SIST

SLOVENSKI STANDARD
SIST EN 12873-1:2004

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Vpliv materiala na pitno vodo - Vpliv migracije - 1. del: Preskusna metoda za nekovinske in necementne industrijsko izdelane proizvode

Influence of materials on water intended for human consumption - Influence due to migration - Part 1: Test method for non-metallic and non-cementitious factory made products

Einfluss von Materialien auf Trinkwasser - Einfluss infolge der Migration - Teil 1: Prüfverfahren für nichtmetallische und nicht zementgebundene fabrikmäßig hergestellte Produkte

Influence sur l'eau des matériaux en contact avec l'eau destinée a la consommation humaine - Influence de la migration - Partie 1: Méthode d'essai des matériaux de fabrication industrielle, excepté les matériaux métalliques et ceux a base de ciment

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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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Influence of materials on water intended for human consumption - Influence due to migration - Part 1: Test method for non-metallic and non-cementitious factory made products

Influence sur l'eau des matériaux en contact avec l'eau destinée à la consommation humaine - Influence de la migration - Partie 1: Méthode d'essai des matériaux de fabrication industrielle, excepté les matériaux métalliques et ceux à base de ciment

Einfluss von Bedarfsgegenständen auf Trinkwasser - Einfluss infolge der Migration - Teil 1: Prüfverfahren für nichtmetallische und nicht zementgebundene fabrikmäßig hergestellte Produkte

This European Standard was approved by CEN on 1 September 2003.

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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.

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

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Foreword

This document (EN 12873-1:2003) 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 May 2004, and conflicting national standards shall be withdrawn at the latest by May 2004.

It has been drawn up with the objective to describe a test method to determine the migration of substances from non-metallic and non-cementitious products for use in contact with water intended for human consumption.

Annex A, which is informative, describes an alternative arrangement for flushing pipes having a nominal size greater than DN 80.

Annex B, which is informative, describes additional procedures for testing non-homogeneous products and pipes having a nominal size greater than DN 80.

Annex C, which is informative, describes a schedule for the preparation of migration waters.

Annex D, which is informative, describes procedural tests using standard additions (positive controls).

Annex E, which is informative, describes the migration test procedure in a schematic manner.

This European Standard will be one of a series of standards on test methods which supports the appropriate standards.

This standard, part 1, is the first in a series of standards for 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 absorbent resins;

— Part 4 : Test method for membrane water treatment systems.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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.

1 Scope

This European Standard specifies a procedure to determine the migration of substances from non-metallic and non-cementitious factory made or factory applied products for use in contact with water intended for human consumption.

This standard is applicable to products intended to be used under various conditions for the transport and storage of water intended for human consumption, including raw water used for the production of water intended for human consumption. It covers the extraction by water of substances from the finished products.

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).

EN ISO 7393-2, *Water quality – Determination of free chlorine and total chlorine – Part 2: Colorimetric method using N, N-diethyl-1, 4-phenylenediamine for routine control purposes (ISO 7393-2:1985)*.

3 Terms and definitions

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

3.1
test
technical operation that consists of the determination of one or more characteristics of a given product

3.2
test procedure
specified technical method for performing a test

3.3
test report
document that presents test results and other information relevant to a test

3.4
test laboratory
laboratory that performs tests

3.5
product
manufactured item, in its finished form, that comes into contact with water intended for human consumption, or a component part of a manufactured item

3.6
homogeneous product
product where the water contact surface is made from the same material as the remainder of the product

3.7
non-homogeneous product
product where the water contact surface is made from a material that differs from those comprising the remainder of the product

3.8
fitting, ancillary
complete functional unit made up of one or more components or materials, parts of which are in contact with water, e.g. taps, valves, water meters, water filters, pipe connectors and flexible hose assemblies

3.9
test sample
sample of a product submitted for testing

3.10
test piece
test sample, or a part of it, that is tested

3.11
tap water
water intended for human consumption

(See also 5.1.1).

3.12
test water
water used for migration testing

(5.1.2 and 5.1.3).

3.13
disinfection treatment water
water used for preliminary chlorination (5.1.4)

3.14
prewashing water
water used for prewashing (5.1.5)

3.15
blank water
test water (5.1.2 and 5.1.3) which has been kept at the same specified conditions as migration water (3.18) but without contact with test pieces

3.16
migration period
period of time (24 h or 72h, see clause 4) in which the migration is carried out under specified conditions

3.17
migration
movement of a substance or substances from test pieces into test water

3.18
migration water
test water after exposure to a test piece under specified conditions

3.19
migration rate
mass of a measured substance or substances (in mg) migrating from one square decimetre of a test piece into the test water in one day at a specified temperature (°C)

3.20
lining
layer of material applied to a product and intended to come into contact with water intended for human consumption, e.g. the inside surfaces of pipes, fittings or storage vessels. Excluded are layers, such as

coatings, not intended for contact with water intended for human consumption, e.g. as applied to the outside surfaces of pipes and fittings for corrosion protection

3.21
geomembranes
flexible water impermeable membranes normally used to avoid draining of stored water into surrounding soil and sub-soil strata

4 Principle

Each test piece is subjected to a specified pretreatment procedure of stagnation and prewashing. The surface of the test piece, that is exposed in practice to water intended for human consumption, is brought into contact with test water during at least three sequential migration periods. A migration period is either;

— 72 h at 23 °C for products intended to come into contact with cold water,

— 24 h at a specified temperature in the range 60 °C to 85 °C for products intended to come into contact with warm or hot water.

Migration rates for the first three migration periods are determined by analysis of the required substances in the corresponding migration waters.

NOTE 1 The test is carried out under conditions to ensure that calculation of a reliable migration rate is facilitated. These conditions are not meant to simulate "real use conditions". Relating the results obtained from this standard to "real use conditions" is carried out using a conversion procedure. This procedure will be specified in regulations.

NOTE 2 The choice of the type of test water (chlorinated and/or chlorine-free), the temperature of the test water, the number of additional migration periods and the necessity for a preliminary chlorination (see clause 8) will be specified by product/system standards or national regulations.

5 Reagents

For the purposes of this European Standard, the following reagents apply:

5.1 Waters to be used for testing

5.1.1 tap water, water intended for human consumption with a free chlorine content less than 0,2 mg/l as Cl_2.

5.1.2 test water, chlorine free water with a conductivity of < 2 mS/m and a total organic content (TOC) of < 0,2 mg/l C, e.g. prepared by reverse osmosis, deionization or distillation, followed by activated carbon filtration.

5.1.3 chlorinated test water, test water according to 5.1.2 having an active chlorine content of (1 ± 0,2) mg/l as Cl_2 (5.3.1).

5.1.4 disinfection treatment water, test water according to 5.1.2 having an active chlorine content of (50 ± 5) mg/l as Cl_2 (5.3.1).

5.1.5 prewashing water, tap water (5.1.1).

5.2 Cleaning liquids for glassware

5.2.1 hydrochloric acid, concentrated (30% mass per volume) analytical reagent grade.

5.2.2 hydrochloric acid solution, prepared by slowly adding (0,5 ± 0,01) l of concentrated hydrochloric acid (5.2.1) to (0,5 ± 0,01) l of test water (5.1.2).

NOTE Care is needed because the solution may generate heat.

5.2.3 nitric acid, concentrated (65% mass per volume) analytical reagent grade.

5.2.4 nitric acid solution, prepared by slowly adding (0,5 ± 0,01) l of concentrated nitric acid (5.2.3) to (0,5 ± 0,01) l of test water (5.1.2).

NOTE Care is needed because the solution may generate heat.

5.2.5 sulphuric acid, concentrated (density 1,84 g/ml) analytical reagent grade.

5.2.6 chromic acid, analytical reagent grade (5% mass per volume) or prepared by dissolving (50 ± 1) g of chromium (VI) oxide in (1 ± 0,02) l of sulphuric acid (5.2.5).

NOTE Chromic acid is a storage hazard; it can burst a sealed container due to carbon dioxide release. It is a powerful oxidizer and can give potentially explosive reactions with oxidizable materials. It can ignite on contact with acetone or alcohols. When heated to decomposition it emits acrid smoke and irritating fumes.

5.3 Other reagents

5.3.1 sodium hypochlorite solution, prepared from a technical or general purpose reagent grade of sodium hypochlorite (NaOCl), using test water (5.1.2) and having a known concentration of about 0,1 % by mass of free chlorine determined in accordance with EN ISO 7393-2.

NOTE Unless tests have proved otherwise the sodium hypochlorite solution should be considered unstable and prepared on the day of use.

6 Apparatus

6.1 Vessels, containers, stoppers and connectors shall consist of a material, such as glass, PTFE or stainless steel, that is inert under the specified test conditions (clause 9).

NOTE The material PTFE should only be used when there is a small contact area with the test water. Thus PTFE is unsuitable for containers.

6.2 Plates stainless steel, mild steel, (sand-blasted) glass or concrete/cement-mortar plates, for testing linings or the material itself. The plates shall be covered completely.

6.3 Equipment, capable of maintaining the appropriate migration temperature, e.g. (23 ± 2) °C, or (60 ± 2) °C to (85 ± 2) °C.

6.4 Cleaning

Laboratory glassware, stainless steel plates and sand blasted glass plates shall be cleaned by washing with a biodegradable laboratory detergent, followed by rinsing with either hydrochloric acid solution (5.2.2) (except for stainless steel), nitric acid solution (5.2.4) or chromic acid (5.2.6) and finally by thoroughly rinsing with test water (5.1.2). Drain the plates and dry them in a hot air cabinet.

7 Test samples and test pieces

7.1 Sampling, transport and storage of test samples

Sample products in accordance with the relevant product/system standard or with the relevant national regulations when applicable.

Ensure that the surface of test pieces intended to come into contact with test water shall be free from adhesive tape, labels, ink or pencil marks. Care shall be taken to ensure that the transport and storage conditions shall not influence the test results.

NOTE 1 If the test samples have to be stored, then this should be done in the absence of light at (23 ± 5) °C, in stainless steel containers, tissue-paper, glassware or other materials, which do not influence the results of the migration test, except where the supplier of the test samples provides alternative written storage instructions which are those that the products are subject to in practice.

NOTE 2 Storage envelopes or pockets should not be sealed, dusting powder should not be used and cleaning should not be carried out unless any of these procedures form part of the usual production procedures. Where appropriate, storage containers should be cleaned using the same procedures as are used for the test containers.

7.2 Test piece preparation

7.2.1 General

Prepare test pieces in such a way that only the surface intended to come into contact with water intended for human consumption is exposed to the test water (5.1.2 and/or 5.1.3).

For homogeneous materials it is acceptable to expose the whole test piece to the test water, including surfaces not intended to come into contact with water intended for human consumption. Calculate the total surface area of the test piece. The calculation of the surface-area-to-volume (S/V) ratio (7.3) shall include the total surface area of the test piece.

NOTE If a homogeneous product has to be cut to obtain the required test piece size, this should be done in a manner that ensures the area of the cut edges is as small as possible.

7.2.2 Pipes and hoses

7.2.2.1 Use the internal diameter for the S/V ratio calculation.

7.2.2.2 Assess migration from pipes with an internal diameter ≤ DN 80 by using pipes as test vessels with a length that provides sufficient migration water for analysis.

7.2.2.3 Migration from pipes with an internal diameter > DN 80, where the internal and external surfaces have the same properties, can be assessed by either immersing pipe segments in test water (5.1.2 and/or 5.1.3) in glass containers or using one of the test arrangements detailed in annex B.

7.2.2.4 Test pieces from composite pipes, i.e. pipes whose internal and external surfaces have different properties, with an internal diameter > DN 80, shall be tested in such a way that only the surface area intended to come into contact with water intended for human consumption is exposed to the test water (5.1.2 and/or 5.1.3). Suitable arrangements are given in annex B.

7.2.3 Fittings and ancillaries

7.2.3.1 The number of fittings or ancillaries to be tested has to be chosen in such a way that the requirements described in 7.2.1 are satisfied.

7.2.3.2 Assess migration from fittings and ancillaries by immersion according to the requirements described in 7.2.1.

7.2.4 Factory applied linings

7.2.4.1 Test pieces with factory applied linings shall be prepared as described in 7.2.1, 7.2.2 and 7.2.3.

7.2.4.2 If it is not possible to test the original final product then test pieces shall be prepared by the manufacturer or a contractor in accordance with the manufacturer's written instructions under supervision of the responsible body. Test panels/plates shall be fully coated in accordance with the standard factory procedure. If this is impractical, then a method giving an equivalent product surface to that produced by the standard factory procedure shall be used.

7.2.4.3 Assess migration from other linings applied to other products by immersing plates (e.g. stainless steel or (sand blasted) glass plates), completely coated with the product, in the test water (5.1.2 and/or 5.1.3).

7.2.4.4 The number of coated plates has to be chosen in such a way that they meet the requirements of 7.3.1 when tested in containers (6.1) that are completely filled with test water (5.1.2 and/or 5.1.3) and closed with a lid.

7.2.5 Geomembranes

7.2.5.1 Geomembranes (3.21) may be homogeneous (composed of one material only) or non-homogeneous (comprising a complex laminate system of several materials).

7.2.5.2 Assess migration from geomembranes, if homogeneous, by immersing test pieces in the test water (5.1.2 and/or 5.1.3). If non-homogeneous go to 7.2.7.

7.2.6 Other homogeneous products

7.2.6.1 Migration from these products shall be assessed using test pieces immersed in the test water (5.1.2 and/or 5.1.3).

7.2.7 Other non-homogeneous products

7.2.7.1 Test pieces derived from non-homogeneous products shall have the same composition and structure as the finished products.

7.2.7.2 Test the test pieces in such a way that only the surface intended to come into contact with water intended for human consumption is exposed to the test water (5.1.2 and/or 5.1.3). (See also annex B).

7.3 Surface area-to-volume ratio (S/V).

7.3.1 The ratio of the surface area (S) of the test piece intended to come into contact with test water to the volume (V) of the test water shall be expressed per decimeter, i.e dm^{-1} (which is dm^2/dm^3 or dm^2/l). Use a surface area-to-volume ratio in the range of 5 dm^{-1}– 40 dm^{-1}.

NOTE The S/V ratio can be specified by product or system standards or national regulations.

7.3.2 If the test piece has an irregular or textured surface then, for calculations, the surface is considered to be smooth. If the shape of the test piece is such that accurate calculation of the surface is impracticable then use an estimated surface area of the test piece. In this case the length and width shall be recorded together with a sufficiently detailed description of the product(s) to enable further test pieces to be prepared that will be within ± 10% of the surface area of the original test piece.

NOTE The supplier of the test samples should be instructed to ensure that they represent the product as it is used in contact with water intended for human consumption.