

**Nadomešča:**  
**SIST EN 12873-1:2004**

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**Vpliv materiala na pitno vodo - Vpliv migracije - 1. del: Preskusna metoda za industrijske proizvode, ki so izdelani iz organskih ali steklastih materialov (porcelan/steklovina) ali jih vsebujejo**

Influence of materials on water intended for human consumption - Influence due to migration - Part 1: Test method for factory-made products made from or incorporating organic or glassy (porcelain/vitreous enamel) materials

Einfluss von Materialien auf Trinkwasser - Einfluss infolge der Migration - Teil 1: Prüfverfahren für fabrikmäßig hergestellte Produkte aus oder mit organischen oder glasartigen Materialien (Emails/Emailierungen)

Influence des matériaux en contact sur l'eau destinée à la consommation humaine - Influence de la migration - Partie 1: Méthode d'essai des matériaux de fabrication industrielle constitués de ou contenant des matériaux organiques ou vitreux (émaux vitrifiés)

**Ta slovenski standard je istoveten z: EN 12873-1:2014**

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**ICS:**

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

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EUROPEAN STANDARD

EN 12873-1

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English Version

Influence of materials on water intended for human consumption  
- Influence due to migration - Part 1: Test method for factory-  
made products made from or incorporating organic or glassy  
(porcelain/vitreous enamel) materials

Influence des matériaux en contact sur l'eau destinée à la  
consommation humaine - Influence de la migration - Partie  
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der Migration - Teil 1: Prüfverfahren für fabrikmäßig  
hergestellte Produkte aus oder mit organischen oder  
glasartigen Materialien (Emails/Emailierungen)

This European Standard was approved by CEN on 14 May 2014.

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

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**EN 12873-1:2014 (E)****Foreword**

This document (EN 12873-1:2014) 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 January 2015, and conflicting national standards shall be withdrawn at the latest by January 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12873-1:2003.

The major revisions of EN 12873-1:2003 are:

- the inclusion of procedures for testing glassy (porcelain/vitreous enamel) materials. This inclusion enabled an improvement of the title of the standard;
- the test temperatures, outlined in Clause 4 'Principle', are more specific;
- the use of chromic acid is removed because of safety concerns;
- the examples of extended collection and analysis of migration waters (Annex C) are more systematic.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey 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.

This European Standard has been drawn up with the objective to describe a test method to determine the migration of substances from products made from, or incorporating, organic and glassy (porcelain/vitreous enamel) material for use in contact with water intended for human consumption.

Annex A, which is normative, 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.

Annex F, which is informative, provides information on a Cell system for testing glassy materials.

This European Standard will result in one of a series of standards on test methods which support 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 factory-made products made from or incorporating organic and glassy (porcelain/vitreous enamel) materials;
- Part 2: Test method for non-metallic and non-cementitious site-applied products;
- Part 3: Test method for ion exchange and absorbent resins;
- Part 4: Test method for membrane water treatment systems.

**EN 12873-1:2014 (E)****1 Scope**

This European Standard specifies a procedure to determine the migration of substances from factory-made or factory-applied products for use in contact with water intended for human consumption. Materials used to make such products include plastics, rubber and glassy (porcelain/vitreous enamel) materials.

This European 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**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15826, *Vitreous and porcelain enamels - Terminology*

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)*

EN ISO 28764, *Vitreous and porcelain enamels - Production of specimens for testing enamels on sheet steel, sheet aluminium and cast iron (ISO 28764)*

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**3 Terms and definitions**

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

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**3.1 test** <https://standards.iteh.ai/catalog/standards/sist/6ff8c9de-ba08-4fec-9ef1-052ff9aefd15/sist-en-12873-1-2014>

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**

a 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 heaters, 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****prewashing water**

water used for prewashing (5.1.4)

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**3.14****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

**3.15****migration period**

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

**3.16****migration**

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

**3.17****migration water**

test water after exposure to a test piece under specified conditions

**3.18****migration rate**

the 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)

**3.19****lining**

layer of material applied to a product and intended to come into contact with drinking water, e.g. the inside surfaces of pipes, fittings or storage vessels

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Note 1 to entry: Excluded are layers, such as coatings, not intended for contact with drinking water, e.g. as applied to the outside surfaces of pipes and fittings for corrosion protection.

**3.20****geomembranes**

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

**3.21****glassy material**

porcelain, vitreous enamel coating (as defined in EN 15826) that is in contact with water and applied to a variety of products that produce or store water at elevated temperature

**4 Principle**

Each test piece is subjected to a specified pre-treatment 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  $(23 \pm 2)$  °C for products intended to come into contact with cold water;
- 24 h at a specified temperature at  $(60 \pm 2)$  °C (warm water test) and/or  $(85 \pm 2)$  °C (hot water test) 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. Referring product standards and/or national regulatory authorities may specify the number of sequential migration periods to be carried out.

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 product standards or national 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 will be specified in product standards or national regulations.

NOTE 3 If testing at warm or hot temperature is required national regulations may require additional cold water testing.

**5 Reagents**

For the purposes of this standard, the listed reagents in Clause 5 will apply.

**5.1 Waters to be used for testing**

**5.1.1 Tap water**, Water that is intended for human consumption with a free chlorine content less than 0,2 mg/l as Cl<sub>2</sub>.

**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, 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 will have an active chlorine content of  $(1 \pm 0,2)$  mg/l as Cl<sub>2</sub> (5.3.1).

**5.1.4 Prewashing water**, prewashing water is tap water.

## 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 preparing the solution may generate heat.

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

**5.2.4 Nitric acid solution**, (2 % mass per volume) is prepared by slowly adding (0,15 ± 0,01) l of concentrated nitric acid (5.2.3) to (5,0 ± 0,1) l of test water (5.1.2).

NOTE Care is needed because preparing the solution may generate heat.

## 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.

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, steel and stainless steel that is inert under the specified test conditions (Clause 9).

The material PTFE should only be used when there is a small contact area with the test water. Thus PTFE is unsuitable for containers. Usually glassy materials are tested only for release of metal ions, consequently, the use of substances, such as PTFE and silicones, can be tolerated.

**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 with the test material.

NOTE In the case of glassy materials it is possible to coat only one surface.

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

**6.4 Laboratory glassware**, steel and stainless-steel plates and sand blasted glass plates shall be cleaned by washing with a biodegradable laboratory detergent, followed by exposing to either hydrochloric acid solution (5.2.2) (except for stainless steel) or nitric acid solution (5.2.4) for 2 to 3 days 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 standards or national regulations where 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.

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Ensure that transportation simulates the manufacturer's normal practice; e.g. employment of end-caps if used.

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

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 drinking water 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 drinking water. Calculate the total surface area of the test piece in contact with the testing water. The calculation of the surface-area-to-volume (S/V) ratio (7.3) shall include the total surface area of the test piece in contact with the testing water.

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**

Prepare test pieces for pipes and hoses in the following manner:

- Use the internal diameter for the S/V ratio calculation,
- Assess migration from pipes with an internal diameter  $\leq$  DN 80 by using pipes as test vessels with a length that provides sufficient migration water for analysis;
- 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;
- 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 drinking water 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**

Prepare test pieces for fittings and ancillaries in the following manner:

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