Influence of metallic materials on water intended for human consumption - Method to evaluate the passive behaviour of stainless steels and other passive alloys

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 16056:2023 sisaldab Euroopa standardi EN 16056:2023 ingliskeelset teksti.	This Estonian standard EVS-EN 16056:2023 consists of the English text of the European standard EN 16056:2023.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 31.05.2023.	Date of Availability of the European standard is 31.05.2023.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 67.250

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16056

May 2023

ICS 67.250

Supersedes EN 16056:2012

English Version

Influence of metallic materials on water intended for human consumption - Method to evaluate the passive behaviour of stainless steels and other passive alloys

Influence des matériaux métalliques sur l'eau destinée à la consommation humaine - Méthode d'évaluation du comportement passif des aciers inoxydables et autres alliages passifs

Einfluss metallischer Werkstoffe auf Wasser für den menschlichen Gebrauch - Verfahren zur Ermittlung des Passivverhaltens von nichtrostenden Stählen und anderen Legierungen

This European Standard was approved by CEN on 24 April 2023.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 16056:2023 E

Contents

Page

European foreword

This document (EN 16056:2023) 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 November 2023, and conflicting national standards shall be withdrawn at the latest by November 2023.

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

This document supersedes EN 16056:2012.

EN 16056:2023 includes the following significant technical changes with respect to EN 16056:2012:

— scope extension with alloys with a passive behaviour comparable to stainless steel;

— other sample geometries than sheets have been added.

This document is one of a series of test methods which support associated product standards.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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

Introduction

The test methods in this series are designed to provide information on metal release over time from metallic materials into drinking water.

When tested in a test rig as described in EN 15664-1:2008+A1:2013, stainless steels show very low metal release rates and the resulting metal concentrations in the water are in most cases below the detection limits of available analytical instruments. The reason for these small metal release rates is the formation of a passive layer on the surface on stainless steels.

It was therefore decided to test stainless steels for the properties of the passive layer and not metal release. The material under consideration is tested in an electrochemical test. For verification of the correct performance of the test protocol, the test is also performed in parallel on material 1.4404 which is passive in contact with drinking water but shows a clear pitting potential under the conditions of this test.

The test method is also applicable to alloys having a passive behaviour comparable to that of stainless steels.

This test is terminated when the pitting potential of the material or the break-through potential is reached.

With respect to the potential adverse effects on the quality of water intended for human consumption caused by metallic materials, attention is drawn to the fact that the relevant national regulations remain in force until the adoption of verifiable European acceptance criteria. Water intended for human consumption is hereafter referred to as “drinking water” and means the same as the definition given in Article 2(1) of the Council Directive 98/83/EC on the quality of water intended for human consumption.

This document describes the method to evaluate the passive behaviour of stainless steels and other alloys in contact with water. The passive layer is the cause for the negligible release of metal ions from stainless steels and other alloys into the drinking water.

1 Scope

This document specifies a procedure to evaluate the passive behaviour of stainless steels and other passive alloys used in products intended to come into contact with drinking water.

The passive state is the reason why no relevant amounts of metals are released from such materials into the drinking water. This test is used to verify whether the alloy under consideration is passive under conditions which can occur in drinking waters.

This document is not applicable for product testing. It is only applicable for the assessment of passive behaviour of materials.

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 12502-1:2004, *Protection of metallic materials against corrosion — Guidance on the assessment of corrosion likelihood in water distribution and storage systems — Part 1: General*

EN 15664-1:2008+A1:2013, *Influence of metallic materials on water intended for human consumption — Dynamic rig test for assessment of metal release — Part 1: Design and operation*

EN ISO 8044:2020, *Corrosion of metals and alloys — Vocabulary (ISO 8044:2020)*

EN ISO 17475:2008, *Corrosion of metals and alloys — Electrochemical test methods — Guidelines for conducting potentiostatic and potentiodynamic polarization measurements (ISO 17475:2005/Cor 1:2006)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 8044:2020, EN 12502-1:2004 and EN 15664-1:2008+A1:2013 apply.

4 Test cell

The test equipment shall be used as described in EN ISO 17475:2008. The test cell shall be constructed according to EN ISO 17475:2008, Annex A, flushed port cell. To ensure that the salt concentration remains constant during the test, the test cell shall be modified according to the scheme shown in Figure A.1. This modification allows the chloride content to remain constant despite the addition of the demineralized water by adding a solution with (440 ± 1) mg/l chloride with the same pumping rate. The overflow system is necessary due to the long testing time and the continuous addition of demineralized water and chloride solution.

Depending on the geometry of the material and the test samples, it may be necessary to alter the geometry of the test cell base. If this is the case, it is important that a crevice-free sealing is made to ensure that only pitting corrosion is induced in this cell.

The exposed surface of the material to be tested shall be 5 cm^2 to 10 cm^2.

The pumping rate for the demineralized water and the concentrated chloride solution ((440 ± 1) mg/l, see Figure A.1) shall be adjusted to 6 ml/h to 8 ml/h.

Test solution is in contact to air and agitated.