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Geosynthetics — Screening test method for determining the resistance of geotextiles and geotextile-related products to oxidation

Géosynthétiques — Méthode de détermination de la résistance des géotextiles et produits apparentés à l'oxydation

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 221, *Geosynthetics*.

This second edition cancels and replaces the first edition (ISO 13438:2004), which has been technically revised. The main changes compared to the previous edition are as follows:

— procedural guidance regarding the use of exposure ovens has been added;

— procedural guidance regarding the use of autoclaves has been added.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

In many civil engineering applications, geotextiles and geotextile-related products can come into contact with water or aqueous solutions present in the soil environment. At the same time, in specific parts of the construction, they can 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). Other polymers, such as poly(vinyl alcohol) (PVAL according to ISO 1043-1), are also sensitive to oxidation in specific conditions (aqueous media with oxidizing agent). This behaviour can be improved very effectively by the use of appropriate stabilizing additives.

It is the purpose of this document to provide a method for screening the resistance to oxidation of geotextiles and geotextile-related products in service for 25, 50 and 100 years. In order to achieve the sufficiently short exposure times needed for screening tests, the oxidative degradation process is accelerated. This acceleration can be achieved either by raising the temperature or by increasing the concentration of the active reaction partner. Raising the temperature can 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.

Method A (which was Method B in the previous edition) uses temperature alone as the accelerating factor and is used for PE, PP, PA and AR.

Method B operates at moderately high temperatures and, at the same time, the oxygen concentration is increased by using pure oxygen at high pressure. Method B is used for PVAL.

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Geosynthetics — Screening test method for determining the resistance of geotextiles and geotextile-related products to oxidation

1 Scope

This document specifies a screening test method for determining the resistance of geotextiles and geotextile-related products to oxidation. The test is applicable to products as follows:

— **Method A** for material consisting solely in polypropylene (PP), polyethylene (PE), polyamide (PA), aramide (AR);

— **Method B** for material consisting solely in polyvinyl alcohol (PVAL).

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 documents are 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.

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 Terms and definitions

No terms and definitions are listed in this document.

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 http://www.electropedia.org/

4 Method A

4.1 Principle

Test specimens are stored in water (Grade 3 or better according to ISO 3696) at 80 °C for 28 days before being exposed to an elevated temperature in air over a fixed time period, using a regulated laboratory oven as described in 4.3. Oven ageing shall be carried out at a temperature of (100 ± 1) °C.

NOTE In the previous edition, the only difference between Methods A and B was the temperature (100 °C and 110 °C). With this revision, this difference was deleted.

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

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