

Fat and oil derivatives - Fatty Acid Methyl Esters (FAME)  
- Determination of oxidation stability (accelerated  
oxidation test)

## EESTI STANDARDI EESSÕNA

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English Version

**Fat and oil derivatives - Fatty Acid Methyl Esters (FAME) -  
Determination of oxidation stability (accelerated oxidation  
test)**

Produits dérivés des corps gras - Esters méthyliques  
d'acides gras (EMAG) - Détermination de la stabilité à  
l'oxydation (Essai d'oxydation accélérée)

Erzeugnisse aus pflanzlichen und tierischen Fetten und  
Ölen - Fettsäure-Methylester (FAME) - Bestimmung  
der Oxidationsbeständigkeit (Beschleunigte  
Oxydationsprüfung)

This European Standard was approved by CEN on 8 July 2016.

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## European foreword

This document (EN 14112:2016) has been prepared by Technical Committee CEN/TC 307 "Oilseeds, vegetable and animal fats and oils and their by-products - Methods of sampling and analysis", 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of an identical text or by endorsement, at the latest by March 2017, and conflicting national standards shall be withdrawn at the latest by March 2017.

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 14112:2003.

Significant changes between this document and EN 14112:2003 are:

- a) the limitation of the scope of the method to a maximum induction period of 48 h, reflecting the precision range of the method;
- b) indication of a potential alteration of the induction period in the presence of cetane enhancers;
- c) editorial changes in order to clarify the test procedure;
- d) addition of Clause 2 – Normative references;
- e) addition of Clause 11 – Expression of results;
- f) background information on the method added as Annex A.

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, 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.

## Introduction

This document is based on EN 14112:2003, which was specifically adapted for the determination of oxidation stability of fatty acid methyl esters (FAME). This method had been developed under CEN/TC 307 (Fats and oils).

The modifications as given in this document address the field experience with this method made since its introduction as a standard test method. Editorial changes are made in order to specify some aspects of the test. Additionally, the cleaning procedure is modified based on field experience.

## 1 Scope

This European Standard specifies a method for the determination of the oxidation stability of fatty acid methyl esters (FAME) at 110 °C, by means of measuring the induction period up to 48 h.

NOTE 1 EN 15751 [1] describes a similar test method for oxidation stability determination of pure fatty acid methyl esters and of blends of FAME with petroleum-based diesel containing 2 % (V/V) of FAME at minimum.

NOTE 2 The precision statement of this test method was determined in a Round Robin exercise with induction periods up to 8,5 h, thus covering the limit value in EN 14214. Results from precision studies on EN 15751 indicate that the precision statement is valid for induction periods up to 48 h but not for higher values.

NOTE 3 Limited studies on EN 15751 with EHN (2-ethyl hexyl nitrate) on FAME blends indicated that the stability is reduced to an extent which is within the reproducibility of the test method. It is likely that the oxidation stability of pure FAMEs is also reduced in the presence of EHN when EN 14112 is used for testing.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 3170, *Petroleum liquids - Manual sampling (ISO 3170)*

EN ISO 3171, *Petroleum liquids - Automatic pipeline sampling (ISO 3171)*

## 3 Terms and definitions

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

### 3.1

#### **induction period**

time which passes between the moment when the measurement is started and the moment when the formation of oxidation products begins to increase rapidly

### 3.2

#### **oxidation stability**

induction period determined according to the procedure specified in this European Standard, expressed in hours

## 4 Principle

A stream of purified (dried) air is passed through the sample which has been heated to the target temperature which is 110 °C in the usual application of the method. Volatile compounds are formed during the oxidation process. They are, passed together with the air into a flask containing demineralized or distilled water, equipped with a conductivity electrode. The electrode is connected to a measuring and recording device. It indicates the end of the induction period by rapid increase of the conductivity due to the dissociation of volatile carboxylic acids produced during the oxidation process and absorbed in the water. For more details on the background of the method see Annex A.