SLOVENSKI STANDARD
SIST EN 13491:2005

01-marec-2005

Geosintetične zapore - Zahtevane lastnosti pri uporabi za zaščito pred tekočinami pri gradnji predorov in pri podzemnih gradnjah

Geosynthetic barriers - Characteristics required for use as a fluid barrier in the construction of tunnels and underground structures

Geosynthetische Dichtungsbahnen - Eigenschaften, die für die Anwendung beim Bau von Tunneln und Tiefbauwerken erforderlich sind

Géomembranes, géosynthétiques bentonitiques - Caractéristiques requises pour l' utilisation dans la construction des tunnels et ouvrages souterrains

Ta slovenski standard je istoveten z: **EN 13491:2004**

ICS:

59.080.70	Geotekstilije	Geotextiles
93.060	Gradnja predorov	Tunnel construction

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EUROPEAN STANDARD

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EN 13491

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ICS 59.080.70; 91.100.50

English version

Geosynthetic barriers - Characteristics required for use as a fluid barrier in the construction of tunnels and underground structures

Barrières géosynthétiques - Caractéristiques requises pour l'utilisation comme barrière contre les liquides dans la construction des tunnels et des structures souterraines

Geosynthetische Dichtungsbahnen - Eigenschaften, die für die Anwendung beim Bau von Tunneln und Tiefbauwerken erforderlich sind

This European Standard was approved by CEN on 17 March 2003.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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Contents

Page

Foreword

This document (EN 13491:2004) has been prepared by Technical Committee CEN/TC 189 “Geosynthetics”, the secretariat of which is held by IBN.

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 February 2005, and conflicting national standards shall be withdrawn at the latest by May 2006.

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 organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and 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 however 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 a construction expediency, or permanent, for the lifetime of the structure.

1 Scope

This document specifies the relevant characteristics of geosynthetic barriers, including polymeric geosynthetic barriers, clay geosynthetic barriers and bituminous geosynthetic barriers, when used as fluid barriers in the construction of tunnels and underground structures, 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 wall.

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

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

This document defines requirements to be met by manufacturers and distributors with regard to the presentation of product properties.

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

NOTE: 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 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.

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

EN 963 — *Geotextiles and geotextile-related products – Sampling and preparation of test specimens*

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

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 13361	*Geosynthetic barriers – Characteristics required for use in the construction of reservoirs and dams*
prEN 13362	*Geosynthetic barriers – Characteristics required for use in the construction of canals*
EN 13492	*Geosynthetic barriers – Characteristics required for use in construction of liquid waste disposal sites, transfer stations or secondary containment*
prEN 13493	*Geosynthetic barriers – Characteristics required for use in the construction of solid waste storage and disposal sites, and storages for hazardous solid materials*
prEN 14150	*Geosynthetic barriers – Determination of permeability to liquids*
prEN 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*
prCEN/TS 14416	*Geosynthetic barriers — Test method for determining the resistance to roots*
prEN 14417	*Geosynthetic barriers – Test method for the determination of the influence of wetting-drying cycles on the permeability of clay geosynthetic barriers*
prEN 14418	*Geosynthetic barriers – Test method for the determination of the influence of freezing-thawing cycles on the permeability of clay geosynthetic barriers*
prEN 14575	*Geosynthetic barriers – Screening test method for determining the resistance to oxidation*
prEN ISO 10318:2002	*Geosynthetics – Geotextiles, geotextile-related products, geomembranes and geosynthetic clay liners – Terms and their definitions (ISO/DIS 10318:2000)*
EN ISO 10319	*Geotextiles – Wide-width tensile test (ISO 10319:1993)*
EN ISO 10320	*Geotextiles and geotextile-related products – Identification on site (ISO 10320:1999)*
EN ISO 11925-2	*Reaction to fire tests – Ignitability of building products subjected to direct impingement of flame – Part 2: Single-flame source test (ISO 11925-2:2002)*
EN ISO 12236	*Geotextiles and geotextile-related products – Static puncture test (CBR-Test) (ISO 12236:1996)*

prEN ISO 13438	*Geotextiles and geotextile-related products – Screening test method for determining the resistance to oxidation at elevated oxygen pressure (ISO/DIS 13438:2002)*
ISO 34	*Plastics - Tear strength*
ISO R 527-1	*Plastics -- Determination of tensile properties -- Part 1: General principles*
ISO R 527-3	*Plastics -- Determination of tensile properties -- Part 3: Test conditions for films and sheets*
ASTM D 696-91	*Standard test method for coefficient of linear thermal expansion of plastics between -30 °C and 30 °C*
ASTM D 1434-82	*Standard test method for determining gas permeability characteristics of plastic film and sheeting*
ASTM D 5397-99	*Standard test method for evaluation of stress crack resistance of polyolefin geomembranes using notched constant tensile load test*
ASTM D 5887-95	*Standard test method for measurement of index flux through saturated geosynthetic clay liner specimens using a flexible wall permeameter*
ASTM D 5890-95	*Standard test method for swell index of clay mineral component of geosynthetic clay liners*

3 Definitions and abbreviations

3.1 Definitions

For the purpose of this document the definitions given in prEN ISO 10318:2002 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
underground structure
any constructed void below ground which belongs to the tunnel construction

3.1.4
tunnel
underground passage, open to the daylight at one or both ends, with a minimum diameter of one meter, which is made by removing soil or rock

3.1.5
moisture barrier
barrier used to prevent the ingress of liquids and vapours, mainly water, without external hydrostatic pressure, to a tunnel or underground structure

3.1.6
pressure water barrier
barrier used to prevent or reduce the escape from or the ingress of water to a tunnel or underground structure when subject to external hydrostatic pressure

3.1.7
fluid barrier
barrier used to prevent or reduce the escape from or the ingress of fluids to a tunnel or underground structure when subject to differential pressure

3.2 Abbreviations

For the purpose of this document the abbreviations given in prEN ISO 10318:2002 apply.

GBR-P: polymeric geosynthetic barrier

GBR-B: bituminous geosynthetic barrier

GBR-C: clay geosynthetic barrier

4 Required characteristics and corresponding methods of test

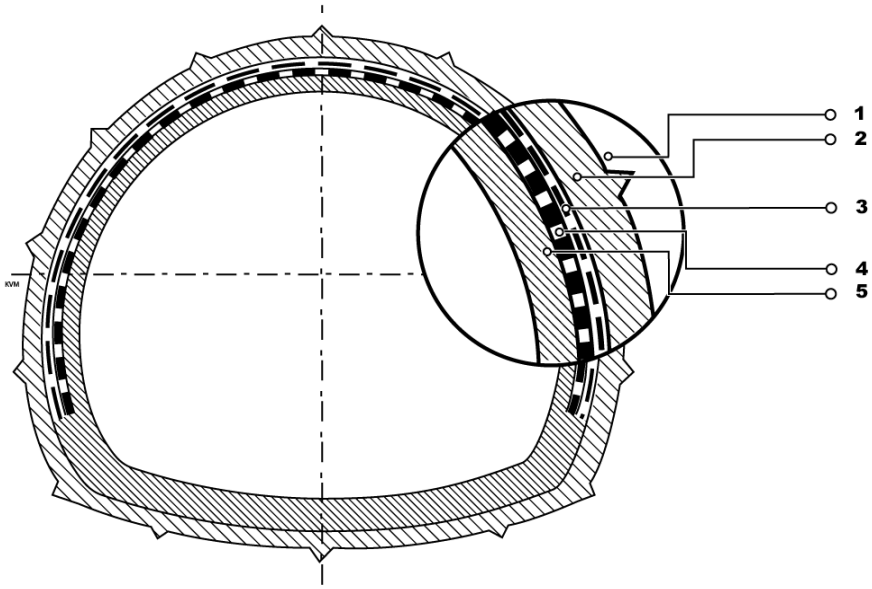
4.1 General

The main function of geosynthetic barriers used in the construction of tunnels and underground structures is to prevent or reduce the flow of fluid through the structure wall. Damage during installation has not been addressed in this document.

4.2 Types of Application

4.2.1 Application 1: " seepage water tunnel"

Application where the geosynthetic barrier is used as a stand-alone seepage (moisture) barrier. Figure 1 shows a typical cross-section.



Key

1 rock
2 shotcrete
3 geotextile
4 geosynthetic barrier
5 concrete

Figure 1 A geosynthetic barrier in a drilled seepage water tunnel

4.2.2 Application 2: "pressurised water tunnel"

Application where the geosynthetic barrier is used as a barrier against pressurised water. Figure 2 shows a typical cross-section.