

---

---

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

*Géotextiles et produits apparentés — Méthode de détermination de la  
résistance à l'oxydation*



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS

© ISO 2004

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

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

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13438 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 189, *Geosynthetics* in collaboration with Technical Committee ISO/TC 221, *Geosynthetics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

## 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.

This document is a preview generated by EVS

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

## 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.