

BS EN ISO 10710:2013



BSI Standards Publication

# Water quality — Growth inhibition test with the marine and brackish water macroalga *Ceramium tenuicorne*

**bsi.**

...making excellence a habit.  
**AVA** Documents™  
Document Sharing Hub

**National foreword**

This British Standard is the UK implementation of EN ISO 10710:2013. It is identical to ISO 10710:2010. It supersedes BS ISO 10710:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EH/3, Water quality.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2013.  
Published by BSI Standards Limited 2013

ISBN 978 0 580 79934 1

ICS 13.060.70

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2010

**Amendments/corrigenda issued since publication**

| Date        | Text affected                                                        |
|-------------|----------------------------------------------------------------------|
| 31 May 2013 | This corrigendum renumbers BS ISO 10710:2010 as BS EN ISO 10710:2013 |

English Version

Water quality - Growth inhibition test with the marine and  
brackish water macroalga *Ceramium tenuicorne* (ISO  
10710:2010)

Qualité de l'eau - Essai d'inhibition de croissance sur la  
macro algue d'eaux marine et saumâtre *Ceramium*  
*tenuicorne* (ISO 10710:2010)

Wasserbeschaffenheit - Bestimmung der  
Wachstumshemmung auf die marine und ästuarine  
Makroalge *Ceramium tenuicorne* (ISO 10710:2010)

This European Standard was approved by CEN on 14 March 2013.

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, 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 United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

## **Foreword**

The text of ISO 10710:2010 has been prepared by Technical Committee ISO/TC 147 "Water quality" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 10710:2013 by Technical Committee CEN/TC 230 "Water analysis" the secretariat of which is held by DIN.

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 October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

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.

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.

### **Endorsement notice**

The text of ISO 10710:2010 has been approved by CEN as EN ISO 10710:2013 without any modification.

## Contents

Page

|                                                                                         |    |
|-----------------------------------------------------------------------------------------|----|
| Introduction.....                                                                       | iv |
| 1 Scope .....                                                                           | 1  |
| 2 Terms and definitions .....                                                           | 1  |
| 3 Principle.....                                                                        | 2  |
| 4 Test organisms, nutrients, media, and materials.....                                  | 2  |
| 5 Cultivation .....                                                                     | 6  |
| 6 Apparatus .....                                                                       | 6  |
| 7 Procedure .....                                                                       | 7  |
| 7.1 Algae material .....                                                                | 7  |
| 7.2 Preparation of dilution water.....                                                  | 8  |
| 7.3 Choice of test concentrations.....                                                  | 8  |
| 7.4 Start of test.....                                                                  | 9  |
| 7.5 Incubation.....                                                                     | 9  |
| 7.6 Measurement .....                                                                   | 9  |
| 7.7 Test with reference substances .....                                                | 9  |
| 8 Validity criteria .....                                                               | 9  |
| 9 Evaluation of results .....                                                           | 10 |
| 9.1 Calculations .....                                                                  | 10 |
| 9.2 Determination of $E_r C_x$ .....                                                    | 10 |
| 9.3 Expression of results .....                                                         | 10 |
| 9.4 Interpretation of results .....                                                     | 11 |
| 10 Reproducibility .....                                                                | 11 |
| 11 Test report.....                                                                     | 11 |
| Annex A (informative) Growth pattern of <i>Ceramium tenuicorne</i> in 7S and 20S.....   | 13 |
| Annex B (informative) Results of ring test with <i>Ceramium tenuicorne</i> at 20 S..... | 16 |
| Bibliography.....                                                                       | 17 |

## Introduction

The red macroalga *Ceramium tenuicorne* belongs to Ceramiaceae, Rhodophyta. The species can be used as a model organism for the near coastal ecosystem. This species is found in temperate marine waters in both the northern and southern hemispheres and is thus relevant for large areas. As primary producers, they are a food source for many invertebrates and serve as living habitat for bacteria, invertebrates, and juvenile fish. They also serve as substrate for many oviparous fish species.

# Water quality — Growth inhibition test with the marine and brackish water macroalga *Ceramium tenuicorne*

**WARNING** — Persons using this International Standard should be familiar with normal laboratory practice. This International Standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

**IMPORTANT** — It is absolutely essential that tests conducted according to this International Standard be carried out by suitably trained staff.

## 1 Scope

This International Standard specifies a method for the determination of the inhibition of growth of the macroalga *Ceramium tenuicorne* by substances and mixtures contained in seawater or by waste water with salinities between 4S and 32S. This method is applicable to substances that are easily soluble in water.

**NOTE** With modifications as described in ISO 14442<sup>[4]</sup> and ISO 5667-16<sup>[2]</sup>, the inhibitory effects of poorly soluble organic and inorganic materials, volatile compounds, metals, waste water, marine water samples, and elutriates of sediments can be tested.

## 2 Terms and definitions

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

### 2.1

#### **algal length**

length from the first division to the most distant tip of the plant

**NOTE** The algal length is expressed in millimetres.

See Figure 1.

### 2.2

#### **control medium**

combination of dilution water and/or nutrient medium used in the test

[ISO 20079:2005<sup>[5]</sup>, 3.6]

### 2.3

#### **control batch**

control medium including organisms used for testing

[ISO 20079:2005<sup>[5]</sup>, 3.5]

### 2.4

#### **effective concentration**

$E_{r,x}$

concentration of test sample at which an effect of  $x$  % is measured, if compared to the control

[ISO 20079:2005<sup>[5]</sup>, 3.9]

## 2.5

### growth medium

mixture of natural seawater and nutrients in which algal plants are cultivated, which is used for pre-cultures

NOTE Adapted from ISO 8692:2004<sup>[3]</sup>, 3.3.

## 2.6

### growth rate

$\mu$

(water quality) proportional rate of increase in algal length per day

NOTE See Clause 9.

## 2.7

### salinity

#### practical salinity

$S$

(seawater) ratio  $K_{15}$  of the electrical conductivity of the seawater sample, at the temperature of 15 °C and a pressure of one standard atmosphere, to that of a potassium chloride solutions in which the mass fraction of KCl is  $32,435\ 6 \times 10^{-3}$ , at the same temperature and pressure

NOTE Adapted from Reference [14], p. 12.

## 2.8

### test medium

mixture of seawater, nutrients and test sample

NOTE Adapted from ISO 8692:2004<sup>[3]</sup>, 3.5.

## 2.9

### test sample

(water quality) aqueous sample, e.g. chemical substance, mixture of chemicals or waste water, for which the inhibitory effects on the growth of algae are determined

NOTE Adapted from ISO 8692:2004<sup>[3]</sup>, 3.4.

## 3 Principle

Algal tips from monocultures of ceramium female gametophytes are grown in defined test conditions and in a defined medium containing a range of concentrations of the test sample. The test solutions are incubated for a period of 7 d after which the increase in length is measured and the growth rate is calculated. The growth inhibition is determined as a reduction in growth rate, relative to control cultures grown under identical conditions.

When toxicity of samples is to be compared to the toxicity of other chemicals or waste waters, tests can be performed in artificial seawater. If the purpose of the testing is to assess and to predict effects in a specific receiving water body, the tests can be conducted with algae adapted to the salinity in the receiving water body. In this case, natural seawater from an uncontaminated site of the same properties is used.

## 4 Test organisms, nutrients, media, and materials

Unless otherwise stated, use only reagents of recognized analytical grade and distilled or demineralized water or water of equivalent purity.