

**Geotextiles and geotextile-related products
- Screening test method for determining the
resistance to oxidation**

Geotextiles and geotextile-related products -
Screening test method for determining the
resistance to oxidation

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 13438:2005 sisaldab Euroopa standardi EN ISO 13438:2004 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 25.01.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 13438:2005 consists of the English text of the European standard EN ISO 13438:2004.</p> <p>This document is endorsed on 25.01.2005 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p>Käsitlusala:</p> <p>This International Standard specifies a screening test method for determining the resistance of geotextiles and geotextile-related products to oxidation. The test is applicable to polypropylene- and polyethylene-based products. The data are suitable for screening purposes but not for deriving performance data such as lifetime unless supported by further evidence.</p>	<p>Scope:</p> <p>This International Standard specifies a screening test method for determining the resistance of geotextiles and geotextile-related products to oxidation. The test is applicable to polypropylene- and polyethylene-based products. The data are suitable for screening purposes but not for deriving performance data such as lifetime unless supported by further evidence.</p>
---	---

ICS 59.080.70

Võtmesõnad:

English version

Geotextiles and geotextile-related products
Screening test method for determining the resistance to oxidation
(ISO 13438 : 2004)

Géotextiles et produits apparentés –
Méthode de détermination de la résis-
tance à l'oxydation (ISO 13438 : 2004)

Geotextilien und geotextilverwandte
Produkte – Auswahlprüfverfahren zur
Bestimmung der Oxidationsbestän-
digkeit (ISO 13438 : 2004)

This European Standard was approved by CEN on 2004-10-04.

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 Management Centre or to any CEN member.

The European Standards exist 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 Management Centre has the same status as the official versions.

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

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Management Centre: rue de Stassart 36, B-1050 Brussels

Foreword

International Standard

ISO 13438 : 2004 Geotextiles and geotextile-related products – Screening test method for determining the resistance to oxidation,

which was prepared by ISO/TC 221 'Geosynthetics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 189 'Geosynthetics', the Secretariat of which is held by BSI, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by May 2005 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 13438 : 2004 was approved by CEN as a European Standard without any modification.

Contents

Page

Foreword	2
Introduction	3
1 Scope	4
2 Normative references	4
3 Methods A1, A2, B1 and B2	4
3.1 Principle	4
3.2 Specimens	5
3.3 Apparatus	5
3.4 Conditioning	5
3.5 Test procedure	5
4 Methods C1 and C2	6
4.1 Principle	6
4.2 Apparatus and reagents	6
4.3 Test procedure	7
5 Determination of mechanical properties	8
6 Test report	9
Annex A (informative) Background information on oxidation processes and oxidation measurements	10
Bibliography	12

Introduction

In many civil engineering applications geotextiles and geotextile-related products may come into contact with water or aqueous solutions present in the soil environment. At the same time, in specific parts of the construction, they may be exposed to oxygen, giving rise to oxidative degradation processes. These processes are usually very slow.

Polyolefin materials such as polypropylene (PP) and polyethylene (PE) are inherently more sensitive to oxidation than those based on polyethylene terephthalate (PET). This behaviour can be improved very effectively by the use of appropriate stabilizing additives.

It is the purpose of this international standard to provide a method for screening the resistance to oxidation of geotextiles and geotextile-related products in service up to 25 years. In order to achieve the sufficiently short exposure times needed for screening tests, it is necessary to accelerate the oxidative degradation process. This acceleration can be achieved either by raising the temperature or by increasing the concentration of the active reaction partner. Raising the temperature may lead to the oxidation rate being limited by oxygen diffusion, thus invalidating the acceleration. This applies particularly to materials with a low surface-to-volume ratio and less to nonwovens made from fine fibres. Two methods are therefore proposed.

Methods A1, A2, B1 and B2 use temperature alone as the accelerating factor.

Methods C1 and C2 operate at moderately high temperatures and at the same time the oxygen concentration is increased by using pure oxygen at high pressure.

Each test may be performed at a shorter duration for non-reinforcing materials (A1, B1, C1) or for a longer duration for reinforcing materials (A2, B2, C2).

NOTE This International Standard should be used with reference to ISO/TR 13434. For further information see Annex A.

1 Scope

This International Standard specifies a screening test method for determining the resistance of geotextiles and geotextile-related products to oxidation. The test is applicable to polypropylene- and polyethylene-based products.

The data are suitable for screening purposes but not for deriving performance data such as lifetime unless supported by further evidence.

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.

ISO 188:1998, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

EN 12226, *Geotextiles and geotextile-related products — General tests for evaluation following durability testing*

3 Methods A1, A2, B1 and B2

3.1 Principle

Test specimens are exposed to an elevated temperature in air over a fixed time period, using a regulated laboratory oven without forced air circulation.

Oven ageing on polypropylene shall be carried out at a temperature of $(110 \pm 1) ^\circ\text{C}$ (Methods A1 and A2).

Oven ageing of polyethylene shall be carried out at a temperature of $(100 \pm 1) ^\circ\text{C}$ (Methods B1 and B2).

The test specimens shall hang freely in the oven space.

After the fixed time period of oven ageing, the exposed test specimens are submitted to a tensile test. The tensile strength and the strain at maximum load are measured for both the control specimens and the exposed specimens. The tensile test shall be carried out in accordance with EN 12226. For woven fabrics both the machine and cross direction shall be tested, unless otherwise agreed.