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Water supply – Requirements for systems and components for the storage of water

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ICS 13.060.20

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English version

**Water supply – Requirements for systems and
components for the storage of water**

Alimentation en eau – Prescriptions pour les
systèmes et les composants pour le stockage
de l'eau

Wasserversorgung – Anforderungen an
Systeme und Bestandteile der
Wasserspeicherung

This European Standard was approved by CEN on 24 July 1998.

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CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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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of an identical text or by endorsement, at the latest by March 1999, and conflicting national standards shall be withdrawn at the latest by March 1999.

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.

Introduction

In specifying the requirements of this standard, due regard has been taken of the importance of a reliable and safe supply of water for human consumption as well as for the purpose of trade, industry, agriculture and fire fighting.

The widely varying water supply legislative requirements, populations, social and climatic conditions across Europe have also been taken into account.

1 Scope

This standard specifies and gives guidance on :

- general requirements for storage of water outside consumers' buildings, including service reservoirs for potable water and reservoirs containing water not for human consumption at intake works or within treatment works, excluding those that are part of the treatment process ;
- design ;
- general requirements for product standards ;
- requirements for checks, testing and commissioning ;
- operational requirements ;
- requirements for rehabilitation and repair.

The requirements of this standard are applicable to :

- the design and construction of new reservoirs ;
- the extension and modification of existing reservoirs ;
- significant rehabilitation of existing reservoirs.

NOTE 1: It is not intended that existing reservoirs are to be altered to comply with this standard, provided that there are no significant detrimental effects on water quality.

NOTE 2: This standard does not apply to reservoirs formed by the building of dams or the use of lakes for water storage purposes.

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.

prEN 805:1996 Water supply - Requirements for systems and components outside buildings

3 Definitions

For the purposes of this standard, the following definitions apply :

3.1 capacity

The total volume of the compartment(s) which can be used for the operation of a reservoir.

3.2 compartment

Self-contained part of a reservoir which has separate inlet, outlet, overflow and washout arrangements, and can be operated independently from other compartments of the same reservoir (see figures 1 and 2).

3.3 control building

Self-contained part of a reservoir used to accommodate the main valves, pumps, controls and monitoring equipment and which can provide the means of access to the water compartment(s).

3.4 designer

The person responsible for establishing, with the purchaser or water company, the basic criteria to be used for the design, construction, commissioning and operation of the reservoir.

3.5 elevated reservoir

A reservoir constructed with the compartment(s) at ground level, but at an elevation sufficient to provide water by gravity to the supply area.

3.6 rehabilitation

Work necessary to upgrade or improve a reservoir to comply with this standard.

3.7 repair

Work necessary to remedy a defect and restore a reservoir to satisfactory operation.

3.8 reservoir

Storage facility for water.

3.9 service reservoir

Covered storage facility for potable water which includes water compartment(s), control building, operation equipment and access arrangements, providing reserve supplies and pressure stability, and balancing demand fluctuations (see figure 1).

3.10 water demand

Estimated quantity of water required per unit of time.

3.11 watertightness

The characteristic quality of the structure that prevents the passage of water through the structure in excess of any permitted quantity.

4 Application of standards and regulations

In all aspects, including health and safety, the national standards, transposing European standards as available shall apply as well as the regulations valid at the place where the system is being constructed and/or operated.

5 General requirements

5.1 General

This standard is written principally for application to service reservoirs. In the case of other reservoirs the designer or operator will determine which parts of the standard shall apply e.g. disinfection may not be required for reservoirs containing water not for human consumption.

5.1.1 Functions

(See also A.1).

The purpose of service reservoirs is to store the necessary amount of water required for water supply in the area concerned. To achieve this their functions include :

- to equalise the difference between water intake and output and to cover peaks in demand ;
- to maintain the required pressure in the water distribution systems ;
- to keep stocks in reserve in case of plant malfunctions and interruptions in the water distribution systems ;
- to provide water for firefighting in accordance with local requirements.

5.1.2 Decision criteria and system configuration

(See also A.2).

Important decision criteria are :

- security of supply and water quality ;
- overall cost of construction, operation and maintenance ;
- integration into the water supply system ;
- town and landscape planning.

The above-mentioned criteria can be achieved by elevated service reservoirs, water towers or by low level service reservoirs with pumping systems. Service reservoirs may be designed as buried, partially buried or above ground structures.

The construction of an elevated service reservoir is advisable if suitable high ground is available.

The construction of a water tower may be considered where the necessary ground elevation at a suitable point near the supply area is not available for an elevated service reservoir.

A pumping station with a low level service reservoir is a viable option if measures have been taken to ensure continuity of power supply.

Service reservoirs are mainly constructed from reinforced or pre-stressed concrete. They may also be constructed using steel, glass fibre reinforced plastic or other appropriate materials.

5.2 Functional requirements

5.2.1 Functional requirements - Water quality

5.2.1.1 General

Service reservoirs shall be designed, constructed and operated to prevent contamination or other chemical, physical and biological changes that are detrimental to the water quality (Refer to water quality regulations).

5.2.1.2 Materials

Materials which meet appropriate test requirements and which will not cause the stored water to fail to comply with the requirements of appropriate EU Directives or EFTA Regulations shall be used in the structure of the water compartments and in the surfaces in contact with the stored water. Concrete and cement mortars generally satisfy this requirement but special care shall be taken if additives are used. In order to facilitate subsequent cleaning and to avoid bacterial growth internal surfaces shall be as smooth and pore-free as possible. This can be achieved by high quality concrete finishes or by the application of suitable coatings or linings.

All metallic parts vulnerable to corrosion shall be protected.

5.2.1.3 Water circulation

Stagnant zones shall be minimised. This can be achieved by suitable design of the physical shape of the water compartments and the arrangement of inlet and outlet pipework for the particular storage capacity.

5.2.1.4 Ventilation

Ventilation facilities are required in the water compartments in order to permit air movement caused by changing water levels. This may be achieved by natural or forced ventilation. If specified by the designer measures shall be taken to safeguard and control the quality of the air entering or leaving the service reservoir.

5.2.1.5 Prevention of contamination

Service reservoirs shall be designed to prevent the ingress of external water or other contaminant either through the structure of any opening, entrance or pipework. Permanent exposure of the water to daylight shall be avoided.

Entrances and ventilation equipment shall also be designed so that the water cannot be contaminated (e.g. by polluted air, dust, insects and other animals).

Design may specify that openings shall not be positioned directly above the free water surface. Wherever positioned they shall be arranged in such a way that no extraneous matter is able to enter the compartment and that all external interference is impeded.

5.2.1.6 Temperature effects

There shall be no unacceptable alteration to the stored water caused by heat or cold. Thermal insulation measures can need to be taken to avoid adverse effects on the stored water, the structure and the associated equipment. The thermal insulation measures for service reservoirs shall be appropriate for the local climatic conditions, the operating requirements and in order to minimise condensation within the water compartments.

5.2.1.7 Maintaining water quality

Prior to commissioning, the service reservoir and the associated equipment shall be carefully checked, cleaned and disinfected.

Inspections shall be carried out before initial commissioning, during operation and as part of regular maintenance.

Facilities to allow the sampling of water, without entry by personnel, shall be provided for each compartment, and if specified by the designer for the inlet and outlet pipes.

5.2.2 Functional requirements - Operation

5.2.2.1 Access and security

(See also A.3).

Service reservoir sites shall be provided with access for routine visits and repair work. Facilities shall be provided to permit cleaning of each compartment independently.

Access to the water compartments, control buildings and all functional equipment shall be designed for safety, including that of personnel, and for ease of operation. Openings shall be dimensioned so as to permit entry for materials and equipment for cleaning, maintenance and repair.

Access to the reservoirs shall always be restricted and controlled. Arrangements shall be such that the minimum number of openings are provided into the water compartments. The compartments may be accessed from the control building or, subject to suitable safeguards, from the roof.

Due regard shall be paid to the security of service reservoirs with respect to acts of terrorism, vandalism and other unlawful activity. Measures shall be taken to deter, detect and delay intruders.

5.2.2.2 General arrangement

Service reservoirs shall normally comprise at least two compartments (see figure 2).

Inlet, outlet, overflow and washout pipework, the necessary valves, and if specified by the designer, flow meters and level measuring devices, shall be provided for each water compartment. A bypass pipework arrangement to connect inlet and outlet pipework shall be provided for all reservoirs. The type and arrangement of the valves will depend upon the configuration of the water distribution system. If necessary, underfloor and perimeter drains shall be provided.