



**SLOVENSKI STANDARD**  
**oSIST prEN 15664-1:2024**  
**01-september-2024**

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**Vpliv kovinskih materialov na pripravo pitne vode - Dinamično preskuševališče za ocenjevanje izločanja kovin - 1. del: Načrtovanje in delovanje**

Influence of metallic materials on water intended for human consumption - Dynamic rig test for assessment of metal release - Part 1: Design and operation

Einfluss metallischer Werkstoffe auf Wasser für den menschlichen Gebrauch - Dynamischer Prüfstandversuch für die Beurteilung der Abgabe von Metallen - Teil 1: Auslegung und Betrieb

Influence des matériaux métalliques sur l'eau destinée à la consommation humaine - Banc d'essai dynamique pour l'évaluation du relargage de métaux - Partie 1 : Conception et fonctionnement

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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

**oSIST prEN 15664-1:2024**

**en,fr,de**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 15664-1**

July 2024

ICS 67.250

Will supersede EN 15664-1:2008+A1:2013

English Version

## Influence of metallic materials on water intended for human consumption - Dynamic rig test for assessment of metal release - Part 1: Design and operation

Influence des matériaux métalliques sur l'eau destinée à la consommation humaine - Banc d'essai dynamique pour l'évaluation du relargage de métaux - Partie 1 : Conception et fonctionnement

Einfluss metallischer Werkstoffe auf Wasser für den menschlichen Gebrauch - Dynamischer Prüfstandversuch für die Beurteilung der Abgabe von Metallen - Teil 1: Auslegung und Betrieb

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.

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## prEN 15664-1:2024 (E)

### European foreword

This document (prEN 16554-1:2024) 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 15664-1:2008+A1:2013.

This document is Part 1 of a series dealing with the test method to determine the release of metals from metallic products into drinking water comprising:

- Part 1: Design and operation
- Part 2: Test waters

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## Introduction

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

NOTE 1 In respect of potential adverse effects on the quality of water intended for human consumption caused by metallic materials, attention is drawn to relevant national regulations.

NOTE 2 Water intended for human consumption is hereafter referred to as “drinking water” and means the same as the definition given at Article 2(1) of the Council Directive 98/83/EC on the quality of water intended for human consumption.

Part 1 of EN 15664 describes a test method to produce contact waters for the assessment of metal release from metallic materials.

The main application of metallic materials in water supply is within the domestic installation. The test method given in this standard is designed to provide information on metal release over time from metallic materials into drinking water.

The test is based on a programme of alternating periods of once-through flow and stagnation in a rig, simulating the conditions in a domestic distribution system.

The test conditions are more relevant than conditions of continuous through-flow or sit and soak tests and are applicable to all metallic materials in distribution systems.

Internal corrosion of metallic products in water conveying systems generally leads to the build-up of layers, which might or might not be protective. The factors influencing corrosion are described in EN 12502-1. Type and rate of the production of corrosion products and the rate of metal release can depend on:

- characteristics of the metallic material;
- characteristics of the water;
- design and construction of the products and the complete system the products are installed in;
- tightness testing and commissioning of the system;
- operating conditions and duration of operation.

Corrosion product layers begin to form as soon as a metallic material comes into contact with water. Their properties depend on the factors noted above and for a given water/material combination especially on the operating conditions. It is not possible to reproduce the conditions of an actual installation in tests by constant once-through flow or circulation of water. The flow regime (3.17) used in this test simulates the operating conditions in domestic drinking water installations where stagnation times of water considerably exceed the times of through-flow.

An assessment by testing is possible only if the influence of the flow regime (3.17) and the operation period (3.20) is taken into consideration. A compilation of data is needed which has been determined under defined conditions over a prolonged period of time. In most cases, metal release decreases with operation time. For some alloying elements and impurities, however, an increase in their release can be observed.

## prEN 15664-1:2024 (E)

### 1 Scope

This document specifies a procedure to determine the release of metals from metallic materials used in products intended to come into contact with drinking water.

The test can be used for three purposes:

- a) **To assess a material as a reference material for a new category** of materials by metal release testing using the results of several investigations in different waters covering a broad range of water compositions;
- b) **To assess a material for an existing category** for approval by way of metal release testing using the water defined in part 2, which exhibited the highest metal release when the reference material of the category was tested;
- c) To obtain data on the interaction of local water with a material.

### 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 1484, *Water analysis - Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)*

EN 10088-1, *Stainless steels - Part 1: List of stainless steels*

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

EN 15664-2, *Influence of metallic materials on water intended for human consumption - Dynamic rig test for assessment of metal release - Part 2: Test waters*

EN 25813, *Water quality - Determination of dissolved oxygen - Iodometric method (ISO 5813)*

EN ISO 5814, *Water quality - Determination of dissolved oxygen - Electrochemical probe method (ISO 5814)*

EN 27888, *Water quality - Determination of electrical conductivity (ISO 7888)*

EN ISO 6878, *Water quality - Determination of phosphorus - Ammonium molybdate spectrometric method (ISO 6878)*

EN ISO 8044, *Corrosion of metals and alloys - Vocabulary (ISO 8044)*

EN ISO 9963-1, *Water quality - Determination of alkalinity - Part 1: Determination of total and composite alkalinity (ISO 9963-1)*

EN ISO 10304-1, *Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (ISO 10304-1)*

EN ISO 11885, *Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) (ISO 11885)*



EN ISO 14911, *Water quality - Determination of dissolved Li+, Na+, NH<sub>4</sub>+, K+, Mn<sup>2+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, Sr<sup>2+</sup> and Ba<sup>2+</sup> using ion chromatography - Method for water and waste water (ISO 14911)*

EN ISO 15586, *Water quality - Determination of trace elements using atomic absorption spectrometry with graphite furnace (ISO 15586)*

EN ISO 17294-1, *Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 1: General requirements (ISO 17294-1)*

EN ISO 17294-2, *Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes (ISO 17294-2)*

ISO 6058, *Water quality — Determination of calcium content — EDTA titrimetric method*

ISO 6059, *Water quality — Determination of the sum of calcium and magnesium — EDTA titrimetric method*

ISO 9297, *Water quality — Determination of chloride — Silver nitrate titration with chromate indicator (Mohr's method)*

ISO 9964-3, *Water quality — Determination of sodium and potassium — Part 3: Determination of sodium and potassium by flame emission spectrometry*

ISO 10523, *Water quality — Determination of pH*

### 3 Terms and definitions

For the purposes of this document the terms and definitions given in EN ISO 8044, EN 12502-1 and the following apply:

#### 3.1 metal release testing

test for accepting a material with restricted composition as reference material of a new category or for accepting a commercial alloy to an existing category

#### 3.2 test rig

assembly of test lines, control lines and where necessary reference lines together with test water inlet and discharge arrangements

Note 1 to entry: See Annex A, Figure A.1.

#### 3.3 line

continuous part between a check valve and the corresponding flow regulator

#### 3.4 control line

line containing a single length of pipe made of an inert material for the purposes of the test

#### 3.5 test line

line containing test pieces or a test pipe

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### 3.6

#### **reference line**

line containing test pieces each made of the same reference material or line containing a single length of pipe made of a reference material

### 3.7

#### **dummy lines**

pipes made of an inert material for the purposes of the test used for the conditioning run of a newly built test rig

### 3.8

#### **test pipe**

specimen that is representative of a construction product in the form of a pipe for use with drinking water in terms of material composition and surface characteristics

### 3.9

#### **test piece**

specimen that is representative of a construction product, which is not a pipe, for use with drinking water in terms of material composition

Note 1 to entry: See Annex A, Figure A.2.

### 3.10

#### **category**

group of materials with the same metal release characteristics in respect of their application in products and behaviour in contact with drinking water

### 3.11

#### **reference material**

metallic material of a tightly defined composition for which the characteristics of metal release into drinking water are known and reproducible, and are accepted for a category

### 3.12

#### **surface characteristics**

aspects of the surface of a product exposed to the water, which are derived from the production process

### 3.13

#### **local water**

water from a particular supply zone

### 3.14

#### **test water**

water used for testing purposes

### 3.15

#### **contact water**

test water which has been in contact with a test line

### 3.16

#### **control water**

test water which has been in contact with the control line

**3.17****flow regime**

consecutive alternating periods of flow, at a given flow rate, and stagnation of the test water in the test rig

**3.18****representative water sample**

continuous column of water in the test line containing released corrosion products from the test pieces or test pipe uninfluenced by the remainder of the test rig

**3.19****fractional sampling**

method used to check the proper hydraulic function of the rig and to determine the representative volume of the water samples

**3.20****period of operation or operation period ( $T$ )**

period of time, expressed in weeks, during which the flow regime is operated for a particular test

**3.21****stagnation time ( $t$ )**

period of time, expressed in hours, when the test water is static in the test rig

**3.22****run-time curve**

graphical representation of the relationship between the mean of the metal concentration arising from the sampling plan,  $MEP(T)$ , or of the concentration after 4 hours of stagnation, over the period of operation ( $T$ )

**3.23****stagnation curve**

graphical representation of the relationship between the measured metal concentration and the length of the stagnation time ( $t$ ) at a given period of operation ( $T$ )

**4 Principle**

Test pieces or test pipes of a material of defined geometry and given surface characteristics are installed in a test rig which is operated for a period of time under controlled conditions of water quality, temperature and flow regime.

Water samples are taken at specified operation periods after specified stagnation times throughout the whole of the test and analysed for concentrations of relevant metals.

**5 Test rig****5.1 General**

The test rig shall be constructed in accordance with Annex A in addition to the requirements given in this clause.

A test rig shall have: one line for control purposes (5.3); three identical test lines for each material submitted for testing as set out in 5.4.

With the exception of the materials under test, all materials used in the test rig that come into contact with the test water shall be inert for the purposes of the test.