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**Alge in izdelki iz alg - Metode za določanje produktivnosti rastišč alg**

Algae and algae products - Methods for the determination of productivity of algae growth sites

Algen und Algenprodukte - Methoden zur Bestimmung der Produktivität von Algenwachstumsstandorten

Algues et produits à base d'algues - Méthodes de détermination de la productivité des sites de croissance d'algues

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**ICS:**

13.020.55

Biološki izdelki

Biobased products

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English Version

# Algae and algae products - Methods for the determination of productivity of algae growth sites

Algues et produits à base d'algues - Méthodes de détermination de la productivité des sites de croissance d'algues

Algen und Algenprodukte - Methoden zur Bestimmung der Produktivität von Algenwachstumsstandorten

This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 454.

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.

This draft European Standard was established by CEN 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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

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## European foreword

This document (prEN 17480:2020) has been prepared by Technical Committee CEN/TC 454 “Algae and algae products”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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## Introduction

This document has been prepared by the experts of CEN/TC 454 'Algae and algae products'.

The European Committee for Standardisation (CEN) was requested by the European Commission (EC) to draft European standards or European standardisation deliverables to support the implementation of Article 3 of Directive 2009/28/EC for algae and algae-based products or intermediates.

This request, presented as Mandate M/5471, also contributes to the Communication on "Innovating for Sustainable Growth: A Bio economy for Europe".

The former working group CEN Technical Board Working Group 218 "Algae", was created in 2016 to develop a work programme as part of this Mandate. The technical committee CEN/TC 454 'Algae and algae products' was established to carry out the work programme that will prepare a series of standards.

The interest in algae and algae-based products or intermediates has increased significantly in Europe as a valuable source including but not limited to, carbohydrates, proteins, lipids, and several pigments. These materials are suitable for use in a wide range of applications from food and feed purposes to other sectors, such as textile, cosmetics, biopolymers, biofuel and fertilizer/biostimulants. Standardisation was identified as having an important role in order to promote the use of algae and algae products.

The work of CEN/TC 454 should improve the reliability of the supply chain, thereby improving the confidence of industry and consumers in algae, which include macroalgae, microalgae, cyanobacteria, Labyrinthulomycetes, algae-based products or intermediates and will promote and support commercialisation of the European algae industry.

In industry and science many different measures for productivity can be found. This makes comparison unrealistic.

The goal of this document is to allow for a comparison between productivity of different algae growth sites. The specification of the area in a wild growth site where macroalgae are growing in nature without human interference, except when harvesting, is misleading for the calculation of productivity as many factors influence the growth (e.g. currents, mixture of species, natural regeneration cycles, etc.). For an investigation on the productivity and its sustainability of an aquatic ecosystem an area estimation is possible, but this exceeds the scope of this document.

The reasons to compare algae growth sites can be different. For example, there might be the interest to buy a cultivation unit or to invest in a company which produces algae. Or there might be sustainability issues and life-cycle-analysis (LCA) which need to rely on a common way to calculate the productivity and thereby the area.

With EN ISO 14040 and EN ISO 14044 complete standards on LCA and sustainability for algae already exist. The parameter which is not clearly defined in these standards is the accounting of the productivity area (or volume) of algae growth sites. The way the area is calculated can have a huge impact on the productivity per area. Because of this, a great part of this document is on the definition of area.

A flowchart is provided to estimate if it is possible to utilize the general area definition of this document.

In comparison to land-based agriculture, the productivity of algae growth sites can be defined over several time periods. This allows to calculate productivity of algae growth sites also over periods which are less than one year.

Whenever possible, for comparability reasons, it is advisable to use the achieved production data to calculate the productivity for every time period that is defined in this document.

## 1 Scope

This document specifies the methods to be used for the determination of productivity of algae growth sites.

This document excludes methods for sampling, harvesting and pre-/postprocessing. Excluded as well is 'wild growth', which is defined as algae growing in nature without human interference except when harvesting the algae.

## 2 Normative references

The following document is 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.

FprEN 17399, *Algae and algaebased products or intermediates – Terms and definitions*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions in FprEN 17399 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1

#### **cultivation (of algae)**

process of growing and harvesting algae

### 3.2

#### **controlled growth**

algae growing in a (partly) controlled environment

### 3.3

#### **wild growth**

algae growing in nature without human interference except when harvesting the algae

### 3.4

#### **cultivation unit**

equipment in which algae are cultivated, e.g. photobioreactors or open ponds

### 3.5

#### **natural basin**

enclosed or sheltered area of water in nature in which algae are cultivated

### 3.6

#### **natural site**

area of open water in nature where algae are cultivated

### 3.7

#### **insolate**

to expose to sunlight

**prEN 17480:2020 (E)****3.8****algae growth site**

insolated area of a single or multiple algae cultivation unit(s)

**3.9****production area**

insolated horizontal surface of the cultivation medium

Note 1 to entry: If the non-horizontal system consists only of one row see Annex A.

Note 2 to entry: Wild growth areas are excluded.

**3.10****productivity**

quantity of algae harvested during a specified period of time and over a specified area or volume

**3.11****peak productivity**

indicates the maximum productivity obtained in a certain period of time

**3.12****yearly productivity**

indicates the average productivity obtained during one year

**3.13****net productivity**

indicates the average productivity obtained during the operative time

**3.14****operative time**

period that the algae production is in progress

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**4 Productivity****4.1 Parameters specific to algae productivity****4.1.1 Area aspect**

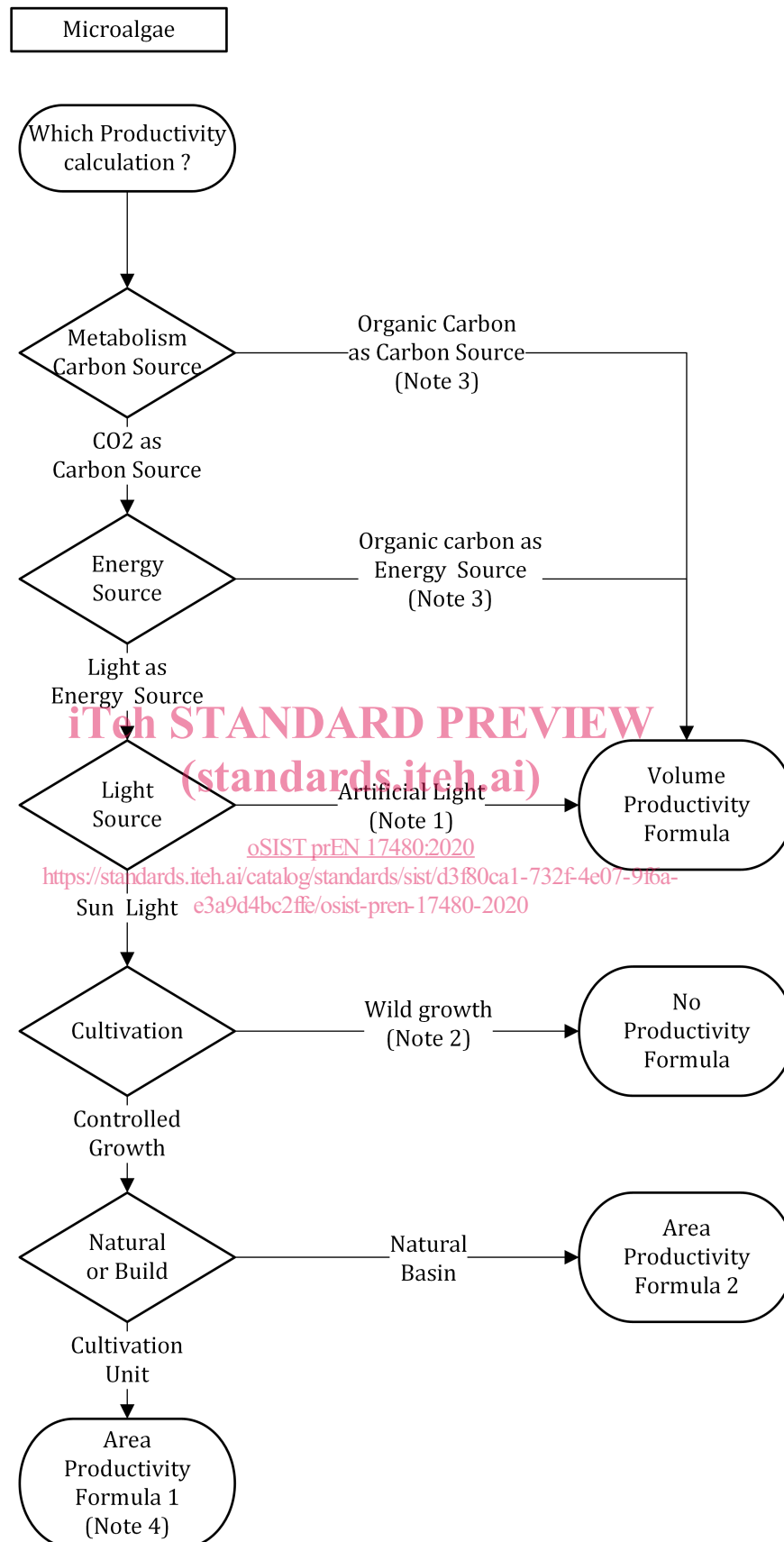
The type of algae, and therefore the production methods, covered by this standard are very diverse. The types of algae are specified in FprEN 17399. Not all production alternatives have the same prerequisites and are therefore not comparable. To help to decide whether a production method is applicable for an area calculation, and thereby an area productivity calculation, a flowchart was developed.

By going through the characteristics of the production method the indication is given, if an area definition is possible and therefore an area productivity can be calculated.

The flowchart is divided into (Figure 1) microalgae, cyanobacteria, Labyrinthulomycetes and (Figure 2) macroalgae.

For microalgae the parameters light source, cultivation and metabolism have to be checked. Additionally explanatory notes are added for both figures.





NOTE 1 As the energy source light is produced artificially outside of the system any reference to insolated area could be misleading.