default.aspx

KIWA is an independent testing and certification organization: https://www.kiwa.com/en/services/certification/services/

KIWA also certifies energy efficiency, and that certificate is attached. An additional certification for energy efficiency from the Passive House Institute in Germany is attached.

Q-Blue is willing to supply other certifications, but they may not be in English.

B. History of Use: Describe all known instances where this technology has been applied to a constructed building, including approximate date, location and building type. ***Please attach any documentation that supports your answer.***

Q-Blue started production of the Showersave in May 2016 by taking over machinery, knowledge and employees of a company called Hei-Tech.

Hei-Tech produced the Showersave (then named Recoh-Vert) from 2009.

The Q-Blue distribution network is growing quickly and currently includes the Netherlands, the UK, Finland, Sweden, Denmark, France and Belgium.

In ten years, approximately 75,000 Showersaves (including earlier Recoh-Verts) have been sold in those countries.

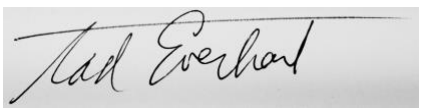
LIST OF ATTACHED DOCUMENTS:
Cross-section diagram
Installation manual
BRL regulations
WRAS certificate
KIWA certificates
BRL-K 656 *KIWA Evaluation Guideline*
Passive House Institute certificate

Responsibility Statement:

As the applicant submitting this application I am responsible for the accuracy of the information submitted. I have submitted all the relevant information available about the technology I am requesting the Alternative Technology Advisory Committee to review. I believe the information submitted to be a compete and accurate representation of the proposed technology and I am aware that any omission (either voluntary of accidental) could cause the application to be denied. I understand that more information may be requested before the committee can make a recommendation on my application.

I understand that the recommendation from the committee is not binding. In addition, a favorable recommendation from the committee is not a guarantee that the Administrative Appeals Board will approve a subsequent building code appeal. The City of Portland and the committee members have no implied or expressed liability associated with the conclusions of the Alternative Technology Advisory Committee. By my signature, I indicate my understanding and agreement to the Responsibility Statement.

Applicant's signature: **Date:**

Property owner's signature (if applicable):  **Date:** ***2/25/19***

For Office Use Only:
Received By: Date Received: Receipt No.:

Materials and chemicals in the supply of drinking water and warm tap water Regulation (version dated 2012-04-01 incl. technical adjustments dated 2017-07-01)

ONLY THE DUTCH TEXT IS LEGALLY BINDING (for the Dutch text see http://wetten.overheid.nl/BWBR0030279/2012-04-01#Opschrift **and** http://wetten.overheid.nl/BWBR0030279/2017-07-01 **)**

The Minister for Infrastructure and the Environment,

Acting upon consultation with the Minister of the Interior and Kingdom Relations;

Having regard to Directive 98/83/EC of the European Communities of 3 November 1998 on the quality of water intended for human consumption (OJEC L 330), Decision 2002/359/EC of the Commission of the European Communities of 13 May 2002 on the procedure for attesting the conformity of construction products that come into contact with water intended for human consumption, in accordance with Article 20(2) of Directive 89/106/EEC of the Council, Article 20(1), preamble and subparagraph b of the Drinking Water Decree and Articles 6.12(2) and 6.13(2) of the 2012 Building Act;

Hereby resolves as follows:

Chapter 1. Definitions

Article 1

The following definitions shall apply in the context of the present Regulation:

Decree: Drinking Water Decree;
Commission: the commission of experts as described in Article 20(2), of the Decree;
Common approach: joint research and assessment methods of Member States of the European Union for products in contact with drinking water and hot water, as disclosed pursuant to Article 20a;
List of components: pursuant to Article 11, the list included in Annex B of constituent components and the maximum allowed contaminations for metal products;
Conversion factor: conversion factor for the assessment of the results of hte migration test;
Threshold dose: quantity of a substance administered or ingested per unit of body mass expressed, for example, as mg/kg of body weight, that just does not have harmful effects for the health;
Drinking water and warm tap water supply: extracting, preparing, treating, storing, transporting or distributing drinking water or warm tap water;
Recognised certifying body: body recognised by the Certification Council authorised to issue a quality certificate;
Recognised quality certificate: quality certificate recognised by the Minister pursuant to Article 12, as described in Article 20(1) of the Decree, or Article 1.6 of the 2003 Building Decree, consisting of written evidence issued by a recognised certifying body showing that materials or chemicals comply with the requirements set on the basis of the present Regulation;
Migration: moving substances from materials to water for treatment or drinking water or warm tap water;
Migration test: test method to identify the migration rate, as established in Annex C;
Minister: the Minister for Infrastructure and the Environment;
MPC (maximum permissible concentration): maximum permissible concentration of a substance in drinking water or warm tap water;
Positive lists: pursuant to Article 11, the lists included in Annex B of substances of which the presence in products or the use in a manufacturing process is permissible under the set conditions;
Product: object made by humans in its finished state or a component thereof composed of materials or chemicals that may come into contact with water for treatment or drinking water or warm tap water;

Substances: chemical elements and their compounds as they appear in nature or materialise through the intervention of humans;
Sub-commission: a group of experts as described in Article 4(3), providing support to the Commission;
QM: maximum permissible level of the remnants of a substance in the material or product;
TDI (Tolerable Daily Intake): permissible daily dose of a substance;
TOC (Total Organic Carbon): the total amount of organic carbon in drinking water or warm tap water originating from a product that comes into contact with drinking water or warm tap water, calculated and derived by using the measuring method and migration tests included in Annex C, to which the maximum permissible concentration of 2 mg carbon per litre of drinking water or warm tap water applies, as described in Annex B;
Statement of no objection: statement that may be issued by the Minister that a product intended for killing the Legionella bacteria in drinking water and warm tap water systems, other than a biocide covered by the Plant Protection Products and Biocides Act, may be used under the set conditions and restrictions to identify the efficacy of the product in a real environment.

Chapter 2. The Commission

Article 2

1. The Commission has at least seven and no more than eleven members, including the President.

2. The Minister appoints the members of the Commission to a four-year term. This term may be extended no more than two times, each time by another four years. The names of the members of the Commission will be published in the Government Gazette.

3. The Minister may, in special circumstances, suspend or dismiss the members of the Commission.

Article 3

1. The Commission has a secretary. The secretary shall support the Commission and is responsible for the administration of the data files created by the Commission in the performance of its duties.

2. The Minister appoints the secretary to a four-year term. This term may be extended each time by another four years. The appointment and the extension of the term will be announced in the Government Gazette.

3. The Minister may, in special circumstances, suspend or dismiss the secretary.

Article 4

1. The Commission shall advise the Minister on the following:

a. In view of the protection of health, the requirements for materials and chemicals used in the supply of drinking water or warm tap water;
b. The tests and assessments of such materials and chemicals pursuant to Articles 6-11;
c. Authorising the issue of recognised quality certificates;
d. Recognising quality certificates;
e. The cases described in Articles 10 and 20(3); and
f. Pursuant to the guidelines set forth in Article 5(2), assessing if and when any quality certificate may be considered the equivalent of a recognised quality certificate on the basis of Article 16.

2. In addition, the Commission has the following tasks:

a. Pursuant to the guidelines set forth in Article 5(2), the investigation into and the assessment of potential adverse effects for public health of materials or chemicals if no test methods and assessment methods are included for them in the Annexes to the present Regulation; and
b. The maintenance of the Annexes to the present Regulation.

3. In the performance of the tasks specified in the first and second paragraphs, one or more sub-commissions may support the Commission. The members of any sub-commission shall be appointed and dismissed in accordance with the rules specified in Article 5(1).

Article 5

1. The Commission shall draw up the rules for its mode of operation and the mode of operation of any sub-commission specified in Article 4(3). The Commission shall thereby include the rules for compensating any costs incurred. The Payment of Advisory Boards and Commissions Decree shall apply.

2. Included in the rules described in the first paragraph, shall be the mode of operation and guidelines to be used by the Commission in the tests and assessments described in Article 4(1)(f) and Article 4(2)(a) and (b).

3. Drawing up and amending the rules will require the Minister's approval. Once the rules are drawn up or amended, they will be announced in the Government Gazette.

4. The Minister is authorised to cancel decisions made by the Commission. Such a decision will be announced in the Government Gazette.

Chapter 3. Tests and requirements for materials and chemicals

Article 6

1. Materials, other than metals, and chemicals must meet the requirements set forth in Articles 7-9. To this end, materials, other than metals, and chemicals, as well as their constituent substances or the substances used in their manufacturing processes, will be assessed as indicated in these Articles to identify potential adverse effects on public health.

2. If the assessment specified in the first paragraph identifies an MPC for a substance or a QM in the product and the substance may come into contact with water for treatment, drinking water or warm tap water in the drinking water or warm tap water supply, the migration of the substance or its remnants in the product will be decided by using the methods specified in Annex C, or, in accordance with Article 8(2), (3) and (4), for identifying the concentration of the substance in the drinking water or warm tap water, thereby complying with the requirements set forth in Articles 7-9.

3. Metal products must meet the criteria for their composition and purity specified in Annex B(3) thereby considering the Class the product might be assigned to. There is no need to test the release of substances pursuant to Annex A(2.8), if a metal product meets the criteria of the list of components specified in Annex A(3).

4. If a metal product belonging to product group A or B specified in Annex A (2.8) fails to meet the criteria of the list of components included in Annex B(3), the product will be tested and assessed as set forth in Annex A(2.3).

5. In addition to the first paragraph, cement-based products must also comply with the requirements set forth in Annex A(2.9).

6. If the assessment of cement-based products specified in the fifth paragraph identifies an MPC for a substance or QM in the product, and the substance may enter the water for treatment or the drinking water or warm tap water in the drinking or warm tap water supply, the migration of the substance or its remnants in the product will be decided by using the methods specified in Annex C, or, in accordance with Article 8(2), (3) and (4), for identifying the concentration of the substance in the drinking water or warm tap water, thereby complying with the requirements set forth in Articles 7-9.

7. The assessment of a substance as specified in the first paragraph, second sentence, is not required if the substance is included in the positive list in Annex B(1).

8. For the assessment of the substances referred to in the first paragraph, second sentence and the products mentioned in the fifth paragraph, which are not mentioned in the relevant part of the common approach stated in Annex B, Chapter 1, the data mentioned in Part A, subparagraph 2.4 of the common approach for organic materials shall be presented.

9. Products made of materials other than metals must meet the requirements for the organoleptic aspects specified in Annex C, if relevant for the product at issue in accordance with Annex A.

10. Once the Minister has identified the assessment criteria and respecting the stipulations of Article 20, products made of materials, other than metals, or chemicals must meet the requirements for the

microbiology aspects specified in Annex C, if relevant for the product at issue in accordance with Annex A.

Article 7

1. To the constituent substances of materials, other than metals, and chemicals or the substances used in their manufacturing processes applies the rule that these substances basically contribute up to 10 % of the parameter values, which are listed in Table II of Annex A attached to the Decree, to the concentration of these substances in drinking water or warm tap water or the water to be treated, with the exception of acrylamide, vinyl chloride and epichlorohydrin.

2. For substances as referred to in the first paragraph with a threshold dose, which have not been included in Table II of Annex A pertaining to the decree, an MTC in drinking water or hot water shall be determined in accordance with Part A, subparagraph 3, of the common approach for organic materials.

3. The requirement that, in reasonable conditions for use, the migration from the product is lower than 0.1 µg/L, applies to substances without a threshold dose.

4. For substances used for the manufacture of products intended for in drinking water and hot water supply, but also used as a pesticide, the maximum value of 0.1 µg/l per pesticide shall not be applicable. For these substances, an MTC should be determined in accordance with Part A, subparagraph 3, of the common approach for organic materials.

5. The requirements listed in the Table of Annex A(2.8.3.7) apply to the constituent components of metal products and contaminations in these products.

6. The second and third paragraphs will apply accordingly to the constituent components of metal products and contaminations in these products that are not included in the Table of Annex A(2.8.3.7).

Article 8

1. Pursuant to Article 4(2)(a) and Annex C, all materials may be subjected to laboratory tests to verify if the requirements were met.

2. For materials other than metallic materials, the following requirements shall apply:
a. After conversion as referred to in Part A, subparagraph 5, of the common approach for organic materials, the expected concentration of substances in drinking water or hot water examined pursuant to Article 7 and determined by the migration test, shall be less than the migration limit;
b. After conversion as referred to in Part A, subparagraph 5, of the common approach for organic materials, the TOC determined by the migration test shall not exceed 2 mg/l;
c. To the extent applicable, QM of a substance in the material shall be smaller than the specified limit; and
d. The migration rate shall not increase during the migration test.

3. If no suitable determination method is available for a substance, the admissibility of the substance can be evaluated on the basis of model calculations mentioned in Chapters 3 and 4 of Annex C to this regulation.

4. Departing from the first paragraph, at the Commission’s discretion, the standard calculations specified in the third paragraph may also be used to identify the necessity of the migration test specified in the second paragraph for substances for which a measuring method is available.

5. The commission may decide that a migration test will still be carried out in the case of a violation of the MTC to be expected according the calculations referred to in the third and fourth paragraphs. The expected concentration, determined by the migration test and the conversion referred to in Part A, subparagraph 5, of the common approach for organic materials, shall be binding for the admissibility of the relevant product.

6. The requirements for tests and assessments listed in Annex A(2.8) shall apply to metal products that fail to meet the criteria listed in Annex B(3).

Article 9

1. Pursuant to Article 4(2)(a) and Annex A(3), all chemicals may be subjected to laboratory tests to verify that the requirements were met.

2. The maximum permissible concentrations of contaminations for chemicals at maximum dosage must be lower than the limits set forth in Article 7.

Article 10

1. Tests and assessments specified in the Articles 6-9 will be conducted in accordance with the state of the art.

2. The Minister may issue further instructions for the performance of the tests and assessments specified in the first paragraph.

Article 11

1. Substances for which MTC is identified in the assessment specified in Articles 6 and 7 will be added to the positive lists of Annex B(1) and (2). If said assessment takes place for the application to issue a recognised quality certificate, the applicant's consent will be required to add the substance to the positive lists.

2. When a metallic material is tested and assessed as specified in Article 6(4), and identified as meeting the requirements set forth in Articles 6-9, it will be added to the List of Components for Metals described in Annex B(3). If these tests and assessments take place for the application to issue a recognised quality certificate, the applicant's consent will be required to add the composition of the respective metallic material to the List of Components for Metals.

3. Once a year, the Commission will decide whether or not the positive lists of Annex B(1) and (2) and the List of Components for Metals listed in Annex B(3) must be reviewed.

Chapter 4. Recognised Quality Certificate

Article 12

The Minister may recognise a quality certificate to be issued by a recognised certifying body upon the request of such body, if the quality certificate and the related application and other procedures meet the criteria specified in Articles 13 and 14.

Article 13

1. In the application of a quality certificate as referred to in Article 12, the information specified in Part A, Section 2.4, of the common approach for organic materials, shall at least be submitted by the applicant in a form required by the accredited certification body.

2. The certifying body, as referred to in the first paragraph, will send a copy of the application and the data specified in the first paragraph to the Commission immediately upon receipt of the application.

3. The product information submitted with the application for a recognised quality certificate will be handled as confidential information.

4. The Minister will grant the approval to issue a recognised quality certificate upon the Commission's recommendation pursuant to Article 4(1)(c), within six months of the date of submission of the data specified in the first paragraph.

Article 14

1. Without prejudice to the requirements set forth in Articles 6-9, the manufacturer or supplier must have a quality system in place in order to obtain a recognised quality certificate. Such system shall at least consist of the following:

a. An internal schedule for quality monitoring with a description of the inspections that are part of the quality system; and
b. The procedures that may be relevant for the issue of a recognised quality certificate. These include in any case the steps to be followed when shortcomings are observed and the process to deal with complaints about the products supplied.

2. The following items must in all cases be included in the quality monitoring schedule referred to in the first paragraph, under a:

a. Raw materials purchased or acquired or the constituent materials;
b. Manufacturing process;
c. Finished products;
d. Status of measuring and test devices;
e. Inspection of how rejected products are further processed;
f. Inspection of products with variances; and
g. Internal transport, storage and identification of markings of semi-finished and finished products.

3. The applicant for a recognised quality certificate shall have the following written documentation in relation to items a-g of the second paragraph:

a. The aspects of the manufacturing process to be checked, including at least the purity of raw materials and auxiliary materials that will be used, the temperature, the mixing process and applications during manufacturing, thickness of walls and diameters of the pipes, calibration of the measuring devices, and how pipes will be sealed during the transportation;
b. The test methods used; and
c. Test frequencies and how test results will be recorded and archived.

4. The quality monitoring schedule and any relevant procedures will be recorded in an annex to the recognised quality certificate.

5. If assurance of consistent quality in the production of materials or chemicals is required to identify the manufacturing process requirements, these requirements shall be recorded in an annex to the recognised quality certificate.

6. If it is important for correctly processing materials and chemicals to set criteria for processing or for the related guidelines set by the applicant for a recognised quality certificate, especially focusing on their feasibility, the criteria to this end shall be recorded in an annex to the recognised quality certificate.

7. In addition, it must be recorded in an annex to the recognised quality certificate how a certifying body will perform periodic inspections of the manufacturer's manufacturing process and quality system in accordance with the applied certifying rules. The manufacturer or supplier shall cooperate in this inspection.

8. If the manufacturing process referred to in the second paragraph is not a continuous process or is a non-recurring process, the Commission will identify further rules for the issue of the recognised quality certificate in addition to the provisions set forth in Article 13 and paragraphs 1-7.

Article 15

1. The certifying body shall notify the Commission of the issue of a recognised quality certificate.

2. Certifying bodies shall keep the Commission informed of their activities related to this subject matter by submitting once a year, by 1 April, the following documents to the Commission's secretary:

a. The results of the inspection and permissibility tests performed in the past calendar year; and
b. Any informational and complementary comments by the certifying body in relation to one or more inspections.

3. If deemed desirable by the Commission, the Commission's secretary may demand the data specified in the second paragraph.

Article 16

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.

Article 17

The Minister shall notify the issue of a recognised quality certificate or the equivalent thereof as specified in Article 16 by means of an announcement in the Government Gazette, thereby listing the materials or chemicals the certificate was issued for.

Chapter 5. Biocides

Article 18

1. For products that are biocides covered by the Plant Protection Products and Biocides Act, and biocides brought into contact with drinking water or warm tap water in the process of their supply, or added to them with the intention of changing water quality, a recognised quality certificate is required in addition to the authorisation issued by the Board for the Authorisation of Plant Protection Products and Biocides (College voor de toelating van gewasbeschermingsmiddelen en biociden, Ctgb).
2. Articles 12-17 shall apply accordingly to the issue of a recognised quality certificate for the biocides referred to in the first paragraph.

Chapter 6. Statement of no objection

Article 19

1. Products other than biocides covered by the Plant Protection Products and Biocides Act intended to affect the microbiology quality of the drinking water or warm tap water shall be used only if the Minister has issued the related statement of no objection.

2. The statement of no objection will stay in effect for the period defined by the Minister on a per product basis. The product's efficacy and side effects must be investigated during this period by using the criteria identified by the Commission.

3. If the efficacy of a product specified in the first paragraph has been proven, and it has been determined that its side-effects are not harmful to public health, then the Minister may recognise, following the period described in the second paragraph, a quality certificate issued by a recognised certifying body upon that body's request, if the quality certificate and the related procedures are based on the requirements specified in the Articles 13 and 14 for the product.

Chapter 7. Transitional provisions and final clauses

Article 20

1. The present Regulation does not apply to products used prior to the Regulation's effective date in existing systems in houses, existing collective mains systems, existing collective water supplies, existing distribution systems, and existing water supply works.

2. If a recognised quality certificate has been issued for any product in accordance with the present Regulation and the Minister later confirms the amendment of the authorisation criteria, the authorisation criteria in effect on the date of issue of the recognised quality certificate shall stay in effect in the new situation for two years following the date when the amendments were notified in writing to the interested party.

3. In the case and during the period referred to in the second paragraph, the Minister may put restrictions in place for the products specified in that paragraph for the supply of drinking water and warm tap water, if the Minister is of the opinion that the use may have adverse effects on public health.

4. If a recognised quality certificate for materials and chemicals was issued prior to the effective date of the present Regulation on the grounds of the Drinking Water Act, the latter certificate will be considered as a recognised quality certificate in the application of the present Regulation.

Article 20a

1. The Minister shall be responsible for the publication of the common approach applicable under this regulation by means of display and publication on the internet.

2. The notification shall be published in the Government Gazette [Staatscourant].

Article 20b

1. For the purposes of this regulation, amendment to the common approach applicable under this regulation shall apply with effect from the date when the amendment has been published in the Government Gazette, unless otherwise determined by decision of the Minister.

2. To the extent that the amendment only applies to products used on or after a certain date, the common approach as it read before the amendment shall remain applicable to products that have been applied before that date, unless otherwise determined by decision of the Minister.

3. A decision of the Minister as referred to in the first or second paragraph shall be published in the Government Gazette.

Annex A. - Product description and assessment (annex to the Regulation on materials and chemicals in drinking and hot water supply)

1. Distinction between materials and chemicals
The Regulation on materials and chemicals in drinking and hot water supply (hereinafter: Regulation) makes distinction between materials and chemicals with regard to products. Roughly speaking, it can be said that materials particularly cover products that will be used for construction purposes, such as storage and piping systems and internal installations, while chemicals cover products that will come into contact with drinking water or hot water to be treated or added thereto to bring about a change in quality of the water. Chapter 2 of this annex discusses the materials; chemicals are described in Chapter 3.

2. Materials

2.1. Introduction
The regulation shall apply to all finished products made of materials, organic and inorganic or a combination thereof, which may come into contact with drinking water or hot water. The finished products must meet the toxicological, organoleptic and microbiological requirements as outlined in the regulation.

For assessment of a product against the toxicological requirements, a complete specification of the raw materials and excipients and potential impurities should be submitted in accordance with Part A, Section 2.4 of the common approach for organic materials. When describing the relevant materials or products in this annex, it has been indicated which level of specification will be used. By level of specification is meant that the toxicity data referred to in Part A, Section 2.4 of the common approach for organic materials will not have to be submitted for the substances that are present in amounts less than the levels mentioned in the formulation, because the expected concentration of these substances in drinking and hot water shall not be greater than 0.1 µg/l, being the Threshold of Toxicological Concern (TTC) value for substances with a so-called structural alert for genotoxicity.

The specification levels mentioned for the products shall be applicable to both individual substances and the sum of the substances in the corresponding formulation.
The specification of the raw materials and excipients shall be tested against the relevant positive lists referred to in Annex B. If a substance is not listed on the relevant positive list, the appropriate toxicity data according to Part A, Section 2.4 of the common approach for organic materials should be submitted for this. The commission shall determine which MTC should apply for this substance. This will be documented in a position, or "opinion", of the Netherlands to be submitted for review to the other cooperating common approach Member States. If all cooperating Member States agree, the substance will be placed in one of the "Core Lists" as stated in Part A, Section 1.1 of the common approach for organic materials. The commission shall then decide which investigations should be carried out for assessing a product.

For the testing of a product against the organoleptic requirements, the investigation and assessment methods listed in Annex C must be observed.
For a review of a product for potency of biofilm formation, the research methods and corresponding evaluation criteria listed in Annex C need to be observed.
When carrying out the examination, it will not be necessary or possible to perform all the tests in all cases. The choice and implementation of the tests which will be carried out is dependent on the composition of the finished product and will be made by the Commission.

The decision to perform a migration test is also dependent on the concentration of the relevant substance(s) in the finished product, the expected migration rate of these substance(s), and the actual contact surface of the finished product with drinking water or hot water.
The regulation offers the possibility, by means of calculations, to create an estimate of the migration rate of a substance, with which an expected concentration of this substance in the drinking water or hot water may be indicated.

If the calculation can clearly demonstrate that the MTC will not be exceeded, it will be unnecessary to conduct laboratory tests. If no analysis method is available, the calculation shall provide a possibility to

come nevertheless to a conclusion about the admissibility of a product.
Below, it has been indicated which investigation and assessment methods are necessary for the admission of a particular product. The commission has the possibility to decide otherwise if the composition or the intended use of the product to be assessed gives rise to this.

2.2. Plastics and elastomers (rubber products)

2.2.1. General

For the assessment of plastics and elastomers, the common approach for organic materials applies shall apply.

Plastics are macromolecular organic compounds which have been obtained by polymerisation from molecules with a lower molecular weight or which have arisen by chemical modification of natural macromolecules (monomers and other starting substances).

Plastics can be divided into thermoplastics (which melt when heated), thermosets (which dissolve when heated) and elastomers.
The term "rubber" is used both for elastomers that obtained their properties through vulcanisation, and for compounds of these elastomers with one or more excipients or additives. In vulcanisation, a network is formed on a molecular scale, usually at elevated temperature and whether or not under pressure. There are also vulcanised elastomers, the so-called thermoplastic elastomers (TPE).
Elastomers are macromolecular (natural and synthetic) compounds which are distinguished from thermoplastics and thermosets, because they quickly and forcefully resume their shapes at temperatures between 18 °C and 29 °C if the action of a deforming force is lifted after strong deformation under the influence thereof.

2.2.2. Thermoplastics

Thermoplastics are frequently used in the drinking water or hot water supply for piping systems (pipes and fittings). Commonly used thermoplastics include: polyvinyl chloride (PVC, PVC-C, PVC-U, PVC-P), polypropylene (PP, PP-R), polyethylene (PE80, PE100, PE-Xa, PE-Xb, PE-Xc, PE-RT), polybutene (PB), acrylonitrile butadiene stryrene (ABS) and polyacetal (POM). Polysulfone (PPSU - polyphenylsulfone) is used in membrane filtration modules. Polytetrafluoroethylene (PTFE) is also applied in some products.

2.2.3. Thermosets

Thermosets are less applied in the drinking water or hot water supply than thermoplastics. Examples of thermosets are epoxy, melamine and urea-formaldehyde (MF and UF), alkyd resins and polyester resins. Of these plastics, glass-fibre reinforced polyester resins are used in particular for the manufacture of (parts of) piping and storage systems. Coatings (protection systems) for metals and cementitious products may be based on epoxies.

2.2.4. Elastomers

In the drinking water or hot water supply, elastomers (rubber products) are primarily used for sealing purposes (rubber rings), flexible connecting pipes and in compensators (joints in piping systems for absorbing of movements). Commonly used elastomers are: styrene-butadiene rubber (SBR), nitrile rubber (NBR) and EPDM (ethylene-propylene-diene monomer). Other examples of elastomers are natural rubber, isoprene rubber, neoprene, polyurethane (PUR) and silicone rubber.

The molecules of elastomers are made up of at least 500 structural units. They may chlorinated and/or brominated.
Rubber (vulcanised) elastomers are almost insoluble in boiling benzene, methyl ethyl ketone or in an azeotropic mixture of ethanol and toluene, but swelling of the elastomer may occur under the influence of these liquids.
Elastomers in their vulcanised state, containing no substances other than are necessary for vulcanisation, will not break if they are extended to three times their original dimension at a temperature between 18 °C and 29 °C, and will contract within one minute to less than one and a half times their original length after having been extended to twice their original length and kept in that state for one minute.

2.2.5. Positive lists for plastics, elastomers and rubber products

For the manufacture and processing of plastics and elastomers and natural and synthetic rubber products that (can) come in contact with drinking water or hot water, Annex B, Chapter 1 refers to the common approach for organic materials. The common approach uses positive lists of substances. These lists are not exhaustive and do not exclude the use of other substances. Substances that are not on the lists may be used if they have been reviewed and approved in accordance with Chapter 3 of the regulation.
Additives are substances that are added to plastics and rubber products in order to achieve a technical effect in the finished product.
Polymerisation excipients are substances that are used to obtain a suitable medium for polymerisation, such as emulsifiers, surface-active substances, substances with a buffer action, and so forth.
Monomers and other starting substances, polymerisation excipients and additives must be of a good technical quality and may not be used in larger quantities than is strictly necessary for the manufacture of the finished product.

2.2.6. By-products

The following can be present in finished products:
Impurities in the monomers used and other starting substances, polymerisation excipients, additives, colourants and pigments;
Intermediate products and oligomers formed during the polymerisation;
Decomposition products in the substances used.

The admission of impurities, intermediate products, oligomers and decomposition products will be determined by the Commission.
The commission may decide in appropriate cases to investigate unknown substances using appropriate analytical methods.

2.2.7. Investigation and assessment

In accordance with Chapter 3 of the regulation and Annex C, the following investigations generally need to be carried out in order to implement the admission investigation for plastics and rubber products:
- Assessment of the formulation, review against the positive lists in Annex B, adoption of MTCs. For PVC and PE pipes, a specification level of 0.1% (m/m) shall apply to the formulation, while this level has been set at 0.5% (m/m) for rubber rings;
- a migration test;
- evaluation of organoleptic aspects;
- determination of regrowth.

For products with a relatively small contact surface for which a conversion factor of < 0.01 d/dm can be determined in accordance with Part A, Section 5 of the common approach for organic materials, a limited set of laboratory tests generally suffices. The admission investigations required for these products are listed under the respective product descriptions. If a product is not mentioned, the following aspects may apply, at the sole discretion of the Commission:
- assessment of the formulation, testing against the positive list in Annex B, adoption of MTCs;
- calculation of the expected concentration in drinking water or hot water of substances for which an MTC applies in accordance with Chapters 3 and/or 4 of Annex C;
- organoleptic aspects, if the product cannot be adequately removed (such as a glue);
- regrowth aspects.

2.3. Foils

2.3.1. Description

A foil, a product in the sense of the regulation, is a relatively thin layer of plastic which can directly come into contact with drinking water, such as in emergency drinking water facilities, or may be used for the protection of the environment, in particular the protection of the soil and groundwater from harmful substances. Foils which are used for the protection of the environment are also referred to as geomembranes.
For the manufacture of plastic foils, three different types of PE (see Section 2.2.2) and a plasticised

polyvinyl chloride (PVC-P) will generally be used. These plastics can be reinforced with a fine-meshed or wide-meshed fabric.

2.3.2. Investigation and assessment
In accordance with Chapter 3 of the regulation and Annex C, the following investigations generally need to be carried out in order to implement the admission investigation for plastic foils:

- Assessment of the formulation, review against the positive lists in Annex B, adoption of MTCs.
- A migration test;
- Evaluation of organoleptic aspects;
- Determination of regrowth aspects.

The assessment of organoleptic aspects and the determination of regrowth aspects shall not be applicable to geomembranes.

2.4. Membranes

2.4.1. Description
Depending on the type of filtration, such as microfiltration, ultrafiltration, nanofiltration, reverse osmosis and electrodialysis, membrane filtration modules and membranes may have different physical configurations. The modules are composed of different types of materials. A quality certificate shall be issued for the entire module.

2.4.2. Investigation and assessment
Only those parts of a membrane filtration module that come in direct contact with water intended for human consumption will be considered for examination and assessment.
Membranes will not be tested for organoleptic aspects, because water that passed through the membrane is not yet drinking water or hot water, and may undergo a further treatment.

A membrane filtration module is a composite product and should preferably be tested in its entirety, as it is used in practice, according to NEN-EN 12873-4: 2006 (see Chapter 2.10.3 of this Annex and Chapter 1.1.3 of Annex C). In addition to NEN-EN 12873-4: 2006, Part A, Section 3 of the common approach for organic materials shall be applicable for the calculation of the estimated concentration of relevant substances in drinking water, and for a review of the estimated concentration against the MTC applicable to the substance in question.
At the sole discretion of the Commission, the various parts of a membrane filtration module can in exceptional cases be tested separately according to NEN-EN 12873-1: 2003, in compliance with the instructions of the manufacturer or supplier regarding the pre-treatment of the membrane filtration module. The results of the third migration period should be used for estimating the concentration of a substance in the drinking water. The estimated concentration in drinking water must be calculated in accordance with Part A, Section 5 of the common approach for organic materials, after which a review against the MTC applicable to the substance in question should be carried out.

If the relevant MTC is still exceeded after the three migration periods of NEN-EN 12873-1: 2003, and if it can be demonstrated or expected that the migration rate decreases in time, the migration test can be extended to a maximum migration period of 30 days in accordance with Part A, Section 5 of the common approach for organic materials. The assessment of a membrane filtration module shall take place on the overall effect (the sum) of the various parts.
If the model calculation described in Chapter 3 of Annex C is used for determining the migration, the following assumptions and data shall apply:

TTC value:	0.1 µg/l (see Part A, Section 4.1 of the common approach for organic materials)
Temperature / migration period:	T = 23 °C and t = 10 days (1 x 24 hours + 3 x 72 hours)
Module structure:	List of components, materials used*) and contact surface with water of the

	individual components
Conversion factor (F_{go}):	To be calculated separately for each part
MTC (not leading to an exceeding of the TTC value):	To be calculated based on conversion factor, polymer type and migrant size

*) A number of the materials will be applied to the feed side of the membrane module. Migrants which end up in the water here have to pass through the membrane to be able to be present in the drinking water. The calculation does not take into account the removal of the relevant substance(s).

2.5. Lubricating agents

2.5.1. Description
These are products that are used for lubrication of components of drinking water or hot water installations, for example, pumps and sanitary fittings. Lubricating agents should be persistent during the (economic) life of the product in which or with which they are used.

2.5.2. Investigation and assessment
It is generally not useful to subject lubricating agents to a migration test. Regarding the toxicological aspects, it will usually be possible to demonstrate that the agent meets the requirements stipulated by means of an evaluation of the formulation and calculations, taking into account the supplier's instructions regarding application and use. When calculating the estimated concentration of a relevant substance in drinking water or hot water, the following aspects can be included in accordance with and in addition to Chapter 4 of Annex C:
• the average amount used per application;
• any possible removal of solvent(s) as a result of evaporation;
• the (bad) solubility of a lubricating agent;
• the (relatively small) contact surface of a lubricating agent with respect to the total surface of a drinking water or hot water installation;
• the quantity of water flowing past.

2.6. Adhesive agents

2.6.1. Description
These are products used for making adhesive bonds in thermoplastic and thermosetting piping systems, where the material allows for filling of the gap between the outside of the tube and the inside of a fitting and for the bonding between these two parts.

2.6.2. Investigation and assessment
It is generally not useful to subject adhesive agents to a migration test. Regarding the toxicological aspects, it will usually be possible to demonstrate that the agent meets the requirements stipulated by means of an evaluation of the formulation - for which a specification level of 1 % (m/m) shall be applicable - and calculations, taking into account the supplier's instructions regarding application and use, such as drying and/or hardening time. When calculating the estimated concentration of a relevant substance in drinking water or hot water, the following aspects can be included in accordance with and in addition to Chapter 4 of Annex C:
• the amount used per bond;
• any possible removal of solvent(s) as a result of evaporation;
• any mutually reacting of starting materials (in case of thermosetting materials);
• the appropriate conversion factor of the piping system;
• the number of adhesive joints per metre of piping system;
• the relatively small contact surface of the adhesive agent with respect to the total surface of a piping system in contact with drinking water or hot water.

2.7. Slip agents

2.7.1. Description
These are agents used in the assembly of rubber seals in piping or distribution systems of different nature, such as concrete, cast iron, steel or different thermoplastic and thermosetting plastics. Rubber seals can have different physical shapes (sealing rings, cuffs and the like).

2.7.2. Investigation and assessment
It is generally not useful to subject slip agents to a migration test. Regarding the toxicological aspects, it will usually be possible to demonstrate that the agent meets the requirements stipulated by means of an evaluation of the formulation and calculations, taking into account the supplier's instructions regarding application and use. When calculating the estimated concentration of a relevant substance in drinking water or hot water, the following aspects can be included in accordance with and in addition to Chapter 4 of Annex C:

• the amount of slip agent used per connection;
• the method of applying a slip agent and of the mounting of the connection;
• any possible removal of solvent(s) as a result of evaporation;
• any possible removal of slip agent during the pre-rinsing of a piping system as a result of the behaviour of all the substances present in a slip agent in an aqueous environment (solubility);
• the appropriate conversion factor of the piping system;
• the number of connections per metre of piping system;
• the relatively small contact surface of a slip agent with respect to the total surface of a piping system in contact with drinking water or hot water.

2.8. Metallic materials

2.8.1 General
For the evaluation of metallic materials, the common approach for metallic materials shall apply.

2.8.2 Special provisions

2.8.2.1 In addition to the composition list referred to in 2.8.1, it shall apply that intermediate review can take place that can lead to adaptation of the list.

2.8.2.2 Notwithstanding the table mentioned in Section 2.6 of Part A - Acceptance Procedure of the Common Approach, an MTC of 50 µg/l and a corresponding reference concentration of 45 µg/l shall apply to the parameter for bismuth.

2.8.2.3 Notwithstanding the table mentioned in Section 2.6 of Part A - Acceptance Procedure of the Common Approach, an MTC of 30 µg/l and a corresponding reference concentration of 15 µg/l shall apply to the parameter for molybdene.

2.8.2.4 For copper pipes and fittings, there is a requirement for the carbon content on the inner surface in according to, respectively, NEN-EN 1057:2006+A1: 2010 and NEN-EN 1254: 1998. For pipes with an outside diameter greater than 54 mm made of hard material (R290, according to EN 1173: 2008) and for fittings, a maximum of 1.0 mg/dm^2 shall apply. For other pipes, a maximum of 0.2 mg/dm^2 shall apply. The carbon content shall be determined according to the Total Carbon method described in NEN-EN 723: 2009. As a rule, production processes of such pipes and fittings shall include a step in which carbon to below the said requirement will be removed.

2.8.2.5 Annex C states that metals need not be examined for possible organoleptic aspects. The reason for this is that the MTC's that have been established for metals or metal ions are (much) lower than the concentrations at which organoleptic aspects will start to play a role.

2.8.2.6 With the exception of the presence of possible organic residues on the surface of metals by the use of tools, such as lubrication and cutting oils during production, possibly in combination with certain surface properties (roughness), it can be excluded that microbiodegradable organic compounds will be released into drinking water or warm water by these products. Metals will therefore not be tested for

microbiological aspects.

2.9. Cementitious products

For the assessment of cementitious products, the common approach for cementitious products shall apply.

2.9.1. Release agents

2.9.1.1. Description

Release agents are used in concrete products (concrete pipes and drinking water reservoirs) in order to prevent that adhesion occurs between the concrete and formwork materials, so that upon removal of the formwork there will be no damage to the hardened material.

2.9.1.2. Investigation and assessment

It is generally not useful to subject formwork materials to a migration test. Regarding the toxicological aspects, it will usually be possible to demonstrate that the agent meets the requirements stipulated by means of an evaluation of the formulation and calculations, taking into account the supplier's instructions regarding application and use. When calculating the estimated concentration of a relevant substance in drinking water or hot water, the following aspects can be included in accordance with and in addition to Chapter 4 of Annex C:

- the amount used of a release agent per unit of area;
- any possible removal of solvent(s) as a result of evaporation;
- a realistic percentage of the original amount of a release agent that remains on the concrete surface after removal of the formwork;
- any steps to remove the remaining portion of a release agent (for example, by spraying a concrete surface);
- any possible removal of release agent during the pre-rinsing of a piping or storage system as a result of the behaviour of all the substances present in a release agent in an aqueous environment (solubility);
- the applicable conversion factor of the piping or storage system stated in Part A, Section 5 of the common approach for organic materials.

2.9.2. Curing compounds

2.9.2.1. Description

Curing compounds are applied to concrete surfaces after removal of the formwork with the purpose of slowing down the drying of concrete mortar.

2.9.2.2. Investigation and assessment

It is generally not useful to subject curing compounds to a migration test. Regarding the toxicological aspects, it will usually be possible to demonstrate that the agent meets the requirements stipulated by means of an evaluation of the formulation and calculations, taking into account the supplier's instructions regarding application and use. When calculating the estimated concentration of a relevant substance in drinking water or hot water, the following aspects can be included in accordance with and in addition to Chapter 4 of Annex C:

- the amount used of a curing compound per unit of area;
- any possible removal of solvent(s) as a result of evaporation;
- any steps to remove the curing compound (for example, by spraying a concrete surface);
- any possible removal of curing compound during the pre-rinsing of a piping or storage system as a result of the behaviour of all the substances present in a curing compound in an aqueous environment (solubility);
- the applicable conversion factor of the piping or storage system stated in Part A, Section 5 of the common approach for organic materials.

2.10. Multilayer and composite products

2.10.1. Multilayer products

The distinction between multilayer and composite products is in practice not always clear. In this context, multilayer products mean "non-decomposable" products. Composite products are

"decomposable", the various components can be tested separately. In practice, the following multilayer products are used in the drinking water or hot water supply:
• plastic pipes provided with an organic or inorganic barrier layer in order to prevent the permeation of impurities from the immediate environment to drinking water or hot water;
• glass-fibre reinforced polyester products;
• foils;
• rubber expansion joints.

For some multilayer pipes, a limited evaluation of the different layers suffices. Please see 2.10.2.2. for this.
For glass-fibre reinforced products, the evaluation means that information is required on the composition of the inner layer (liner), the intermediate layer (effective layer or structural layer) which contains, *inter alia*, glass fibres, glass rovings and polyester fabric, and the outer layer (top coat). Additionally, information on the release agent is required. As a general requirement, it shall apply that the glass fibres should be fully embedded.

2.10.2. Multilayer products with a barrier layer

2.10.2.1. Description
Multilayer products (pipes) with a barrier layer can be divided into the following two types:

a. *Full plastic products usually consisting of three layers:*
• an inner layer that comes into contact with drinking water or hot water;
• an adhesive layer;
• an oxygen-resistant outer layer consisting of an ethylene vinyl alcohol copolymer.

b. *Products with an aluminium barrier layer consisting of five layers:*
• an inner layer;
• an adhesive layer;
• an aluminium layer, in windings glued together or welded in the length;
• an adhesive layer;
• an outer layer.

In contrast to (laser) welded aluminium, aluminium glued together in windings can be permeable to chemical substances.

2.10.2.2. Investigation and assessment
The toxicological, organoleptic and microbiological aspects of multilayer products must be tested in accordance with Chapter 2.2 (Plastics and Rubber Products) of this annex.
The finished product must be examined as a whole, where only the inner layer will be brought into contact with (migration) water in accordance with the investigation methods of Annex C.
For multilayer products with an aluminium layer, the following points shall apply additionally:
• the aluminium layer must comply with the requirements applicable in accordance with Chapter 2.8 of this annex;
• if the aluminium layer has been glued (not welded), the assessment should take place for all layers from which the product was made, and
• if the aluminium layer has been welded, no specification of the raw materials and excipients will have to be provided for the outer adhesive layer and the outer layer; the assessment shall take place only for the inner layer and the first adhesive layer.

2.10.3. Composite products
Composite products consist of two or more components that are made of different materials, such as membrane modules, water meters, taps, shower heads and boilers with plastic and metal parts.
Of the composite products, it must be specified for all the parts from which materials or material they have been fabricated.
Only the parts that come in contact with water intended for human consumption, or that may affect the quality thereof, must be investigated and assessed for an admission in conformity with the methods described in Annex C and the relevant parts of the common approach (for organic materials and metallic materials), while observing the conditions laid down for the various materials and products. If

necessary, the Commission shall decide on the (chemical) specification and the specification level of the respective raw materials and excipients.
If a composite product is to be tested, this should preferably be carried out in its entirety the way it will be used in practice. At the sole discretion of the Commission, the various components can be tested separately in exceptional cases. The assessment shall take place on the overall effect (the sum) of the various parts.

3. Chemicals

3.1. Introduction

Chemicals are solid, liquid and gaseous substances which are either brought into contact with water, or drinking water or hot water to be treated for the purpose of the drinking water or hot water supply, or which may be added thereto for the purpose of effecting a change in quality of that water.
Lubricating agents and slip agents are not covered by chemicals.

Chemicals also include the resulting composite products, including biocides as defined in the Biocides Regulation (EU) 528/2012. Articles 12 to 17 of Chapter 4 of the regulation shall apply to biocides.

For chemicals used in dissolved or gaseous form, the maximum dosage to which the stipulated limit relates has been indicated.
For the classification of chemicals, the following four subareas will be used:
a. chemicals used in solid form;
b. chemicals used in dissolved or suspended form;
c. gases; and
d. chemicals used as biocides in accordance with the Biocides Regulation (EU) 528/2012.

In the subareas, the different chemicals are currently classified and described under the general indication of the purpose for which they will be used. Examples include: anti-scalants, conditioning agents, corrosion inhibitors, filter materials, ion exchangers and adsorbent synthetic resins and flocculating (auxiliary) agents.
Chemicals applied as a solution or in gaseous form shall be examined for admission and verification with the aid of a full dilatation of the product. This is to examine at least the presence of impurities which have been hereinafter referred to for the respective products. The contents of the said components in the product form described may not exceed the values specified in the relevant constituents. The commission may impose further requirements.

Chemicals used in solid form should be investigated with the leaching test as described in NEN-EN 12902: 2004. The contents in the extraction water should not exceed the values specified in the relevant constituents. For these products, the Commission may also impose further requirements.

3.2. Chemicals used in solid form

3.2.1. Bentonite

3.2.1.1. Description

Bentonite (named after the location where it was found: Fort Benton in Wyoming, United States) is a raw clay found in many places which consists mainly of minerals of the montmorillonite group. The chemical formula is $Si_4Al_{2-x}M_x^{2+}M_x^{+}O_{10}(OH)_2.nH_2O$, where x varies from 0 to 2.
Bentonite is obtained through open-pit mining and then industrially pulverised into the desired particle size (95 % of the product (m/m) should have a particle size less than 500 µm) and dried. By mixing with sodium carbonate during pulverising, the bivalent metal (generally Ca^{2+}) can partially be replaced with Na^+, which will increase the swelling properties of bentonite. The product will then be available in powder form (white to light brown or green) in many gradations depending on the purity and the concentration of Na^+. The CAS number of bentonite 1302-78-9.

3.2.1.2. Application

In the drinking water or hot water supply, the following three applications for bentonite can be distinguished:
• as a flocculant for the treatment of water intended for human consumption as defined in NEN-EN

13754: 2009;
• as a sealant for a borehole around the tube of a water extraction pit in order to prevent contamination of the groundwater intended for preparation of drinking water or hot water, when drilling tunnels and for covering waste heaps; and
• as a flooring for reservoirs, for example.

3.2.1.3. Investigation and assessment
Bentonite applied in the drinking water or hot water supply must comply with NEN-EN 13754: 2009 with regard to the chemical and physical composition and properties.
For the admission and verification research for bentonite, the release of the heavy metals listed in the following table should be determined on the basis of the leaching test according to NEN-EN 12902: 2004. The contents of individual heavy metals should not exceed the values expressed in mg/l indicated under the relevant parameter.
At the discretion of the Commission, data of a purity research conducted in the scope of another admission can in some cases be used during the assessment of bentonite. The contents of heavy metals must comply with the background concentrations for soil/sediment, expressed in mg/kg of dry matter, from the Cicular Soil Remediation (2013).

3.2.2. Drilling agents
Drilling agents are used in the construction of wells for groundwater extraction in order to strengthen the borehole wall. The agent is added to the so-called work water (mixture of present groundwater and added water) in relatively small amounts during the drilling of the well. After drilling the well, the work water will be removed together with the drilling agent. The well will then be equipped for extraction of groundwater, pumped clean and put into operation.
In practice, traces of drilling agents can end up in drinking water or hot water. On account of this, drilling agents must be fully specified. The agent shall be permissible if no adverse effects are to be expected for consumer health, in accordance with the evaluation methods of Sections 3 and 5 of Part A of the common approach for organic materials.
Depending on the composition of a drilling agent, an assessment against the Circular Soil Remediation can be necessary, analogous to what was described for bentonite under 3.2.1.3.

3.2.3. Filter materials
In this context, "filter materials" cover silica sand, silica gravel, activated carbon, anthracite, garnet sand, calcium carbonate and dolomite.
The application of activated carbon, in granulated or powdered form, is a separation method (adsorption) which, strictly speaking, is not covered by filtration, but can be placed under it from a practical point of view. During purification, pulverised coal is continuously dosed to the water to be treated, and will be captured again at a later stage through coagulation, sedimentation or filtration.
Calcium carbonate and dolomite are products that can remove particles, but that are actually used as a conditioning agent, where the water to be treated will be passed over a bed with the conditioning agent.

3.2.3.1. Silica sand, silica gravel and anthracite
Silica sand, silica gravel are described in NEN-EN 12904: 2005, anthracite in NEN-EN 12909: 2012.
Silica sand, silica gravel and anthracite should be tested for granules with the leaching test according to NEN-EN 12902: 2004.

Contrary to Section 6.3.4.1 of NEN-EN 12902: 2004, rinsing with a bed volume of extraction water should take place not twice, but nine times during 10 minutes after the backwash. The tenth bed volume of extraction water that will be added after this and will remain in the column for 30 minutes, will be used for analysis of the parameters listed below. The concentration of these parameters in the extraction water should not exceed the value specified in the relevant parameter:

Parameter	Maximum concentration in extraction water (µg/l)
Antimony	0.5
Arsenic	1

Cadmium	0.5
Chromium	5
Mercury	0.1
Lead	1
Nickel	2
Selenium	1

3.2.3.2. Granulated activated carbon

Raw granulated activated carbon is described in NEN-EN 12915-1: 2009[1)].

Granulated activated carbon should be tested with the leaching test for granulates according to NEN-EN 12902: 2004. Contrary to Section 6.3.4.1 of NEN-EN 12902: 2004, rinsing with a bed volume of extraction water should take place not twice, but nine times during 10 minutes after the backwash. The tenth bed volume of extraction water that will be added after this and will remain in the column for 30 minutes, will be used for analysis of the parameters listed below. The concentration of these parameters in the extraction water should not exceed the value specified in the relevant parameter:

Parameter	Maximum concentration in extraction water (µg/l)
Aluminium	30
Antimony	0.5
Arsenic	1
Benz(a)pyrene	0.01
Cadmium	0.5
Chromium	5
Cyanides	5
Mercury	0.1
Lead	1
Nickel	2
PAHs (see Footnotes 1 and 2)	0.1
Selenium	1

Footnote 1: In accordance with Annex A of the Drinking Water Decree, the following PAHs must be determined: pyrene, benzo(a)anthracene, benzo(ghi)perylene, phenanthrene, indeno (1,2,3-cd) pyrene, anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and fluoranthene (benzo(a)pyrene was included separately in the Drinking Water Decree).
The value of 0.1 µg/l is the sum of these specified compounds with a concentration higher than the limit of detection.
Footnote 2: The PAHs and benzo(a)pyrene mentioned in note 1 only have to be measured in extruded carbon, with coal tar pitch being used as a binding agent.

[1] Reactivated granulated activated carbon is described in the draft standard NEN-EN 12915-2: 2008 Draft. For reactivated activated carbon, no quality certificates have been issued yet in the Netherlands.

3.2.3.3. Powdered activated carbon
Powdered activated carbon is described in NEN-EN 12903: 2009.
Powdered activated carbon should be tested with the leaching test for powders according to NEN-EN 12902: 2004. Of the following parameters, the concentration in the extraction water may not exceed the value specified for the relevant parameter:

Component	Maximum concentration in extraction water (µg/l)	Maximum concentration in mg/kg
Aluminium	30	3
Antimony	0.5	0.05
Arsenic	1	0.1
Cadmium	0.5	0.05
Chromium	5	0.5
Cyanides	5	0.5
Mercury	0.1	0.01
Lead	1	0.1
Nickel	2	0.2
Selenium	1	0.1

Footnote: For an expression of the demands in mg/kg according to NEN-EN 12903: 2003, 10 g of pulverised coal should have been in contact with 1 litre of water for 24 hours in the leaching test according to NEN-EN 12902: 2004 . If other amounts of pulverised coal are used, the measured concentrations must be linearly extrapolated to a test with 10 g of pulverised coal per litre.

3.2.3.4. Garnet sand
Garnet sand is described in NEN-EN 12910: 2012.
Garnet sand should be tested with the leaching test for granulates according to NEN-EN 12902: 2004. Contrary to Section 6.3.4.1 of NEN-EN 12902: 2004, rinsing with a bed volume of extraction water should take place not twice, but nine times during 10 minutes after the backwash. The tenth bed volume of extraction water that will be added after this and will remain in the column for 30 minutes, will be used for analysis of the parameters listed below. The concentration of these parameters in the extraction water should not exceed the value specified in the relevant parameter:

Parameter	Maximum concentration in extraction water (µg/l)
Antimony	0.5
Arsenic	1
Cadmium	0.5
Chromium	5
Mercury	0.1
Lead	1
Nickel	2
Selenium	1

3.2.3.5. Calcium carbonate
Calcium carbonate is described in NEN-EN 1018: 2013.
Calcium carbonate should have a purity of at least 98 %.
For heavy metals, the following maximum contents in mg/kg of dry product shall apply:

Component	Maximum concentration in mg/kg
Antimony	3

Arsenic	3
Cadmium	2
Chromium	10
Mercury	0.5
Lead	10
Nickel	10
Selenium	5

In the processing of calcium carbonate, grinding aids may be used. The applicant of a quality certificate must provide the necessary information on formulation, composition and quantity used for such aids. For the substances in the formulation of the grinding aid, an MTC will be established as described in Part A, Section 3 of the common approach for organic materials. By means of a calculation on the basis of a realistic worst case situation, it will be established whether the concentration in drinking water or hot water meets the MTC for the relevant substances.
Calcium carbonate does not need to be tested for cyanides and PAHs.

3.2.3.6. Dolomite
Dolomite (half burned, with the chemical formula $CaCO_3.MgO$) is described in NEN-EN 1017: 2014. For heavy metals, the following maximum contents in mg/kg of dry product shall apply:

Component	**Maximum concentration in mg/kg**
Antimony	3
Arsenic	3
Cadmium	2
Chromium	10
Mercury	0.5
Lead	10
Nickel	10
Selenium	5

In the processing of dolomite, grinding aids may be used. For such aids, the applicant of a quality certificate must provide the necessary information on formulation, composition and quantity used. For the substances in the formulation of the grinding aid, an MTC will be established as described in Part A, Section 3 of the common approach for organic materials. By means of a calculation on the basis of a realistic worst case situation, it will be established whether the concentration in drinking water or hot water meets the MTC for the relevant substances. Dolomite does not need to be tested for cyanides and PAHs.

3.2.4. Ion-exchange resins and adsorbent synthetic resins
Ion-exchange resins (both anionic and cationic) can be used to alter water composition, for example, for softening. Adsorbent synthetic resins are used for removal of undesirable substances from water. Ion-exchange resins and adsorbent synthetic resins should be tested in accordance with NEN-EN 12873-3: 2006 (see Annex C, Section 1.4), observing the instructions of the supplier regarding any pre-treatments.

3.3. Chemicals used as a solution

3.3.1. Anti-scalants

Anti-scalants or scale inhibitors are described in NEN-EN 15039: 2014, 15040: 2014 and 15041: 2014. They are used, among others, in plants for desalination of (brackish) water and seawater into drinking water or hot water. It concerns regasification plants (distillation) and membrane filtration systems. Anti-scalants are continuously dosed to raw water so as to either prevent or reduce deposition of poorly soluble salts (scaling) or formation of a biofilm (fouling).
In regasification plants, through splashing over (carryover), anti-scalant can end up in the distillate which will be turned into drinking water or hot water. Under normal conditions, carryover will be about 0.4 %, and in the worst case situation, approximately 4 %. In general, monitoring takes place on the basis of the salt content in the distillate, which helps prevent the carryover of raw (saline) water, and thus also of the anti-scalant, becoming too large.
The maximum expected concentrations in drinking water or hot water in case of carryover are calculated on the basis of the following information:

• the concentrations of (raw) materials present in the product according to the formulation, including any impurities and, if applicable, residual contents of monomers;
• the maximum dose, and
• the percentage of carryover in the worst case situation.

In membrane filtration, anti-scalants will only be applied in plants equipped with nanofiltration (NF) or reverse osmosis membranes (RO). Depending on the type of membrane and the molecular size, the removability of substances shall be at least three log units. Small molecules will, however, completely pass through the membranes and end up in the product water. The limit shall be 200 D for NF membranes, respectively, 50 D for RO membranes.
The anti-scalant can only end up in the product water - from which drinking water will be prepared - via penetration and leakage. Under normal circumstances, a maximum of 0.1 % of the dosed amount of anti-scalant will end up in drinking water. In general, an integrity monitoring of the membranes takes place, causing any cracks in the membrane to be detected quickly. This will prevent that, beside insufficiently purified water, too much of the anti-scalant will also end up in the product water.
The maximum expected concentrations in drinking water or hot water are calculated on the basis of the following information:

• the concentration of (raw) materials present in the product according to the formulation, including any impurities and, if applicable, residual contents of monomers;
• range of application;
• the maximum dose;
• molecular weights of the substances in the formulation, including impurities and, if applicable, residual monomers;
• type of membrane (NF or RO), and
• the percentage of penetration/leakage.

3.3.2. Conditioning agents

Conditioning agents are used in the preparation of drinking water or hot water in order to obtain an optimum composition for drinking water. Addition of conditioning agents have, *inter alia*, the objective to limit corrosion phenomena and annoying deposits in the distribution system and to increase the comfort of users by providing "soft water".

3.3.2.1. Calcium hydroxide ($Ca(OH)_2$) and calcium oxide (CaO)

A description of calcium hydroxide and calcium oxide is depicted in NEN-EN 12518: 2014.
Calcium hydroxide (slaked lime or lime hydrate) is used for softening hard water, usually with the aid of granular reactors. It is supplied in solid form or as a milk of lime slurry.
Calcium oxide (quick lime) is "quenched" on the spot with water to form a slurry of calcium hydroxide (lime milk).

In general, a softening step is followed by a filtration step to capture carryover of lime particles. This then will also partially remove impurities introduced through the calcium hydroxide.

In the production of calcium oxide, grinding aids may be used. Regarding such aids, the applicant of a quality certificate must provide the necessary information on formulation, composition and quantity used. For the substances in the formulation of the grinding aid, an MTC will be established according to Part A, Section 3 of the common approach for organic materials. By means of a calculation on the basis of a realistic worst case situation, it will be established whether the concentration in drinking water or hot water meets the MTC for the relevant substances.
The maximum dose for both aids shall be 135 mg Ca per litre of water to be treated.

For heavy metals, the following maximum contents in mg/kg of dry product shall apply, without taking into account a possible removal in the further purification:

Component	**Maximum concentration in mg/kg**	
	$Ca(OH)_2$	CaO
Antimony	3 mg/kg	3 mg/kg
Arsenic	5 mg/kg	5 mg/kg
Cadmium	2 mg/kg	2 mg/kg
Chromium	20 mg/kg	20 mg/kg
Mercury	0.3 mg/kg	0.3 mg/kg
Lead	10 mg/kg	10 mg/kg
Nickel	10 mg/kg	10 mg/kg
Selenium	3 mg/kg	3 mg/kg

When using calcium hydroxide or calcium oxide, the concentration of aluminium in water can increase. In case of a (threatening) exceeding of a value for aluminium of 30 g/l, this must be reported to the supervisor in accordance with the Drinking Water Decree.

3.3.2.2. Sodium carbonate (Na_2co_3)
Sodium carbonate used for treatment of water intended for human consumption is described in NEN-EN 897: 2012.
Sodium carbonate (calcined soda (light), light soda) is used in water softening and pH correction.
Sodium carbonate is obtained by saturating a solution of sodium chloride with ammonia and carbonic acid, causing sodium bicarbonate to be formed and precipitated. After filtration, sodium carbonate, water vapour and carbon dioxide will be formed by heating. The latter two components will escape, and the sodium carbonate will be cooled and stored in silos.
The maximum dose shall be 60 mg Na_2CO_3 per litre of water to be treated.
For heavy metals, the following maximum contents in mg/kg of dry product shall apply, without taking into account a possible removal in the further purification:

Component	**Maximum concentration in mg/kg**
Arsenic	17
Cadmium	8.5
Chromium	85
Mercury	2
Lead	17
Nickel	34

3.3.2.3. Sodium hydroxide (NaOH)
Sodium hydroxide used for treatment of water intended for human consumption is described in NEN-EN 896:2012.
Sodium hydroxide is used in softening with the aid of granular reactors. In addition, it is used in several places in the production process for pH correction in a much lower dose. Sodium hydroxide is generally supplied as an aqueous solution in a concentration ranging from 20 % to 50 %. It is obtained by electrolysis of sodium chloride by means of several processes. It concerns continuous processes in which, in general, there are very low amounts of impurities.
The maximum dose shall be 130 mg NaOH per litre of water to be treated.
For heavy metals, the following maximum contents in mg/kg of product (as a solution in water) shall apply, without taking into account a removal in the further purification:

Component	**Maximum concentration in mg/kg**		
	NaOH 50 %	NaOH 33 %	NaOH 20 %
Arsenic	4	2.5	1.5
Cadmium	2	1.3	0.8
Chromium	20	13	8
Mercury	0.4	0.3	0.15
Lead	4	2.5	1.5
Nickel	8	5	3

3.3.2.4. Hydrochloric acid (HCl)
Hydrochloric acid intended for treatment of water for human consumption is described in NEN-EN 939: 2009.
Hydrochloric acid is used for various purposes in the production of drinking water, such as for decarbonisation of mixing water for milk of lime and for lowering of pH of the effluent in pellet reactors and of the feed water of membrane filtration systems. It is generally supplied as a solution of 33 % or 36 % in water. It is produced by a reaction of chlorine gas with hydrogen, after which the hydrogen chloride gas will be absorbed in demineralised water
The maximum dose shall be 100 mg HCl per litre of water to be treated.
For heavy metals, the following maximum contents in mg/kg (as a solution in water) shall apply, without taking into account a removal in the further purification:

Component	**Maximum concentration in mg/kg**	
	HCl (33%)	HCl (36 %)
Arsenic	3.4	3.7
Cadmium	1.7	1.9
Chromium	17	19
Mercury	0.4	0.4
Lead	3.4	3.7
Nickel	6.8	7.4

3.3.3. Flocculating (auxiliary) agents
Inorganic iron and aluminium salts are particularly applied as flocculants. In drinking water preparation, these substances are used for coagulation/flocculation and sedimentation of surface water in order to be able to remove the suspended solids present in the water better and more easily. 98 % of the added flocculant is removed in the sedimentation step and the rest will follow in the following fast filtration step.
In addition, flocculating (auxiliary) agents are also applied in order to support the operation of

flocculants. This concerns products based on starch or polyacrylamide. They are always used in combination with flocculants.
Flocculants can be produced from waste products of the (chemical) industry with a high iron or aluminium content. In general, the contents of heavy metals and cyanides are toxicologically relevant for these products.

3.3.3.1. Flocculants based on aluminium
The following agents are involved here:
- aluminium hydrochloride;
- aluminium sulfate;
- basified aluminium sulfate;
- polyaluminium chloride.

Aluminium chloride and aluminium hydrochloride are described in NEN-EN 881: 2004, aluminium sulfate is described in NEN-EN 878: 2004.
The chemical formula of the active constituents is: $Al_2Cl_{(n)}(OH)_{(m)}(SO_4)_{(p)}\bullet(q)(H_2O)$.
Examples of a number of applied agents are:

Formula	CAS No	Molecular mass
$Al_2Cl(OH)_5\bullet 2\text{-}3\ H_2O$	12042-91-0	210.5 - 228.5
$Al_2Cl_3(OH)_3$	12445-51-0	211.3
$Al_2Cl_3(OH)_{2.5}(SO_4)_{0.25}$	39290-78-3	226.9
$Al_2(SO_4)_3\bullet 14\ H_2O$	17927-65-0	594.3
$Al_2(SO_4)_{0.55}(OH)_3Cl_{1.6}$		214.5

Flocculants on the basis of aluminium are a white to light brown powder as a solid, or occur in white to light brown nuts or lumps, with a content of up to 470 g/kg of aluminium oxide, corresponding to approximately 250 g/kg Al. In liquid form, they are a clear to slightly cloudy, viscous and colourless to pale yellow liquid. The content of aluminium oxide in it is a maximum of 235 g/kg, corresponding to about 125 g/kg Al. The density at 20 °C ranges from 1.2 to 1.35 kg/dm^3.
There are two different preparation procedures which are based on a treatment of aluminium (hydr)oxide with hydrochloric acid or sulfuric acid.
Products based on polyaluminium chloride will be obtained by treatment of aluminium oxide (possibly in combination with aluminium sulfate) with hydrochloric acid.
Products on the basis of aluminium sulfate will be obtained by treatment of aluminium hydroxide with sulfuric acid, possibly supplemented by a further reaction with hydrochloric acid in the presence of selected types of chalk.
The maximum dose should be 15 mg of aluminium per litre of water to be treated.
The contents of the components listed below in the product form described may not exceed the values specified in the relevant constituents:

Content (g/kg) of active constituent in the product supplied							
as Al_2O_3	83	100	150	170	180	235	470
as Al	44	54	79	90	95	124	248

Component	**mg/kg of aluminium-containing flocculant**						
Antimony	1.5	1.8	2.5	3	3.2	4.1	8.3
Arsenic	2.9	3.6	5	6	6.4	8.3	16.5
Cadmium	1.5	1.8	2.5	3	3.2	4.1	8.3

Chromium	15	18	25	30	32	41	83
Cyanides	15	18	25	30	32	41	83
Mercury	0.3	0.4	0.5	0.6	0.6	0.8	1.7
Lead	2.9	3.6	5	6	6.4	8.3	16.5
Nickel	6	7.2	10	12	12.8	16.4	33.2
Selenium	2.9	3.6	5	6	6.4	8.3	16.5

If the concentration of aluminium in the drinking water or hot water supplied exceeds 30 µg/l, it must be reported to the supervisor in connection with the possible use of drinking water or hot water for dialysis, in accordance with the provisions of the Drinking Water Decree.

3.3.3.2. Iron aluminium sulfate
The chemical formula of the active constituents is:
- $Al_2(SO_4)_3 \bullet 14\text{-}16\ H_2O$;
- $Fe_2(SO_4)_3 \bullet 9\ H_2O$.

The relevant CAS numbers are:
- 61114-26-9;
- 10043-01-3 ($Al_2(SO_4)_3$);
- 10028-22-5 ($Fe_2(SO_4)_3$).

The molecular weight ranges from 617 to 621.

The granulates are composed as follows:

Aluminium (Al^{3+})	7.2 – 8.4 % (13.7 – 15.9 % Al_2O_3)
Aluminium present as	$Al_2(SO_4)_3 \bullet 14\text{-}16\ H_2O$
Iron (Fe^{3+})	0.7 – 3.0 % (1.0 – 4.3 % Fe_2O_3)
Iron present as	$Fe_2(SO_4)_3 \bullet 9\ H_2O$
Active constituent (Me^{3+})	3.2 mol/kg
Water insoluble constituents	3 %

The maximum dose shall be 100 mg of iron aluminium sulfate per litre of water to be treated.
The contents of the components listed below in the product form described may not exceed the values specified in the relevant constituents:

Component	Maximum concentration in mg/kg
Antimony	5
Arsenic	10
Cadmium	5
Chromium	50
Mercury	1
Lead	10
Nickel	20
Selenium	10

If the concentration of aluminium in the drinking water or hot water supplied exceeds 30 µg/l, it must

be reported to the supervisor in connection with the possible use of drinking water or hot water for dialysis, in accordance with the provisions of the Drinking Water Decree.

3.3.3.3. Iron (III) chloride

Iron (III) chloride ($FeCl_3$) is described in NEN-EN 888: 2004.
The product is obtained by a reaction of iron or iron (III) oxide with chlorine or a reaction of iron (III) oxide with hydrochloric acid. It can also be produced by the treatment of iron (scrap) with hydrochloric acid, forming iron (II) chloride which will then be oxidised with chlorine to iron (III) chloride. Iron (III) chloride is generally supplied as a solution of 40 % in water.
In the production of iron scrap, the scrap is usually pre-treated with the aid of agents containing organic amines. Regarding such aids, the applicant of a quality certificate must provide the necessary information on formulation, composition and quantity used. For the substances in the formulation of the relevant agent, an MTC will be established according to Part A, Section 3 of the common approach for organic materials. It will be determined by means of a risk approach based on a realistic worst case situation whether the concentration of the relevant substances in drinking water or hot water does not exceed the MTC.
The maximum dosage of iron chloride shall be 50 mg Fe per litre of water to be treated.
For heavy metals, the following maximum contents in mg/kg of iron (III) chloride solution (40 %) shall apply:

Component	Maximum concentration in mg/kg
Antimony	1.5
Arsenic	2.6
Cadmium	1.5
Chromium	70
Mercury	0.3
Nickel	70
Selenium	3

3.3.3.4. Iron (III) chloride sulfate

Iron (III) chloride sulfate ($FeClSO_4$) is described in NEN-EN 891: 2004.
The product is obtained by a reaction of iron (II) sulfate with chlorine gas. It is generally supplied as a solution of 40 % in water.
The maximum dosage of iron chloride sulfate shall be 50 mg Fe per litre of water to be treated.
For heavy metals, the following maximum contents in mg/kg of iron (III) chloride sulfate solution (40 %) shall apply:

Component	Maximum concentration in mg/kg
Antimony	1.5
Arsenic	2.6
Cadmium	1.5
Chromium	70
Mercury	0.3
Lead	2.6
Nickel	70
Selenium	3

3.3.3.5. Iron (II) sulfate
Iron (II) sulfate is described in NEN-EN 889: 2004.
The product is the iron (II) sulfate heptahydrate ($FeSO_4.7H_2O$) which comes in crystal form. It is produced by the pickling of steel with sulfuric acid, or by a reaction of an iron titanium ore / iron mixture with sulfuric acid and water.
The maximum dosage of iron (II) sulfate shall be 50 mg Fe per litre of water to be treated.
For heavy metals, the following maximum contents in mg/kg of iron (II) sulfate crystals shall apply:

Component	Maximum concentration in mg/kg
Antimony	2
Arsenic	4
Cadmium	2
Chromium	70
Mercury	0.4
Lead	4
Nickel	70
Selenium	4

3.3.4 Heat transfer media and corrosion inhibitors
Heat transfer media and corrosion inhibitors are agents that are only used in drinking water or hot water systems or their components, such as heating systems, boilers and combi boilers. For double-walled systems, the assessment is limited to the intermediate medium, i.e. the medium located between the walls which separate the primary heat-transferring medium and the secondary medium (the drinking water to be heated) from each other. For single-walled systems, the primary medium should be assessed.

The agent is permissible if it will be established that no adverse effects are to be expected for consumer health in accordance with the evaluation methods of the common approach for organic materials (Part A, Sections 3, 4 and 5).

3.3.5 Other chemicals

3.3.5.1 Potassium permanganate
The basis for the assessment of potassium permanganate ($KMnO_4$) used for the treatment of water intended for human consumption shall be NEN-EN 12672: 2008 (en).

Potassium permanganate is a very strong oxidising agent used to influence smell and taste, remove algae and micro-organisms, and remove iron (Fe) and manganese (Mn) by oxidation to insoluble oxides, and for regeneration of filter materials

The maximum dose shall be 10 mg $KMnO_4$ per litre of water to be treated.
For heavy metals, the following maximum contents in mg/kg of dry product shall apply, without taking into account a possible removal in the further purification:

Component	**Maximum concentration in mg/kg**
Antimony	50
Arsenic	100
Cadmium	50
Chromium	500
Mercury	10
Lead	100
Nickel	200
Selenium	100

3.4. Gases
Carbon dioxide (CO_2) and oxygen ($O_{2)}$ are used in drinking water preparation in the Netherlands. Carbon dioxide is used for pH changes or reduction of over-saturation of water after softening, such as after application of membrane filtration. Oxygen is used in a limited way to increase the oxygen content and also serves as a process gas for ozonisation of drinking water. Both of these gases are dosed continuously to the water.

3.4.1. Carbon dioxide
The basis for the assessment of carbon dioxide shall be the standard NEN-EN 936: 2013.
Depending on the production method used, additional information must be provided on the extent of the presence of the relevant impurities listed in Table 2 of Annex B to the EIGA (European Industrial Gases Association) document IGC Doc 70/08/E.

3.4.2. Oxygen
The product must comply with the purity requirement for 'Grade A', as specified in NEN-EN 12876: 2009.

3.4.3. Assessment
Based on the information provided on the impurities and the maximum dose of the product, the (maximum) expected concentrations of the relevant substances in drinking water or hot water will be calculated. Impurities are often specified in vpm (volume parts per million). On the basis of the ideal gas law and of the maximum dose, the contents of the respective substances in the gas will be converted to the (maximum) concentration to be expected in drinking water or hot water.

3.5. Cleaning agents
Cleaning agents other than biocides under the Biocides Regulation (EU 1107/2012) must be investigated and assessed in accordance with Articles 6 and 9 of the regulation, after which an approved quality certificate may be issued in accordance with Articles 13 and 14 of the regulation.

For an assessment, the maximum expected concentrations in drinking water or hot water are calculated on the basis of the following information:
• the concentration of substances, including impurities, present in the product according to the formulation;
• the maximum dose;
• the residual content in drinking water after the rinsing procedure if complete removal of the agent is not possible.

In case of doubt about a possible disinfecting effect of a cleaning agent, the applicant of a quality certificate must obtain clarity on this from Board for the Authorisation of Plant Protection Products and Biocides (Ctgb).

3.6. Disinfectants
Disinfectants are used to disinfect parts of the drinking water or hot water supply, such as storage or distribution systems and their components. They are also used for regeneration of sources for drinking water or hot water.
When used in storage or distribution systems and drinking water and hot water systems, the relevant components will be disconnected from the supply of drinking water or hot water. After use, treated surfaces should be rinsed with drinking water or hot water.
For disinfectants specifically intended for drinking water or hot water applications, authorisation by the Ctgb is required on account of the Act on plant protection agents and biocides (see also Article 1 of the regulation).
For agents assessed and authorised by the Ctgb, an approved quality certificate should then be issued in accordance with Article 18 of the regulation.

3.6.1 Sodium hypochlorite
The basis for the assessment of sodium hypochlorite (NaOCl, chlorine bleach lye) used for treatment of water intended for human consumption shall be NEN-EN 901: 2013.
Sodium hypochlorite (chlorine bleach lye, NaOCl) is used for disinfection of drinking water systems -

where the systems will be removed from the production - and can be dosed to the drinking water in case of calamities.
The maximum dose shall be 32 mg of sodium hypochlorite per litre of water to be treated.
At the maximum dose of 32 mg NaOCl/l, the contents of the parameters mentioned below shall not exceed the values specified in the relevant constituents:

Component	**Maximum concentration in mg/kg**
Antimony	15
Arsenic	30
Cadmium	15
Chromium	150
Mercury	3
Lead	30
Nickel	60
Selenium	30
Bromate	30
Chlorate	

Annex B. - Positive lists (annex to the Regulation on materials and chemicals in drinking and hot water supply)

1. Positive lists for plastics, elastomers and rubber products

1.1 Plastics
For the assessment of plastics, the common approach for organic materials applies shall apply.

1.2 Elastomers and rubber products
For the assessment of elastomers and rubber products, Chapter III of the Commodities Act Regulation on packaging and consumer products (WVG) of 14 March 2014 with reference 328583-117560-VGP and Part B of the common approach for organic materials shall aply, while ensuring observance of the conversion method for the Specific Migration Limit to the Maximum Permissible Concentration stated in Section 3.3 of Part A of the common approach for organic materials.

1.3 Further requirements and descriptions

1.3.1 The TOC (Total Organic Carbon) release of products that come into contact with drinking water or hot water must not exceed 2 mg/l of drinking water or hot water under reasonably foreseeable conditions of use multiplied by the applicable conversion factor stated in Section 5 of Part A of the common approach for organic materials.

1.3.2 No MTC shall apply to a substance if the substance is an organic compound and the MTC exceeds 2.0 mg/l, which is the limit for the TOC parameter.

1.3.3 MTC (T) = 0.1 µg/l shall apply for the following groups of compounds, with the exception of substances which have been included separately in the lists mentioned under 1.1 and 1.2:
- Secondary and tertiary aliphatic amines;
- Aromatic amines;
- Fenolic compounds (such as phenol);
- Nitrosamines;
- Peroxides (both organic and inorganic peroxides);
- Polycyclical aromatic hydrocarbons.

1.3.4 It shall apply for aluminium compounds that the expected concentration of aluminium in drinking water or hot water, derived from the measured migration and the applicable conversion factor specified in Part A, Section 5 of the common approach for organic materials or obtained through a theoretical calculation, must not exceed 30 µg/l.

1.3.5 The content of toluene extractable substances in elastomers and rubber products may amount to a maximum of 0.15 %.

1.3.6 For the assessment of elastomers and rubber products, subsections 3.1, 3.2 and 3.4 of Section 3 Classification of rubber products in categories of Chapter III of the Commodities Act Regulation on packaging and consumer products (WVG) shall not apply.

1.3.7 Category II, specified in subsection 3.3 of Section 3 Classification of rubber products in categories of Chapter III of the WVG, relates to those rubber products used in transport and storage of drinking water and hot water, while Category III concerns rubber products for sealing purposes.

1.3.8 Subsections 5.1 to 5.6 and subsection 5.1 of Section 5 Requirements for finished products of Chapter III of the WVG shall not apply to rubber products that come into contact with drinking water and hot water.

1.3.9 Since 1 January 2015, stabilisers containing lead shall no longer be used in plastic pipes, according to agreement with the plastics industry.

2. Colourants and pigments

2.1. Requirements for colourants and pigments

At extraction with 0.1 N of hydrochloric acid, the following elements from the colourant or pigment may go into solution up to the amount indicated, calculated on the basis of the colourant or pigment:

Component	Maximum amount
Antimony	0.2 %
Arsenic	0.01 %
Barium	0.01 %
Cadmium	0.1 %
Chromium	0.1 %
Mercury	0.005 %
Lead	0.01 %
Selenium	0.01 %

At extraction with 2 N of ethanolic hydrochloric acid, up to 0.05 % of aromatic amines from the colourant or pigment may go into solution, calculated on the basis of the colourant or pigment:

2.2. Requirements for the coloured finished product

The migration of constituents of colourants and pigments in a finished product in contact with drinking water or hot water, as determined by the current investigation and assessment methods listed in Annex C and Part A of the common approach for organic materials, shall not exceed the value in µg/l indicated below for the respective constituent:

Component	Maximum concentration in migration water (µg/l)
Aromatic amines	0.1
Antimony	0.5
Arsenic	1
Barium	50
Cadmium	0.5
Chromium	5
Cobalt	2.5
Mercury	0.1
Lead	1
Manganese	5
Nickel	2
Selenium	1

2.3. Permitted colourants and pigments

C.I. generic name	C.I. number	Chemical or common name	CAS number
C.I. Fluorescent Brightener 184:1	–	2.5-bis(5-tert.butyl-2-benzoxazolyl)thiophene	7128-64-5
C.I. Fluorescent Brightener 236	–	7-(2H-naphthol[1.2-d]triazol-2-yl)-3-phenylcoumarin	3333-62-8
C.I. Food Blue 2	42090	triarylmethane	3844-45-9
C.I. Food Yellow 4	19140	tartrazine (E102)	1934-21-0
C.I. Pigment Black 11	77499	iron oxide black	12227-89-3 1317-61-9
C.I. Pigment Black 28	77428	copper chromite	68186-91-4
C.I. Pigment Black 33	77537	iron manganese trioxide	12062-81-6
C.I. Pigment Black 7	77266	carbon black	1333-86-4
C.I. Pigment Blue 15	74160	phthalocyanine blue (incl. 15:1, 15:2, 15:3, 15:4)	147-14-8
C.I. Pigment Blue 28	77346	cobalt aluminate	1345-16-0
C.I. Pigment Blue 29	77007	ultramarine blue	57455-37-5
C.I. Pigment Blue 36	77343	cobalt chromite	68187-11-1
C.I. Pigment Blue 74	77366	cobalt zinc silicate	68412-74-8
C.I. Pigment Brown 11	77495	magnesium ferrite	12068-86-9
C.I. Pigment Brown 24	77310	chromium antimony titanate	68186-90-3
C.I. Pigment Brown 29	77500	chromium iron oxide	12737-27-8
C.I. Pigment Green 17	77288	chromium (III) oxide	1308-38-9
C.I. Pigment Green 7	74260	phthalocyanine green	1328-53-6
C.I. Pigment Orange 13	21110	diazo	3520-72-7
C.I. Pigment Red 101	77491	iron (III) oxide	1309-37-1
C.I. Pigment Red 104	77605	lead chromate/molybdate/sulfate	12656-85-8
C.I. Pigment Red 178	–	perylene red	3049-71-6
C.I. Pigment Red 214	–	condensation azo	60618-31-3 82643-43-4
C.I. Pigment Red 242	20067	disazo condensation	52238-92-3
C.I. Pigment Red 247	15915	monoazo	43035-18-3
C.I. Pigment Red 38	21120	diazo	6358-87-8
C.I. Pigment Red 57:1 (D & C Red 7)	15850:1	monoazo	5281-04-9
C.I. Pigment Violet 15	77007	ultramarine violet	12769-96-9
C.I. Pigment Violet 23	51319	oxazine	6358-30-1

C.I. Pigment White 18	77220	carbonic acid, calcium salt	471-34-1
C.I. Pigment White 21	77120	barium sulfate	7727-43-7
C.I. Pigment White 26	77718	magnesium silicate (talc)	14807-96-6
C.I. Pigment White 4	77947	zinc oxide	1314-13-2
C.I. Pigment White 5	77115	lithopone (coprecipitate of barium sulfate and zinc sulfide)	1345-05-7
C.I. Pigment White 6	77891	titanium dioxide	13463-67-7 1317-80-2)
C.I. Pigment White 7	77975	zinc sulfide	1314-98-3
C.I. Pigment Yellow 110	56280	aminoketone	5590-18-1
C.I. Pigment Yellow 119	77496	zinc ferrite	68187-51-9
C.I. Pigment Yellow 191	18795	monoazo	129423-54-7
C.I. Pigment Yellow 53	77788	nickel antimony titanate	8007-18-9
C.I. Pigment Yellow 65	11740	monoazo	6528-34-3
C.I. Solvent Black 7	50415:1	azine	8005-02-5
C.I. Solvent Violet 13	60725	anthraquinone	81-48-1
D & C Red No. 7	15850:1	monoazo	5281-04-9
		iron oxide	1332-37-2

Annex C – Testing Methods

1 Migration tests

1.1 Migration tests for verification with the MPC

1.1.1 Organic, factory-manufactured products

As set forth in Article 19(3), standard NEN-EN 12873-1:2003 (EN) applies.

1.1.2 Organic materials (other than metals or cement products) applied on site

As set forth in Article 19(3) standard NEN-EN 12873-2:2005 (EN) applies.

1.1.3 Membranes

As set forth in Article 19(3) standard NEN-EN 12873-4:2006 (EN) applies.

1.1.4 Ion exchangers and adsorbing resins

As set forth in Article 19(3) standard NEN-EN 12873-3:2006 (EN) applies.

1.1.5 Metals

As set forth in Article 19(3) standard NEN-EN 15664-1:2008 (EN) applies.

1.1.6 Migration test for cement products

As set forth in Article 19(3) standard NEN-EN 14944-3:2005 Draft (EN) applies to factory-manufactured products.

At this point, a standard for materials and associated cement products applied on site is not available. The Commission may decide which method to use.

1.2 Migration tests to assess the organoleptic aspects

As established in Article 19(3) the following standards apply (see also the table at the end of this Annex):

1.2.1 Organic, factory-manufactured products in water distribution systems

To identify the effects of organic, factory-manufactured products applied in drinking water systems on the smell and flavour of water for human consumption, the migration water must be obtained as set forth in NEN-EN 1420-1:1999 (EN).

To identify the effects of organic, factory-manufactured products applied in water supply systems on the smell and flavour of water for human consumption, the migration water must be obtained as described in NEN-EN 13052-1:2001 (EN).

1.2.2 Organic materials in storage systems

To identify the effects of organic materials in water storage systems (tanks, reservoirs, fittings and potential coatings used), both for factory-manufactured end products and materials applied on site, on the organoleptic aspects of water for human consumption, the migration water must be obtained as described in NEN-EN 14395-1:2004 (EN).

1.2.3 Membranes

Membranes are not tested for organoleptic aspects, because the water passing the membrane is not yet drinking water or warm tap water.

1.2.4 Ion exchangers and adsorbing resins

Ion exchangers and adsorbing resins are not tested for organoleptic aspects, because the water that has contacted these products is not yet drinking water or warm tap water.

1.2.5 Metals

A method to assess the organoleptic aspects of metals is not described. MPCs defined for metals or metal ions released by metal products or materials are (much) lower than the concentrations in which organoleptic aspects have any relevance. Therefore, if a metal product/material meets the toxicological criteria/requirements, testing the organoleptic aspects will not be necessary.

1.2.6 Cement products

To identify the effects of factory-manufactured cement products on the organoleptic aspects of water for human consumption, the migration water must be obtained as set forth in NEN-EN 14944-1:2006 (EN).

As of now, a standard to identify the effects of cement materials applied on site and their associated products on the organoleptic aspects of drinking water or warm tap water, is not available.

1.2.7 Technological auxiliary agents

To identify the effects of technological auxiliary agents, *i.e.* flow-control agents, de-moulding agents, *curing compounds*, slipping agents and release agents, on the organoleptic aspects of drinking water or warm tap water, if it is impossible to adequately remove these agents, the Minister may issue further guidelines in accordance with Article 10. The same applies to lubricants in assembled products and sealing materials.

2 Measuring methods

2.1 Measuring methods for organoleptic aspects

As set forth in Article 6(9) the following standards apply to organic, factory-manufactured products in water supply systems, organic materials in storage systems, membranes, ion exchangers and cement products (see also the table at the end of this Annex):

2.1.1. Smell and taste
The quantitative determination of the smell and taste of the migration water obtained with the tests specified in 1.2.1 to 1.2.6 shall be carried out according to any one of the methods described in the standard NEN-EN 1622: 2006. The dilution factor of the migration water shall be 8. The assessment shall be carried out by a panel of at least five panellists through unforced choice.

2.1.2. Colour
The quantitative determination of the colour of the migration water obtained with the tests specified in 1.2.1 to 1.2.6 shall be carried out according to method C described in NEN-EN-ISO 7887: 2012. The limit shall be 10 mg/l Pt in drinking water or hot water.

2.1.3 *Degree of turbidity*

The quantitative value of the turbidity of the migration water obtained by using the tests listed under 1.1.1-1.14 and 1.2.6 is measured in accordance with the method described in standard NEN-EN-ISO 7027:2000 (EN). The limit for turbidity shall be 1 FTE in drinking water or hot water.

2.2. Determination method for determination of regrowth (microbiological testing)

The standard NEN-EN 16421: 2014 shall apply to determine regrowth. In NEN-EN 16421:2014, the testing methods *Biomass Production Potential* (BPP), *Biofilm Volume* (VM) and *Mean Dissolved Oxygen Depletion* (MDOD) are described.

An assessment criterion of 1000 pg ATP/cm^2 shall apply to BPP.
If the assessment criteria used for the VM and MDOD testing method provide a level of protection equivalent to the assessment criterion for BPP, the test results obtained with the VM or MDOD method can be used. For VM, it involves the assessment criterion of 0.05 ± 0.02 ml of mucus volume /800 cm^2.
For elastomers used as sealing material in contact with drinking water, no BPP criterion has been established yet. For now, the VM assessment criteria of 0.12 ± 0.03 ml of mucus volume /800 cm^2 and 0.20 ± 0.03 ml mucus volume /800 cm^2 shall apply to these, regarding sealing materials with a respectively large and small contact surface with drinking water.

2.3 Measuring methods to identify the TOC and the specific migrations, and to test the purity

2.3.1 TOC

As set forth in Article 19, third paragraph, standard NEN-EN 1484:1997 (EN/NL) applies to measure the TOC.

2.3.2 Specific migrations, testing the purity of chemicals

If available, the specific migration of compounds for which an MPC has been set, and the purity of chemicals, will be measured in accordance with the related EN standard.
If no EN standards are available, the Commission will decide which method to use. Known characteristics of such method include:

- It is repeatable;
- It is reproducible;
- It is accurate;
- The outcome of the measurement is not certain.

The method's limit of evidence must be under one-fifth times the MPC.

The methods will be defined by the Commission in accordance with Article 1(4) of the Commission's rules.

2.4 Determination methods for determination of the carbon content on the inner surface of copper pipes and fittings

The quantitative determination of the carbon content on the inner surface of copper pipes and fittings shall be carried out in accordance with the "Total Carbon" method described in NEN-EN 723: 2009.

3 Sample calculations

To calculate the migration of substances from materials that contact drinking water or warm tap water, one may use as a guideline the formulas and assumptions derived from the Piringer model, as shown under 3.1, thereby observing the criteria described in chapter 4 of Annex C. The calculations must be made on the basis of the state of the art, as decided by the Commission. Should the value of the expected concentration in the drinking water or warm tap water calculated on the basis of the migration model used be lower than the MPC in effect, a migration test in the laboratory would not be necessary.

3.1 Formulas and assumptions

The following analytical solution may be derived for a substance's rate of migration from material P to liquid F by using the time-dependent diffusion equation according to Fick's 2nd Law of Diffusion:

$$\frac{m_{F,t}}{1\ A} = 0{,}1 c_{p,0} \rho_p d_p \left(\frac{\alpha}{1+\alpha} \right) \left[1 - \sum_{n=1}^{\infty} \frac{2\alpha(1+\alpha)}{1+\alpha+\alpha^2 q_n^2} \exp\left(-D_p t \frac{q_n^2}{d_p^2} \right) \right]$$

With:

$m_{F,t}$ = a migrant's volume migrated from material P into liquid F after a time t (s) in (mg);
A = the contact surface between material P and liquid F (dm^2);
$c_{P,0}$ = the migrant's initial concentration in material P (µg/g = mg/kg = ppm);
ρ_P = material P's density (g/cm^3);
d_P = material P's thickness (cm);
α = parameter without dimensions according to the equation:

$$\alpha = \frac{1}{K_{p,f}} \frac{V_F}{V_P} = \frac{c_{F,\infty}}{c_{P,\infty}} \frac{\rho_F}{\rho_P} \frac{V_F}{V_P}$$

with:

V_F = volume of liquid F (cm^3);
V_P = volume of material P (cm^3);
$K_{P,F}$ = partition coefficient of the migrant over material P and liquid F (without dimensions) defined by:

$$K_{p,f} = \frac{c_{P,\infty}}{c_{F,\infty}} \frac{\rho_P}{\rho_F}$$

with:

$c_{P,\infty}$ = the migrant's balanced contents in material P (mg/kg);
ρ_P = material P's density (g/cm^3);
$c_{F,\infty}$ = the migrant's balanced contents in liquid F (mg/kg);
ρ_F = liquid F's density (g/cm^3);
q_n = the positive roots of the "transcendent" equation $\tan q_n = -\alpha q_n$;
D_P = the migrant's diffusion coefficient in material P (cm^2/s);
t = the migration time (s).

It is assumed in this calculation that the migrant at the start of the mass transport is distributed homogenously in the polymer material P, and that there is no threshold resistance for the transfer of the substance between P and F. The migrant is also distributed homogenously in F, and the total volume of the migrant in P and F is constant throughout the migration process. The following prerequisites must always be met in drinking water or warm tap water applications (pipe materials):

- All starting substances in a product's formulation are distributed homogenously;
- There is no resistance throughout the transfer of the substance from the wall of any pipe or fitting to the drinking water or warm tap water;
- The migrant will be distributed homogenously in the water due to the flow of the drinking water or warm tap water (practice) or due to diffusion in the water (migration water);
- The migrant has no other "source of origin"; therefore, its total volume will not change in the synthetic material or in the water.

If it is assumed that the thickness of the packaging (for example, the wall of a pipe) is infinite (thus, enough "availability" at the migrant), that the migrant's solubility in the well mixed liquid is high, and that the migration process is far under the balance (less than 60 % of the initial concentration is migrated), then equation 0 will result in:

$$\frac{m_{F,t}}{A} = 2c_{p,0}\rho_p\sqrt{\frac{D_P t}{\pi}}$$
4

The partition coefficient of polymer/food

The partition coefficient represents the distribution between the concentration of a migrant in the synthetic material and in the medium the material is contacting. The value of the partition coefficient depends on the degree of interaction between the migrant and the synthetic material on one hand, and between the migrant and the medium on the other hand. This means that each “pair” of synthetic/medium/migrant has its own value for the partition coefficient. If specific data are unavailable, the partition coefficient of a migrant between the synthetic material and the medium $K_{P,F}$ = 1 may be used if the migrant has a good solubility in the medium. If a migrant is “not” soluble in the medium, $K_{P,F}$ = 1,000 may be used. It is recommended to use partition coefficients identified in experiments if they are available.

The diffusion coefficient

Similar dependence factors apply to the diffusion coefficient as those for the partition coefficient. The diffusion coefficient depends on the properties of the polymer and the migrant. The maximum diffusion coefficient (D_P^* in lieu of D_P) may be calculated on the basis of the migrant’s mass and two constant values that are specific for the polymer:

$$D_P^* = 10^4 \exp\left(A_P - 0{,}1351 M_r^{\frac{2}{3}} + 0{,}003 M_r - \frac{10454}{T}\right)$$
5

With:

$$A_P = A'_P - \frac{\tau}{T}$$
6

A’$_P$ = a polymer-specific “diffusion conducting capacity”;
τ = a polymer-specific “activating energy”;
T = the temperature (K);
M_r = the relative molecular weight of a migrant (D);
D^*_P = the polymer-specific maximum diffusion coefficient (cm^2/s).

The use of the maximum diffusion coefficient D_p^* implies that the migration is overestimated. If an exact diffusion coefficient is available for a certain migrant/polymer pair, it may be used instead of the maximum diffusion coefficient.

4. Calculation of the expected concentration of a substance in drinking water or hot water

If the correct toxicity data cannot be provided according to Chapter 1 of this annex, and if use of that substance in accordance with Article 7 of the regulation cannot be avoided, the admissibility of the substance can be assessed on the basis of information obtained through a theoretical calculation. This shall be subject to the following criteria and assumptions:

• The concentration of a genotoxic substance in drinking water or hot water, or a substance for which the genotoxic potential has not been assessed (sufficiently), must not exceed 0.1 µg/l after 10 days after the introduction of the product in which the substance is encountered;

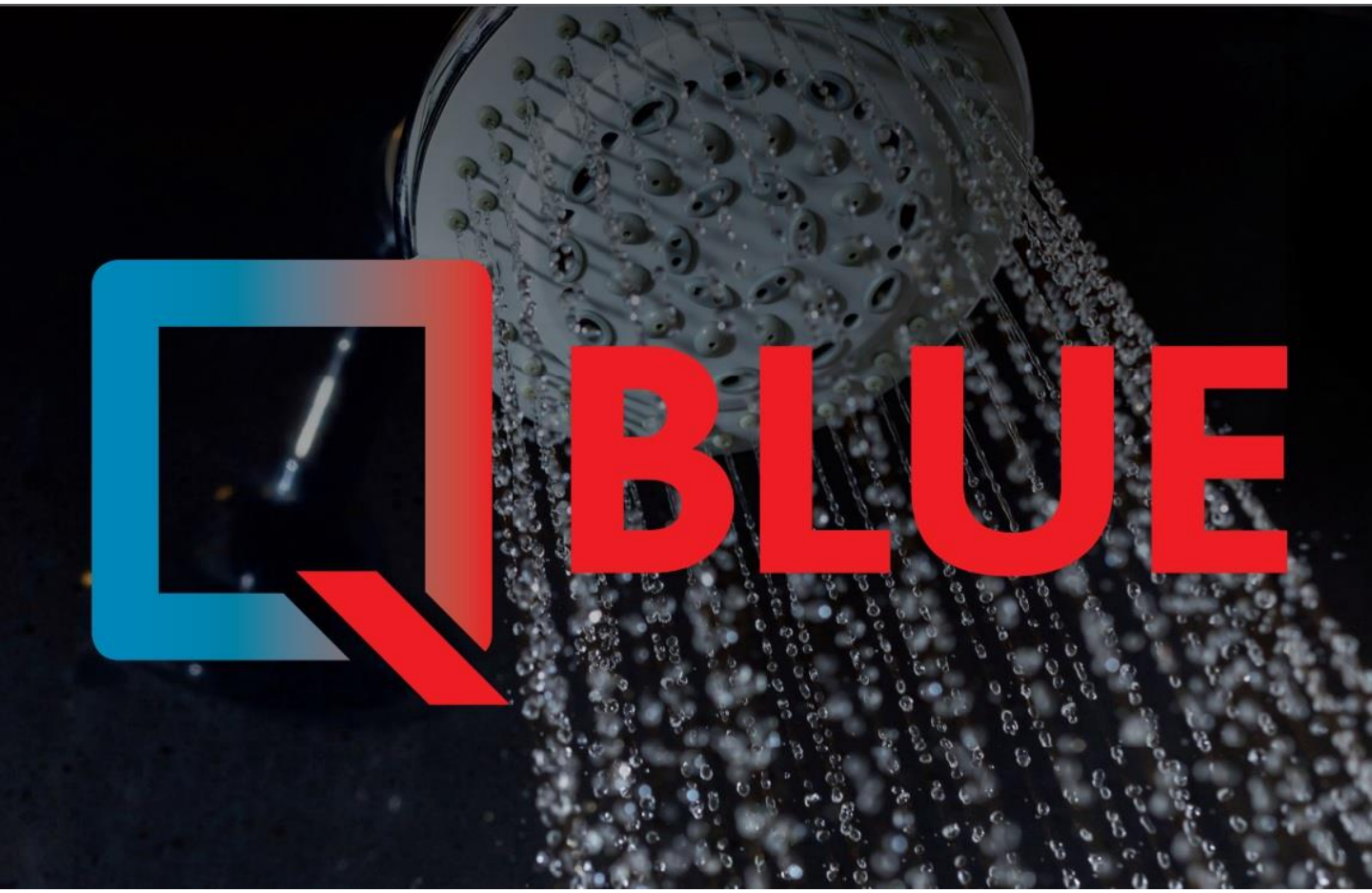
• If it is sufficiently demonstrated that a substance is non-genotoxic, its concentration in the drinking water or hot water must not exceed 2.5 µg/l after 10 days after the introduction of the product in which the substance is encountered;

• Calculations of the expected (final) concentration in drinking water or hot water should be based on,

among other things:
- the residual content of the substance in the finished product, as specified by the manufacturer or supplier;
- the relevant diffusion coefficient;
- the conversion factors mentioned in Section 3;
- the application of the finished product;
- the service life of the finished product in which the substance in question is encountered;
- a linear reduction of the concentration (migration) of the substance in drinking water or hot water;
- the behaviour of the substance in aqueous medium.

Showersave®

QB1-21
QB1-16
QB1-12



Installation Manual

Showersave®QB1-21 (heat exchanger)
QB1-16
QB1-12

Contents

Showersave®QB1-21 (heatexchanger)
QB1-16
QB1-12

1.0 General Information

This Installation Manual is about installation of the Q-Blue Showersave®QB1-series. This serie contains the Showersave®QB1-21, the Showersave®QB1-16 and the Showersave®QB1-12. The way these products work is identical, only the lenghts of the heatexchangers differ. Because the lenghts of the heatexchangers differ also the efficiencys and the pressurelosses differ (see points 4.0 and 4.1 of this manual).

On average, a shower uses 60 litres of water at a temperature of between 38 and 40 °C. This shower water goes straight down the drain, wasting a great deal of heat and energy. By running the hot waste water through the Showersave QB1 this heat can be transferred to the water on it's way to the boiler and/or the cold water tap of the shower's mixer tap. The heat transfer takes place simultaneously while you shower.

1.1 Description of the heat exchanger

In fact the Showersave®QB1 contains three copper pipes, the wastewater pipe, the outer pipe and a pipe in between which is connexted to the outer pipe. This is how a double barrier is realised between waste water and tap water. The miniscule space between the pipe in between and the wastewater pipe (wastewater pipe) contains air. If the inner pipe develops a leak, this becomes visual apparent as water will drip from the heat exchanger. This double wall seperation is according to EN1717:2000 and is tested and approved by KIWA. This system is also WRAS approved.

Each Showersave®QB1 has a label (see fig. 1) with printed on it a unique serial number and also technical information. This label should always stay on the Showersave®QB1 and may not be removed. If the label is removed or not readable garantee is no longer valid.

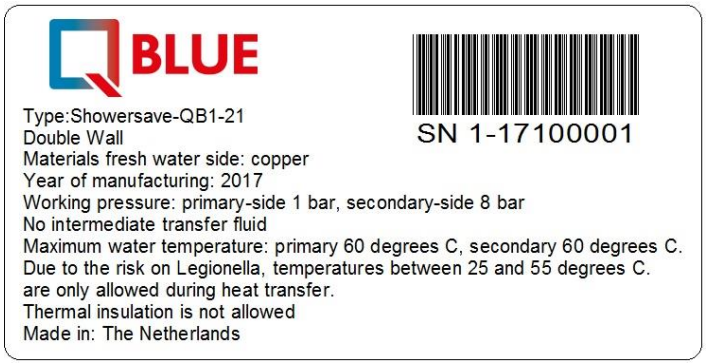


fig. 1

1.2 Safety and legionella

When no cold water is flowing up the Showersave®QB1, the temperature in the pipe should be prevented from becoming higher than 25°C. The Showersave®QB1 may therefore not be installed near heat conducting pipes, on warm surfaces or in spaces with constantly high temperatures (>25°C). The cold water pipe, connection and the outer wall of the Showersave®QB1 **may therefore not be insulated.**

1.3 Maintenance and cleaning

Generally no maintenance is required. Efficiency can decrease as a result of dirt accumulating on the inside of the Showersave®QB1. However, the waste water from the showersave flows at a high speed (>1m/s) along the inner pipes wall. This is comparable to the water speed in a dishwasher. The water flows through the pipe in 2 seconds and therefore no dirt will accumulate (normally).
If, for what reason, dirt accumulates, then a soap based cleaning agent can be used to flush the pipe. Cleaning agents based on scouring or polishing agents are not allowed, because they can stik to the wall of the pipe and reduce efficiency.
Connecting a wash basin to the Showersave®QB1 is not recommended as shaving gel and toothpaste are very sticky and could adhere to the wall of the inner pipe.

2.0 Points of attention when installing:

- The Showersave®QB1 should be mounted vertically both from frontside as from the side
- The Showersave®QB1 is a device and should therefore be mounted easily accesable, so that it can be easily installed and uninstalled
- Before the freshwater connection a non-return valve and a shut-off valve should be installed (type EA) (see afb.1 page 5)
- The Showersave®QB1 may not be mounted in an area where the temperature normally is higher than 25 °C
- The Showersave®QB1, the water pipeline and the connections may not be inslulated
- The waterconnections should be made with straight thread, so not with conical thread
- Hemp may not be used on the connections
- The tightening moment of the connection may not exceed 120 Nm (Tip : use a counter key)
- The label with the serial number and technical information may not be removed and should stay readable

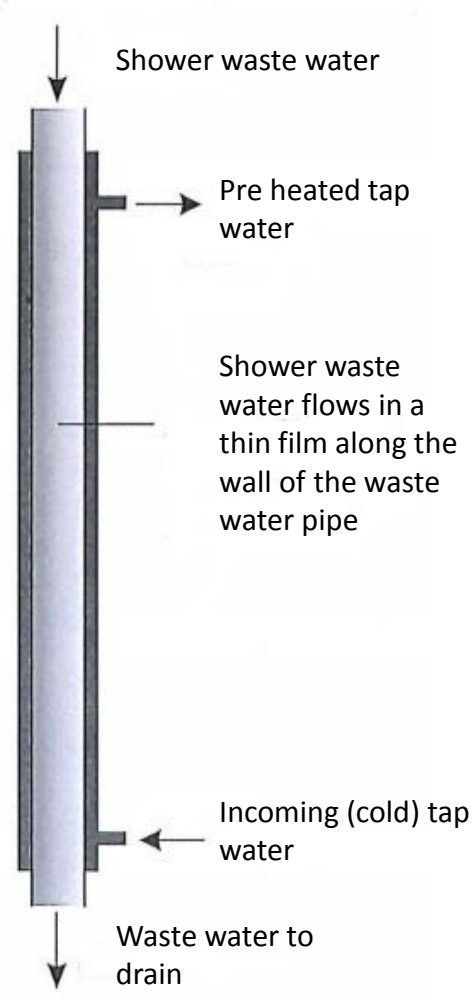
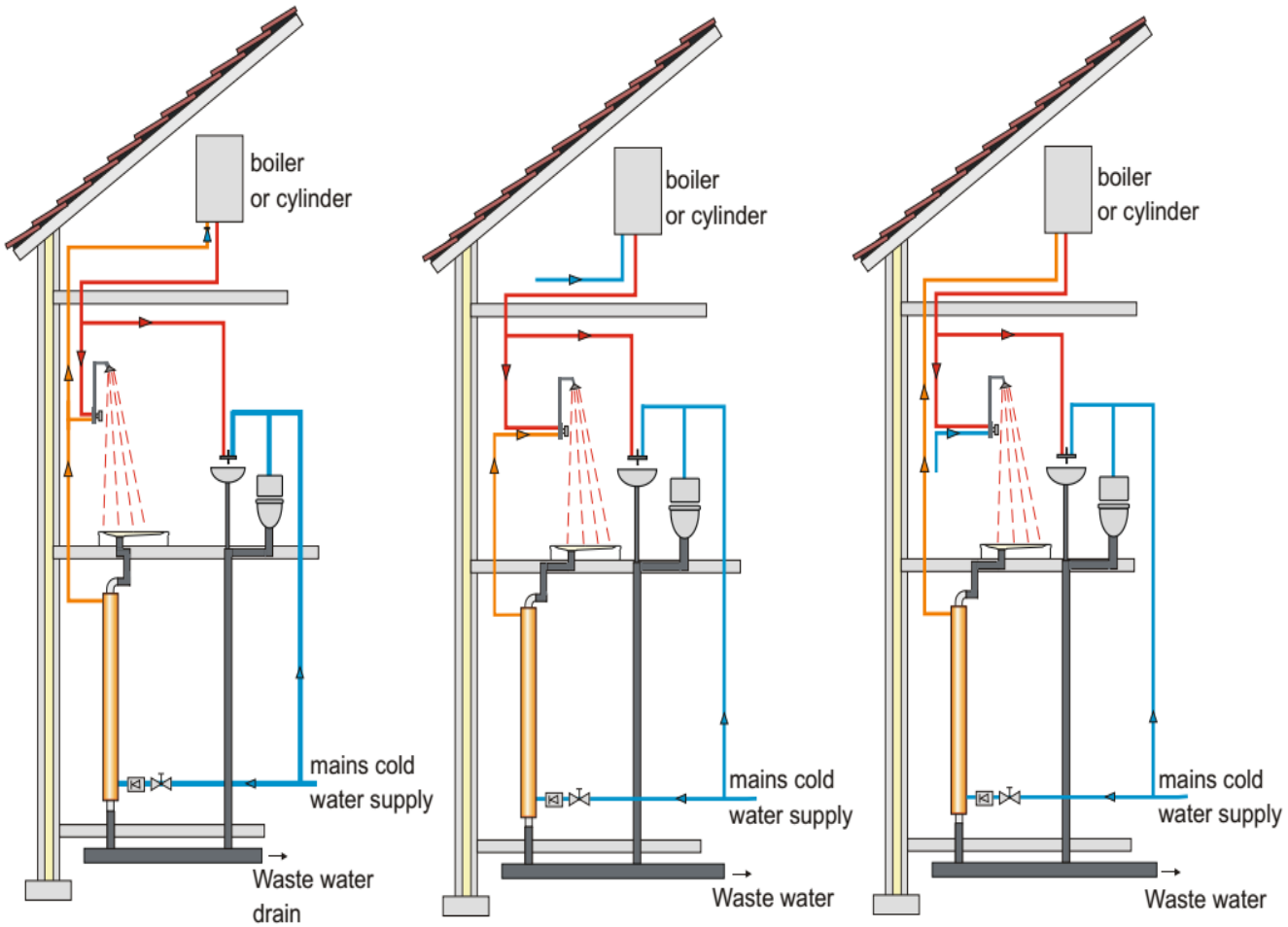


fig.2

3.0 Installation of the Showersave®QB1

3.1 Systems A, B en C

The inlet side of the Showersave®QB1 can be connected to the tap water system.
The outlet side can be installed in three different ways, namely:
System A: Combined connection to the shower mixer tap's cold water connection and the heater/boiler
System B: Connection of the cold water connection from the shower mixer
System C: Connection to the water heater/boiler



System A System B System C

fig. 3

3.2 Connections

The tap water connections should be demountable. Just before the tap water connection a non-return valve and a shut-off valve should be mounted (type EA) (see afb. 1).

Afb. 1

Extra aeration

Dearation of the Showersave®QB1 is not necessary, all air will disappear automatically because the water flows from the bottom on the top.

If aeration of the drainage area between the showerplace and the Showersave®QB1 is desired it can be achieved in two ways:

1. A connection to a relief pipe or stand pipe (with relief pipe) of the shower (see fig. 4).
2. By using an aerator. The aerator must be mounted vertically above the heat exchanger and may not be placed lower than 1 meter below the top of the shower place. The aerator can be placed on the rotator by replacing the 45 degrees bend for a T-connector (see fig. 5).
   (note: aerator is not standardly supplied)

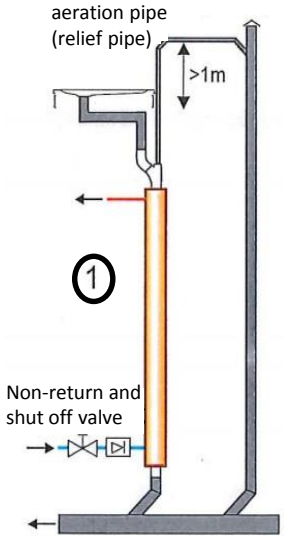


fig. 4

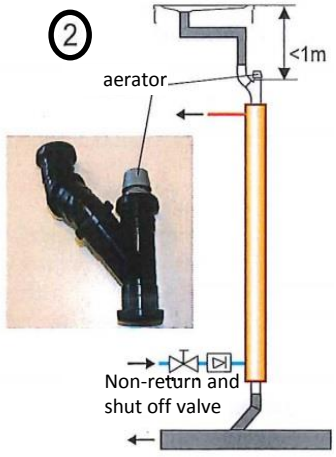


fig. 5

3.3 Positioning of the Showersave®QB1

The Showersave®QB1 is considered a device. The space it is installed in should be large enough so that inspections can be carried out properly and if necessary the Showersave®QB1 can be replaced easily. Access has to be possible without extra work. When this is not respected any garantee claim will not be valid.

Possible positions of installation are a fixed cabinet, cilinder shaft with removable panel, technical area, stair cupboard etc.
Positioning in a Electrical meter cupboard is only allowed when properly compartimented and only when accordated by local building authority.

3.4 Fixation of the Showersave®QB1

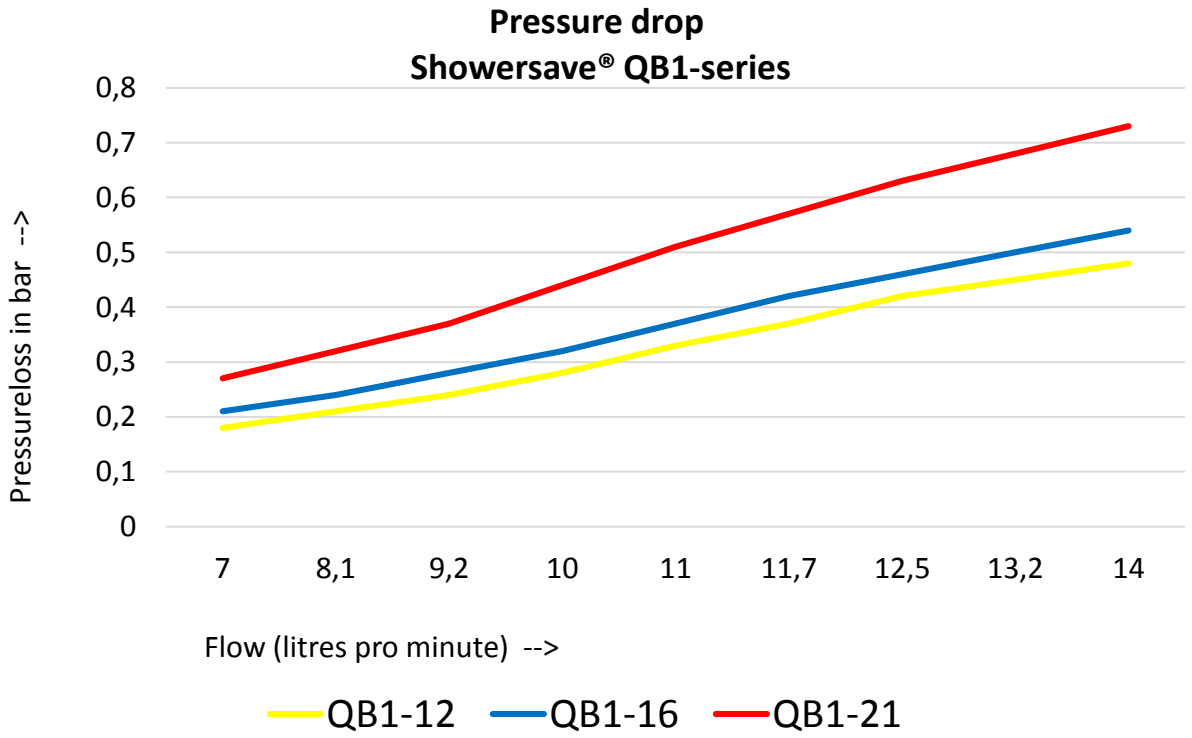
The Showersave®QB1 is mounted to the wall with two special braces (see afb. 2). It is important to take good care of that the Showersave®QB1 is mounted strictly vertical, seen from the front as from the side.

Afb. 2

4.0 Technical information of the Showersave®QB1

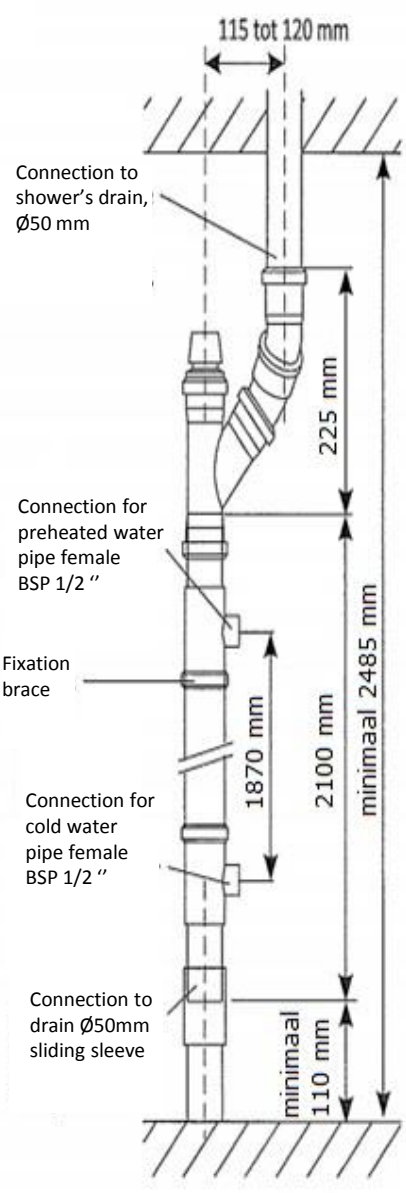
Specifications	QB1-21	QB1-16	QB1-12
Length	: 2100 mm	1680 mm	1270 mm
Weight	: 7,8 kg	6,1 kg	4,5 kg
Content water compatiment	: 0,52 liter	0,39 liter	0,28 liter
Diameter (outer) waste water connection	: 50 mm	50 mm	50 mm
Tap water connections	: G1/2"	G1/2"	G1/2"
Max. allowed tightning moment	: 150Nm	150Nm	150Nm
Max. allowed pressure wastewater	: 1 Bar	1 Bar	1 Bar
Max. allowed pressure tap water	: 8 Bar	8 Bar	8 Bar
Max. allowed temperature waste- or tap water	: 60 graden	60 graden	60 graden
Efficiency on system A en 12,5 l/min flow (*)	: 61,4%	56,1%	48,5%
Efficiency on system A en 9,2 l/min flow (*)	: 64,6%	60,1%	52,7%
(*) efficiencys measured by KIWA			

4.1 Pressureloss

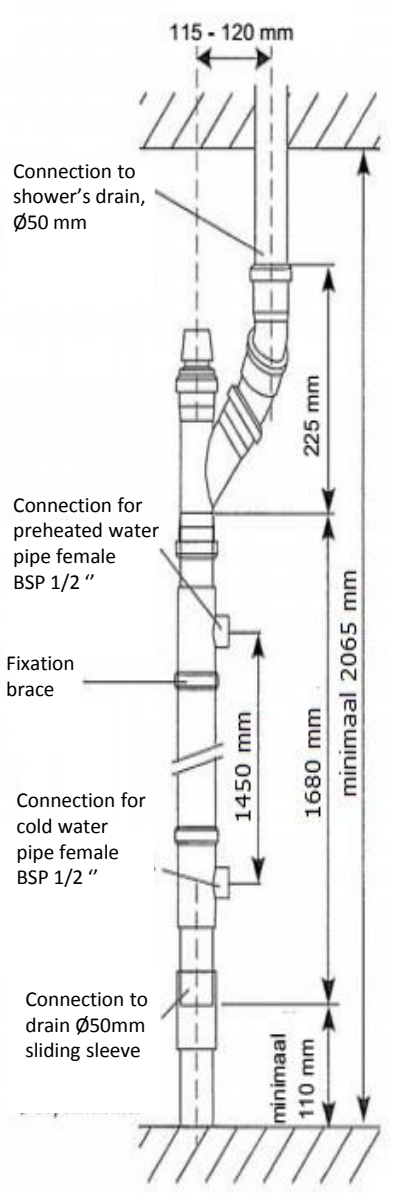


4.1 Dimensioning (sizes) for mounting of the Showersave®QB1

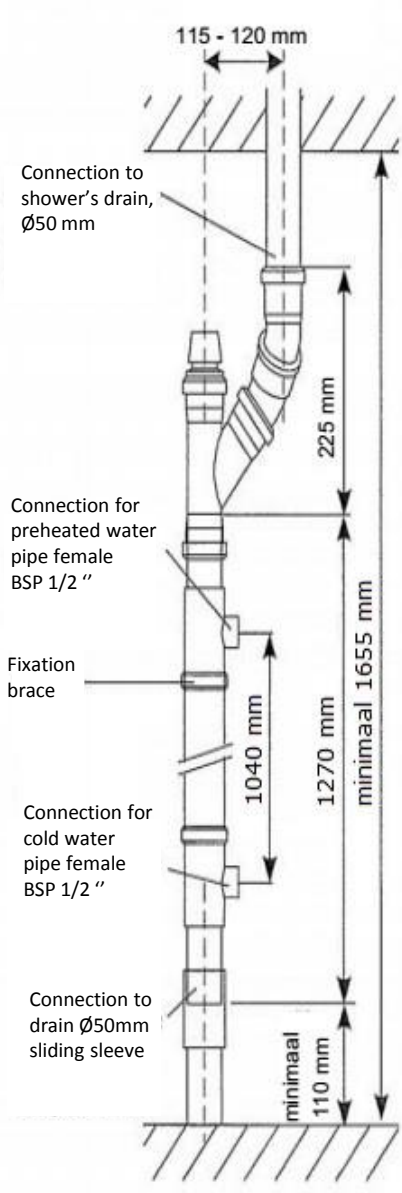
QB1-21



QB1-16



QB1-12



Declaration

Partner for progress

number	93835/02	Replaces	93835/01
Date of issue	11-12-2017	Issued first	23-11-2016
		Report number	161000141

Declaration

regarding the efficiency of a shower heat recovery unit

DECLARATION OF KIWA

This declaration is based on a single examination by Kiwa on a product supplied by

Q-Blue B.V.

This declaration does not pass a judgment on other products supplied by the manufacturer.
The product was tested according the procedure according annex B of the NEN7120:2011/C2:2011.

PRODUCT NAME

Showersave®-QB1-21

class	Flow (l/min)	Volume (l)	Efficiency (%)	Flow resistance (ΔP) (bar)
3	9.2	73	65.0	0.30
4, 5, 6	12.5	100	61.4	0.52

Allard Slomp
Productmanager

Kiwa Nederland B.V.

Kiwa Nederland B.V.
Wilmersdorf 50
Postbus 137
7300 AC Apeldoorn
Tel. 088 998 33 55
Fax 088 998 36 85
E-mail eup@kiwa.nl
www.kiwa-eup.nl

Q-Blue B.V.
Willem Barentszstraat 5
7825 VZ EMMEN
The Netherlands
+31 (0) 591 374570
info@q-blue.nl
www.q-blue.nl

CERTIFICATE

Product certificate
K95352/01

Issued *2017-06-01*

Replaces

Heat exchangers

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

Q-Blue B.V.

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-K656 “Heat exchangers intended for the indirect heating of drinking water” dated 01-02-2012.

Luc Leroy
Kiwa

2871170315

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

Kiwa Nederland B.V.
Sir Winston Churchilllaan 273
Postbus 70
2280 AB RIJSWIJK
The Netherlands
Tel. +31 88 998 44 00
Fax +31 88 998 44 20
info@kiwa.nl
www.kiwa.nl

Company
Q-Blue B.V.
Willem Barentszstraat 5
7825 VZ EMMEN
Tel. +31 591-630003
info@q-blue.nl

PRODUCTS RvA C 002

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

Heat exchangers

PRODUCT SPECIFICATION

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

- Showersave®QB1 -serie;
- Q-Blue Recoh-Vert V6.

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

Place of the mark: on the identification plate of each heat exchanger.

Compulsory specifications:

- Trade mark/type or logo,
- Construction (single-partition/double-partition),
- Secondary side wall material used,
- Intended purpose of use of the connection ends,
- Year of manufacture,
- Primary side working pressure,
- Secondary side working pressure,
- Designation of liquid intermediate medium,
- Maximum primary water temperature,
- Maximum secondary water temperature.

Method of marking:

- Non-erasable;
- visible after assembly.

APPLICATION AND USE

The products are intended to be used in hot water installations with a working pressure of maximum.1 MPa (10 bar) and a water temperature of maximum 90 °C.

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:

- Q-Blue B.V.

and, if necessary,

- Kiwa Nederland B.V.

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

kiwa
Partner for progress

BRL-K 656/02
2001-08-24

Evaluation Guideline

For the Kiwa product certificate for
Heat exchangers intended for the indirect heating of drinking water

kiwa
Partner for progress

BRL-K 656/02
2001-08-24

Evaluation Guideline

For the Kiwa product certificate for
Heat exchangers intended for the indirect heating of drinking water

This Evaluation Guideline has been validated by the Director of Certification and Inspection of Kiwa as per 24 August 2001

Erkenning

Accredited by RvA

Kiwa N.V
Certificatie en Keuringen
Sir Winston Churchill-laan 273
Postbus 70
2280 AB Rijswijk
Telefoon 070 – 41 444 00
Telefax 070 – 41 444 20
Internet www.kiwa.nl

Preface

This Evaluation Guideline has been prepared by Kiwa's Board of Experts Commission Heat exchangers, in which the parties interested in the area of Heat exchangers intended for the indirect heating of drinking water are represented. This Board of Experts also guides the performance of certification and adjusts this Evaluation Guideline where necessary. Wherever the term 'Board of Experts' is used in this Evaluation Guideline, the above-mentioned Board of Experts is meant.

Kiwa will use this Evaluation Guideline in conjunction with the Kiwa Regulations for Product Certification, in which the general rules used by Kiwa in the event of certification are recorded.

Contents

1 Introduction

1.1 General

Kiwa uses the requirements included in this Evaluation Guideline when handling an application, and maintaining a product certificate for Heat exchangers intended for the indirect heating of drinking water.

This Evaluation Guideline replaces Evaluation Guideline BRL number dated.
A quality certificate issued on the basis of that Evaluation Guideline would in any case lose its validity on date.2 months after validation of this evaluation guide line.

In the performance of its certification work Kiwa is bound by the requirements set out in the Chapter entitled 'Agreements on the performance of certification'.

1.2 Application area

The products are intended to be used as/in in hot water installations with a working pressure of maximum.1 MPa and a water temperature of maximum 90 °C

Remark: The technical specifications to be fulfilled of the primary side will be established down in mutual agreement between supplier and user.

1.3 Terms and definitions

1.3.1 Terms

In this Evaluation Guideline (BRL) the following terms shall have the following meanings:

- Evaluation Guideline: the agreements made within the Board of Experts on the subject of certification;
- Board of Experts: The Board of Experts " Commission Heat exchangers";
- 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.

1.3.2 Definitions

Drinking water: water intended to be used for drinking purposes

Pressure: the effective pressure (p_e): the difference between the absolute pressure (p) and the ambient pressure (p_{amb}). In formula form: $p_e = (p - p_{amb})$.

Heat exchanger: an appliance in which heat-exchange is carried out.

Primary medium: the heat-transfer medium.

Primary side: that side of the heat exchanger that comes into contact with the primary medium.

Intermediate medium: the medium, which in a double-partition heat exchanger is located between the walls separating the primary and secondary media.

Intermediate zone: The zone in between the primary and the secondary side that separates the primary medium and secondary medium from each other.

Secondary medium: the drinking water for heating.

Secondary side: that side of the heat exchanger that comes into contact with the drinking water.

Hot water: heated drinking water

Hot water installation: installation for the distribution of hot water.

Single-partition heat exchanger: a heat exchanger in which the primary and secondary media are separated by one wall.

Double-partition heat exchanger: a heat exchanger in which the primary and second media are completely separated by two walls.

Working pressure: the maximum pressure occurring under normal conditions in the drinking water installation or parts thereof.

1.4 Requirements and determination methods

In this Evaluation Guideline requirements and determination methods are included, by which the following is meant:

1.4.1 Requirements

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.

1.4.2 Determination methods

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.

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.

1.5 Acceptance of research reports supplied by the supplier

If the supplier submits reports from research bodies or laboratories to show that the requirements of the Evaluation Guideline are met, it will have to be shown that such reports were prepared by a body meeting the prevailing accreditation standard, i.e.

- NEN-EN-ISO/IEC 17025 for laboratories;
- NEN-EN 45004 for inspection bodies;
- NEN-EN 45011 for certification bodies certifying products;
- NEN-EN 45012 for certification bodies certifying systems;
- NEN-EN 45013 for certification bodies certifying persons.
- The body is deemed to meet these criteria if an accreditation certificate can be submitted which has been issued by Raad voor Accreditatie (Board of Accreditation) or an accreditation body with which Raad voor Accreditatie has concluded a mutual acceptance agreement.

This accreditation should relate to the tests required for this Evaluation Guideline.
If no accreditation certificate can be submitted, Kiwa itself shall verify whether the accreditation standard has been met or carry out the tests concerned itself, or have it carried out.

1.6 Quality certificate

Any quality certificate issued on the basis of this Evaluation Guideline is referred to as a 'Kiwa product certificate1'.
The model of this quality certificate has been included in this Evaluation Guideline as an addendum.

1 **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.

2 Product requirements

2.1 General

This chapter contains the requirements to be met by the heat exchangers. These requirements will form part of the technical specification of the product, which will be included in the product certificate.

2.2 Types

The manufactured heat exchangers covered by this evaluation guideline to be distinguished in:

- Heat exchangers with single partition
- Heat exchangers with double partition

2.2.1 Single or double partition heat exchanger

It shall be determined that the heat transfer in a heat exchanger between the heating (primary) medium and the heated (secondary) medium takes place by applying and single partition or double partition. This shall be determined according to clause 3.6.1.
Heat exchangers with double partition with a occurring leakage in one of the separation walls shall lead to a visual leakage signalling outside the heat exchanger within 300 s. This shall be determined according to clause 3.6.2

2.2.2 Heat exchangers with single partition

Heat exchangers with a single partition shall meet all the, in this evaluation guide line, stated requirements excluded the requirements for heat exchangers with double partition as stated in clause 3.6

2.2.3 Heat exchangers with double partition

Heat exchangers with double partition to be distinguished in:

2.2.3.1 Heat exchangers with liquid as intermediate medium

If a liquid is used as intermediate medium the following requirements shall be met:

- The liquid shall not constitute a risk to public health. In the instructions for use the manufacturer shall indicate the liquid used and shall provide information the LD_{50}> 200 mg/kg[2].
- The pressure of the liquid between the two partitions may not exceed 100 kPa at the lowest point of the heat exchanger.
- The materials of the partitions shall not corrode under the influence of the intermediate medium, the primary medium or the secondary medium with which they come into contact.

2.2.3.2 Heat exchangers where partition walls in contact with each other or connected to each other

If thermal bridges are used, the following requirements shall be met:

- The space(s) between the two partitions shall be at atmospheric pressure.
- The materials of the walls and thermal bridges shall not corrode under the influence of the intermediate medium, the primary medium or the secondary medium with which they come into contact.
- The construction shall guarantee that leakage signalling is assumed. This shall be verified according to clause 3.6.

[2] LD 50 is the abbriviation of Lethal Dosis 50%.

2.3 Toxicological requirements

For this purpose the materials must meet the criteria recorded in the 'Guideline regarding the quality of materials and chemicals for the drinking water supply[3]
Materials that may come into contact with drinking water may not exude substances into the drinking water in quantities that are harmful to the consumers of such drinking water.
The materials shall be meet the requirements which are laid down in 'Guideline regarding the quality of materials and chemicals for the drinking water supply.

Remark: If the application procedure Attestation Toxicological Aspects is concluded positively it is assumed that is requirement is met.

2.3.1 Discharge of substances which impact colour smell and taste

Colour

The colour imparted to the migration water, when tested in accordance with article 3.1, shall not, after the third migration period, be more than 5 mg/l (Pt/Co scale) greater than the original migration water.

Smell and taste

Testing of the migration water in accordance with article 3.1for smell and taste imparted by the heat exchanger shall not, after the third migration period, in the case of a 1 : 15 dilution, result in at least five out of the eight members of the panel finding a different smell or taste.

2.4 Chemical and mechanical requirements

2.4.1 Corrosion resistance

The applied materials in contact with drinking water shall be corrosion-resistant or protected against corrosion. They shall not result in mutual corrosion.

2.4.2 Corrosion resistant steel

Corrosion-resistant steel shall satisfy:
EN 10088-1 or EN 10088-2, with a quality equivalent to the following compositions:

- Material number 1.4401 X 2CrNiMo - 17 13 3 (AISI 316 L)
- Material number 1.4404 X 6CrNiMoTi - 17 12 2 (AISI 316 Ti)
- Material number 1.4571 X6CrNiMoTi 17 12 2 (AISI 316 Ti)
- Material number 1.4521 X2CrNiMoTi 18-2
- Material number 1.4301 X5CrNi18-10 (AISI 304) 4
- Material number 1.4521 X2CrMoTi18-2 (F 18 MT).

2.4.3 Copper and copper alloys

Copper shall be de-oxidised copper Cu-DHP, with a high residual phosphorus content.
Carbon contamination of the surface may not exceed 0.3 mg/dm^2. And satisfy:

- EN 1982 Copper and copper alloys - Ingots and castings
- EN 12163 Copper and copper alloys - Rod for general purposes
- EN 12164 Copper and copper alloys - Rod for free machining purposes
- EN 12420 Copper and copper alloys - Forgings

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[3] In the publication of the Netherlands Public Health Authority (*Staatstoezicht op de volksgezondheid)* entitled 'Guideline regarding the quality of materials and chemicals for the drinking water supply', the Netherlands Chief Public Health Inspectorate (*Hoofdinspectie van de Volksgezondheid voor de Milieuhygiëne)* has laid down the system for assessing products used for the drinking water supply from a health point of view. This Guideline also includes so-called positive lists for a number of materials. These lists state the raw and auxiliary materials the presence of which in these products, or their use in the manufacture of these products, are considered admissible by the Chief Public Health Inspectorate in the conditions laid down. Materials and products which do not or do not fully consist of ingredients included on a positive list are assessed by the Chief Inspector on a case-by-case basis

[4] Annealed piping for heat exchangers and connection ends only

Remark
The lead content in lead containing copper alloys shall not exceed 3%.

2.4.4 *Steel*
Steel shall be equivalent to S235JRG2, material number 1.0038 according to EN 10025-2.

2.4.5 *Enamel coatings*
Enamel coatings shall satisfy DIN 4753, Part 3.
The cathodic protection to be applied shall be to DIN 4753, Part 6.

2.4.6 *Rubber sealing materials*
Rubber sealing materials shall satisfy BRL-K 2013.
Natural rubbers (NR) and isoprene rubbers (IR) are not permitted.

2.4.7 *Other materials*
If materials other than those indicated above are used, they shall be equivalent and be considered suitable for the purpose.

2.5 Construction and shape

2.5.1 *Internal configuration*
The internal configuration of the heat exchanger shall granted that under normal operating conditions the water is refreshed and the conductivity of the water my not increase by more then 5 mS/m compared against the reference water.

This shall be examined according to clause 3.4

2.5.2 *Heat resistance*
The manufacturer shall indicate the temperature up to which the heat exchanger may be used.

2.5.3 *Connection ends*

2.5.3.1 *Strength*
If the connection ends are not prevented from turning loose or breaking off when connecting, these connection ends shall be so tested as to be resistant to a torque of 30 Nm for 300 s. After this test, the fixings of the connection ends to the heat exchanger shall not shown any cracking and/or change of shape.

This shall be examined in accordance with clause 3.3

2.5.3.2 *Fittings*
Fittings shall satisfy the relevant requirements of Kiwa BRL-K623; 639 or 640.

2.5.4 *Anodes*
If anodes are used, the construction and method of assembly of the anodes shall satisfy DVGW-Arbeitsblatt W 511.

2.6 Functional requirements

2.6.1 *Strength and sealing*
On the primary and secondary sides, the heat exchanger shall be resistant to the working pressure specified by the manufacturer.
Testing to in accordance with clause 3.3 shall not result in any leakage, damage or permanent deformation.

2.6.2 Double partition

Heat exchangers with double partition with a occurring leakage in one of the separation walls shall lead to a visual leakage signalling outside the heat exchanger within 300 s.

This shall be examined according to clause 3.6.2.

2.6.3 Bleeding

The heat exchanger shall be bleedable on both the primary side and the secondary side.

2.6.4 Possibility of draining the heat-exchanger

It shall be possible to drain the heat exchanger on both the primary side and the secondary side.

2.7 Finish

By visual inspection it shall be verified that:

- The secondary site of the heat exchanger is cleaned and properly finished.
- Welding and soldering connections shall be smooth and sound of appearance. Welding specks shall be avoided.
- Welded products of corrosion resistance material their basis colour shall not be altered compared to the material before welding.

2.8 Marking

Engraving or stickers shall provide the marking of the heat exchangers.

The endurance of stickers shall be examined according to EN 248. After the examination the stickers shall be tested on the aspects readability and adhesivenes

2.9 Certification mark

The execution of the certification mark to be affixed to certified products is as follows:
The word mark KIWA

3 Determination Methods

3.1 Determining imparted colour, smell and taste

3.1.1 Test installation, aids and conditions

In order to determine the imparted colour, smell and taste, the appliance shall be capable of inclusion in a drinking water installation in which the volumetric flow of the water can be adjusted. The test water shall be non-chlorinated pure water previously passed through a carbon filter at a volumetric flow of 15 ± 5 ml/min.

The carbon filter used shall comprise a glass cylinder of about 80 mm inside diameter filled with 2.5 l of carbon (height about 500 mm). The carbon to be used shall be of the type RBX-no.1 of Norit or a carbon of equivalent quality and properties.

The glassware to be used shall not impart any smell or taste and shall have been cleaned with an odourless detergent. 24 hours before the taste tests the glassware shall be filled with tasteless water to which 10 ml of hydrogen peroxide 30% per 250 ml has been added.

For at least 1 hour before the test the panel members may not have eaten, drunk or smoked and shall have avoided substances that may influence smell and/or taste. The imparted smell and taste test shall be carried out in a room free from any disturbing smells and noises, the temperature being maintained at 23 ± 2 C, the relative air humidity being at least 50%.

To perform the colour analysis to EN-ISO 7887, suitable apparatus shall be used for the purpose.

3.1.2 Procedure

a. Rinse the secondary side of the appliance with drinking water at a speed of 2 m/s, related to the internal diameter of the connecting end, so that the contents are renewed five times.
b. Fill the appliance with test water on the secondary side.
c. Cover the connection so that there is access of air on the secondary side.
d. After 72 ± 1 hours take a sample therefrom.
e. Drain the appliance and then rinse it with test water.
f. Repeat the procedure according to paragraphs b - d) twice (total 3 migration periods). Carry out the migration test with (blank) test water at the same temperature in an odourless and tasteless glass Erlenmeyer flask.
g. Analyse a water sample of the third period for colour to EN-ISO 7887.
h. Make a 16 x dilution of the migration water taken at paragraph d) by mixing it with 15 parts of test water from the third period.
i. Have at least 8 members of the panel test for imparted smell and taste on samples of the dilution and samples of the blank water.

3.2 Material

3.2.1 Enamel coatings

Test the enamel as described in DIN 4753, Part 3

3.2.2 Magnesium anode

a. Test the magnesium anode as described in DIN 4753, Part 6.
b. Check whether the construction and assembly method satisfy DVGW-Arbeitsblatt W 511.

3.3 Strength of the connection ends

a. To test the resistance of the connection end to forces and moments, the heat exchanger shall be installed in a test apparatus in which the required moment can be exerted on the mechanism.
b. If required the connection ends of the heat exchanger can be provided with auxiliary equipment with which the moment can be exerted to the connection ends
c. Apply a clockwise moment of 30 Nm to the connection ends perpendicular to connection end for a period of 300 seconds.

3.4 Determination of refreshing

a. Measure the volume from the secondary side of the heat exchanger to be tested by filling it with water of ambient temperature, emptying en collecting the water.
b. Repeat this procedure a three times and calculate the average volume.
c. Measure the conductivity (mS/m) of the water in the test installation.
d. Mix a test fluid with a conductivity of 100 mS/m and fill the heat exchanger with this test fluid.
e. Execute ten tappings with the volume calculated in b and a velocity of 0,5 m/s related to the internal diameter of the connection end.
f. Rinse the heat exchanger with water for 10 s with velocity of 0,5 m/s. Collect this water and determine the conductivity.

3.5 Strength and sealing properties

a. The heat exchanger shall be installed in a test apparatus in which the required water pressure can be exerted to the heat exchanger.
b. Flush the secondary side of the heat exchanger with a volumetric flow of water such that the air is removed.
c. Close the exit aperture on the secondary side.
d. Subject the secondary side of the heat-exchanger to a pressure gradually rising within 60 s from 0 kPa to 1.3 times the working pressure specified by the manufacturer and maintain this pressure for 900 s. The pressure is atmospheric on the primary side.
e. Repeat paragraphs a to d for the primary side, the pressure on the secondary side being atmospheric.
f. Check for leakage, damage and permanent deformation.

3.6 Verification of the safety aspects of double partition walls.

3.6.1 Establishing complete double partition

a. Verify against the manufacturing drawings and/or necessarily section(s) if any spots are present where the partition walls are in contact with each other or connected to each other.
b. Establish by evaluation that on these spots it is not possible to drill a hole through with a diameter of 2 mm without to drill into leakage detection channel(s).

3.6.2 Establishing leakage signalling

a. Establish against the manufacturing drawings and/or necessarily sections on which spots an occurring leakage in the partition walls shall be seen and understood as critical in relation to the observed time in which leakage signalling via the intermediate zone shall occur.
b. Drill a 2-mm diameter continuous hole through both partitions at the most critical location. Check that the access to the intermediate medium is not blocked by the drilling work.
c. Fill the heat exchanger on both the primary and the secondary sides and subject both sides directly to a water-pressure of 50 kPa and maintain this pressure.

d. Measure the time between reaching this pressure and the time at which leakage liquid is signalled.

4 Marking

The following data shall be clearly and permanently indicated on the heat exchanger:

- Trade mark/type or logo
- Construction (single-partition/double-partition)
- Secondary side wall material used
- Intended purpose of use of the connection ends
- Year of manufacture
- Primary side working pressure
- Secondary side working pressure
- Designation of liquid intermediate medium
- Maximum primary water temperature
- Maximum secondary water temperature

Remark
The type of connection ends may be also described in the installation instructions if it is ensured that no mistake can take place in between the primary and secondary side

Remark
The data in respect of heat exchangers, which are not visible (internal installation), shall be visible after removing the cover of the final appliance.

5 Instructions

The manufacturer's instructions shall be supplied in the Dutch language with the heat exchanger.

These instructions shall cover at least the following aspects:

- possible applications
- installation instructions
- operating instructions
- maintenance instructions
  - cleaning methods
  - bleeding the heat exchanger
  - draining the heat exchanger

6 Requirements to be met by the quality system

6.1 General

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

6.2 Manager of the quality system

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

6.3 Internal quality control/quality plan

The supplier must have an internal quality control scheme (IQC scheme) which is applied by him.
At the time of the pre-certification tests this scheme must be at minimum drawn up).

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

- what aspects are checked by the producer;
- according to what methods such inspections are carried out;
- how often these inspections are carried out;
- in what way the inspection results are recorded and kept.

This IQC scheme should at least be an equivalent derivative of the model IQC scheme included in the addendum.

6.4 Procedures and working instructions

The supplier shall be able to submit the following:

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

7 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 BRL	Tests within the scope of		
		Pre-certification Tests	Supervision by Kiwa after granting of certificate	
			Inspection	Frequency
Toxicological requirements				
Discharge of substances which impact colour smell and taste	2.3.1	X		
Chemical and mechanical requirements	2.4	X	X	2
Product requirements				
Internal configuration	2.5.1	X		
Heat resistance	2.5.2	X	X	2
Strength	2.5.3.1	X		
Fittings	2.5.3.2	X		
Strength and sealing	2.6.1	X	X	2
Bleeding	2.6.3	X		
Possibility of draining the heat-exchanger	2.6.4	X		
Finish	2.7	X	X	2
Marking	2.8	X	X	2
Certification mark	2.9	X	X	2
Establishing complete double partition	3.6.1	X		
Establishing leakage signalling	3.6.2	X		
Marking	4	X	X	2
Instructions	5	X	X	2

7.2 Inspection of the quality system

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

8 Agreements on the implementation of certification

8.1 General

This chapter contains the agreements made within the Board of Experts on the implementation of the certification by Kiwa.

8.2 Certification staff

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

- certification experts: they are in charge of carrying out the pre-certification tests and assessing the inspectors' reports;
- inspectors: they are in charge of carrying out external inspections at the supplier's works;
- decision-makers: they are in charge of taking decisions in connection with the pre-certification tests carried out, continuing the certification in connection with the inspections carried out and taking decisions on the need to take corrective actions.

8.2.1 Qualification requirements

The Board of Experts has set the following qualification requirements for the subject matter of this Evaluation Guideline:

Certification staff	Level of education	Experience
Certification expert	Higher-level professional education (*HBO*) in one of the following disciplines: • Mechanical Engineering (general) • Chemical Engineering • Technical Business administration	3 years
Inspector	Intermediate-level professional education (*MBO*) in one of the following disciplines: • Mechanical Engineering	3 years
Decision-maker	Higher-level professional education (*HBO*) in one of the following disciplines: • Mechanical Engineering (general) • Technical Business administration	3 years Management experience

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

Remark
Mechanical engineering (general) covers energy engineering, marine engineering and Installation technique.

8.3 Frequency of external inspections

At the time this Evaluation Guideline took effect, the frequency was set at 2 of inspection visits per year.

9 List of documents stated

9.1 Standards / normative documents:

BRL-K 623	Fittings, couplings and parts for solder and screw joints with copper pipes
BRL-K 639	Fittings with compression ends for use with copper tubes
BRL-K 640	Compression and pressfittings making part of appliances and installations, for connecting copper pipes in drinking water installations
BRL-K 2013	Vulcanized rubber pipe joint seals for potable water and waste water.
DIN 4753, Teil 1	Wasserwärmer und Wasser verwärmungsanlagen für Trink- und Betriebswasser; Anforderungen, Kennzeichnung, Ausrüstung und Prüfung
DVGW, Arbeitsblatt GW 2	DVGW-Arbeitsblatt; Gasversorgung/Wasserversorgung Rhrnets/Installation/Kupferrohe; verbinden von Kupferrohren für die Gas- und Wasser innerhalb von Grundstücken und Gebäuden.
DVGW, Arbeitsblatt W 511	Güte- und Prüfbestimmungen für den Trinkwasserseitigen Korrosionsschtuz von Warwasserbereitern aus Stahl durch Emaillierung
EN-ISO 7887	Water quality, Examination and determination of colour
EN 1982	Copper and copper alloys - Ingots and castings
EN 10025-1	Hot Rolled products of non-alloy structural steels - Part 1; General delivery conditions
EN 10088-1	Steenless steel - Part 1, Lis of stainless steels
EN 10088-2	Stainless steels - Part 2; Technical deliverey condtions for sheet/plate en strip
EN 12163	Copper and copper alloys - Rod for general purposes
EN 12164	Copper and copper alloys - Rod for free machining purposes
EN 12420	Copper and copper alloys - Forgings
Publicatie 92-02	Guideline regarding the quality of materials and chemicals for the drinking water supply

Certificate

KIWA
Partner for progress

Number	12345	Replaces	Appendix 1
Issued		Dated	

Productcertificate

Heat exchangers intended for the indirect heating of drinking water

Based on pre-certification tests as well as periodic inspections by Kiwa the products referred to in this certificate and marked with the Kiwa-mark as indicated under "Marking", manufactured by

Ondernemer

May, on delivery, be relied upon to comply with the Kiwa evaluation guideline BRL-K "Heat exchangers intended for the indirect heating of drinking water".

TOEPASSINGSGEBIED

Kiwa N.V.

ing. B. Meekma
Director
Certification and Inspection

This certificate is issued in accordance with the Kiwa-regulations for Product Certification and consists X pages.
*) This is a translation. Only the Dutch text is legally binding.

Company

Kiwa N.V.
Certification and Inspection
Sir W. Churchill-laan 273
Postbus 70
2280 AB Rijswijk
Telephone +31 (0)70 41 44 400
Telefax +31 (0)70 41 44 420
Internet www.kiwa.nl

Heat exchangers intended for the indirect heating of drinking water

PRODUCTSPECIFICATION

Tekst

APPLICATION AND USE

RECOMMENDATIONS FOR CUSTOMERS

1. Check at the time of delivery whether:
   1.1 the producer has delevery in accordance with the agreement;
   1.2 the product show no visible defects as a result of transport atc.
2. If you should reject a product on the basis of above, please contact:
   2.1 Ondernemer.
   and, if necessary :
   2.2 Kiwa N.V.
3. Consult the producer´s processing guidelines for the proper storage and transport methods.
4. Check whether this certificate is still valid by consulting the Kiwa guide.

Appendix 2

Model IQC scheme or Framework IQC scheme

Inspection subjects	**Inspection aspects**	**Inspection method**	**Inspection frequency**	**Inspection registration**
Raw materials or materials supplied • Incoming goods inspection raw materials • Installation components • Packing materials • Semi manufactured products	Purchase specifications Materials Measurements Appearence Sub-supplier			
Production process, production equipment, plant: • Machining of compoments • Assembly • Welding equipment • Factory equipment • Soldering oven	Temperatures Solderingmaterial Colour deviations Pressures Appearence			

finished-products
• Appearence
• Marking
• Functional aspects
  • Watertightness
  • Double partition				

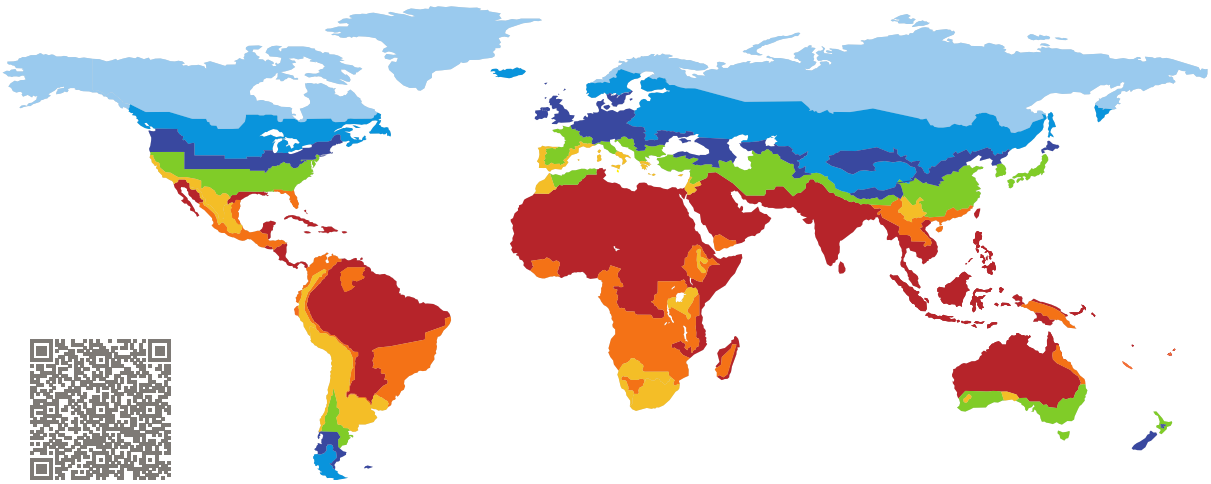
Measuring and testing equipment • Measuring means • Calibration • test equipment				
Logistics • Internal transport • Storage • Packaging • Preservation • Identification or marking of semi-manufactures and end-products				

CERTIFICATE

Certified Passive House Component

Component-ID 1045sr03 valid until 31st December 2019

Passive House Institute
Dr. Wolfgang Feist
64283 Darmstadt
Germany



Category: **Shower Water Heat Recovery**

Manufacturer: **Q-Blue B.V., Emmen, Netherlands**

Product name: **Showersave QB1-21C**

steady-state efficiency
70 %
effective dead time
5 s
design flow rate
8 l/min

This certificate was awarded based on the following criteria:

Tested under standard boundary conditions[1] the system reduces the useful energy demand for shower by

57 % ≥ 30 %

Further properties

Pressure drop tap water at 8 l/min:	0.32 bar
Connection tap water:	1/2" IG
Connection waste water:	DN 50

[1] Balanced flow rates, cold water temperature 10 °C, Temperature at shower head 40 °C, waste water temperature 35 °C, negligible pipe length, shower time 6 min, flow rate 8 l/min

Passive House efficiency class	phE	phD	phC	phB	phA	phA+

all climate zones

phA

CERTIFIED COMPONENT

Passive House Institute

www.passivehouse.com

WRAS
APPROVED PRODUCT
CERTIFICATION MARK

This certifies that

BPD LIMITED

has had the undermentioned product examined, tested and found, when correctly installed, to comply with the requirements of the United Kingdom Water Supply (Water Fittings) Regulations and Scottish Water Byelaws.

"SHOWERSAVE QB1-21C, QB1-16C, QB1-12C, QB1-21, QB1-16, QB1-21D & QB1-12 HEAT EXCHANGERS"

The certificate by itself is not evidence of a valid WRAS Approval. Confirmation of the current status of an approval must be obtained from the WRAS Directory (www.wras.co.uk/directory)

The product so mentioned will be valid until the end of:

June 2022

1706069

Certificate No.

Secretary

Chairman, Product Assessment Group