
Vpliv organskih snovi na pitno vodo - Ugotavljanje zahtevanega klora – Preskusna metoda

Influence of organic materials on water intended for human consumption - Determination of the chlorine demand - Test method

Einfluss organischer Materialien auf Wasser für den menschlichen Gebrauch - Bestimmung der Chlorzehrung - Prüfverfahren

Influence des matériaux organiques sur l'eau destinée à la consommation humaine - Détermination de la demande en chlore - Méthode d'essai

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**Influence of organic materials on water intended for human
consumption - Determination of the chlorine demand - Test
method**

Influence des matériaux organiques sur l'eau destinée à la
consommation humaine - Demande en chlore - Méthode
d'essai

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menschlichen Gebrauch - Bestimmung der Chlorzehrung -
Prüfverfahren

This European Standard was approved by CEN on 30 June 2006.

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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 Central Secretariat has the same status as the official versions.

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Foreword

This document (EN 14718:2006) 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of an identical text or by endorsement, at the latest by February 2007, and conflicting national standards shall be withdrawn at the latest by February 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

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1 Scope

This standard specifies a method for determining the chlorine demand of organic materials intended for use in contact with drinking water.

The standard is applicable to factory made and site applied products used for the distribution, transport and storage of drinking water.

The standard does not cover the use of high levels of chlorine to disinfect products when they are put into service.

2 Normative References

The following referenced documents are indispensable for the application 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 7393-2:2000, *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
chlorine demand
ability of a material in contact with chlorinated water to remove/reduce the concentration of free chlorine (see clause 2.1 of EN ISO 7393-2:2000) in the water compared with a reference sample

3.2
test water
water used for testing purposes prepared with a free-chlorine content as described in 5.2

3.3
rinsing water
test water without added chlorine

3.4
contact water
test water (see 3.2) which has been in contact with a test piece under specified conditions

3.5
blank water
test water (see 3.2) which has been kept at the same specified conditions (e.g. temperature, contact time, contact with any sealing material) as contact water but without contact with the test piece

3.6
flushing water
tap water

3.7**product**

manufactured item, in its finished form

3.8**sample**

one or more units, or a specified quantity of a product, selected from a batch or lot

3.9**test piece**

sample or portion of it which is tested to obtain a single test result

3.10**factory made products**

products made in a factory under controlled conditions as part of the manufacturing process

3.11**site applied products**

manufactured item(s) for application on-site and subsequent contact with water. In this context the product is the final prepared surface that comes into contact with water

4 Principle

Initially test pieces are pre-conditioned by washing and rinsing procedures.

Test pieces are then completely filled with or immersed in test water. This filling or immersion procedure is carried out three times on the same test pieces under specified conditions. After each contact period the contact water is immediately analyzed to determine the residual content of free chlorine. Blank tests without test pieces are undertaken with the same test water to obtain blank water results.

NOTE If the reduction in the free chlorine concentration of the test water in contact with the test material is particularly high, the test will have to be repeated using fresh test samples and a reduced S/V test ratio (see 8.3).

The chlorine demand of the material is based on the difference between the free chlorine content of the contact water (see 3.4) and of the blank water (see 3.5).

5 Reagents**5.1 Sodium hypochlorite solution**

Sodium hypochlorite solution, with a concentration of about 0,1 % by mass of free chlorine determined in accordance with EN ISO 7393-2, to be prepared from a commercial solution of sodium hypochlorite (NaOCl).

As this sodium hypochlorite solution is unstable, it shall be prepared on the day of use.

5.2 Test water

Test water shall have a conductivity of < 2 mS/m and a total organic carbon content (TOC) of $< 0,2$ mg/l C (e.g. prepared by reverse osmosis, deionization or distillation, followed by activated carbon filtration) and the addition of sodium hypochlorite solution (see 5.1) to $(1,0 \pm 0,1)$ mg/l of free chlorine. The test water shall be stable in the absence of light, such that the depletion of free chlorine shall not exceed 0,1 mg/l during the contact period i.e. (72 ± 2) h at (23 ± 2) °C, when stored without contact with a test piece.

5.3 Rinsing water

Test water (see 5.2) without added chlorine.

EN 14718:2006 (E)**5.4 Cleaning liquids for apparatus**

Use one or more of the following cleaning liquids, if appropriate:

- biodegradable detergent;
- hydrochloric acid, 2 mol/l (analytical grade);
- hydrogen peroxide, 3 % vol/vol (analytical grade);
- nitric acid, 1,5 mol/l (analytical grade).

6 Apparatus for Chlorine Demand Assessment**6.1 Materials**

Vessels, containers, connectors and stoppers, shall be made of materials which do not consume free chlorine under the conditions of the test (see annex A).

NOTE Suitable materials include glass and stainless steel.

6.2 Test vessels

Test vessels shall be designed for filling without headspace (ullage). They shall be reserved for chlorine demand testing only and cleaned separately from other items.

6.3 Equipment

Equipment, capable of maintaining the test temperature of $(23 \pm 2)^\circ\text{C}$, for the duration of the test.

7 Procedural Constraints

Unlike migration tests, the chlorine demand test starts with a fixed concentration of free chlorine and a realistic surface area to volume (S/V) ratio according to Tables 1 and 2.

At the end of each contact period there shall be a minimum concentration of free chlorine (see 11.2.3).

NOTE To ensure the results are reliable it is necessary to limit the reduction of free chlorine by fixing a minimum concentration for free chlorine after the contact period. This is achieved by adapting the best surface area to volume (S/V) ratio.

8 Samples of Products and Test Pieces

8.1 Factory made products

8.1.1 General

8.1.1.1 Sampling of products shall be performed in accordance with the relevant product standard, system standard or the national regulations, where applicable.

8.1.1.2 Care shall be taken that the transport conditions shall not influence the test results.

8.1.1.3 If it is necessary to store samples before testing, they shall be protected from contamination. If the manufacturer provides written storage instructions they shall be followed. The samples shall be stored in their original form as delivered.

Where appropriate, storage containers shall be cleaned using the same procedures used for the test containers.

8.1.1.4 For a product where only part of its surface will come into contact with drinking water, the test piece(s) shall be prepared so that only this part of its surface is exposed to the test water (see 5.2).

8.1.1.5 If the preparation procedure for a test piece of a particular type of product has not been covered in this standard, deviation from this procedure is permissible under the following conditions:

- a) product and the test piece shall be produced in the same manner;
- b) preparation of the test pieces before testing shall conform to the procedures, which are performed in practice before the system is put into operation, e.g. curing and cleaning procedures.

8.1.1.6 Ensure that the surface of the test piece(s), which are intended to come into contact with the test water shall be free from adhesive tapes, labels, ink or pencil marks.

8.1.1.7 The minimum age of the test pieces shall conform to the relevant product standard, system standard or, if not given in such a standard, a manufacturer recommendation that the product is ready for use.

8.1.2 Samples and test pieces of factory made products

8.1.2.1 Pipes

For each test, take a specimen of sufficient length from a pipe to give sufficient volume (V) of test water for analysis purposes.

When no difference in the material composition and the production process exists in the range of diameters produced, testing the smallest diameter, where appropriate and with regard to the quantity of test water and the necessary quantity of free chlorine, is sufficient.

8.1.2.2 Other factory made products

8.1.2.2.1 For each test take one or more test pieces of the product and immerse them in a volume of the test water sufficient to provide enough water for the chlorine demand assessment procedure.

In the case when it is not possible to reach the analytical limits given for the chlorine demand assessment, the procedure 8.3 shall be applied, taking into account the calculated S/V ratio.

The test pieces shall have a sufficiently low S/V-ratio to conform the procedural constraints (see 7).