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Vattenförsörjning – Rekommendationer för att förebygga legionellatillväxt i tappvatteninstallationer i byggnader

Recommendations for prevention of Legionella growth in installations inside buildings conveying water for human consumption

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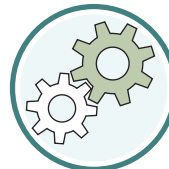
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TECHNICAL REPORT

CEN/TR 16355

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

June 2012

ICS 91.140.60

English Version

Recommendations for prevention of Legionella growth in installations inside buildings conveying water for human consumption

Recommandations de prévention du développement des légionnelles dans les installations de distribution d'eau destinée à la consommation humaine à l'intérieur des bâtiments

Empfehlungen zur Verhinderung des Legionellenwachstums in Trinkwasser-Installationen

This Technical Report was approved by CEN on 25 March 2012. It has been drawn up by the Technical Committee CEN/TC 164.

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Foreword

This document (CEN/TR 16355:2012) has been prepared by Technical Committee CEN/TC 164 "Water Supply", the secretariat of which is held by AFNOR.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This Technical Report should be read in conjunction with national regulations.

The status of this document as CEN Technical Report has been chosen because most of its content is not completely in line with practice and regulations in each Member State. This document gives recommendations for good practice concerning the prevention of Legionella growth in drinking water installations but existing national regulations remain in force.

In this report, one item of the technical concept to prevent proliferation of Legionella in drinking water installations is to keep the water temperature out of the range where Legionella can grow and to make the provision for thermal disinfection.

1 Scope

This Technical Report provides basic information about the conditions for Legionella growth in drinking water installations in accordance with EN 806 series up to draw-off points and gives recommendations for preventing the growth of Legionella in these installations.

NOTE 1 For further information, cf. Annex A.

NOTE 2 National documents regarding the prevention of Legionella growth are shown in Annex B.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 806-1:2000, *Specifications for installations inside buildings conveying water for human consumption — Part 1: General*

3 Terms and definitions

For the purposes of this document, the terms and definitions in EN 806-1:2000 and the following apply.

3.1

redundant pipe (dead end)

part of a drinking water installation which is permanently not in use but full of water

3.2

cut-off end

remaining part of a redundant pipe after being cut off

4 General recommendations

4.1 Conditions for Legionella growth

The following conditions encourage legionella growth:

- water temperature between 25 °C and 50 °C;
- stagnation of the water;
- nutrients, biofilm and sediment within the installation including water heaters, etc.

4.2 Temperature

4.2.1 General

To restrict the growth of Legionella bacteria the water temperature shall be in a range that the bacteria will not grow or have minimum growth, wherever possible.

4.2.2 Cold water temperature

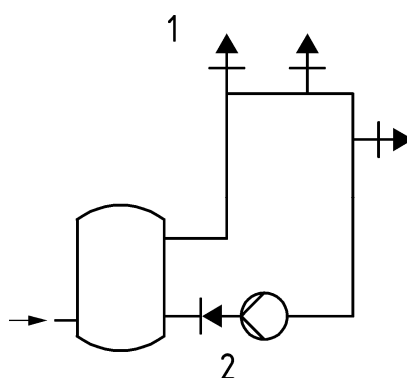
The cold water temperature in the installation should be kept below or equal to 25 °C.

NOTE In some countries or in the summer season it is possible that temperature of the water in the installation will be above 25 °C and in these cases other solutions should be found to restrict Legionella growth (e.g. flushing, disinfection). External influences on temperatures are described in 4.2.4.

4.2.3 Hot water temperature

For a drinking water installation without hot water circulation (see Annex C, Figures C.1 and C.3), the water should be capable of reaching a temperature of minimum 55 °C at any point during normal use.

For a drinking water installation with circulation of hot water, the water in any circulation loop should be minimum of 55 °C (see Figure 1). Within 30 s after fully opening a draw off fitting the water temperature should not be less than 60 °C unless otherwise specified by local or national regulations (see EN 806-2).



Key

- 1 After 30 s not less than 60 °C
- 2 Not less than 55 °C

Figure 1 — Drinking water installation with circulation of hot water

High hot water temperatures will increase the risk of scalding. Appropriate measures should be taken to reduce this risk, e.g. notices by hot water draw-offs or mechanical devices (see Table 1).

Table 1 — Guide values for the risk of scalding in relation to hot water temperature and time of exposure

| Hot water temperature | 70 °C | 60 °C | 50 °C |
|-----------------------|-------|-------|-------|
| Time of exposure for | | | |
| – children | < 1 s | 3 s | 120 s |
| – adults | 1 s | 7 s | 510 s |

4.2.4 External influences on temperature

Ambient conditions can cause problems in maintaining the cold and hot water temperature limits (conduction, convection and radiation).

To minimise the cooling of the water in a hot water circulation system (pipes with continuous flow), it should be insulated (see Directive 2002/91/EC [8]).

To minimise the warming-up of the water in cold water pipes and the slow cooling in hot water pipes other than being part of a circulation system (e.g. dead-legs, floor service pipes, rising pipes), these pipes should not be insulated.

NOTE It should be taken into account that all measures of insulation of cold water pipes have only a delaying effect on the warming up of the cold water but have no influence on the end temperature after warming-up.

Cold water pipes and dead-legs of hot water pipes other than being part of a circulation system should not be placed in rooms, places or constructions with a temperature above 25 °C and should be kept away from heat radiation sources or places where the temperature at certain times can be higher than 25 °C (e.g. below a glass dome, in technical rooms and cabinets/metering boxes with heating sources). In case of floor heating systems potable water pipes should not be placed in ceilings or in floors unless adequately insulated.

Further recommendations for dealing with external influences on temperature are given in Annex D.

4.2.5 Thermal disinfection

Hot water systems should have the facility to enable the temperature at any point of the system to be raised to 70 °C for disinfections purposes (see EN 806-2).

NOTE There are several methods for disinfection of a drinking water installation. In this Technical Report, only the thermal disinfection is mentioned.

4.3 Stagnation

The drinking water installation should be designed and installed in a way that stagnation of the water under normal use is avoided.

In order to avoid long periods of stagnation the water in every part of the drinking water installation should be used or flushed at least weekly.

Cut-off ends should be as short as possible, but should be no longer than two times of the internal diameter of the pipe.

Redundant pipes (dead-ends) should be removed or disconnected, and converted to a cut off end.

Infrequently used pipes should be isolated by a shut-off device or flushed regularly. The length of pipe between the branch and the shut-off device in the infrequently used pipe should be as short as possible, but not greater than 150 mm.

NOTE It is understood that in stagnant water Legionella can grow in volumes smaller than 3 l. Therefore, it is recommended to keep the volume of water contained in the pipework between the circulation system and the draw-off tap as small as possible. Cf. national or local requirements.

4.4 Biofilm and sediments

4.4.1 Biofilm

Any surface in natural aquatic environments will acquire a biofilm. Biofilm formation generally follows the same sequence of steps wherever it occurs: formation of a conditioning layer of organic molecules, initial attachment of bacteria, growth of adhered bacteria resulting in the formation of microcolonies and subsequently a mature biofilm.

Microorganisms like protozoa often become incorporated within the biofilm and during a certain period invertebrate larvae and algal spores can settle and grow. Bacterial extracellular polymeric substances (EPS) constitute the biofilm matrix in which also the organisms like Legionella are embedded.

For prevention of Legionella growth one should take measurements to minimise the formation of biofilm in drinking water installations. The potential of biofilm formation is influenced by several aspects, e.g. by temperature, water treatment, the materials of products in contact with drinking water, the volume flow and stagnation times. The biofilm potential of materials is therefore an important aspect to monitor ('unified biofilm approach').

NOTE At this point in time the research on biofilm formation is ongoing in order to find out how to define the extent of biofilm growth and when which actions are to be taken to minimise the growth.

4.4.2 Sediment

Sediment can support the growth of Legionella bacteria and it should be removed on a regular basis from e.g. storage systems, water heaters, non-flown through expansion vessels (e.g. once a year). Sediment in pipe work should be avoided by close attention to design parameters in EN 806-2 and EN 806-3.

5 Types of hot water installation — Legionella prevention recommendations

When using thermostatic mixing valves, they should be in accordance with EN 1111 or EN 1287.

When using an inline hot water tempering valve, it should be in accordance with EN 15092.

NOTE Types of hot water installation and relevant recommendations for Legionella prevention are given in Table 2. All symbols used for the figures in Annex C are in accordance with EN 806-1.