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Geotextiles and geotextile-related products — Characteristics required for use in the construction of railways

bsi.

National foreword

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Géotextiles et produits apparentés - Caractéristiques requises pour l'utilisation dans la construction des voies ferrées

Geotextilien und geotextilverwandte Produkte - Geforderte Eigenschaften für die Anwendung beim Eisenbahnbau

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European foreword

This document (EN 13250:2016) 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of an identical text or by endorsement, at the latest by April 2017, and conflicting national standards shall be withdrawn at the latest by July 2018.

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.

This document supersedes EN 13250:2014+A1:2015.

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 Regulation No 305/2011.

For relationship with Regulation (EU) Nr. 305/2011, see informative Annex ZA, which is an integral part of this document.

Annex D provides details of significant technical changes between this European Standard and the previous editions.

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 European Standard allows manufacturers to describe geotextiles and geotextile-related products 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 the assessment and verification of constancy of performance and factory production control.

This European Standard may also be used by designers, end-users and other interested parties to define which functions and conditions of use are relevant.

The term “product” used in this European Standard refers to a geotextile or geotextile-related product.

This European Standard is part of a series of standards, addressing the requirements for geotextiles and geotextile-related products when used in a specific application. Annex C provides guidance on how to select the appropriate standard.

1 Scope

This European Standard specifies the relevant characteristics of geotextiles and geotextile-related products used in the construction of railways, and the appropriate test methods to determine these characteristics.

The intended use of these geotextiles or geotextile-related products is to fulfil one or more of the following functions: filtration, separation and reinforcement.

The separation function will always occur in conjunction with filtration or reinforcement, and hence will not be specified alone.

This European Standard applies in superstructure-ballast or substructure-blanket layer, within a sub-grade.

This European Standard is not applicable to geosynthetic barriers, as defined in EN ISO 10318-1.

This European Standard provides for the assessment and verification of constancy of performance of the product to this European Standard and for factory production control procedures.

Particular application cases may contain requirements regarding additional properties and – preferably standardized – test methods, if they are technically relevant.

This European Standard may be used to derive design values by taking into account factors within the context of the definitions given in EN 1997-1 (Eurocode 7), e.g. factors of safety. 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.

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

EN 12226, *Geosynthetics - General tests for evaluation following durability testing*

EN 12447, *Geotextiles and geotextile-related products - Screening test method for determining the resistance to hydrolysis in water*

EN ISO 1043-1, *Plastics - Symbols and abbreviated terms - Part 1: Basic polymers and their special characteristics (ISO 1043-1)*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696)*

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)*

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

EN ISO 10321, *Geosynthetics - Tensile test for joints/seams by wide-width strip method (ISO 10321)*

EN ISO 10722, *Geosynthetics - Index test procedure for the evaluation of mechanical damage under repeated loading - Damage caused by granular material (ISO 10722)*

EN ISO 11058, *Geotextiles and geotextile-related products - Determination of water permeability characteristics normal to the plane, without load (ISO 11058)*

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

EN ISO 12956, *Geotextiles and geotextile-related products - Determination of the characteristic opening size (ISO 12956)*

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 13426-1, *Geotextiles and geotextile-related products - Strength of internal structural junctions - Part 1: Geocells (ISO 13426-1)*

EN ISO 13426-2, *Geotextiles and geotextile-related products - Strength of internal structural junctions - Part 2: Geocomposites (ISO 13426-2)*

EN ISO 13427, *Geosynthetics - Abrasion damage simulation (sliding block test) (ISO 13427)*

EN ISO 13431, *Geotextiles and geotextile-related products - Determination of tensile creep and creep rupture behaviour (ISO 13431)*

EN ISO 13433, *Geosynthetics - Dynamic perforation test (cone drop test) (ISO 13433)*

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

ISO 10390, *Soil quality — Determination of pH*

ASTM D7409 — 15, *Standard Test Method for Carboxyl End Group Content of Polyethylene Terephthalate (PET) Yarns*

ASTM D4603 — 03(2011) e1, *Standard Test Method for Determining Inherent Viscosity of Poly(Ethylene Terephthalate) (PET) by Glass Capillary Viscometer*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
product
geotextile or geotextile-related product

3.1.2
specification
document in which the work, functions and specific conditions of use of the product are described

3.1.3
rework material
RWM
material that is generated in a process and capable of being reclaimed within the same process that generated it

3.1.4
post-consumer material
PCM
material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose

Note 1 to entry: This includes returns of material from the distribution chain.

3.1.5
post-industrial material
PIM
material diverted from the waste stream during a manufacturing process

3.2 Abbreviations

For the purposes of this document, the abbreviations given in EN ISO 1043-1 and EN ISO 10318-1 and the following apply.

— AR: aramid

— GCO-R: geocomposite reinforcement

4 Required characteristics and corresponding methods of test

4.1 General

The main functions of geotextiles and geotextile-related products used in the construction of railways are filtration, separation and reinforcement. If a drainage or erosion control system is integrated in the construction, the requirements of the appropriate standards shall also be fulfilled. As the separation function is always used in conjunction with another function, the separation function shall never be specified alone.

The specification shall define which functions and conditions of use are relevant (see Table 1). The producer shall provide the necessary data based on the requirements and test methods specified in this European Standard, as described in 5.1.

The characteristics, their relevance to the conditions of use, and the test methods to be used, are specified in Table 1. The list of characteristics in Table 1 includes those relevant to all conditions of use (A), and those relevant to specific conditions of use (S). The indication "–" means that the characteristic is not relevant for that function.

Where, for the same property, data for more than one function shall be provided, the following ranking order shall be observed: A overrules S, and S overrules "–".

The functions and conditions of use, corresponding with the S-coded characteristics in Table 1, are specified in 4.3.

Durability shall be assessed in accordance with the requirements of Annex B.

4.2 Selection of the appropriate standard in a specific application

Guidelines for the selection of the appropriate standard in a specific application are given in Annex C.

Table 1 — Geotextiles and geotextile-related products used in the construction of railways – Functions, function-related characteristics and test methods to be used

Characteristic	Test method	Functions		
		Filtration	Separation	Reinforcement
(1) Tensile strength [b]	EN ISO 10319	A	A	A
(2) Elongation at maximum load	EN ISO 10319	A	A	A
(3) Stiffness at 2 %, 5 % and 10 %	EN ISO 10319	–	–	S
(4) Tensile strength of seams and joints [c d]	EN ISO 10321	S	S	S
(5) Static puncture resistance (CBR test) [a b]	EN ISO 12236	S	A	A
(6) Dynamic perforation resistance (cone drop test) [a]	EN ISO 13433	A	A	A
(7) Friction	EN ISO 12957-1; EN ISO 12957-2	S	S	S
(8) Tensile creep	EN ISO 13431	–	–	S
(9) Abrasion	EN ISO 13427	S	S	S
(10) Resistance to damage during installation under repeated loading	EN ISO 10722	S	S	S
(11) Characteristic opening size	EN ISO 12956	A	A	–
(12) Water permeability normal to the plane (velocity index)	EN ISO 11058	A	A	S
(13) Durability	According to Annex B	A	A	A

Relevance of codes:

A: relevant to all conditions of use

S: relevant to specific conditions of use

"–": indicates that the characteristic is not relevant for that function.

[a] Static puncture resistance may not be relevant for some types of products, e.g. GGR, GCO-R or GST.

[b] If the mechanical properties (tensile strength and static puncture) are coded "A" in this Table, the use of only one, either tensile strength or static puncture, is usually sufficient in a project specification.

[c] The strength of internal structural junctions of geocells shall be tested in accordance with EN ISO 13426-1.

[d] The strength of internal structural junctions of geocomposites shall be tested in accordance with EN ISO 13426-2.

4.3 Characteristics relevant to specific conditions of use

4.3.1 Stiffness at 2 %, 5 % and 10 %

Data on stiffness are necessary for the reinforcement function if the deformation of the structure needs to be evaluated.

4.3.2 Tensile strength of seams and joints

Data on tensile strength of seams and joints are necessary for all functions if the product is to be mechanically jointed and if load is transferred across the seams and joints.

4.3.3 Static puncture

Data on static puncture or - as an alternative - on tensile strength, are necessary for the filtration function if required by the specification, i.e. when the site loading conditions are such that there is a potential risk of static puncture of the filter layer.

4.3.4 Friction characteristics

Data on friction characteristics are necessary for the functions separation and filtration when the product is used in a situation where a differential movement can take place between the product and adjacent material that may endanger the stability of the works. The friction characteristics can be measured, using site specific materials, by a direct shear test according to EN ISO 12957-1 or, in the case of loads up to 5 kPa, by an inclined plane test according to EN ISO 12957-2.

Friction behaviour with the adjacent construction materials, e.g. the soil or the geosynthetic barrier, should also be considered.

4.3.5 Tensile creep

Data on tensile creep can be used to give an indication of the resistance to sustained loading, when the product fulfils a reinforcement function.

4.3.6 Abrasion

Data on abrasion are necessary for all functions when the product is in contact with the ballast material.

4.3.7 Resistance to damage during installation

EN ISO 10722 can be used as an index test giving the relative performance of the product. Testing with site specific soil and conditions may give more relevant results for specific design.

4.3.8 Water permeability normal to the plane

Data on water permeability are necessary when the reinforced structure is subject to water flow.

4.4 Release of dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this European Standard are placed on those markets.

In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at: *http://ec.europa.eu/growth/tools-databases/cp-ds/index_en.htm*.

5 Assessment and verification of constancy of performance (AVCP)

5.1 General

The compliance of geotextiles and geotextile-related products with the requirements of this European Standard and with the declared values shall be demonstrated by:

— Product type determination (PTD);

— Factory production control (FPC) by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the product.

5.2 Presentation of characteristics

The characteristics specified in Table 2, except for durability, shall be expressed as mean values and tolerance value(s) corresponding to the 95 % confidence level. The values expressed may be verified using the procedure referred to in 5.5.

NOTE The 95 % confidence level corresponds to the mean value minus (and/or plus) 1,0 tolerance value(s).

Information on durability shall be expressed in accordance with Annex B.

5.3 Product type determination (PTD)

PTD tests shall be carried out by the manufacturer to define the values of the properties to be declared for the product to satisfy the requirements of this European Standard.

PTD tests shall also be carried out on existing products when a change in the basic materials or manufacturing procedures affects the declared properties or the use of a product. In these cases the PTD tests are those for the properties which are affected or shall be confirmed and new properties introduced by a change of use.

The tests to be conducted shall be reference tests as specified in this standard and shall be selected from the characteristics specified in Table 2, consistent with the product's intended use:

Table 2 — Characteristics required for PTD and AVCP

Characteristic	Functions
Tensile strength	Filtration, separation, reinforcement
Elongation at maximum load	Filtration, separation, reinforcement
Static puncture resistance (CBR test)	Separation, reinforcement
Dynamic perforation resistance (cone drop test)	Separation, filtration, reinforcement
Characteristic opening size	Filtration, separation
Water permeability normal to the plane	Filtration, separation
Durability [a]	Filtration, separation, reinforcement
[a] For the durability aspects, see Table 1 and Annex B.	

The results of PTD tests shall be recorded and be available for inspection.

The sample for the PTD tests shall be drawn according to EN ISO 9862 from a normal production run using the same materials and forming processes as used for the full production process. The size of the sample shall be big enough to allow the determination of the characteristics specified in Table 2. Handmade samples, short trial batches and other development prototypes may be tested by the same methods, but shall not be used for establishing characteristic values in PTD tests.

5.4 Factory production control (FPC)

A FPC scheme shall be established and documented in a manual prior to a product type being placed on the market. Subsequently, any fundamental changes in raw materials and additives, manufacturing procedures or the control scheme that affect the properties or use of a product shall be recorded in the manual.

The manual shall include the FPC procedures relevant to the declared properties, as confirmed by the product type determination.

The FPC procedures shall consist of a permanent internal production control system to ensure that such products comply with this European Standard and that the measured values conform to the declared values.

Annex A (normative) lists all the items that shall be considered to determine the appropriate control measures for a product. The manufacturer shall establish control measures for the relevant items and record them in his FPC manual. These measures shall be described in detail, including the type of tests to be performed and the frequency of these tests (see also A.2).

When relevant, the procedure given in A.2.3 shall be used to check the conformity of the product for one or more characteristics.

5.5 Verification of values

If verification of values is required, the compliance of characteristics with the values defined in 5.2 shall be based on measurements made on two representative samples (A and B), taken from two different rolls. Sampling shall be made in accordance with EN ISO 9862.

For on-site quality control purposes CEN/TR 15019 may also be considered.

The characteristics given in Table 2 shall be measured in accordance with the corresponding European standards on specimens prepared from sample A.

If the test result(s) for a particular characteristic is (are) within the tolerance value(s) given by the manufacturer, the product is accepted as complying with respect to this characteristic.

If the test result(s) for a particular characteristic is (are) outside 1,5 times the tolerance value(s), the product does not comply with respect to that characteristic. If the test result(s) for a particular characteristic is (are) within 1 and 1,5 times the tolerance value(s), specimens prepared from sample B shall be tested.

If the test result(s) of the sample B specimens for the same characteristic is (are) within the given tolerance value(s), the product is accepted as complying with respect to that characteristic. If the test result(s) is (are) outside the tolerance value(s), the product is not accepted.

5.6 Initial inspection of factory and of FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 5.4 and Annex A are fulfilled.

During the inspection, it shall be verified that:

a) all resources necessary for the achievement of the product characteristics included in this European Standard are in place and correctly implemented, and

b) the FPC-procedures in accordance with the FPC documentation are followed in practice, and

c) the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed shall be assessed to verify that the above conditions a) to c) are in place and implemented.

If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

The single steps of this inspection are specified in A.2.

5.7 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken at least once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the corrective actions have been taken for non-compliant products.

6 Marking

The manufacturer shall clearly and indelibly mark the product with the information specified in EN ISO 10320.

NOTE For CE-marking see ZA.3.

Annex A
(normative)

Factory production control

A.1 Factory production control scheme

A.1.1 General

The items to be addressed in the factory production control manual relating to the system of control, determined from 5.4, are given in A.1.

The single steps of factory production control are addressed in the check-list (A.2).

NOTE Manufacturers operating an FPC system, which complies with EN ISO 9001 and which addresses the provisions of this European standard, are considered to be able to satisfy the FPC requirements of this European standard.

A.1.2 Product design

The manufacturer shall describe how product design requirements and criteria are identified, checked, controlled and updated to be unambiguous and relevant to the use of the product and its specification.

The manufacturer shall describe the communication of the product design to the internal production departments or to external subcontractors.

A.1.3 Production

A.1.3.1 Raw or incoming materials

The manufacturer shall define the acceptance criteria of raw or incoming materials and the procedures that he operates to ensure that these are met.

The manufacturer shall document by analyses and/or certificates from his suppliers that all raw or incoming materials meet the declared performance, including durability performance.

A.1.3.2 Production process

The relevant features of the plant and production process shall be defined giving the frequency of the inspections, checks and tests, together with the values or criteria required on equipment and on work in process. The actions to be taken when control values or criteria are not obtained shall be recorded. These records shall be available for inspection.

A.1.4 Finished products

A.1.4.1 Tests on the finished product

The size of the samples and the frequency of sampling, together with the results obtained, shall be recorded. These records shall be available for inspection.

A.1.4.2 Alternative tests

Where alternative tests to the reference tests are used, details of the alternative tests and procedures together with their correlation with the reference tests shall be recorded and shall be made available for inspection.

A.1.4.3 Equipment

Test equipment having an influence on test results shall be calibrated to traceable national or international standards.

The manufacturer shall have or have available the installations, equipment and personnel which enable him to carry out the necessary verifications and tests. He may meet this requirement by concluding a subcontracting agreement with one or more organizations or persons having the necessary skills and equipment.

The manufacturer shall calibrate or verify measuring or test equipment and maintain it in good operating condition, whether or not it belongs to him.

The appropriate calibrations shall be carried out with defined measuring and test instruments according to standards or manufacturer's test procedures.

The equipment shall be used in conformity with the specification or the test reference system to which the specification refers.

A.1.5 Provisions applicable to A.1.2, A.1.3 and A.1.4 (to be used where appropriate)

A.1.5.1 Records

The dates, together with details and results of inspections, checks and tests carried out during the factory production control shall be properly recorded. These records shall be maintained for 10 years.

The product description, the date of manufacture, test method adopted, test results and acceptance or rejection criteria shall be entered under the signature of the person responsible for control who carried out the verification.

A.1.5.2 Assessment of results

Where possible and applicable, the results of inspections, checks and tests shall be interpreted statistically by attributes or by variables to determine whether the corresponding production conforms with the requirements and the declared values for the products.

A.1.5.3 Traceability

Systems of traceability and control of designs, incoming materials, and the use of materials shall be given in the manual. The stock control system of manufactured products shall be given in the manual.

A.1.5.4 Corrective action for non-conforming materials and products

The immediate actions to be taken when incoming materials or finished products do not conform to the requirements of this European Standard shall be described and recorded. These actions shall include the steps necessary to rectify the deficiency, modify the manual if required, identify and isolate the deficient raw or incoming materials and finished products and determine whether they shall be discarded or re-specified.

A.1.5.5 Personnel

The manufacturer shall ensure that the personnel involved in the process are suitably trained. The job description and responsibility of the operatives shall be given in the manual.

A.1.5.6 Quality management

The activities to ensure that all of the above requirements operate shall be described in the manual.

A.2 Assessment of a factory production control (FPC) system

A.2.1 General

A factory production control system is only applicable to one production site. In case of several production lines at the same site, all of them shall be checked.

The FPC shall cover specified products produced on the same production site. Each product covered by the FPC shall be clearly identified. To add a new product to the covered range, the producer shall submit the results of the PTD of the new product for an extension of the FPC system. This shall be taken into account at the next follow-up inspection. In case of a new production process, the manufacturer shall apply for a new inspection visit.

Follow-up inspections shall take place not less than once a year for each production line at each production site.

All the questions in this checklist shall be checked at the first inspection visit and at each follow-up inspection.

A.2.2 Checklist

An example of a FPC checklist is given in Table A.1.

The items marked with "E" are considered to be of essential importance, i.e. immediate corrective actions are needed if the requirement is not fulfilled.

The assessment can lead to A-, B- or C-type remarks:

— A: an immediate corrective action is needed;

— B: corrective action shall be taken within 3 months;

— C: corrective action shall be taken before the next inspection visit.

If a B-type remark is not corrected in due time, it becomes an A-type remark and if a C-type remark is not corrected in due time, it becomes a B-type remark.

Table A.1 — Checklist for FPC

Question	Relevance	Comment
1 Design		
1.1 – Has the manufacturer a description how design requirements and criteria are identified, checked, controlled and updated to be unambiguous and relevant to the use of the product and its specification?	*To be assessed only if claimed by the manufacturer*	*Refer to the manufacturer's documentation.*
1.2 – Has the manufacturer a description of the communication of the design to the internal production departments or to external subcontractors?	*To be assessed only if claimed by the manufacturer.*	*Refer to the manufacturer's documentation.*
2 Product identification and traceability		
2.1 – What are the means used for the unique identification of any individual finished product ?	E	*Refer to the manufacturer's documentation.*

Question	Relevance	Comment
2.2 – Is it possible to identify and check date, place and general manufacturing conditions (including raw material used) through the identifications on the final product?	E	*Refer to the manufacturer's documentation.*
2.3 – Does the marking on the final product comply with EN ISO 10320?	E	
3 Production process control		
3.1 – Are there documents which define the production process parameters which could affect quality?	E	*Refer to the manufacturer's documentation.*
3.2 –Are the standards and procedures implemented?	E	
3.3 – Are the specified requirements concerning process validation, including the associated personnel and equipment, documented?	E	*Refer to the manufacturer's documentation.*
4 Inspection and testing on receipt of raw materials		
4.1 – Are there specification sheets concerning incoming raw materials?	E	*Refer to the manufacturer's documentation.*
4.2 – Are there documents which define what shall be done in case of non-conformance of raw materials?	E	*Refer to the manufacturer's documentation.*
4.3 – Are the nature and frequency of the evaluation of incoming raw materials described and followed?	E	*Refer to the manufacturer's documentation.*
5 Inspection and testing during manufacturing		
5.1 – Are there inspections or tests during the manufacturing process with specific requirement for the results?	E	*Refer to the manufacturer's documentation.*
5.2 – Are there documents concerning inspection or testing during the manufacturing process with requirement for the results?	E	*Refer to the manufacturer's documentation.*
5.3 – Do they define what shall be done in case of non-conformance of the product with the requirements?	E	*Refer to the manufacturer's documentation.*
5.4 – Are non-conforming products isolated from conform products when they are detected during manufacturing?	E	*Refer to the manufacturer's documentation.*
5.5 – Is there a procedure for handling non-conforming products?	E	*Refer to the manufacturer's documentation.*
6 Final inspection and testing		
6.1 – Are there installations, equipment and personnel for final inspection and tests?	E	*Refer to the manufacturer's documentation.* *This requirement may be fulfilled by concluding a*

Question	Relevance	Comment
		subcontracting agreement with one or more organizations or persons having the necessary skills and equipment.
6.2 – Are there standards and methods for final inspection and testing? Have they been implemented?	E	*Refer to the manufacturer's documentation.*
6.3 – What tests are implemented (standard used) and at what frequency?	E	*Refer to the manufacturer's documentation.* *These tests should preferably be the reference test methods called up in the harmonized standards and used for ITT. If the tests are not performed to these reference methods, there shall be a proven correlation between the test(s) used for FPC and the corresponding reference test.*
6.4 – Are the characteristics tested in accordance with the announced "application / function" combination(s) (see the relevant harmonized standard(s))?	E	*Refer to the manufacturer's documentation.*
6.5 – Are there documented specifications concerning the results for final inspection and testing?	E	*Refer to the manufacturer's documentation.*
6.6 – Are there documented procedures which define what shall be done in case of non-conformance of the final product with the specified requirements?	E	*Refer to the manufacturer's documentation.*
6.7 – Are there appropriated records which complete evidence that a product has been tested and is in conformance with the specified requirements?	E	*Refer to the manufacturer's documentation.*
6.8 – Is it possible through these records to identify the persons responsible for testing final products and for releasing the products for the market?	E	*Refer to the manufacturer's documentation.*
7 Control of inspection, measuring and test equipment		
7.1 – Are there defined procedures to control, calibrate and maintain the equipment used, to bring evidence of the conformance of the products with the specified requirements?	E	*Refer to the manufacturer's documentation.*
7.2 – Are inspection, measuring and test equipment calibrated and adjusted against equipment having a known and valid relationship to nationally or internationally recognized standards?	E	*Refer to the manufacturer's documentation.* *Check calibration records for inspection, measuring and test*

Question	Relevance	Comment
		equipment and - if existing - round robin test results.
8 Control of non-conforming products		
8.1– Are there documented procedures to ensure that non-conforming products cannot be inadvertently used or delivered?	E	*Refer to the manufacturer's documentation.*
8.2 – In particular, are non-conforming products identified, documented and segregated from the rest of the production?	E	*Refer to the manufacturer's documentation.*
8.3 – Are there documented procedures which define responsibilities for the examination of non-conforming products and who has the authority to take decisions concerning them?	E	*Refer to the manufacturer's documentation.* *Check organization diagram.*
9 Corrective actions		
9.1 – Are there documented procedures to implement proper corrective actions concerning non-conformity?	E	*Refer to the manufacturer's documentation.*
9.2 – In this case are these procedures implemented and the corrective actions recorded (mainly these concerning consumer's complaints)?	E	*Refer to the manufacturer's documentation.*
9.3 – Have corrective actions been carried out from the previous audit? With which result?	E	*Refer to the manufacturer's documentation.*
10 Handling, storage and packaging		
10.1 – Are the methods used to protect the product during handling, storage and packaging described?		*Refer to the manufacturer's documentation.*
10.2 – Are handling, storage and packaging methods and means appropriate to prevent final products from being damaged or deteriorated?		
10.3 – Is the labelling of final products in conformance with the provisions of the harmonized standards?	E	
11 Control of quality records		
11.1 – Are quality records legible and retained for at least a 10 years period so as to be easily available on request?	E	*Refer to the manufacturer's documentation.* *Electronically stored records shall be protected against changes and deletion.*
12 Personnel		
12.1 – Does the manufacturer ensure that the personnel involved in the process are suitably trained?	E	*Refer to the manufacturer's documentation.*
12.2 – Are the job descriptions and responsibilities of the operators specified in the manual?	E	*Refer to the manufacturer's documentation.*

Question	Relevance	Comment
13 Withdrawal of certificates		
13.1 – Have temporary or final withdrawals been pronounced? If so, what practical measures have been defined and implemented?	E	*Refer to the manufacturer's documentation.*

A.2.3 Test frequency

The factory production control shall precise the tests frequency for the A-coded characteristics defined in Table 1. Table A.2 gives the minimum tests frequencies required. This table should be used in conjunction with items 5 and 6 of the check list in Annex A with regard to control testing during manufacture and testing of final product.

Table A.2 — Minimum test frequency required for FPC

Characteristic	Test Method	Minimum test frequencies
Tensile strength	EN ISO 10319 [a]	1 per batch and 1 per week
Elongation at maximum load	EN ISO 10319 [a]	1 per batch and 1 per week
Static puncture resistance (CBR test)	EN ISO 12236 [a]	1 per batch and 1 per week
Dynamic perforation resistance (cone drop test)	EN ISO 13433 [a]	1 every 6 months [b]
Characteristic opening size	EN ISO 12956 [a]	1 every 1 year [b]
Water permeability normal to the plane (velocity index)	EN ISO 11058, [a]	1 every 1 year [b]
Durability characteristics	Annex B	Every 5 years

[a] The use of alternative tests to confirm control of the parameters is acceptable provided the manufacturer can prove validity of the alternative method via a robust statistical correlation.

[b] Unless correlation with other FPC tests can be proven for the product.

NOTE A batch is a continuously produced quantity of product from the same raw materials and according to the same production specification. For woven geotextiles, a beam, defined as a single lot of warp element on a single production machine, is considered being the same as a batch.

Annex B
(normative)

Durability aspects

B.1 General

B.1.1 Service life

The provisions and assessment methods of this annex are based upon the intended use of geotextiles and geotextile-related products, as specified in the scope of this European Standard, and their foreseen service life in years. They are based upon the current state of the art, knowledge and experience. The service life refers to the period during which the geosynthetic retains the required properties of this annex, assuming it was properly installed, used and maintained.

For a geosynthetic which satisfies the requirements of this annex the service life represents a minimum indication. The real service life, for normal conditions of use, may turn out to be considerably longer without major degradation affecting the essential requirements of the works defined in the CPR.

The indicated service life of the geosynthetic cannot be interpreted as a guarantee given by the manufacturer but should be regarded only as a tool for selecting a product suitable for the anticipated working life.

The tests described in this annex do not allow the determination of reduction factors. The tests described in this annex are screening tests to show the ability of a product to serve for a certain time. The reference strength and retained strength of products investigated in this Annex B shall be determined in the same way in accordance with EN 12226.

B.1.2 Initial and repeat testing of durability

A product shall be submitted to an initial testing of its durability in accordance with this annex.

A product that is unchanged shall be tested again after 5 years. A product is considered unchanged if the raw material supply, the production technology and the process and stabilization of the product have not been subject to a significant process change.

If a product has been subject to a significant process change, then it shall be tested in the same manner as a new product.

A significant process change is defined as any of the following:

— a change in the chemical formulation (CAS No);

— reduced active ingredient concentration levels of raw materials in the polymer recipe;

— substitution of any polymer in the recipe, irrespective of any change in concentration.

Testing of a changed product may be exempted for products with a service life of more than 5 years if the producer can demonstrate by means of regular assessment, including analyses of the process and of long-term stabilizers, that the type of active ingredients has remained the same and that the content of these ingredients is not lower than that in the material used in the initial durability testing.

B.1.3 Use of rework material

Rework material can be used without limitations, if the original raw material meets the requirements of this annex and no pelletizing is done in the rework process.

If pelletizing is done in the re-work process, rework material from the same production or source can be used, if the final product meets the requirements of this annex. If the original raw material meets the requirements of this annex, a maximum of 10 % pelletized rework material is acceptable without further proof.

NOTE Pelletizing is a thermal process whereby the polymer melt coming from an extruder is pressed through a die plate and cut by knives to make pellets. This process may affect the properties of the product.

B.2 Weathering (all products)

All products shall pass the accelerated weathering test described in EN 12224, unless they are to be covered on the day of installation. The strength retained at the end of this test, together with the intended application, will determine the length of time the product may be exposed on site. The maximum exposure times are given in Table B.1. Extended testing is necessary for products, which will be exposed for a longer duration.

Table B.1 — Maximum exposure times

Application	**Retained strength**	**Maximum time of exposure after installation**
Reinforcement or other applications where long-term strength is required	> 80 %	1 month
	60 % to 80 %	2 weeks
	< 60 %	1 day
Other applications (where long-term strength is not required)	> 60 %	1 month
	20 % to 60 %	2 weeks
	< 20 %	1 day

A product, which has not been tested for resistance to weathering, shall be covered on the day of installation.

For a range of products, which differ only in mass per unit area, only the product with the lowest mass per unit area shall be subjected to the tests. The results of the test may be applied for the other products in the range, unless they have been tested separately.

The product information shall state: “To be covered within (*duration*) after installation”.

B.3 Products used in non-reinforcing applications and with service lives up to 5 years

A product may be considered sufficiently durable for a minimum service life of 5 years, provided it contains no biodegradable materials and it is used:

— in a non-reinforcing application, and

— in natural soils with a pH between 4 and 9 (determined in accordance with ISO 10390), and

— in a soil with temperature ≤ 25 °C.

Such product may contain PCM (Post Consumer Material) or PIM (Post Industrial Material).

The product information shall state: “Predicted to be durable a minimum of 5 years for non-reinforcing applications in natural soils with 4 ≤ pH ≤ 9 and soil temperatures ≤ 25 °C”.

B.4 Other applications and service lives up to 25 years, 50 years and 100 years

B.4.1 General

A product, which consists of virgin or reworked polymers or a combination of these, may be considered sufficiently durable in natural soils with a pH between 4 and 9 and at a soil temperature ≤ 25 °C provided it passes the relevant material test(s) of B.4.2 for the specified service life.

After the durability tests specified in B.4.2 the test specimens are subjected to tensile tests given in EN 12226. The retained tensile strength is compared to the original tensile strength of reference specimens (result expressed in percentage retained strength).

A product consisting of more than one polymer shall be separated into its constituent parts which shall each pass the relevant tests of B.4.2. If it is not possible to separate the product into its constituent parts, samples of the constituent materials shall be submitted to the relevant tests of B.4.2.

The lightest product variant in a family shall be the variant selected for durability testing. If a manufacturer produces a lighter variant after the initial type testing, it is the responsibility of the manufacturer to decide whether the change is of sufficient magnitude to require the product to be tested as a new product. If the manufacturer decides the change is significant he shall test the light variant as a new product. If the manufacturer decides this change is not significant, he can use his existing durability data to make a statement for the new product. In either case, when the 5 year PTD repeat testing as defined in Table A.2 is required the new product shall be the variant selected for testing, it now being the lightest variant in the product family.

The product information shall state:

— “Predicted to be durable for (specify the service life) in natural soils with 4 ≤ pH ≤ 9 and soil temperatures ≤ 25 °C” on the basis of the results of test method (reference to the relevant section and test duration of B.4.2).

B.4.2 Tests for specific materials

B.4.2.1 Polyester (PET)

A non-reinforcing product consisting solely of PET shall be tested for resistance to internal hydrolysis following EN 12447 (CEG content [according to ASTM D7409] and an average molecular weight (M_n) [according to ASTM D4603] shall be evaluated), with the following modifications:

a) Test temperature: 80 °C;

b) Test duration:

   1) For service lives up to 25 years: 14 d;

   2) For service lives up to 50 years: 28 d;

   3) For service lives up to 100 years: 56 d.

The minimum retained strength shall be 50 %.

A reinforcing product consisting solely of PET shall have a carboxyl end group content (CEG content) of less than 30 meq/g (according to ASTM D7409) and an average molecular weight (M_n) of more than 25 000 g/mol (according to ASTM D4603).

A product consisting solely of PET shall be tested for resistance to internal hydrolysis following EN 12447, with the following modifications:

a) Test temperature: 80 °C;

b) Test duration:

   1) For service lives up to 25 years: 28 d;

   2) For service lives up to 50 years: 56 d;

   3) For service lives up to 100 years: 112 d.

The minimum retained strength shall be 50 %.

B.4.2.2 Polypropylene (PP) and Polyethylene (PE)

A product consisting solely of PP or PE shall be tested for resistance to oxidation following EN ISO 13438 procedure A, with the following modifications:

a) The test specimen shall be stored in water (Grade 2 according to EN ISO 3696) at 80 °C for 28 d before testing. The medium shall be changed every 7 d and moved once per day;

b) Test temperature: 100 °C;

c) Test duration:

   1) For service lives up to 25 years: 28 d;

   2) For service lives up to 50 years: 56 d;

   3 For service lives up to 100 years: 112 d.

The minimum retained strength shall be 50 %.

NOTE An autoclave method is under further development for determination of resistance to oxidation of polyolefines. When sufficient data are available for this to be applied to geotextiles and geotextile related products, it is intended that this will be included as an alternative method in a future revision of this European Standard.

B.4.2.3 Polyamide (PA) and aramid (AR)

B.4.2.3.1 Oxidation resistance

A product consisting solely of PA-6, PA-6.6 or AR shall be tested for resistance to oxidation following EN ISO 13438 procedure B with the following modifications:

a) The test specimen shall be stored in water (Grade 2 according to EN ISO 3696) at 80 °C for 28 d before testing. The medium shall be changed every 7 d and moved once per day;

b) Test temperature: 100 °C;

c) Test duration:

1) For service lives up to 25 years: 28 d;

2) For service lives up to 50 years: 56 d;

3) For service lives up to 100 years: 112 d.

The minimum retained strength shall be 50 %.

B.4.2.3.2 Hydrolysis resistance

A product consisting solely of PA-6 or PA-6.6 or AR shall be tested for resistance to hydrolysis according to EN 12447.

a) Test duration:

1) For service lives up to 25 years: 28 d;

2) For service lives up to 50 years: 56 d;

3) For service lives up to 100 years: 112 d.

The minimum retained strength shall be 50 %.

B.4.2.4 Polyvinyl alcohol (PVA)

B.4.2.4.1 Oxidation resistance for PTD

A product consisting solely of PVA shall be tested for resistance to oxidation following EN ISO 13438, method C with the following modifications when performing PTD:

For service lives up to 25 years

— The test specimen shall be immersed in diluted sulphuric acid with a pH of 3,0;

— Oxygen pressure 30 bar;

— Test temperature: 70 °C;

— Test duration: 28 d.

The minimum retained strength shall be 50 %.

For service lives between 25 years and up to 50 years and for up to 100 years:

— The test specimen shall be immersed in diluted sulphuric acid (with pH of 3 at 20 °C);

— Test temperatures of 50 °C, 60 °C, 70 °C shall be used.

The lowest temperature shall not be higher than 40 K above than the *in situ* temperature of the application

— Test shall be performed using autoclaves with a minimum oxygen pressure of 2 bar.

— An Arrhenius plot shall be used for the evaluation of the minimum retained strength of 50 %, (which has to be passed during the tests) for the corresponding service life.

B.4.2.4.2 Oxidation resistance follow up procedure

For follow up evaluation, the following conditions might be applied in order to confirm the service life chosen in the PTD long term durability:

The test specimen shall be immersed in diluted sulphuric acid with a pH of 3,0

— Oxygen pressure: the same as used for the PTD;

— Test temperature: 70 °C;

— Test duration: depending on the activation energy determined in the PTD.

The minimum retained strength shall be not less than the 95 % confidence level of the PTD.

Annex C
(informative)

Guidelines for the selection of the appropriate standard in a specific application

This group of European standards was developed to specify the characteristics relevant to the use of geotextiles and geotextile-related products in particular applications or works. Sometimes, however, an application can be considered as a part of another application. In such cases, it is not clear which standard to use.

Table C.1 shows how to select the appropriate standard depending on the application. The following steps should be used in this selection process.

a) select the application from column 1 (vertical) of the Table;

b) check if the relevant application is mentioned in row 1 (horizontal) in columns 3 to 6

   1) if not, use the standard quoted in column 2;

   2) if yes, use the standard quoted at the intersection of the first applicable row and first applicable column.

EXAMPLES:

— a drainage trench in a road: row 2 and column 3 apply and EN 13252 should be used;

— a retaining structure in a railway: row 3 and column 6 apply and EN 13251 should be used, since in this case $H > H_c$;

— an external erosion control system in a canal: row 5 and column 4 apply and EN 13253 should be used;

— a drainage for a road in a tunnel: row 2 and column 3 apply and EN 13252 should be used, not EN 13256 (at the intersection of row 2 and column 5);

— a protection layer for a road tunnel: row 2 and column 5 apply and EN 13256 should be used;

— a drainage system in a retaining wall: row 9 and column 3 apply and EN 13252 should be used.

NOTE EN 13252 applies to geotextiles and geotextile-related products used as a component of a drainage system, e.g. in a green roof, a podium deck or a parking deck. However, such a green roof system, if put on the market as a kit, is not covered by EN 13252.

Table C.1 — Selection of the appropriate standard

	1	2	3	4	5	6
1	Application	Standard	Drainage systems	Erosion control systems	Tunnels and underground structures	Earthworks, foundations and retaining structures
2	Roads and other trafficked areas	EN 13249	EN 13252	EN 13253	EN 13256	if $H < H_c$: EN 13249 if $H > H_c$: EN 13251
3	Railways	EN 13250				if $H < H_c$: EN 13250 if $H > H_c$: EN 13251
4	Reservoirs and dams	EN 13254				EN 13251
5	Canals	EN 13255				
6	Solid waste disposals	EN 13257				
7	Liquid waste disposals	EN 13265				
8	Tunnels and underground structures	EN 13256			not applicable	
9	Earthworks, foundations and retaining structures	EN 13251			not applicable	not applicable

Definitions:

H: the height of the structure

H_c: - for roads and other trafficked areas: the height where the traffic load is dominant

- for railways: the difference of height between the bottom of the rails and the subgrade (platform)

Annex D
(informative)

Significant technical changes to superseded versions of this standard

This European Standard supersedes EN 13250:2014+A1:2015. Compared to that version following significant changes were made:

- In 4.1, Table 1, all H-coded characteristics were replaced by "A". The characteristic "damage during installation" was coded "S" and a corresponding paragraph was added in 4.3.
- In ZA.3 the example was deleted.

This European Standard contains the following significant technical changes, compared to the superseded EN 13250:2000 and EN 13250:2000/A1:2005:

- The list of normative references was updated;
- Table 1 has been modified to comply with the modified mandate M/386 (inclusion of elongation in separation and filtration functions);
- Annex A.2.3: minimum test frequencies were included;
- Annex B (durability) was redrafted to include new polymers and long term durability assessment for a service lives up to 100 years. Assessment with respect to durability at low temperatures will be included in the next revision of the standard;
- Annex B: clarifications were made with respect to use of recycled materials and significant process changes;
- Annex ZA was updated to comply with modified mandate M/386 (inclusion of elongation in separation and filtration functions);
- Annex ZA: modification of CE labelling on packaging.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/107 Geotextiles amended by M/386 given to CEN by the European Commission and the European Free Trade Association.

If this European standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the Geotextiles and geotextiles-related products for the use in the construction of railways intended for the uses indicated in Tables ZA.1.1 to ZA.1.6 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this European Standard related to the aspects covered by the mandate and is defined by Tables ZA.1.1 to ZA.1.6.

Table ZA.1.1 — Relevant clauses for geotextiles and geotextile-related products - Filtration

Product: Geotextiles and geotextile-related products Intended use: filtration (F) in construction of railways			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Tensile strength (in both directions)	4.1, Table 1 (1) and 5.1	_	(kN/m, -kN/m) [a]
Elongation at maximum load (in both directions)	4.1, Table 1 (2) and 5.1	_	(%, ± %) [a]
Dynamic perforation resistance	4.1, Table 1 (6) and 5.1	_	(mm, + mm) [a]
Characteristic opening size Water permeability normal to the plane	4.1, Table 1 (11) and 5.1 4.1, Table 1 (12) and 5.1	_	(µm, ± µm) [a] (l/(m²s), - l/(m²s))[a]
Durability	Annex B, 4.1, 5.1 and Table 1 (13)	_	To be declared in accordance with the relevant clause of Annex B
Dangerous substances	4.4	_	
[a] To be declared as mean value and tolerance value(s)			

Table ZA.1.2 — Relevant clauses for geotextiles and geotextile-related products - Reinforcement

Product: Geotextiles and geotextile-related products Intended use: reinforcement (R) in construction of railways			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Tensile strength (in both directions)	4.1, Table 1 (1) and 5.1	_	(kN/m, -kN/m) [a]
Elongation at maximum load (in both directions)	4.1, Table 1 (2) and 5.1	–	(%, ± %) [a]
Resistance to static puncture	4.1, Table 1 (5) and 5.1	_	(kN, -kN) [a]
Dynamic perforation resistance	4.1, Table 1 (6) and 5.1	_	(mm, + mm) [a]
Durability	Annex B, 4.1, 5.1 and Table 1 (13)	_	To be declared in accordance with the relevant clause of Annex B
Dangerous substances	4.4	_	
[a] To be declared as mean value and tolerance value(s)			

Table ZA.1.3 — Relevant clauses for geotextiles and geotextile-related products – Filtration and separation

Product: Geotextiles and geotextile-related products Intended use: filtration and separation (F + S) in construction of railways			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Tensile strength (in both directions)	4.1, Table 1 (1) and 5.1	_	(kN/m, -kN/m) [a]
Elongation at maximum load (in both directions)	4.1, Table 1 (2) and 5.1	–	(%, ± %) [a]
Resistance to static puncture	4.1, Table 1 (5) and 5.1	_	(kN, -kN) [a]
Dynamic perforation resistance	4.1, Table 1 (6) and 5.1	_	(mm, + mm) [a]
Characteristic opening size Water permeability normal to the plane	4.1, Table 1 (11) and 5.1 4.1, Table 1 (12) and 5.1	–	(µm, ± µm) [a] (l/(m²s), -l/(m²s))[a]
Durability	Annex B, 4.1, 5.1 and Table 1 (13)	_	To be declared in accordance with the relevant clause of Annex B
Dangerous substances	4.4	_	
[a] To be declared as mean value and tolerance value(s)			

Table ZA.1.4 — Relevant clauses for geotextiles and geotextile-related products – Reinforcement and separation

Product: Geotextiles and geotextile-related products Intended use: reinforcement and separation (R + S) in construction of railways			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Tensile strength (in both directions)	4.1, Table 1 (1) and 5.1	_	(kN/m, -kN/m) [a]
Elongation at maximum load (in both directions)	4.1, Table 1 (2) and 5.1	–	(%, ± %) [a]
Resistance to static puncture	4.1, Table 1 (5) and 5.1	_	(kN, -kN) [a]
Dynamic perforation resistance	4.1, Table 1 (6) and 5.1	_	(mm, + mm) [a]
Durability	Annex B, 4.1, 5.1 and Table 1 (13)	_	To be declared in accordance with the relevant clause of Annex B
Dangerous substances	4.4	_	
[a] To be declared as mean value and tolerance value(s)			

Table ZA.1.5 — Relevant clauses for geotextiles and geotextile-related products – Filtration and reinforcement

Product: Geotextiles and geotextile-related products Intended use: filtration and reinforcement (F + R) in construction of railways			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Tensile strength (in both directions)	4.1, Table 1 (1) and 5.1	_	(kN/m, -kN/m) [a]
Elongation at maximum load (in both directions)	4.1, Table 1 (2) and 5.1	–	(%, ± %) [a]
Resistance to static puncture	4.1, Table 1 (5) and 5.1	_	(kN, -kN) [a]
Dynamic perforation resistance	4.1, Table 1 (6) and 5.1	_	(mm, +mm) [a]
Characteristic opening size Water permeability normal to the plane	4.1, Table 1 (10) and 5.1 4.1, Table 1 (11) and 5.1	–	(µm, ± µm) [a] (l/(m²s), -l/)m²s))[a]
Durability	Annex B, 4.1, 5.1 and Table 1 (12)	_	To be declared in accordance with the relevant clause of Annex B
Dangerous substances	4.4	_	
[a] To be declared as mean value and tolerance value(s)			

Table ZA.1.6 — Relevant clauses for geotextiles and geotextile-related products – Filtration, reinforcement and separation

Product: Geotextiles and geotextile-related products Intended use: For filtration, reinforcement and separation (F+ R+ S) in construction of railways			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Tensile strength (in both directions)	4.1, Table 1 (1) and 5.1	_	(kN/m, -kN/m) [a]
Elongation at maximum load (in both directions)	4.1, Table 1 (2) and 5.1	–	(%, ± %) [a]
Resistance to static puncture	4.1, Table 1 (5) and 5.1	_	(kN, -kN) [a]
Dynamic perforation resistance	4.1, Table 1 (6) and 5.1	_	(mm, +mm) [a]
Characteristic opening size Water permeability normal to the plane	4.1, Table 1 (10) and 5.1 4.1, Table 1 (11) and 5.1	–	(µm, ± µm) [a] (l/(m²s), -l/(m²s))[a]
Durability	Annex B, 4.1, 5.1 and Table 1 (12)	–	To be declared in accordance with the relevant clause of Annex B
Dangerous substances	4.4	_	
[a] To be declared as mean value and tolerance value(s)			

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure for AVCP of Geotextiles and geotextiles-related products for the use in the construction of railways

ZA.2.1 Systems of AVCP

The AVCP system(s) of Geotextiles and geotextiles-related products for the use in the construction of railways indicated in Tables ZA.1.1 to ZA.1.6, established by EC Decision(s) 96/581/EC of 8th October 1996 published in the OJEU under L254 is shown in Table ZA.2 for the indicated intended uses and relevant level(s) or class(es) of performance.

Table ZA.2 — Systems of AVCP

Products	Intended uses	Level(s) or class(es) of performance	AVCP systems
Geosynthetics (membranes and textiles),geotextiles, geocomposites, geogrids, geomembranes and geonets used: - As fluid or gas barriers - As protective layer - For drainage and/or filtration - For reinforcement	In roads, railways, foundations and walls, drainage systems, erosion control, reservoirs and dams, canals, tunnels and underground structures, liquid waste disposal or containment, for solid waste storage or waste disposal	_	2+
Geosynthetics (membranes and textiles), geotextiles, geocomposites, geogrids, geomembranes and geonets used: - As separation layer	In all works	_	4
System 2+: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.3 including certification of the factory production control by a notified production control certification body on the basis of initial inspection of the manufacturing plant and of factory production control as well as of continuous surveillance, assessment and evaluation of factory production control. System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5			

NOTE As listed in Tables ZA.1.1 to ZA.1.6, the separation function is always used in conjunction with filtration or reinforcement.

The AVCP of the Geotextiles and geotextiles-related products for the use in the construction of railways in Tables ZA.1.1 to ZA.1.6 shall be according to the AVCP procedures indicated in Tables ZA.3.1 to ZA.3.2 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3.1 — Assignment of AVCP tasks for Geotextiles and geotextiles-related products for the use in the construction of railways under system 2+

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of the Table ZA.1 relevant for the intended use which are declared	5.4
	determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Parameters related to essential characteristics of the Table ZA.1 relevant for the intended use which are declared	5.3
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of the Table ZA.1 relevant for the intended use which are declared	5.4
Tasks for the notified production control certification body	Initial inspection of the manufacturing plant and of FPC	Parameters related to essential characteristics of the Table ZA.1, relevant for the intended use which are declared, namely: Tensile strength (for products for uses of Tables ZA.1.1 to ZA.1.6) Dynamic perforation resistance (for products for uses of Tables ZA.1.1 to ZA.1.6) Elongation (for products for uses of Tables ZA.1.1 to ZA.1.6) Water permeability – opening size (for products for uses of Tables ZA.1.1, ZA.1.3, ZA.1.5 and ZA.1.6) Documentation of the FPC.	5.4, 5.6, 5.7

Tasks		Content of the task	AVCP clauses to apply
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely: Tensile strength (for products for uses of Tables ZA.1.1 to ZA.1.6) Dynamic perforation resistance (for products for uses of Tables ZA.1.1 to ZA.1.6) Elongation (for products for uses of Tables ZA.1.1 to ZA.1.6) Water permeability – opening size (for products for uses of Tables ZA.1.1, ZA.1.3, ZA.1.5 and ZA.1.6) Documentation of the FPC.	5.4, 5.6, 5.7

Table ZA.3.2 — Assignment of AVCP tasks for Geotextiles and geotextile-related products for the use as separation layer in the construction of railways under system 4

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Tables ZA.1.3, ZA.1.4 and ZA.1.6 relevant for the intended use	5.4
	Determination of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Tables ZA.1.3, ZA.1.4 and ZA.1.6 relevant for the intended use which are declared	5.3

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

In case of products under system 2+

— the determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; the factory production control and the testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and

— the certificate of conformity of the factory production control, issued by the notified production control certification body on the basis of:

  — initial inspection of the manufacturing plant and of factory production control and

  — continuous surveillance, assessment and evaluation of factory production control.

In case of products under system 4

— the factory production control carried out by the manufacturer

— the determination by the manufacturer of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011, as amended.

According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product-type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

(a) the intended use or uses (as a combination of application and functions) for the construction product, in accordance with the applicable harmonized technical specification;

(b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

(c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

(d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;

(e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

(f) for the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined);

Regarding the supply of the DoP, Article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for Geotextiles and geotextile-related products:

DECLARATION OF PERFORMANCE

N° 001DoP-2014-07-14

1. Unique identification code of the product-type:

GEO/RW

2 Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

GEO/RW-145

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

For use in construction of railways as a filtration and separation layer.

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

AnyCo SA,

PO Box 21

B-1050 Brussels, Belgium

Tel. +32987654321

Fax: +32123456789

Email: anyco.sa@provider.be

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2):

Anyone Ltd

Flower Str. 24

West Hamfordshire

UK-589645 United Kingdom

Tel. +44987654321

Fax: +44123456789

e-mail: anyone.ltd@provider.uk

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

System 2+

7. In case of the declaration of performance concerning a construction product covered by a harmonized standard:

   Notified factory production control certification body No. 5678 performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control and issued the certificate of conformity of the factory production control.

8. Declared performance

Essential characteristics	Performance	Harmonized technical specification: EN 13250:2016
Tensile strength T_{max}	MD 12kN/m (−1kN/m) CMD 10 kN/m (−0,8kN/m)	EN ISO 10319
Elongation ε_{max}	MD 70 % (±10 %) CMD 80 % (±5 %)	EN ISO 10319
Dynamic perforation resistance D_c	8 mm (+1mm)	EN ISO 13433
Resistance to static puncture F_p	1,2 kN (−0,15 kN)	EN ISO 12236
Characteristic opening size (O_{90})	90 µm (±20 µm)	EN ISO 12956
Water permeability (q_N)	100 l/(m²s) (−10 l/(m²s))	EN ISO 11058
Durability	To be declared in accordance with the relevant clause of EN 13250:2016, Annex B.	EN 13250:2016, Annex B
Dangerous substances	Less than required by national regulations in EU Member States	National Regulations in force in EU Member States

10. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4. Signed for and on behalf of the manufacturer by:

……

(name and function)

…… ……

(place and date of issue) (signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the geotextile

or

— to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

— to the packaging

or

— to the accompanying documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed;

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;

— the unique identification code of the product-type;

— the reference number of the declaration of performance *[see example of DoP]*;

— the level or class of the performance declared;

— the dated reference to the harmonized technical specification applied;

— the identification number of the notified body, *[only for products under system 2+]*;

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Bibliography

[1] EN 1997-1, *Eurocode 7: Geotechnical design - Part 1: General rules*

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

[3] EN 13249, *Geotextiles and geotextile-related products — Characteristics required for use in the construction of roads and other trafficked areas (excluding railways and asphalt inclusion)*

[4] EN 13251, *Geotextiles and geotextile-related products — Characteristics required for use in earthworks, foundations and retaining structures*

[5] EN 13252, *Geotextiles and geotextile-related products — Characteristics required for use in drainage systems*

[6] EN 13253, *Geotextiles and geotextile-related products — Characteristics required for use in erosion control works (coastal protection, bank revetments)*

[7] EN 13254, *Geotextiles and geotextile-related products — Characteristics required for use in the construction of reservoirs and dams*

[8] EN 13255, *Geotextiles and geotextile-related products — Characteristics required for use in the construction of canals*

[9] EN 13256, *Geotextiles and geotextile-related products — Characteristics required for use in the construction of tunnels and underground structures*

[10] EN 13257, *Geotextiles and geotextile-related products — Characteristics required for use in solid waste disposals*

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[15] EN ISO 14021, *Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling) (ISO 14021)*

[16] ISO/TS 13434, *Geosynthetics — Guidelines for the assessment of durability*

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