



SLOVENSKI STANDARD

oSIST prEN 12873-4:2020

01-november-2020

Vpliv materiala na pitno vodo - Vpliv migracije - 4. del: Metoda preskušanja membran za pripravo vode

Influence of materials on water intended for human consumption - Influence due to migration - Part 4: Test method for water treatment membranes

Einfluss von Materialien auf Wasser für den menschlichen Gebrauch - Einfluss infolge der Migration - Teil 4: Prüfverfahren für Membranen für die Wasserbehandlung

Influence des matériaux sur l'eau destinée à la consommation humaine - Influence due à la migration - Partie 4: Méthode d'essai des membranes des systèmes de traitement d'eau

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Ta slovenski standard je istoveten z: prEN 12873-4

ICS:

13.060.20	Pitna voda	Drinking water
67.250	Materiali in predmeti v stiku z živili	Materials and articles in contact with foodstuffs

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en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
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DRAFT
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ICS 67.250; 13.060.20

Will supersede EN 12873-4:2006

English Version

Influence of materials on water intended for human consumption - Influence due to migration - Part 4: Test method for water treatment membranes

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 164.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 12873-4:2020) has been prepared by Technical Committee CEN/TC 164 “Water supply”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12873-4:2019.

It has been drawn up with the objective to describe a test method to determine the migration of substances from water treatment membranes.

Annex A, which is informative, provides a flow diagram of the steps in the test procedure.

Annex B, which is informative, describes a test rig.

This document is the fourth in a series of standards dealing with the influence of migration from materials on water intended for human consumption, including:

- Part 1 Test method for non-metallic and non-cementitious factory made products;
- Part 2 Test method for non-metallic and non-cementitious site-applied materials;
- Part 3 Test method for ion exchange and adsorbent resins;
- Part 4 Test method for water treatment membranes.

Significant technical difference between this edition and EN 12873-4:2019 is as follows:

- New definitions and editorial changes to existing definitions
- Change to temperature of operation if not provided by the manufacturer
- General editorial, structural and clarification throughout the document.

prEN 12873-4:2020 (E)

Introduction

In respect of potential adverse effects on the quality of water intended for human consumption caused by the materials, it is called to mind that, while awaiting the adoption of verifiable European acceptance criteria, the relevant national regulations remain in force.

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1 Scope

This document describes a test method for laboratory evaluation of possible adverse effects of water treatment membrane elements and modules on drinking water quality.

In principle it is applicable to microfiltration, ultrafiltration, nanofiltration, reverse osmosis and electro dialysis modules for use in the treatment of public water supplies and of water inside buildings.

NOTE Such devices can vary considerably in design and operation and hence some modification of the procedures can be required.

Evaluation of the efficiency of the membrane filter in removing contaminants from the treated water is not included.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 3696:1995, *Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

analytical sample

portion of the migration water collected for the determination of specified water quality parameters

3.2

cell pair

basic unit of electro dialysis systems consisting of a cation transfer membrane, a dilute flow (product) spacer, an anion transfer membrane and a concentrate (waste) spacer

3.3

cleaning and/or disinfection agent

chemical solution passed through the membrane element/module either in response to changes in the performance of the membrane or at fixed times or volumes to remove solids or biofilm build up from the membrane to improve efficiency

3.4

concentrate

permeate and reject water returned to the reservoir of test water to be pumped back through the membrane element/module resulting in a concentration of migrating substances from the membrane element/module

3.5

dead volume

volume of water contained in a membrane element/module (but not including pumps, valves and other ancillaries connected to the membrane element/module) during normal use

prEN 12873-4:2020 (E)**3.6****electrodialysis**

process in which ionic species in a feed water are transferred by means of an electrical driving force via a membrane, which is either cation or anion specific, to a waste water stream

3.7**feed water**

inlet water for the test rig (see diagram in Annex B)

3.8**flushing water**

water used for preconditioning and rinsing

3.9**migration test**

determination of the effects on parameters of water quality following contact with the test sample under specified conditions

3.10**migration**

movement of a substance or substances from test samples into migration water 3.11

3.11**migration water**

test water after exposure to the test sample under specified conditions

3.12**membrane element/module**

filtration unit including the membrane itself and all parts of its housing and fittings

3.13**procedural blank**

test water after contact with the test rig but not with the test sample under the same conditions used for the migration test

3.14**product**

manufactured item, in its finished form, that comes into contact with drinking water

3.15**permeate water**

treated water from the product that has passed through the membrane

3.16**reject water**

tangential water that does not flow through the membrane and becomes the waste stream under normal operation of the product

3.17**storage solution**

solution which fills the dead space in a membrane element/module added by the manufacturer after manufacture to preserve the membrane during distribution, sometimes storage solutions are also added to partially used membrane element/module for storage when not in use

3.18**test rig**

equipment, which is not part of the test sample, used to perform the test and control test conditions

3.19**test sample**

product, or part of a product, submitted for testing for suitability for use in contact with water intended for human consumption

3.20**test water**

water used for migration testing (see 4.2.2)

4 Test method**4.1 Principle**

Water of specified quality is run through a membrane element or module under specified operating conditions representing as much as possible the actual conditions of use. The procedure comprises several steps including flushing, operation with and without recycling and cleaning and/or disinfection, the latter depending on the manufacturers recommendations. The purpose of the recycling phase is to concentrate the potential contaminants migrating from the test sample. Analytical samples of the concentrates and the single-pass migration waters are taken for analysis.

The operating test temperature is maintained at the highest temperature approved by the manufacturer. In the absence of a recommended temperature it is (20 ± 5) °C.

A schematic diagram of the test protocol is shown in Annex A.

Membrane technology can be different in design and operation and therefore the procedures described, such as operation conditions and cleaning, may need to be modified in some cases.

4.2 Reagents and apparatus**4.2.1 General**

Only reagents of analytical grade shall be used, except where specified otherwise. All reagents shall be of sufficient purity to ensure that they do not give rise to interferences during the analysis of the extracts.

NOTE Contamination can arise from various sources, e.g. plastics or rubber materials. The use of procedural blanks and laboratory blanks assists in detecting any contamination and identifying its source.

4.2.2 Test water

The test water shall consist of purified water conforming to grade 3 of EN ISO 3696 with an electrical conductivity not exceeding $(10 \pm 0,1)$ $\mu\text{S}/\text{cm}$. It shall be free from organic contaminants that can interfere with the analysis of the analytical samples.

If testing with chlorinated test water is required then use test water having an active chlorine content of $(1 \pm 0,2)$ mg/l as Cl_2 shall be used.

When testing electrodialysis modules the test water shall contain $(1 \pm 0,1)$ g/l of NaCl.

NOTE Purification of water, such as tap water, by a sequence consisting of carbon filtration, reverse osmosis or distillation and followed by deionization usually produces satisfactory test water.

prEN 12873-4:2020 (E)**4.2.3 Flushing water**

The flushing water shall be test water (4.2.2) or tap water, provided that the following conditions are complied with:

- total organic carbon content of ($<1,0 \text{ mg/l} \pm 0,1 \text{ mg/l}$) carbon;
- conductivity of $< 500 \text{ }\mu\text{S/cm}$;
- it is free from organic contaminants that can interfere with the analysis of the extracts;
- flushing is finished with a volume of the test water, corresponding to at least $(5 \pm 0,5)\%$ of the total volume used for flushing.

NOTE A flushing with 1000 l would consist of 950 l of flushing water followed by 50 l of test water.

For products not intended for use in contact with chlorinated water only unchlorinated flushing water shall be used.

4.2.4 Cleaning and/or disinfection agent

The type and use of agents to clean and/or disinfect the test sample shall be as recommended by the manufacturer.

4.2.5 Test rig

The test rig used depends on the product under test. The design and operation of the test rig for the membrane element/module under test shall reproduce as far as practical the conditions of actual use in service. In particular, testing shall be carried out under the same conditions, as for actual use, for the following:

- a) start-up procedure;
- b) use of cleaning and/or disinfection agents;
- c) operating conditions, as relevant.

As an example the test rig may include a pump, a reservoir of test water, pressure gauges, flow meters, sampling taps and connecting pipes and fittings. The rig shall allow temperature control, sampling of the permeate water, re-circulation of the permeate water and, where relevant, of the reject water or concentrate over a period of 24 h. The re-circulation reservoir should hold sufficient volume of the feed water to allow at least 30 min operation at the minimum recommended flow. The different parts of the test rig shall be inert towards the test water used.

NOTE A schematic diagram of an example test rig is shown in Annex B.

4.3 Test samples

4.3.1 General requirements

Test samples shall be taken from normal production batches.

Where a test sample cannot be taken from a production batch an alternative sample is permitted together with any necessary changes to the test procedure. Such modifications shall be fully described in the Test Report.

Test samples shall be representative of production batches and shall have received no other treatment, unless part of the manufacturer's instructions for use.

The manufacturer's product manual, as supplied to customers, shall be consulted for the procedures for installation, flushing, chemical treatment and/or disinfection and operation. The following information, depending on the particular membrane device, is required:

- a) effective surface area of the membrane;
- b) dead volume of the membrane element/module;
- c) minimum, maximum and typical product water flows and operating pressures;
- d) range of operating reject water flows and pressures;
- e) details of recommended start-up procedure;
- f) details of recommended disinfection and/or cleaning procedure(s);
- g) data showing the removal of the chemicals during the recommended procedures e) and f);
- h) operational temperature range.

4.3.2 Sample storage

Test samples shall be transported and stored as specified in the supplier's product manual.

NOTE To prevent dehydration and growth of bacteria, filter elements are usually saturated with a storage solution.

4.4 Procedure

4.4.1 General

The analysis and number of tests to be carried out, e.g. single tests or duplicates, will be specified in national or other regulations. As guidance, the method assumes single testing. Duplicate tests (a) and (b), if required, should be carried out at the same time using two test rigs or sequentially on the same test rig, provided that the second test is preceded by another procedural blank test.

4.4.2 Test temperature

Ensure that the operating temperature (both test water and surrounding air temperature) is maintained at the highest temperature recommended by the manufacturer. In the absence of a recommended temperature it shall be $(20 \pm 5) ^\circ\text{C}$.