

**Secretariat for building components
approved for drinking water**

Test method for certain water treatment devices M01

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Preface

This test method is applied for certain water treatment devices (M01) for use in building installations in connection with the approval scheme for building components that come into contact with drinking water (the GDV, *Approved for Drinking Water*, approval scheme).

The test method is defined on the basis of the test method stated in the Danish document "Orientering fra Miljøstyrelsen Nr. 6 2004 VA-godkendelse af vandbehandlingsanlæg til montering i husinstallationer". Moreover, the method is based on the experience gained and the testing of the microbiological test applied in the Danish project "Miljøprojekt nr. 1105/2006 Opstilling af forsøgsprotokol til vurdering af mikrobiel vækst i forbindelse med VA-godkendelse af større vandbehandlingsanlæg".

On the initiative of the Danish Energy Agency, the test method M01 is developed in cooperation with Eurofins, DHI and the Secretariat for building components approved for drinking water.

On 1 April 2013, the GDV scheme, "Approved for drinking water", replaced the VA approval scheme with respect to the mandatory approval of health-related properties for building components that come into contact with drinking water. GDV approvals are issued by the Secretariat for building components approved for drinking water. The requirements for the GDV approval are defined in the Executive Order concerning the issue of approvals for building components that come into contact with drinking water. For further information, see the website of the GDV approval scheme: www.godkendttildrikkevand.dk.

1. Introduction

The test method M01 applies for certain water treatment devices for use in building installations that require an approval as building components that come into contact with drinking water (the GDV approval). The background and statutory authority are described further in chapter 2.

For the purpose of this report, water treatment devices mean plants and appliances intended for a physical and/or chemical treatment of water, e.g. active carbon filters, ion exchangers, membrane filters etc. The test method does not include pure mechanical treatment such as dirt traps and sieves. The test samples subject for testing are described further in chapter 3.

The purpose of the test method is to test the influence of water treatment devices on the quality of the drinking water, either by influence of the unit itself or by changing the composition of the water.

A condition for achieving the GDV approval is that the building components used for drinking water installations must not influence the drinking water in ways that are hazardous to human health. The approval of building components that come into contact with drinking water concerns the health-related properties of the building components, and it must ensure the quality of the drinking water. Thus, as stated in the Danish Executive Order concerning the issue of approvals for building components that come into contact with drinking water, building components must be suited for contact with drinking water so that the drinking water as a minimum meets the quality requirements stated in the Danish Executive Order on water quality and inspection of water supply systems.

The test programme concerns general parameters as indicators of the influence on the water quality, including microbiological parameters and specific substances, which depend on the choice of materials for the parts that come into contact with water. The test programme of relevant testing is determined on the basis of a toxicological assessment as described in chapter 4.

The procedure for testing of water treatment devices with regard to the general parameters and specific substances is described partly in chapter 5, Chemical analyses, and partly in chapter 6, Bacteriological analyses.

The test method (i.e. testing and analyses) must be carried out by an independent laboratory, which has the necessary equipment and personnel to carry out the tests. The laboratory must also be accredited for testing and carrying out microbiological environmental analyses.

2. Legislation

The approval of health-related properties of building components used for drinking water installations in buildings is granted according to the Executive Order concerning the issue of approvals of building components that come into contact with drinking water (the GDV Executive Order), which is issued pursuant to the Building Act.

The requirements for approval in the GDV approval scheme include among others water treatment devices, which are a part of or connected to the fixed water installations in a building and thus connected to the public drinking water supplies, i.e. leading the drinking water from the drinking water supply system to the draining point. Only water treatment devices that are marketed and sold with this purpose are covered by the executive order concerning the GDV approval scheme, and only such water treatment devices can obtain a GDV approval.

The GDV approval of such water treatment devices is based on a health-related assessment of the applied materials that come into contact with drinking water as well as necessary testing of the influence of the device on the drinking water parameters. Which testing to be carried out, depends on a concrete assessment of the individual device, the purpose of the device and the materials that come into contact with drinking water.

This test method M01 can be accepted as a migration test for the included water treatment devices in relation to Annex 1 of the GDV Executive Order, if the test method provides an equivalent level of protection, and the Approvals Secretariat, thus, deems it adequate for the water treatment device seeking the approval.

A condition for installing water treatment devices in building installations is that they are installed in accordance with the Building Code. Simultaneously, it is a condition that water, which is supplied to the drinking water installation, meets the drinking water requirements of the Danish Ministry of the Environment; cf. the Executive Order on water quality and inspection of water supply systems.

When installing water treatment devices for treatment of water centrally in a building, it should be taken into consideration that certain types of treatment devices can change the water quality, which might cause an increase in the corrosion or dissolution of metals in the subsequent part of the drinking water installation. At worst, the quality requirements for these might be exceeded.

Devices designed to treat water from supply plants that are not a part of the general water supply system are not covered by the requirements for approval of the GDV Executive Order.

3. Plants and appliances covered by the approval scheme

The test method covers water treatment devices for building installations used for drinking water, regardless of whether the device is intended for water treatment centrally at the entrance of the property or at the tap. Appliances and equipment used for water treatment after the water has been drawn from the tap or installed only with a detachable hose coupling or a corresponding connection to the fixed piping system for drinking water are not covered by the regulations concerning the GDV approval.

Water treatment device means:

- Units intended for the treatment of drinking water with the purpose of removing either unwanted substances or flavours and odours from the drinking water, which can emerge in the installation because of the residence time of the water in the installation.

Examples of such plants and appliances are softening units, demineralizer, carbon filters, membrane filters, bacteriological filters, ion exchangers etc.

The approval scheme also includes drinking water coolers, which are a part of or attached to the fixed drinking water installation and installed before the draining point.

Plants and appliances producing technical water are not covered by the GDV approval scheme.

The GDV requirement for an examination of the influence on the drinking water quality only covers the parts of the device that come into contact with drinking water. For drinking water coolers without any kind of water treatment than cooling, the only requirement is an assessment of the contamination from the materials.

The test method does not cover appliances and installations that mechanically work e.g. as dirt traps and sieves. Typically, such building components are tested in the same way as fittings, manifolds, valves etc.

An assessment must be made for each water treatment device to determine whether it is most appropriately to test the device according to this test method or whether it should be tested according to the general test requirements stated in Annex 1 of the GDV Executive Order. The assessment must be included in the toxicological assessment of the water treatment device in question.

If doubts whether the water treatment device should be tested according to this test method or the general test requirements stated in Annex 1 of the GDV Executive Order, you or your toxicological adviser are welcome to contact the Secretariat for building components approved for drinking water.

4. Toxicological assessment and test programme

The toxicological assessment is carried out according to section 9(1) of the GDV Executive Order. The scope is further specified in the instruction material for the GDV approval scheme. Special reference can be given to:

- Guidelines for building components approved for use with drinking water
- Application guidelines
- Relevant schedule of materials for the water treatment device in question

The toxicological assessment includes the materials of the parts of the water treatment device that come into contact with drinking water. The assessment includes the general parameters as well as the specific chemical substances and the bacteriological parameters.

Among these, the filter media (resin) and the polymeric materials that may occur are assessed based on the chemical composition of the materials.

The applicant is responsible for having the toxicological assessment of the materials that come into contact with drinking water or have an impact on it carried out.

The toxicological assessment must indicate which parameters require further examination based on the information on the different types of materials in contact with water, which the parts of the device in contact with water are made of.

The assessment is based on the following information:

- Chemical names and/or trade names as well as the manufacturer of the different parts that come into contact with drinking water
- Contact time between the drinking water and the individual parts; usually all parts that come into contact with water for more than 30 minutes should be assessed
- Ratio between the water and the surface of the individual parts compared to the entire device

Based on this information and the toxicological assessment of the device, the toxicological adviser sets up a test programme for examining the migration of relevant substances from the materials applied in the device.

All tests must be carried out by a laboratory accredited for carrying out the analyses in question.

After testing, the toxicological adviser will carry out a toxicological assessment of the test results for the water treatment device.

5. Chemical analyses

In principle, the device is tested as a whole (cf. note 1). All the components that are included in a given installation, e.g. primary filter, UV lamps or buffer tanks, must be included in the overall device for testing. If the manufacturer/supplier specifies special installation packages for correct installation, these must be included in the testing. Moreover, it can be a question of special hoses and/or fittings, which ease the installation, but are not a precondition for correct installation. These must be included in the testing as well.

Note 1: If the water treatment device cannot be tested as a whole for physical/technical reasons, the parts that come into contact with water and the resins are tested separately. Reference is made to EN 12873-1 and the guidance material for the GDV Executive Order, including the schedules of materials, which state the testing of area/volume ratio of 1 cm²/ml. For the resins, which are tested separately, reference is made to EN 12873-3.

5.1. Scope of testing

According to the test programme, water samples drawn after the water treatment device (outlet) are analysed in terms of the relevant general parameters (colour, turbidity, flavour and odour, TOC (VOC + NVOC), phenols and/or bacterial count with reference to Annex 1, table 1 of the GDV Executive Order). Moreover, the samples are analysed in terms of the specific substances determined by the toxicological assessment, including silver (see chapter 4).

5.2. Test water

For the testing of the general water parameters and the specific substances, water without chlorine (<0.2 mg chlorine per litre) conducted through pipes must be applied as test water. The test water must not be influenced by the installations in the laboratory. If necessary, water filtered through a millipore filter are applied for the test.

For the testing of TOC (VOC + NVOC) and certain chemical parameters, distilled water with a TOC content of <0.1 mg per litre can be applied.

The water must not contain metals of any significance, i.e. the test water must meet the requirements for drinking water when entering the building.

5.3. Test temperatures

Appliances and plants for treatment of cold water are placed on the cold water pipe. The water temperature for the migration tests must be 23 °C, +/- 2 °C. If the appliances are designed for placement in rooms with a higher temperature than normal room temperature, the appliance during testing must be placed in a room with this higher temperature.

The appliance must be marked with the maximum allowed installation/operation temperature, which is determined by the manufacturer, and the appliance is tested at the specified temperature.

5.4. Preliminary treatment and handling of test samples

In principle, the water treatment device is tested as a whole and connected to the power and water supply of the laboratory according to the instructions that are delivered by the manufacturer/supplier, including that regeneration occurs as under normal use. The device is set up with a "normal" water consumption for a day (the ion exchangers must be regenerated at least once).

Be aware of the specifications of flow direction, flow rate and capacity.

The following values can be applied for a normal water consumption unless otherwise is specified by the manufacturer/supplier:

- Kitchen taps: 10 litre/minute
- Larger plants: 20 litre/minute

A "normal" water consumption is imitated by tapping water for five minutes every hour of the day.

During this period, it must be checked in order to see that everything works normally according to the manual, including the function of the non-return valve as well as alarms and closing devices when there is a need for replacing the cartridge/filters.

5.5. Migration

After the preliminary treatment, the water is replaced so that the device is filled with fresh test water. The device stands connected for 24 hours (day 1) without any tapping of water.

Subsequently, test water equivalent to at least one bed volume (amount of water in the appliance) is tapped, and the equipment stands for another 24 hours (day 2) without any tapping of water (cf. note 2).

Subsequently, test water equivalent to at least one bed volume is tapped, and the equipment stands for another 24 hours (day 3) without any tapping of water (cf. note 2).

At this point, water is tapped for the chemical analyses. A maximum of one bed volume of water can be tapped. If this amount of water is not sufficient in order to carry out all the chemical analyses, the test must be carried out on several devices.

The acceptance requirements must be met for analyses carried out on test water from day 3 (third extraction). Conditional to the results of the analyses, the testing can be extended by several days if it is assessed that the acceptance requirements can be met by later extractions within a reasonable period of time (up to and including the ninth extraction). This only applies to measurements of turbidity, flavour and odour as well as TOC.

Note 2: For the ion exchangers, it should be ensured that the device regenerates before the start of each period of standing. The same residence time of the water is applied, i.e. the maximum amount of residence time before the next change of water/regeneration. The maximum residence time depends on the individual device. The water sample is drawn for analysis after the maximum residence time in the device and immediately before the next regeneration, yet a maximum of 24 hours.

6. Bacteriological analyses

In connection with the bacteriological analyses, the device must be tested as a whole. All components included in the installation, e.g. primary filter, UV lamps or buffer tanks, must be included in the overall device for testing. It is not sufficient that the individual components are approved separately. It is necessary to test the device as a complete unit. If the manufacturer/supplier specifies special installation packages for correct installation, these must be included in the testing. Moreover, it can be a question of special hoses and/or fittings, which ease the installation, but are not a precondition for correct installation. These must be included in the testing as well.

6.1. Test conditions

The following test conditions must be available during the entire test period:

6.1.1. Water temperature (cold water)

The temperature of the test installation must be between 5 °C and 20 °C, without any temperature adjustment. Thus, the device should be mounted on the cold water supply.

6.1.2. Room temperature

A room temperature between 15 °C and 25 °C should be ensured in the room, where the device is to be installed. It should also be ensured that the device is not placed in direct solar radiation.

6.1.3. Water pressure

The device must be connected to a tap with an ordinary water pressure (more than 3.5 bar).

6.1.4. Amount of water

It should be ensured that the device functions at the flow rate specified by the supplier. However, a variation of ± 10 % of the specified flow rate is acceptable.

6.2. Water quality of the test installation

Tap water with chlorine must not be applied.

The tap water in the test installation must meet the general requirements of water quality stated in the Executive Order on water quality and inspection of water supply systems for the time being in force.

6.3. Installation

The device must be installed in a test setup that is connected to the normal distribution system of the laboratory/test site. The device is installed according to the instructions of the manufacturer/supplier.

The test site does not have to be physically connected to the laboratory provided that the test sampling, flushing and analyses can be carried out as prescribed in the test method

and kept under surveillance by the person responsible from the laboratory. All test samples and analyses must be carried out by an accredited laboratory.

6.3.1. Test setup

The test setup consists of:

- Draining point
- Non-return valve
- Quick-acting coupling
- Connecting pipes (possibly with a sampling tap for drawing of water samples before the device)
- Coupling
- Ball valve
- Water treatment device
- Ball valve or drain tap mounted on the device

It is important that all the building components used for the test setup together with the water treatment device are approved for drinking water (GDV).

The non-return valve, which should be installed at the draining point, must ensure that the tap water installation is not contaminated rearwards of the test setup.

Moreover, a flexible and transparent hose with a length of approximately two meters is applied in connection with the grafting of the water. The hose should be able to withstand boiling for a minimum of 15 minutes.

6.3.2. Initial mechanical testing

The device should be setup for use at a normal water consumption. Moreover, the device should be tested prior to the microbiological testing to ensure that it is functional and operates according to the instructions of the manufacturer/supplier.

Initially, the function of the device should be tested for two successive days by tapping water for two minutes every hour in the course of a workday. A total of minimum 6 X 2 minutes should be tapped each day during the two days of testing.

If the equipment is installed with devices for backwashing of filter pulp etc., it should be ensured that these operate at optimum level and according to the instructions of the manufacturer/supplier.

6.4. Practical implementation

For assessing the microbial growth in the water treatment device, it is necessary to test the device for some time in that potential problems of growth in the device only build up gradually. Therefore, the microbial growth can only be detected gradually by means of the microbiological measurements in the tapped water.

Moreover, it is necessary to challenge the systems by grafting with test water that has an increased microbiological load in that Danish tap water has a very low concentration of microorganisms. Therefore, growth-related problems in the device can only be detected

after a very long use. If tap water with a normal microbiological load is applied for the testing, it will result in an inappropriately extensive test period.

6.4.1. Test period

The test period is set to six weeks with two graftings to challenge the system. The first grafting is carried out immediately after the initial mechanical testing of the device, and the second grafting is carried out after two weeks of testing.

Week	Grafting (section 6.4.3 & 6.6)	Flushing (Section 6.4.2)	Sampling (Section 6.4.4 & 6.7)
0		2 days with 6 X 2 minutes.	
1	Carried out on Monday, week 1.	<p>After grafting, the equipment stands with the test water for four hours before being flushed.</p> <p>Subsequently, samples are drawn for analysis.</p> <p>The equipment is flushed once more during the day.</p> <p>During the following four weekdays, the equipment is flushed six times for two minutes to simulate the daily consumption.</p> <p>The equipment is not flushed during weekends (=weekend standing).</p>	<p>After the grafting and four hours of standing, samples are drawn for microbiological analysis.</p> <p>During the other four weekdays, samples are drawn for microbiological analysis after the first flushing.</p> <p>Five samples are collected during week 1.</p>
2		On all weekdays, the equipment is flushed six times for two minutes. The equipment is not flushed during weekends (=weekend standing).	<p>Samples are collected after the first flushing on Monday and Thursday.</p> <p>Two samples are collected during week 2.</p>
3	Carried out on Monday, week 3.	<p>After grafting, the equipment stands with the test water for four hours before being flushed.</p> <p>Subsequently, samples are drawn for analysis.</p> <p>The equipment is flushed once more during the day.</p> <p>During the following four weekdays, the equipment is flushed six times for two minutes to simulate the daily consumption.</p> <p>The equipment is not flushed during weekends (=weekend standing).</p>	<p>After the grafting and four hours of standing, samples are drawn for microbiological analysis.</p> <p>Moreover, microbiological samples are collected after the first flushing on Thursday.</p> <p>Two samples are collected during week 3.</p>
4, 5 & 6		On all weekdays, the equipment is flushed six times for two minutes. The equipment is not flushed during weekends (=weekend standing).	<p>Samples are collected after the first flushing on Monday and Thursday.</p> <p>Two samples are collected during week 4, 5 & 6.</p>

Table 1 - Schematic of the test period.

6.4.2. Flushing

During the test period, a flushing of the equipment must be carried out to simulate a normal consumption of the draining point. Daily, the system is flushed six times for two minutes with an interval of approximately one hour so that it practically can be carried out in the course of a working day. During weekends, the flushing is not carried out in order to simulate prolonged standing.

Flushing occurs by fully opening the tap for two minutes. In the case of equipment with a reservoir/buffer tank, the water is tapped equally for two minutes by fully opening the tap.

Prior to all tests, a two-minute flushing of the equipment is carried out as well.

During weekends, the device stands without being flushed, and the consumption is simulated in terms of prolonged standing. This is defined as a weekend standing.

6.4.3. Grafting

The two graftings are carried out on Mondays during week one and three.

After the grafting, the equipment stands with the test water for four hours without any consumption or flushing.

6.4.4. Test sampling

Two samples (sample A and B) must be collected during all tests. The samples must be collected from the tap water going into the system (inlet) as well as the water after the water treatment device (outlet). The samples from the inlet must be collected as close to the equipment as possible and the samples from the outlet must be collected directly from the equipment, if possible. If a drain tap is not built-in in the equipment, one must be established in the test setup.

During the collection of the samples from the inlet, the system must be disconnected for a brief period, see section 6.7 for further description of test sampling.

In the described test method, samples are collected on a daily basis during week one and on Mondays and Thursdays during the following weeks. To make the sampling schedule more flexible, it can be permissible to change the current days of sampling to other weekdays during week two, three, four, five and six. However, the number of samples per week must be complied with.

6.4.5. Analyses

The water samples are analysed in the following way:

Cold-water device: 22 °C and 37 °C aerobic bacterial count (DS/EN ISO 6222).

6.4.6. Logbook

A logbook is kept of the running-in as well as the graftings and flushing operations.

6.5. Test water

Test water that reflects the microbiological flora in the tap water is applied. The test water is produced by concentrating the microorganisms that are naturally found in the tap water in the test installation. Moreover, the device is grafted immediately after the concentration of the bacteria so that the bacteria are assumed to be in the same physiological conditions as they naturally occur in the tap water. Thereby, it is ensured that the bacteria have the same growth rate as they naturally have in the tap water.

6.5.1. Production of test water

The test water is produced by membrane filtering an amount of water from a cold-water tap equivalent to 10 times the bed volume of the device (a minimum of five litres, though). A normal membrane filtration unit or a device developed in connection with the sampling of large amounts of water to determine the legionella bacterium in drinking water should be applied. A membrane filter with a pore size of 0.45 μm should be applied.

After the membrane filtration, the microorganisms are suspended in 200 ml of tap water. Thus, a concentration occurs so that the total number of microorganisms present in the filtered volume (10 x the bed volume) is now suspended in the 200 ml of tap water. This suspension is now referred to as the test water.

When using this technique, the contents of microorganisms, which are introduced in the overall system of the device, will be 10 times larger than the level of microorganisms in the tap water.

The suspension occurs by transferring the filter to a stomacher bag with 200 ml of cold tap water. Then, the bag and its content are being stomached for one minute, where after the suspension is transferred to a sterile bottle. The test water is now ready for the grafting of the device. The test water should be kept cool for no more than two hours before the grafting. Moreover, the test water should be kept in a dark place if the suspension is not to be applied immediately.

Immediately before the grafting, 1 ml of test water is drawn to determine the bacterial count at 22 °C and 37 °C, see section 6.8.

6.6. Grafting of the device

The grafting occurs by connecting the flexible and transparent hose between the tap and the device. The hose is connected to the water supply system by means of the quick-acting coupling and is half filled with tap water. Subsequently, the test water is poured into the hose from the end where the connection to the device is placed. When the entire amount of test water is poured into the hose, the rest of the volume of the hose is filled with tap water by carefully opening the tap until the hose is just full. Then, the water is turned off. The non-return valve is mounted on the connection tap to ensure that the test water cannot enter the water supply system of the test laboratory.

It is important that the above work is carried out with great caution and calmness to avoid a mixing of the test water and the tap water, whereby the volume that goes into the device for grafting is increased. This is in particular critical for devices with a very small bed volume. It is also important that there are no air pockets in the hose in that this may influence the function of the water treatment device as well as the amount of water in the system after the grafting.

After this, the hose is connected to the water treatment device, and a pressure is slowly added to the system. From the tapping side of the device, an amount of water equivalent to the bed volume of the system is now tapped, i.e. a minimum of 200 ml equivalent to the amount of test water. Hereby, the test water is led into the device where it must stand for four hours.

6.7. Test sampling

In principle, test sampling must comply with DS 2250 with the following specifications:

- For the analyses of cold water, samples of approximately 200 ml per sample are collected.
- Two samples (sample A and sample B) are collected for each test sample and each sampling location.
- Taps, hose connectors etc. are cleaned with 70 % ethanol before the collection of samples.
- The samples must be analysed within four hours after sampling and must be kept in a dark and cool place (maximum 5 °C).

Table 2 shows the sampling schedule for the test period.

	Sampling time	Test water	Samples inlet	Samples outlet
Week 1	Day of grafting, Monday	Test water after grafting	After four hours of standing and flushing	After four hours of standing and flushing
	Tuesday, Wednesday, Thursday and Friday		After one flushing	After one flushing
Week 2	Monday and Thursday		After one flushing	After one flushing
Week 3	Day of grafting, Monday	Test water after grafting	After four hours of standing and flushing	After four hours of standing and flushing
	Thursday		After one flushing	After one flushing
Week 4	Monday and Thursday		After one flushing	After one flushing
Week 5	Monday and Thursday		After one flushing	After one flushing
Week 6	Monday and Thursday		After one flushing	After one flushing

Table 2 - Sampling schedule for the collection of water samples before (inlet) and after (outlet) the water treatment device during the test period.

6.7.1. Sampling on the day of grafting

After the production of test water, a sample is collected to determine the bacterial count at the outlet of the grafting suspension. The sample is analysed as described in section 6.8.

After the grafting of the device and the four hours of standing, two samples are collected from the inlet of the device (inlet A and inlet B). These samples are collected immediately before the device by disconnecting at the quick-action coupling before the device. The device is reconnected and duplicate samples are collected at the tap after the device (outlet A and outlet B). All samples are collected after the system has been flushed (flushing for two minutes).

6.7.2. Test sampling during testing

The samples are collected after the first flushing in the morning. The samples are collected on days where grafting of the device does not occur. Duplicate samples are collected from both inlet and outlet at every test sampling (sample A and sample B).

6.8. Analyses

6.8.1. Test water

The test water is analysed immediately before the grafting of the device is carried out. The cold test water is analysed according to DS/EN ISO 6222.

6.8.2. Cold water samples

Samples of water collected during testing of devices for cold water must be analysed for aerobic bacterial count in yeast extract agar by using the pour plate method as well as by incubating at 22 °C for three days and 37 °C for two days according to DS/EN ISO 6222.

6.9. Acceptance requirements for cold water devices

- The aerobic bacterial count at 22 °C and 37 °C (DS/EN ISO 6222) measured in water drawn immediately after the water treatment device must be less than five times the level of aerobic bacteria in the water from the distribution system measured at the inlet of the water treatment device. However, a value of 10 times the content of the inlet water measured immediately after grafting is acceptable.
- The bacterial count at 37 °C must not increase systematically or gradually over the test period.
- There must be no selection of the bacterial count at 22 °C and 37 °C towards a pure culture at the end of the test period. This requirement is assessed on the basis of a characterization of the bacterial flora, and if necessary an identification of the dominant flora in the water that is led into the device as well as the processed water. This takes place during week 6.

Table 3 shows the requirements, accept criteria and calculation methods for microbiological testing of water treatment devices.

	Requirements	Calculation method	Accept criteria
Cold water device	The aerobic bacterial count of the processed water is less than five times the level of aerobic bacteria in the inlet water. A value of 10 times the content of the inlet water measured immediately after both graftings is acceptable.	<p>Ratio: outlet/inlet =</p> <p>The average of (A outlet + B outlet)</p> <p>divided by</p> <p>the average of (A inlet + B inlet)</p> <p>This is calculated for both the aerobic bacterial count at 22 °C and 37 °C</p>	<p>Week 1: After grafting, day 1: Ratio: outlet/inlet <10 Other days: Ratio: outlet/inlet <5</p> <p>Week 2: Ratio: outlet/inlet <5</p> <p>Week 3 After grafting, day 1: Ratio: outlet/inlet <10 Thursday: Ratio: outlet/inlet <5</p> <p>Week 4, 5 & 6: Ratio: outlet/inlet <5</p>
	Bacterial count determined at 37 °C must not increase systematically or gradually during the test period.	<p>Ratio: 37/22 =</p> <p>The average of (A outlet 37 + B outlet 37)</p> <p>divided by</p> <p>the average of (A outlet 22 + B outlet 22)</p>	<p>The entire test period: Ratio: 37/22 <1,5</p>

Table 3 – Requirements, accept criteria and calculation methods for microbiological testing of water treatment device.

6.10. Assessment of microbiological flora

An assessment of the microbiological flora should be made in connection with the samples collected during week 6. A macroscopic and a microscopic examination of the emerged bacterial flora should be carried out in connection with the water samples collected at the inlet as well as after the water treatment device (outlet).

The composition of the bacterial flora must be described by extracting a minimum of five representative colonies from water samples collected at the inlet as well as the outlet during week 6.

This assessment of the bacterial flora must be accompanied by a conclusion to which the requirement is that a shifting tendency of the bacterial flora before or after the water treatment must not be detected. Moreover, there should be no sign that the flora, which grows from the samples after the water treatment, is a pure culture.