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**Vattenförsörjning – Invändig utrustning –
Avhjärdare – Utförandekrav, säkerhet och
provning**

**Water conditioning equipment inside buildings –
Softeners – Requirements for performance,
safety and testing**

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Water conditioning equipment inside buildings - Softeners - Requirements for performance, safety and testing

Appareils de traitement d'eau à l'intérieur des bâtiments -
Adoucisseurs - Exigences de performance, de sécurité et
essais

Anlagen zur Behandlung von Trinkwasser innerhalb von
Gebäuden - Enthärter - Anforderungen an Ausführung,
Sicherheit und Prüfung

This European Standard was approved by CEN on 26 August 2005 and includes Amendment 1 approved by CEN on 10 May 2007.

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EN 14743:2005+A1:2007 (E)

Foreword

This document (EN 14743:2005+A1:2007) has been prepared by Technical Committee CEN/TC 164 "Water supply", the secretariat of which is held by AFNOR.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2007 and conflicting national standards shall be withdrawn at the latest by December 2007.

This document includes Amendment 1, approved by CEN on 2007-05-10.

This document supersedes EN 14743:2005.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** and **A1**.

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

- 1) This European Standard provides no information as to whether the product may be used without restriction in any of the Member States 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 this product remain in force.

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

1 Scope

This European Standard specifies requirements relating to the construction and mode of operation and relevant methods of testing of automatic, salt-regenerated, cation exchange softeners for drinking water installations inside buildings which are permanently connected to the mains supply.

Until EAS comes into force, the current national regulations remain applicable.

NOTE Products intended for use in water supply systems should comply, when existing, with national regulations and testing arrangements that ensure fitness for contact with drinking water. The Member States relevant regulators and the EC Commission agreed on the principle of a future unique European Acceptance Scheme (EAS) which would provide a common testing and approval arrangement at European level.

If and when the EAS is adopted, European Standards on products will be amended by the addition of an Annex Z/EAS under Mandate M/136 which will contain formal references to the testing, certification and product marking requirements of the EAS.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 973, *Chemicals used for treatment of water intended for human consumption — Sodium chloride for regeneration of ion exchangers*

EN 1717, *Protection against pollution of potable water in drinking water installations and general requirements of devices to prevent pollution by backflow*

EN 60335-1, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1:2001, modified)*

EN ISO 228-1, *Pipe threads where pressure tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 3822-1, *Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations — Part 1: Method of measurement (ISO 3822-1:1999)*

EN ISO 3822-3, *Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations — Part 3: Mounting and operating conditions for in-line valves and appliances*

EN ISO 10304-1, *Water quality — Determination of dissolved fluoride, chloride, nitrite, orthophosphate, bromide, nitrate and sulfate ions, using liquid chromatography of ions — Part 1: Method for water with low contamination (ISO 10304-1:1992)*

EN ISO 11885, *Water quality — Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy (ISO 11885:1996)*

ISO 7-1, *Pipe threads where pressure tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

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3 Terms and definitions

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

3.1

blending device

internal or external device used to adjust the hardness of supplied water by mixing hard water with softened water

3.2

brining

main phase of the regeneration process, during the course of which the brine flows through the bed of resin for the purpose of exchanging the alkaline earth ions by sodium ions during the regeneration run, and thereby recovering the exchange capacity of the resin bed

3.3

brining efficiency

link, expressed in grams of calcium carbonate (CaCO_3) per kilogram of salt, between the exchange capacity and the salt consumption

3.4

cation exchange resin

synthetic material which has the capability to exchange cations reversibly

3.5

continuous flow rate

maximum flow rate at which a duplex appliance can operate continuously (24 h per day) without premature break-through of hardness

3.6

duplex appliance

softening system employing two resin tanks, enabling the production of uninterrupted softened water supply

NOTE A transient hard water supply during change-over from tank to tank is permissible.

3.7

exchange capacity of the softening unit

quantity of alkaline earths, expressed in grams of calcium carbonate, fixed by the softener between the end of the last regeneration and the beginning of the exhaustion of the resin

NOTE 1 The end of the regeneration is defined as the moment when the softener is available for service.

NOTE 2 The resin is considered to be exhausted when the residual hardness of the softened water increases above a defined value.

3.8

monitoring device

time controller, flow integrator, resin exhaustion sensor or a combination of these, used to determine the appropriate moment in the operating cycle for regeneration to begin, and to initiate that regeneration

3.9

nominal flow rate

flow rate of water, expressed in cubic metres per hour, at which a pressure drop of maximum 100 kPa is established

3.10

operating cycle

two successive and repetitive runs: the softened water run (or service) and the regeneration run

3.11

operating range

physical conditions (temperature, pressure, flow rate) within which a softening unit can operate and meet its performance guarantees

3.12

pressure drop

decrease in pressure between the inlet and outlet of the softener, expressed in kilopascals, at nominal flow rate

3.13

regeneration process

part of softener operating cycle, during which all the operations needed to restore the ion exchange capacity of a resin bed are carried out

3.14

regeneration water

quantity of water, expressed in litres (or in cubic meters), necessary for a complete regeneration process, including water used for the preparation of the brine

3.15

residual hardness

hardness of water sampled at the outlet of a softener during the service run

3.16

salt consumption

quantity of salt, expressed in kilograms, used for each regeneration

3.17

salt tank

tank containing the regenerating salt and the brine-production device

3.18

softener

complete installation necessary for the ongoing production of softened water

3.19

softening

reduction of the hardness of water by exchange of alkaline earths ions (mainly calcium and magnesium) with sodium ions, by passing through a bed of cation exchange resin in the sodium form

3.20

softening unit

appliance employing the softening principle and which generally comprises the following constituent parts:

- pressure vessel containing the cationic ion exchange resin and devices for distributing and collecting hydraulic flows,
- devices for monitoring hydraulic flows (water and brine) through a multi-way valve or a set of pipes and multiple valves,
- tank (called salt-tank) for storage of the regeneration salt and production of the brine

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3.21

total hardness

concentration of alkaline earth ions (mainly calcium and magnesium) in water, expressed in millimoles per litre

NOTE Previously, the total hardness was expressed in French degrees (°f), German degrees (°dH) or ppm as CaCO₃. ^{A1} (1 mmol/l corresponds to 100 mg/l of CaCO₃ or to 10 °f or to 5,6 °dH). ^{A1}

^{A1} *deleted text* ^{A1}

3.22

volume of resin

quantity of cation exchange resin, expressed in litre, indicated on the rating plate or in the technical documentation

4 Requirements

4.1 Softener specification

Softeners shall include all of following features and devices:

- a) resin tank, control valve, brine tank, monitoring device;
- b) automatic regeneration;
- c) continuity of supply during regeneration;
- d) manual override facility;
- e) protection against backflows.

NOTE When necessary to meet national or local provision, the softener may be required to include additional features; for example:

- blending device,
- automatic initiated regeneration after a certain period without regeneration, and
- feature to control microbiological growth.

4.2 Quality of materials and chemicals

4.2.1 Cation exchange resin

The cation exchange resin used in the softener shall be certified by the resin manufacturer to be suitable for the intended application.

4.2.2 Regenerating salt

The salt used for the regeneration shall be in compliance with EN 973.

4.3 Design and manufacturing specifications

4.3.1 Resistance to hydrostatic pressure

The softening unit shall resist, without visible damage nor leakage, a hydrostatic pressure of 1,5 times the maximum design pressure or 1 000 kPa which ever is the greater for 10 $\begin{smallmatrix} +2 \\ 0 \end{smallmatrix}$ min as defined in 7.4.1.

4.3.2 Resistance to cyclic pressure

The softening unit shall resist, without visible damage nor leakage, a cyclic pressure test of not less than 5 000 cycles with the pressure fluctuating at a frequency of 15 $\begin{smallmatrix} +2 \\ -1 \end{smallmatrix}$ cycles per minute between 150 kPa and 1,3 times the maximum design pressure as defined in 7.4.2.

4.3.3 Minimum and maximum operating pressure

The softener shall operate and regenerate to the requirements of this European Standard with a minimum water supply pressure of 200 kPa and a maximum pressure not less than 60 % of the maximum design pressure when tested in accordance with 7.1.3 d).

4.3.4 Resistance to temperature

The softener shall be designed to operate and regenerate to the requirements of this European Standard with water temperatures between 5 °C and 25 °C and with ambient temperatures between 5 °C and 35 °C.

4.3.5 Electrical safety

Softening units shall conform to the requirements for safety of electrical appliances in accordance with EN 60335-1.

4.3.6 Salt tank

The salt tank shall be equipped with a cover to prevent the intrusion of dust and foreign bodies, and an overflow of ample dimensions.

The capacity of the salt tank shall be such that it permits a minimum of five regenerations between refills.

4.3.7 Continuity of supply during regeneration

The softener design shall permit continuity of water supply during regeneration (see 7.4.3).

4.3.8 Protection against backflow and infiltration of brine

- a) Softener shall include a device to prevent backflow into the main supply, in accordance with the national implementation of EN 1717. If such a device is not evident, the softener shall be tested in accordance with 7.4.4.1. There shall be no water or brine collected from the vacuum reservoir.
- b) Infiltration of brine into the softened water supply during normal operation shall also be verified by testing in accordance with 7.4.4.2. In no outlet samples, the chloride concentration shall exceed 1,5 mmol/l over that of the inlet water.

4.3.9 Noise level

The softening unit shall conform to noise levels defined and measured in accordance with EN ISO 3822-1 and EN ISO 3822-3 for both the service and regeneration runs.