

**Geosüntettked. Nõutavad omadused kasutamiseks  
hoidlate ja tammide ehitusel**

**Geosynthetic barriers - Characteristics required for use  
in the construction of reservoirs and dams**

## EESTI STANDARDI EESSÕNA

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ICS 59.080.70, 91.100.50

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English Version

## Geosynthetic barriers - Characteristics required for use in the construction of reservoirs and dams

Géomembranes, géosynthétiques bentonitiques -  
Caractéristiques requises pour l'utilisation dans la  
construction des réservoirs et des barrages

Geosynthetische Dichtungsbahnen - Eigenschaften, die für  
die Anwendung beim Bau von Rückhaltebecken und  
Staudämmen erforderlich sind

This European Standard was approved by CEN on 23 May 2013.

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 CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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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## Foreword

This document (EN 13361:2013) has been prepared by Technical Committee CEN/TC 189 "Geosynthetics", the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by January 2014, and conflicting national standards shall be withdrawn at the latest by January 2014.

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

This document supersedes EN 13361:2004.

The following technical changes were introduced in comparison with the previous edition:

- The normative references were updated.
- Table 1 was revised.
- "Chemical resistance" was added to Clause 4.
- "Release of dangerous substances" was added to Clause 4.
- Annex A revised: "raw or incoming material" and Tables A.1 to A.3 were added.
- Annex B was revised.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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 allows manufacturers to describe geosynthetic barriers on the basis of declared values for characteristics relevant to the intended use and if tested to the specified method. It also includes procedures for evaluation of conformity and factory production control.

This document can also be used by designers, end-users and other interested parties as a tool to define relevant and appropriate characteristics for specifications and on-site quality control. It should be emphasised that not all characteristics and test methods quoted in this document are suitable for the purpose of on-site quality control.

Tests for some non-mandated characteristics are still under study and will be included when the standard is revised.

The term “product” used in this document refers to a geosynthetic barrier, including polymeric geosynthetic barriers, clay geosynthetic barriers and bituminous geosynthetic barriers.

This document is part of a group of standards, addressing the requirements for geosynthetic barriers when used in a specific application.

Particular application cases can contain requirements about additional properties and – preferably standardised – test methods, if they are technically relevant and not conflicting with European Standards.

The design life of the product should be determined, since its function may be temporary, as construction expediency, or permanent, for the lifetime of the structure.

## 1 Scope

This European Standard specifies the relevant characteristics of geosynthetic barriers, including polymeric geosynthetic barriers, clay geosynthetic barriers and bituminous geosynthetic barriers, to be used as fluid barriers for potable, fresh or saline water, in the construction of reservoirs and dams, and the appropriate test methods to determine these characteristics.

The intended use of these products is to control the leakage of water through the construction.

This European Standard is not applicable to geotextiles or geotextile-related products.

This European Standard provides for the evaluation of conformity of the product to this document.

This European Standard defines requirements to be met by manufacturers and their authorised representatives with regard to the presentation of product properties.

This European Standard does not cover applications where the geosynthetic barrier is to be in contact with water that has been treated for human consumption.

Where potable water is or may be in direct contact with the product the designer should also refer to other relevant standards, requirements and/or regulations.

## 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 495-5, *Flexible sheets for waterproofing — Determination of foldability at low temperature — Part 5: Plastic and rubber sheets for roof waterproofing*

EN 1109, *Flexible sheets for waterproofing — Bitumen sheets for roof waterproofing — Determination of flexibility at low temperature*

EN 1849-1, *Flexible sheets for waterproofing — Determination of thickness and mass per unit area — Part 1: bitumen sheets for roof waterproofing*

EN 1849-2, *Flexible sheets for waterproofing — Determination of thickness and mass per unit area — Part 2: Plastic and rubber sheets*

EN 1844, *Flexible sheets for waterproofing — Determination of resistance to ozone — Plastic and rubber sheets for roof waterproofing*

EN 12224, *Geotextiles and geotextile-related products — Determination of the resistance to weathering*

EN 12225, *Geotextiles and geotextile-related products — Method for determining the microbiological resistance by a soil burial test*

EN 12310-1, *Flexible sheets for waterproofing — Part 1: Bitumen sheets for waterproofing — Determination of resistance to tearing (nail shank)*

EN 12311-1, *Flexible sheets for waterproofing — Part 1: Bitumen sheets for roof waterproofing — Determination of tensile properties*

EN 12311-2, *Flexible sheets for waterproofing — Determination of tensile properties — Part 2: Plastic and rubber sheets for roof waterproofing*



- EN 13362, *Geosynthetic barriers — Characteristics required for use in the construction of canals*
- EN 13491, *Geosynthetic barriers — Characteristics required for use as a fluid barrier in the construction of tunnels and underground structures*
- EN 13492, *Geosynthetic barriers — Characteristics required for use in the construction of liquid waste disposal sites, transfer stations or secondary containment*
- EN 13493, *Geosynthetic barriers — Characteristics required for use in the construction of solid waste storage and disposal sites*
- EN 14150, *Geosynthetic barriers — Determination of permeability to liquids*
- EN 14151, *Geosynthetics — Determination of burst strength*
- EN 14196, *Geosynthetics — Test methods for measuring mass per unit area of clay geosynthetic barriers*
- EN 14414, *Geosynthetics — Screening test method for determining chemical resistance for landfill applications*
- EN 14415, *Geosynthetic barriers — Test method for determining the resistance to leaching*
- CEN/TS 14416, *Geosynthetic barriers — Test method for determining the resistance to roots*
- CEN/TS 14417, *Geosynthetic barriers — Test method for the determination of the influence of wetting-drying cycles on the permeability of clay geosynthetic barriers*
- CEN/TS 14418, *Geosynthetic barriers — Test method for the determination of the influence of freezing-thawing cycles on the permeability of clay geosynthetic barriers*
- EN 14575, *Geosynthetic barriers — Screening test method for determining the resistance to oxidation*
- EN 14576, *Geosynthetics — Test method for determining the resistance of polymeric geosynthetic barriers to environmental stress cracking*
- EN 15382, *Geosynthetic barriers — Characteristics required for use in transportation infrastructure*
- EN 16416, *Geosynthetic clay barriers — Determination of water flux index — Flexible wall permeameter method at constant head*
- EN ISO 527-1:2012, *Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1:2012)*
- EN ISO 527-3:1995, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets (ISO 527-3:1995)*
- EN ISO 527-4:1997, *Plastics — Determination of tensile properties — Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites (ISO 527-4:1997)*
- EN ISO 9862, *Geosynthetics — Sampling and preparation of test specimens (ISO 9862)*
- EN ISO 9863-1, *Geosynthetics — Determination of thickness at specified pressures — Part 1: Single layers (ISO 9863-1)*
- EN ISO 9864, *Geosynthetics — Test method for the determination of mass per unit area of geotextiles and geotextile-related products (ISO 9864)*
- EN ISO 10318:2005, *Geosynthetics — Terms and definitions (ISO 10318:2005)*

EN ISO 10319, *Geotextiles — Wide-width tensile test (ISO 10319)*

EN ISO 10320, *Geotextiles and geotextile-related products — Identification on site (ISO 10320)*

EN ISO 11358, *Plastics — Thermogravimetry (TG) of polymers — General principles (ISO 11358)*

EN ISO 12236, *Geosynthetics — Static puncture test (CBR test) (ISO 12236)*

EN ISO 12957-1, *Geosynthetics — Determination of friction characteristics — Part 1: Direct shear test (ISO 12957-1)*

EN ISO 12957-2, *Geosynthetics — Determination of friction characteristics — Part 2: Inclined plane test (ISO 12957-2)*

EN ISO 13438, *Geotextiles and geotextile-related products — Screening test method for determining the resistance to oxidation (ISO 13438)*

ISO 34-1, *Rubber, vulcanized or thermoplastic — Determination of tear strength — Part 1: Trouser, angle and crescent test pieces*

ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

ASTM D696, *Standard test method for coefficient of linear thermal expansion of plastics between -30 °C and 30 °C*

ASTM D5890, *Standard test method for swell index of clay mineral component of geosynthetic clay liners*

ASTM D6141, *Standard guide for screening clay portion of geosynthetic clay liner (GCL) for chemical compatibility to liquids*

### **3 Terms, definitions and abbreviations**

#### **3.1 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN ISO 10318:2005 and the following apply.

##### **3.1.1**

##### **product**

geosynthetic barrier, including polymeric, bituminous and clay barriers

##### **3.1.2**

##### **specification**

any document in which the works, functions, specific conditions and required material property values of the geosynthetic barrier of use are described

##### **3.1.3**

##### **reservoir**

naturally occurring space or construction for storage, regulation and control of water

##### **3.1.4**

##### **dam**

barrier constructed to hold back water to raise its level, form a reservoir or reduce or prevent flooding

##### **3.1.5**

##### **upstream face**

face of a dam that is normally in contact with the enclosed water