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Protection against pollution of potable water in installations and general requirements of devices to prevent pollution backflow

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EN 1717

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English version

Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow

Protection contre la pollution de l'eau potable dans les réseaux intérieurs et exigences générales des dispositifs de protection contre la pollution par retour

Schutz des Trinkwassers vor Verunreinigungen in Trinkwasser-Installationen und allgemeine Anforderungen an Sicherungseinrichtungen zur Verhütung von Trinkwasserverunreinigungen durch Rückfließen

This European Standard was approved by CEN on 20 January 2000.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 164, "Water supply", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by month of May 2001, and conflicting national standards shall be withdrawn at the latest by May 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Annex A of this European Standard is normative, the annexes B and C are informative.

Introduction

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the products covered by this standard :

1) this standard provides no information as to whether the products may be used without restriction in any of the Member state of the EU or EFTA ;

2) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of these products remain in force.

1 Scope

This standard deals with the means to be used to prevent the pollution of potable water inside premises and the general requirements of protection devices to avoid pollution by backflow.

The hygiene protection specifications of this standard are applicable to all the standards for systems or appliances connected to the private supply system for water intended for human consumption.

This standard specifies the minimum requirements for product standards of protection units.

The product standards are used to detail product specifications. In the absence of a product standard, this standard is used as a reference in order to draw up a specification for the products out of new development.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

prEN 806, *Specification for installations inside buildings conveying water for human consumption*.

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1
air break to drain
the unobstructed distance between the low point of overflow, discharge or drain of a device or installation, leading from a water apparatus, and the top point of the device which collects this water

3.2
air gap
the physical break between the lowest level of the water inlet and the maximum fault level or critical level of an appliance or installation, a feed pipe, or an air inlet orifice incorporated into a hydraulic circuit

3.3
air inlet
an orifice designed to admit air from the atmosphere into a hydraulic circuit

3.4
appliance, equipment
a device in which the potable water is used and/or is modified e.g. water heater, chemical dosing unit, coffee-machine, WC-pan

3.5
backflow
movement of the fluid from downstream to upstream within an installation

3.6
backflow protection device
a device which is intended to prevent contamination of potable water by backflow

3.7
contamination
result of rendering impure by contact or mixture, to corrupt, defile, pollute, sully, taint or infect

3.8
disconnection
break in a hydraulic circuit creating an atmospheric area between two elements, one carrying or containing potable water (upstream) and another carrying or containing another fluid (downstream)

3.9
domestic use
any use related to residential or similar dwellings

— normal use for dwellings and homes, as well as hotels, schools and offices, communal residences, etc. (for example kitchen sink, wash and handbasin, bath, shower, WC, production of hot water for sanitary purposes, domestic washing machine and dishwasher, bidet, watering of garden) ;

— special uses relating to similar consumers where products are used with low concentrations and presenting no danger for human health (for example authorised water conditioning, air conditioning) ;

— in industrial and commercial premises "Domestic use" is limited to water used for those applications/appliances described under normal use in dwelling and homes (for example excludes water used for process, fire fighting, central heating or irrigation systems).

3.10
downstream
the side to which fluid flows under normal conditions

3.11
potable water system
water system located downstream of the delivery point specified by the water supply authorities or regulations

3.12
family of protection
general identification of a backflow protection device principle

3.13
fluid
all substances which can be deformed by small forces. Fluids are divided into liquids and gases

3.14
liquid levels

3.14.1
critical level
physical or piezometric level of the liquid reached in any part of the appliance 2 s after closing the water inlet, starting from maximum fault level

3.14.2
maximum operational level
in an open system, this is the maximum level of the liquid. In a pressurized system, this is the maximum piezometric height possible

3.14.3
maximum fault level
the highest physical or piezometric level of the liquid reached in any part of the appliance when it operates continuously under fault conditions as described in product standard

3.15
LD_{50}
the quantities of substances or mixture which, given on one intake through oral and parental path, bring about within 15 days (the required time to take into account potential delayed effect) the death of 50 out of 100 treated animals

3.16
non domestic use
all uses related to a professional activity within industry, trade, agriculture, health establishments, etc. All uses related to private and public swimming pools and public baths

3.17
overflow
a means for discharging naturally excess fluid from an appliance when it has reached a specified level

3.18
point of use
the point where water is drawn by the user either directly or by connecting an apparatus

3.19
pollution of potable water
any degradation of the quality of potable water

3.20
protection point
location in a hydraulic circuit where a protection unit is installed

3.21
protection unit
a device or a device in combination with other hydraulic components which constitutes the protection against backflow

3.22
type of protection
an identified operating principle applied to a protection device belonging to a given family

3.23
upstream
the side from which fluid flows under normal conditions

4 Pollution of potable water : general observations

Water installations, described in prEN 806, due to their design or construction, shall not be liable to generate pollution of public or private potable water supply system by residual matters, harmful water or any undesirable substance.

4.1 Backflow of used water

The quality of the water distributed can be impaired when used water flows back into the potable water system.

4.2 Connection

When there is a mixing of public potable water and any other water supply, the public water supply shall be protected by an unrestricted air gap.

The non-potable or suspicious water distribution network shall be separated and the whole installation marked (for example different coloured pipes). The non-potable or suspicious water taps shall have markings with clearly visible warning signs.

4.3 External influences

Potable water cisterns, pipes and protection units shall be protected from external pollution.

No other fluid shall be conveyed in a potable water installation (gas, compressed air, ventilation conduct, vapour, chemicals, water used in heating equipment, recycled water, drainage or run-off water, waste water, etc.) than potable water.

If it is considered possible that under the prescribed operation any contaminant could enter through the protection device (for example air gap, air inlet) into the potable water installation, corresponding protection measures are to be provided.

4.4 Materials

The materials used in water installations, including the materials of protection units in contact with potable water, shall satisfy the European standards and national acceptance criteria and / or national restrictions for use currently in force in EU and EFTA.

They shall be compatible with each other, with the water supplied, and with the fluids or substances that can come into contact with them.

4.5 Stagnation

A stagnation of water in the systems can result in impairment of the water quality due to a significant concentration of dissolved substances or substances in suspension or to bacterial growth.

The level of impairment depends on the materials used, the water quality, the temperature (for example pipes in boiler rooms) and the duration of stagnation.

For reasons of hygiene, it is necessary that pipe systems are flushed after periods of stagnation.

Pipes which are only used rarely or which are used for short periods shall be shut off after use and flushed before being brought back into service. Pipes which are no longer in use shall be disconnected from the potable water system.

4.6 Harm caused by inadequate or improper maintenance

Any insufficient or improper maintenance of the potable water installation including backflow protection devices can result in an impaired water quality. Regular maintenance of the protection units shall be carried out. Their proper functioning shall be checked regularly in conformity with national or local provisions.

5 Analysis method of the risks at the point of use and choice of protection

5.1 General remarks

A backflow of fluid in a potable water supply system can occur by :

a) backsiphonage : by partial vacuum (drop in pressure) in the potable water supply system (due for example to the operation of a valve, the bursting of a pipe, the operation of a booster pump, excessive water demands in a part of the system, water taken for emergency use from a fire hydrant) ;

b) pressure backflow : by a back pressure originating in a non-potable system in which the pressure exceeds the pressure in the potable water system.

Two conditions must exist in order to give rise to backflow :

a) possible contact by a physical mixing between the potable water and another fluid ;

b) pressure difference at a given point of the installation reversing the normal direction of flow.

If a common protection to several hydraulic circuits present within a potable water system is sought, it is necessary to consider the technical parameter presenting the highest risk value in the most unfavourable fluid category to all the associated circuits.

The analysis of an existing or projected installation provides information about its characteristics and the fluid categories. The result of this analysis is fixed by a cross in the appropriate field of the installation matrix (see Table 1).

For specific installations presenting an exceptional risk, additional technical parameters may be considered.

In an uncontrolled situation the worst risk shall be assumed.

5.2 Determination of fluid categories which are or could be in contact with potable water

In normal use fluids which are or can be in contact with potable water are classified in five categories as defined below.

In cases where insignificant concentrations or substantial amounts of substances are present it may be appropriate to redefine the safety measurement.

5.2.1 Category 1

Water to be used for human consumption coming directly from a potable water distribution system.

5.2.2 Category 2

Fluid presenting no human health hazard.

Fluid recognised as being fit for human consumption, including water taken from a potable water distribution system, which can have undergone a change in taste, odour, colour or a temperature change (heating or cooling).

5.2.3 Category 3

Fluid representing some human health hazard due to the presence of one or more harmful substances [1)].

5.2.4 Category 4

Fluid presenting a human health hazard due to the presence of one or more toxic or very toxic substances[1)] or one or more radioactive, mutagenic or carcinogenic substances.

5.2.5 Category 5

Fluid presenting a human health hazard due to the presence of microbiological or viral elements.

[1)] The border between category 3 and category 4 is in principle LD 50 = 200 mg/kg body weight in reference to the EU Directive 93/21 EEC dated April 27th, 1993.