SLOVENSKI STANDARD
SIST EN 17738:2023

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Geotekstilije in geotekstilijam sorodni izdelki - Poškodbe med postopkom namestitve - Celovit preskus

Geotextiles and Geotextile related products - Damage during installation procedure - Full scale test

Geotextilien und geotextilverwandte Produkte - Beschädigung während des Einbaus - Großmaßstäbliches Prüfverfahren

Géotextiles et produits apparentés - Endommagement pendant la procédure d'installation - Essai en grandeur réelle

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Geotextiles and geotextile-related products - Damage during installation procedure - Full scale test

Géotextiles et produits apparentés - Endommagement pendant la procédure d'installation - Essai en grandeur réelle

Geotextilien und geotextilverwandte Produkte - Beschädigung während des Einbaus - Großmaßstäbliches Prüfverfahren

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European foreword

This document (EN 17738:2023) has been prepared by Technical Committee CEN/TC 189 “Geotextiles”, 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of an identical text or by endorsement, at the latest by October 2023, and conflicting national standards shall be withdrawn at the latest by October 2023.

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

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Introduction

This document describes the procedure to evaluate the damaging during the installation of a geotextile and geotextile-related product. The test can be used to evaluate the RF_{ID} of the geotextile and geotextile-related product, this parameter is fundamental for design purpose.

1 Scope

This document describes a procedure for producing mechanical damage to geotextiles and geotextile-related products due only to compaction of soil or other materials. The damage is assessed visually and by the loss of tensile strength or other reference tests used to assess the damage caused by this procedure.

The method described is a full-scale test procedure, using a range of fills and compaction methods, and for the derivation of a reduction factor for installation damage for geotextiles and geotextile-related products.

This document excludes geosynthetic barriers and products used in pavements and asphalt overlays.

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.

EN ISO 9862, *Geosynthetics - Sampling and preparation of test specimens (ISO 9862)*

EN ISO 10318-1, *Geosynthetics - Part 1: Terms and definitions (ISO 10318-1)*

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

3 Terms, definitions and symbol(s)

For the purposes of this document, the terms and definitions given in EN ISO 10318-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
reference test
test used to determine a particular property of the geotextile and geotextile-related product being damaged in this procedure

3.2
reference grading parameter
specific diameter in the particle size distribution used to characterize each type of fill used in the procedure (e.g. d_{50} of the soil)

3.3
RF_{ID}
reduction factor to allow for the effect of installation damage; expressed as the ratio of the mean tensile strength of the undamaged material to the mean tensile strength of the damaged material, in relationship to the reference grading parameter of each fill used and to the compaction method used

4 Principle

4.1 General

A full scale geotextile and geotextile-related product specimen is placed under a range of fills that conform to the agreed upon grading limits; the fills are compacted in accordance with and in excess of the agreed upon specification.

The specimens are large enough to be used for wide-width tensile testing (EN ISO 10319) or the test used to measure the reference property.

The geotextile and geotextile-related product specimen is then removed from the test apparatus, examined for any visual damage and subjected to a mechanical test, to measure the change in mechanical properties. The result is expressed as the change (in percent) of the reference property. The visual damage is also reported.

4.2 Sampling

The test specimens from the samples shall be taken in accordance with EN ISO 9862.

4.3 Number and dimensions of test specimens

The amount of geotextile and geotextile-related product to install in and retrieve from a test section is a function of the type and number of laboratory tests to be conducted for assessment of damage. An amount of material sufficient to obtain enough tests on representative specimens, for each type of test, should be installed for each set of installation conditions.

In the recommended installation, geotextiles and geotextile-related products shall be cut to cover the nine test bays in Figure 1. If the width of the product is lower than the width of each test bay in Figure 1, adjacent strips shall be placed, without overlapping.

The test sample should be marked prior to installation and exhumation, or a template made, showing the exact location where specimens for testing are to be obtained. They shall also be labelled with sufficient information to ensure identification of the exposed sample and associated exposure conditions, such as: geotextile and geotextile-related product and fill type. Machine and transverse machine direction of specimens shall be designated. Designation of specimen locations is recommended to eliminate potential bias in specimen selection after the geotextile and geotextile-related product has been damaged. Alternate areas may also be designated in the event the primary specimen area is damaged by exhumation.

From the exhumed damaged specimens, cut the specimens for the reference test in machine direction (MD), in staggered positions across and along the damaged specimen.

Specimens prepared for tensile test shall be cut as required in EN ISO 10319. When other reference tests are used, the number and dimensions of specimens shall suit the specific reference test procedure.

4.4 Control sample

Control or base line (un-installed) sample(s) of the geotextile(s) and geotextile-related product(s) being investigated shall be from the same roll of material that is to be installed in the test section. Sample(s) from each roll of geotextile and geotextile-related product shall be gathered in cases where multiple geotextile and geotextile-related product rolls are used in the test section. Document all control sample information pertinent to sample such as: date of manufacture, manufacturer or supplier, geotextile and geotextile-related product grade and type, machine and transverse machine directions, and roll and lot number, if available. These control samples shall be handled and stored in such a manner to eliminate, or minimize, damage or degradation (for example, without exposure to ultraviolet light).

The orientation of the exhumed sample(s) and control sample(s) shall be documented. That is, the left and right hand sides of each sample shall correspond. It is also recommended that the control sample should be a direct continuation of the exhumed sample so as to minimize differences in control and exhumed specimen properties due to inherent product variability.

The positions of the test specimens on the control sample, relative to roll edge, should correspond with the positions of the exhumed sample.

5 Conditioning

Keep samples in a dry ambient without exposing to sunlight, at the same temperature of the testing environment, for 24 h.

Tests should be carried out at a temperature of (20 ± 2) °C. When this is not possible the temperature of the test environment shall be measured and reported.

6 Test site

6.1 General

Geosynthetic and soil placement techniques shall model the methods anticipated during construction but may also be designed to model hypothetical conditions such as various degrees of compaction, lift heights, drop heights, equipment operations, and/or types of fill material.

In the recommended installation, a level site should be prepared and laid out in nine bays, typically each having 3 m length × 3 m width as shown in Figure 1, leaving working space for construction plant to gain access around the test area without crossing the bays.

Where the geotextile and geotextile-related product is planned to be used within a zone of compacted fill, e.g. a reinforced soil retaining wall or fill slope, a 200 mm thick layer of material (or 1,5 times the maximum fill size, whichever is the greater) should be placed and compacted in each bay prior to the installation of the sample. This material should be the same as that to be placed in the layer above the sample.

Where the geotextile and geotextile-related product is planned to be placed on different foundation soil type than the fill above it, a 200 mm thick layer of the typical foundation soil (or 1,5 times the maximum fill size, whichever is the greater) should be placed in each bay prior to the installation of the reinforcement.

Other testing schemes can be agreed upon by Parties, e.g. the dimensions of the testing bay can be defined based on the intended reference test.

6.2 Arrangement of the specimens

Sufficient portions of the geotextile and geotextile-related product shall be prepared and placed across each bay as shown in Figure 1.

No tension shall be applied to the sample.

The roll number and/or batch number of the geotextile and geotextile-related product shall be recorded. Sufficient unused geotextile and geotextile-related product from this batch shall be retained and prepared for tensile testing, or reference testing, as control samples as specified at 4.3.

6.3 Fill materials

Typically, three different gradings of the fill material proposed for use should represent the coarse, middle and fine fill, as shown in Figure 1.

The fill material may be frictional fill, cohesive frictional fill or other materials as agreed upon by Parties.

Each fill materials used in the test, both for the first layer and the preparatory fill layer, shall be identified by one or more reference grading parameters (e.g. d_{50} of the soil) or grading curves.

Each layer of material should be compacted to a thickness of 200 mm or 1,5 times the maximum particle diameter, whichever is greater, or as agreed upon by Parties.

Typically, three zones should be prepared for each type of fill, as shown in Figure 1, 200 mm thick first layer to be subjected to standard compaction, typical of reinforced soil structures; 200 mm thick first layer to be subjected to heavy compaction, typical of fast train railways, 400 mm thick first layer (single soil lift or 2 × 200 mm soil lifts) to be subjected to compacted to light compaction, typical of non-reinforcement applications.

Typical procedures should include the following:

— particle size distribution for each type of fill should be determined by dry sieve analysis;

— from the particle size distribution, the agreed upon reference grading parameter (e.g. d_{50} of the soil) should be determined;

— fill should not be end tipped onto the reinforcement but should be spread over by bulldozer;

— the installation conditions to be simulated should include, as a minimum:

  — the nature of the backfill both below and above the sample: particle size distribution, hardness and angularity;

  — the depth at which the sample is installed;

  — whether the material is driven over by vehicles before compaction;

  — method and degree of compaction.

Typical soils/aggregates may include: crushed mix (d_{50} > 20,0 mm), coarse gravel (d_{50} > 10,0 mm), sandy gravel (d_{50} > 2,0 mm) or silty sand (d_{50} > 0,4 mm).

The same test procedure could be used with the site specific soil, equipment and conditions in order to check the RF_{id} of the product post design stage.

6.4 Compaction plant

Compaction of the fill should be carried out in accordance with the agreed upon specification.

The roller mass per metre width and number of passes should be selected in accordance with the agreed upon specification.

The direction of traverse of the compaction equipment should be reported with respect to the orientation of the sample.