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The new NorGeoSpec Guideline

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SINTEF Community

Teknologi for et bedre samfunn



The new NorGeoSpec Guideline

- Background & History
- Structure
 - Part 1 - Product Certification
 - Part 2 - Product Specification
- What's new?
 - filtration in drainage systems
 - findings of ROUGH project for application under Nordic conditions
 - new certificates & website
 - updated product certification / assessment process



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- What's new?
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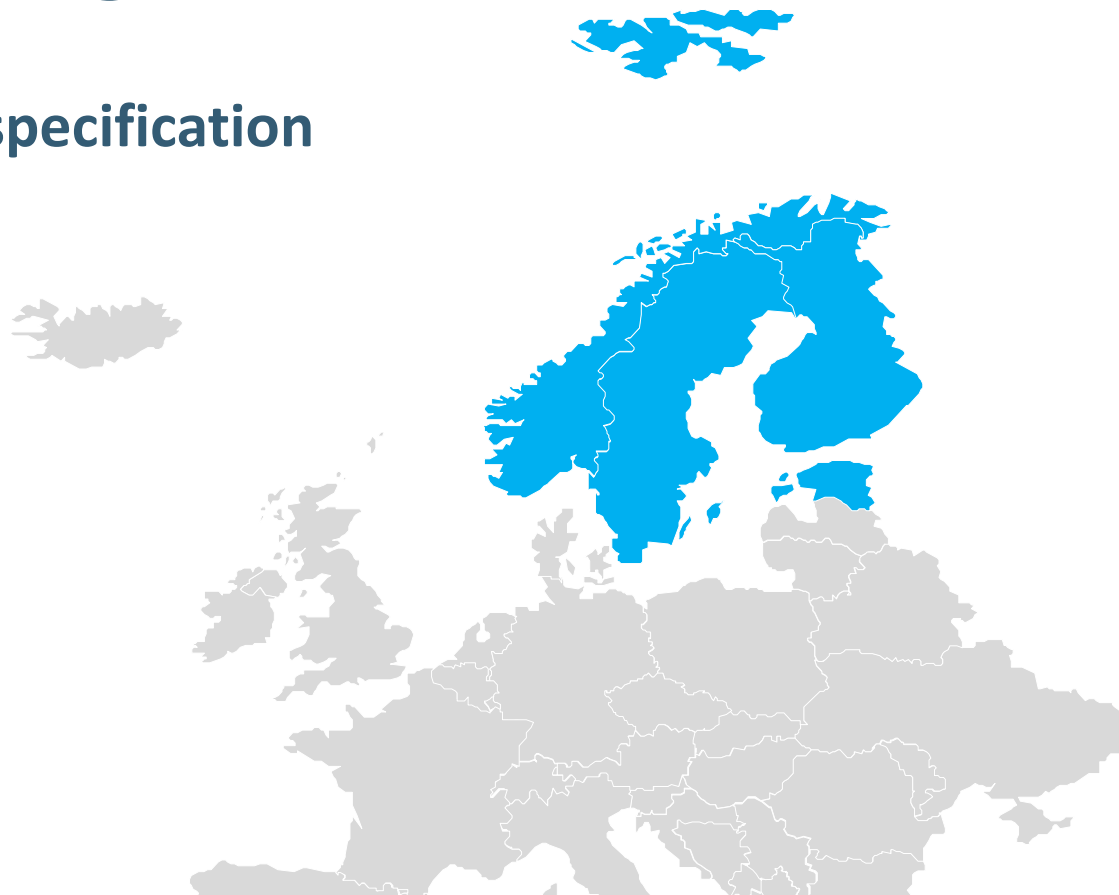


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NorGeoSpec Background

Nordic system for certification and specification of geosynthetics is used in

- Norway
- Sweden
- Finland
- Estonia (2014)



Statens vegvesen



TRAFIKVERKET
SWEDISH TRANSPORT ADMINISTRATION



Finnish Transport
Infrastructure Agency



REPUBLIC OF ESTONIA
TRANSPORT ADMINISTRATION



NorGeoSpec History

Nordic system for certification and specification of geosynthetics

- A Nordic system for **specification and control** of geotextiles in roads and other trafficked areas (2002)



NorGeoSpec 2002

A Nordic system for
specification and control of geotextiles
in roads and other trafficked areas



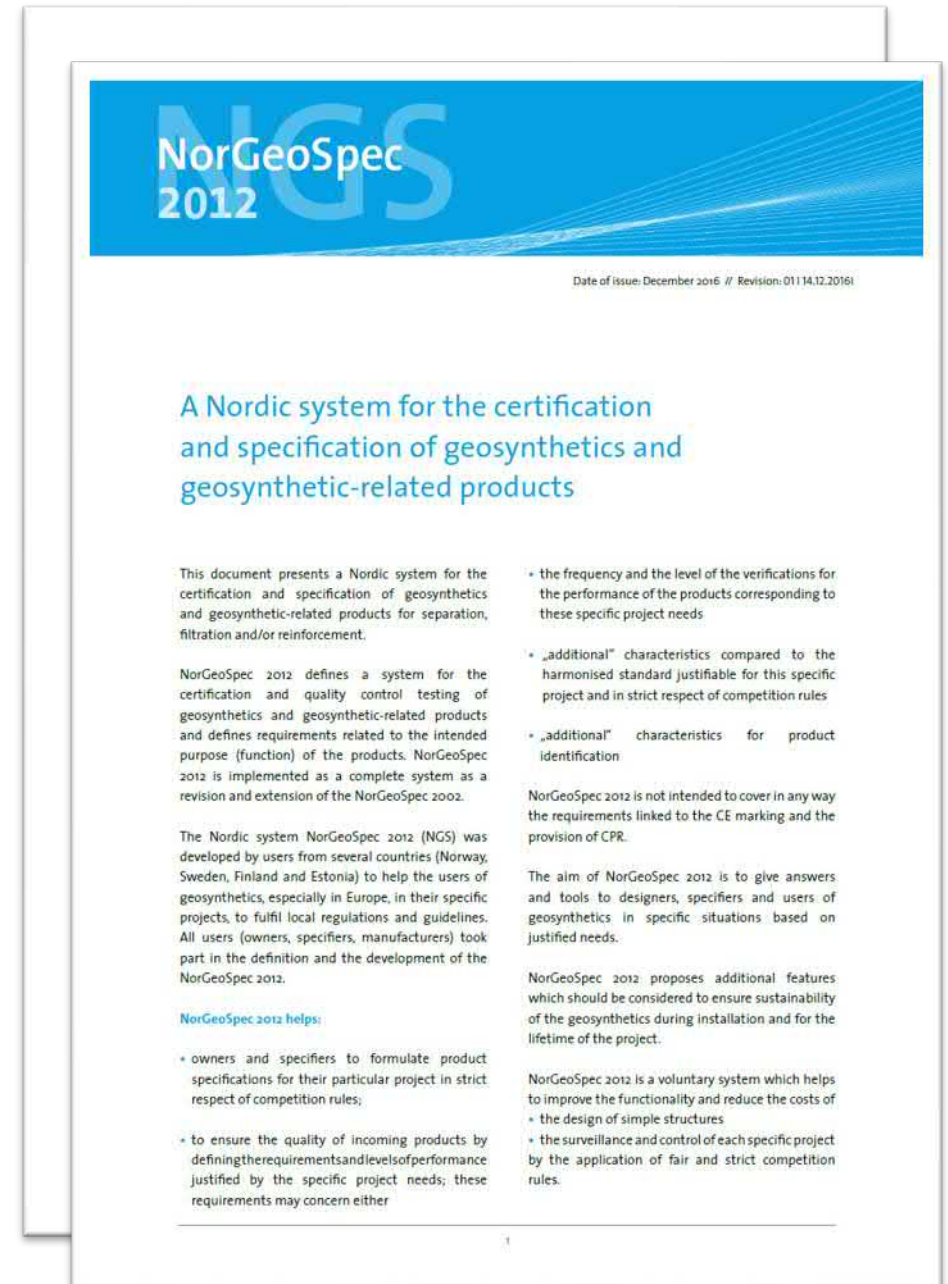


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NorGeoSpec History

Nordic system for certification and specification of geosynthetics

- A Nordic system for **specification and control** of geotextiles in roads and other trafficked areas (2002)
- A Nordic system for the **certification and specification** of geosynthetics and geosynthetic-related products (2012, Rev. 01 in 2016)



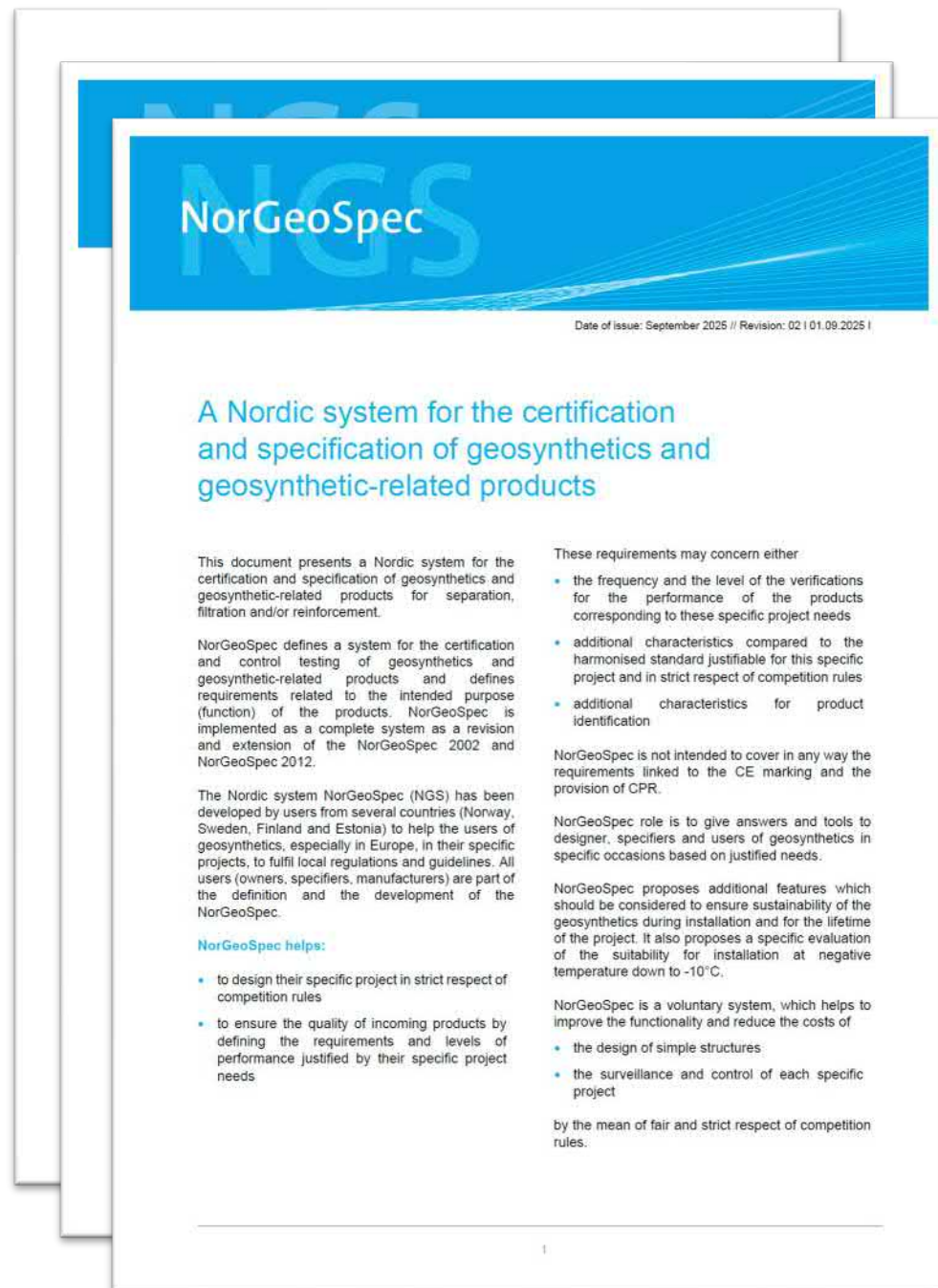


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NorGeoSpec History

Nordic system for certification and specification of geosynthetics

- A Nordic system for **specification and control** of geotextiles in roads and other trafficked areas (2002)
- A Nordic system for the **certification and specification** of geosynthetics and geosynthetic-related products (2012, Rev. 01 in 2016)
- A Nordic system for the certification and specification of geosynthetics and geosynthetic-related products (Rev. 2, 01.09.2025)





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NorGeoSpec Structure

Quality Product Certification – Part 1

- Certification and control testing of geosynthetics
- Functions
 - **Separation** and Filtration,
 - **Filtration** in drainage systems,
 - Reinforcement
- The aim is to assess that the products are fit for purpose
- NGS certification is considered equivalent to incoming quality control on site

Quality Product Specification – Part 2

- Tools for designers, specifiers and users of geosynthetics based on justified needs
- Guidelines for the selection of specification profiles based on the application
- Function reinforcement is not covered because they are designed to project
- Product specification profiles 1 to 5 for Separation and Filtration
- Filter- and mechanical profiles for filtration in drainage systems



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Product Specification - Functions Separation and Filtration

Function: **Separation** and Filtration

- The separation function is always used in conjunction with filtration. Accordingly, the separation will never be specified alone.
- **Separation: prevention from intermixing of adjacent dissimilar soils and/or fill materials by the use of a geosynthetic material**
- the mechanical parameters of the geotextile are dominant to ensure primarily the separation function
- “simple” application cases where the separation function is dominant and only small water flow is to be expected

Filtration in drainage systems

New

- **Filtration: restraining of uncontrolled passage of soil or other particles subjected to hydrodynamic forces, while allowing the passage of fluids into or across a geosynthetic material**
- filtration characteristics are dominant and the mechanical parameters have to ensure the long-term filtration function
- filtration function is dominant due to high water flow (filter design)



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Product Specification

Function Separation and Filtration

- Subsoil
 - soft, medium or firm
- Construction conditions
 - normal or favourable
- Traffic
 - high or low

NorGeoSpec // Part 2: Product Specification // Date of issue: May 2025 // Revision: 02 | 05.05.2025 | // www.norgeospec.org

Annex I: Guidelines for selection of specification profile

1. Application roads and trafficked areas: function separation/filtration

The selection of specification profile may be based on subsoil conditions, aggregate grain size and a combination of construction conditions and quality requirements for the road. For conditions not covered by these guidelines, a special evaluation of required specification profile should be done.

The construction conditions and road-quality requirements are combined into traffic classes *Normal* and *High* according to the following:

Subsoil:

The subsoil is divided into two groups, *Soft* respectively *Medium & Firm*; these groups can be categorised according to soil type and shear strength:

- *Soft* - clay with undrained shear strength $c_u \leq 25$ kPa and peat
- *Medium* - clay with undrained shear strength $25 < c_u < 50$ kPa
- *Firm* - clay with undrained shear strength ≥ 50 kPa and sand or gravel

Construction conditions:

- *Normal* - Two or more of the following conditions: Heavy construction traffic, angular and sharp aggregate e.g. crushed rock, compaction with heavy and vibrating equipment, construction traffic running on aggregate layers with a thickness less than 300 mm
- *Favourable* - For rounded aggregate with maximum grain size < 200 mm and layer thickness $> 1,5 \times$ max. grain size

Traffic:

- *High* - medium and high-volume roads (> 500 vehicles per day)
- *Low* - access roads, lightly trafficked roads (≤ 500 vehicles per day)

Based on these input parameters, the selection of relevant specification profile can be made according to Table 10.

Product Specification

Function Separation and Filtration

- Subsoil
 - soft, medium or firm
- Construction conditions
 - normal or favourable
- Traffic
 - high or low
- Based on these input parameters the relevant specification profile is selected in Table 10.

NorGeoSpec // Part 2: Product Specification // Date of issue: May 2025 // Revision: 02 | 05.05.2025 | // www.norgeospec.org

Table 10: Selection of relevant specification profile

Subsoil	Construction conditions	Traffic	Maximum grain size ($d_{\max}$) in aggregate (mm)			
			$d_{\max} \leq 63$	$63 < d_{\max} \leq 200$	$200 < d_{\max} \leq 500$	$d_{\max} > 500$
Soft	Normal	High Low	3 3	4 4	5 4	5 5
	Favourable	High Low	3 2	3 3		
Medium & Firm	Normal	High Low	2 2	3 2	3 3	4 3
	Favourable	High Low	2 2 ²⁷	2 2		



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Product Specification

Function Separation and Filtration

- Based on the selected profile the product requirements are defined in Table 7

Function: separation and filtration (Roads and other trafficked areas)								
Characteristic	Testing standard	Unit	Maximum tolerance ¹⁹	Required ²⁰ values corresponding to 95% confidence limit				
				Product Specification profiles				
				1	2	3	4	5
Min. tensile strength	EN ISO 10319	kN/m	-10%	6	10	15	20	26
Min. tensile strain at max. load	EN ISO 10319	%	-20%	15	20	25	30	35
Max. cone drop diameter	EN ISO 13433	mm	+25%	44	38	28	22	13
Min. energy index ²¹		kN/m		1.2	2.1	3.2	4.5	6.5
Min. water permeability normal to the plane, without load (velocity index V _{H50})	EN ISO 11058	m/s	-30%	0.003	0.003	0.003	0.003	0.003
Max. char. Opening size, O ₉₀	EN ISO 12956	µm	+30%	200	200	200	150	150
Max. tolerance for mass per unit area	EN ISO 9864	g/m ²	±10%					
Max. tolerance for static puncture strength	EN ISO 12236	kN	-10%					



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Product Specification

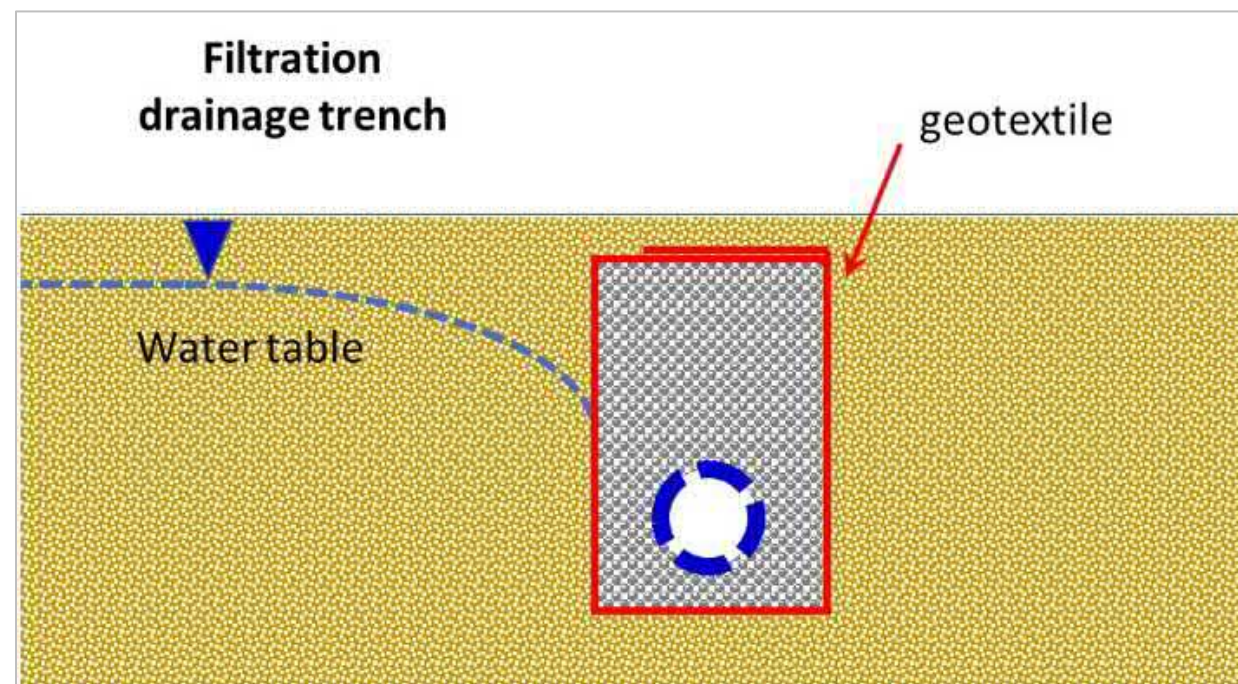
New

Filtration in drainage systems

Filtration function is dominant due to high water flow (filter design).

Applications are:

- **drainage trench**



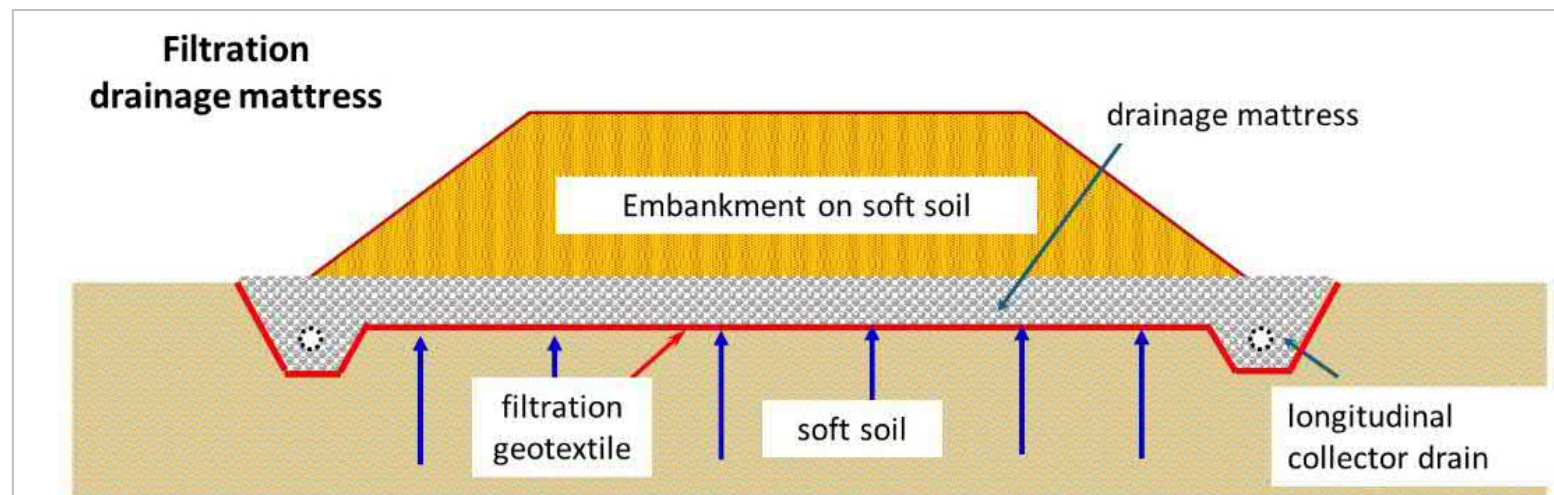
Product Specification

Filtration in drainage systems

Filtration function is dominant due to high water flow (filter design).

Applications are:

- drainage trench
- **drainage mattress under embankment on soft soil**



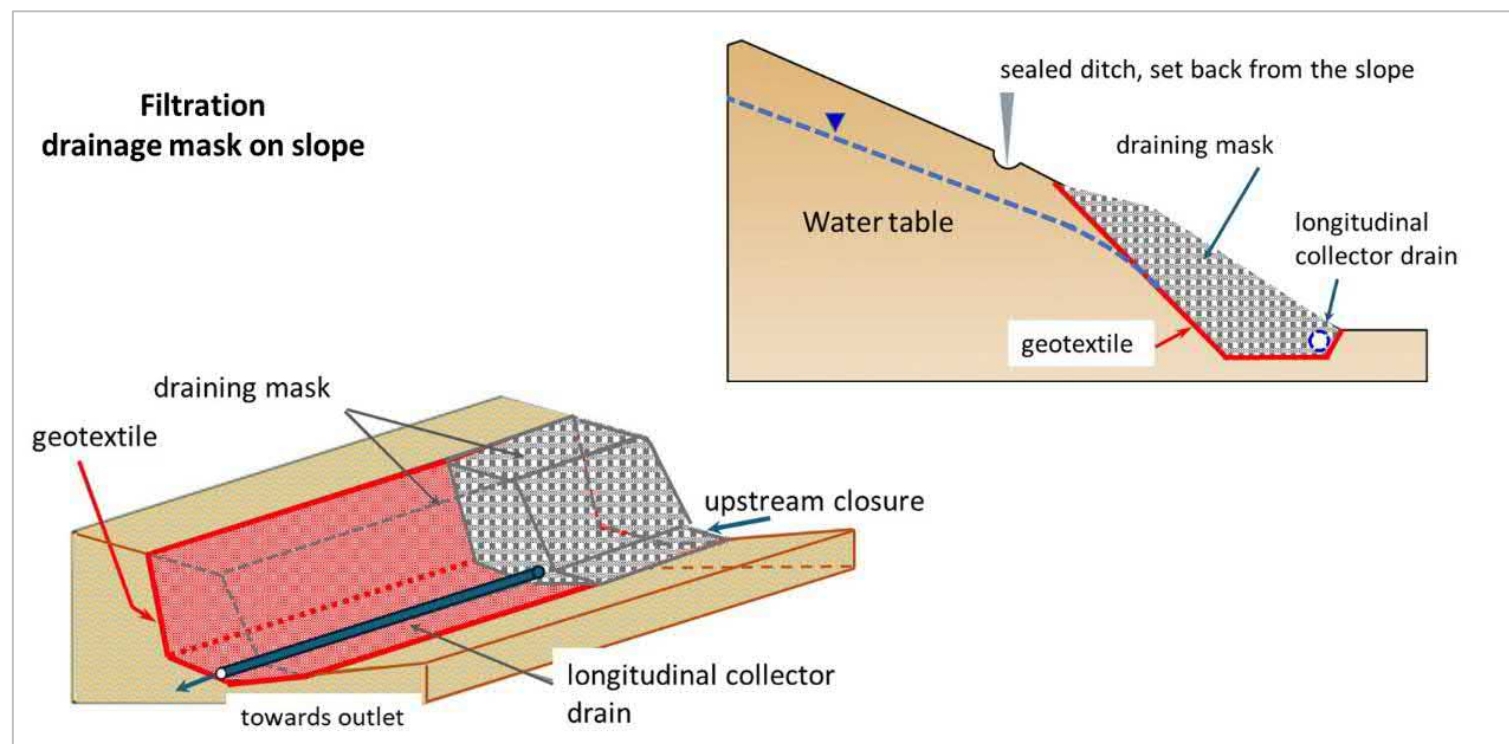
Product Specification

Filtration in drainage systems

Filtration function is dominant due to high water flow (filter design).

Applications are:

- drainage trench
- drainage mattress under embankment on soft soil
- **drainage mask on slope**





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New

Product Specification

NorGeoSpec // Part 2: Product Specification // Date of issue: May 2025 // Revision: 02 / 05.05.2025 // www.norgeospec.org

Annex I: Guidelines for selection of specification profile

2. Function: filtration in drainage systems

The products used for filtration in drainage systems are defined by the combination two components:

- one or more of the six “Filter” profiles (**Fp**) (Table 8)
- and one of the four “Mechanical” profiles (**Mp**) (Table 9)

Filtration in drainage systems

Products used for filtration in drainage systems are defined by the combination two components:

- Filter profile (Fp)
 - considering in-situ soil conditions
 - Fp 1, 2, 3, 4, 5, 6
- Mechanical profile (Mp)
 - considering installation
 - Mp 2, 3, 4, 5

Product Specification

Filtration in drainage systems

Step 1:

Classification of in-situ soil conditions.

Based on the in-situ soil conditions:

- granularity
- hydraulic properties

Note: Step 1 is always the same for all applications

Table 11: Soil granularity classes

G 1	G 2	G 3 medium to well graded ²⁸	G 4 uniformly graded to poorly graded ²⁸
Clean sand & gravels ²⁹	Fine soils ³⁰	Mixed soils $C_u \geq 5$	Mixed soils $C_u < 5$

Table 12: In-situ soil hydraulic classes

H1 Very permeable	H2 Permeable	H3 Low permeable	H4 Very low permeable
k_s : 10^{-2} to 10^{-4} m/s	k_s : 10^{-4} to 10^{-5} m/s	k_s : 10^{-5} to 10^{-6} m/s	k_s : 10^{-6} to 10^{-12} m/s
Gravel	Sand		Silt Clay

Product Specification

New

Filtration in drainage systems

Step 2:

Selection of **Filter profile (Fp)**
for **drainage trench**

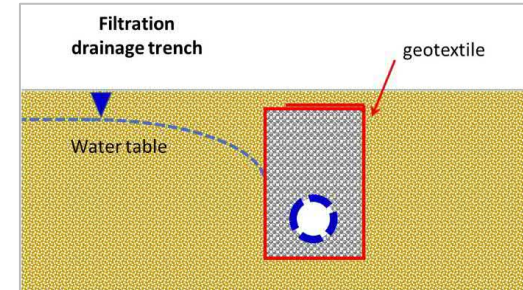


Table 13: selection of “Filter” profile of the geotextile for drainage trench depending on the in-situ soil characteristics (Granularity & Hydraulic characteristic)

	In-situ soil permeability			
In-situ soil granularity	H1 Very permeable	H2 Permeable	H3 Low permeable	H4 Very low permeable
G1 Clean sand & gravels	Fp 6			
G2 Fine soils				Fp 3 ³¹
G3 Mixed soil Cu ≥ 5			Fp 4	Fp 5
G4 Mixed soil Cu < 5			Fp 1	Fp 2

Product Specification

New

Filtration in drainage systems

Step 3:

Selection of **Mechanical profile (Mp)** for drainage trench

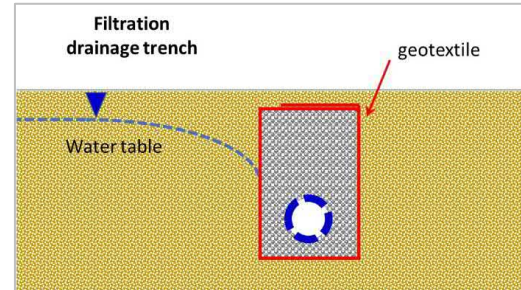
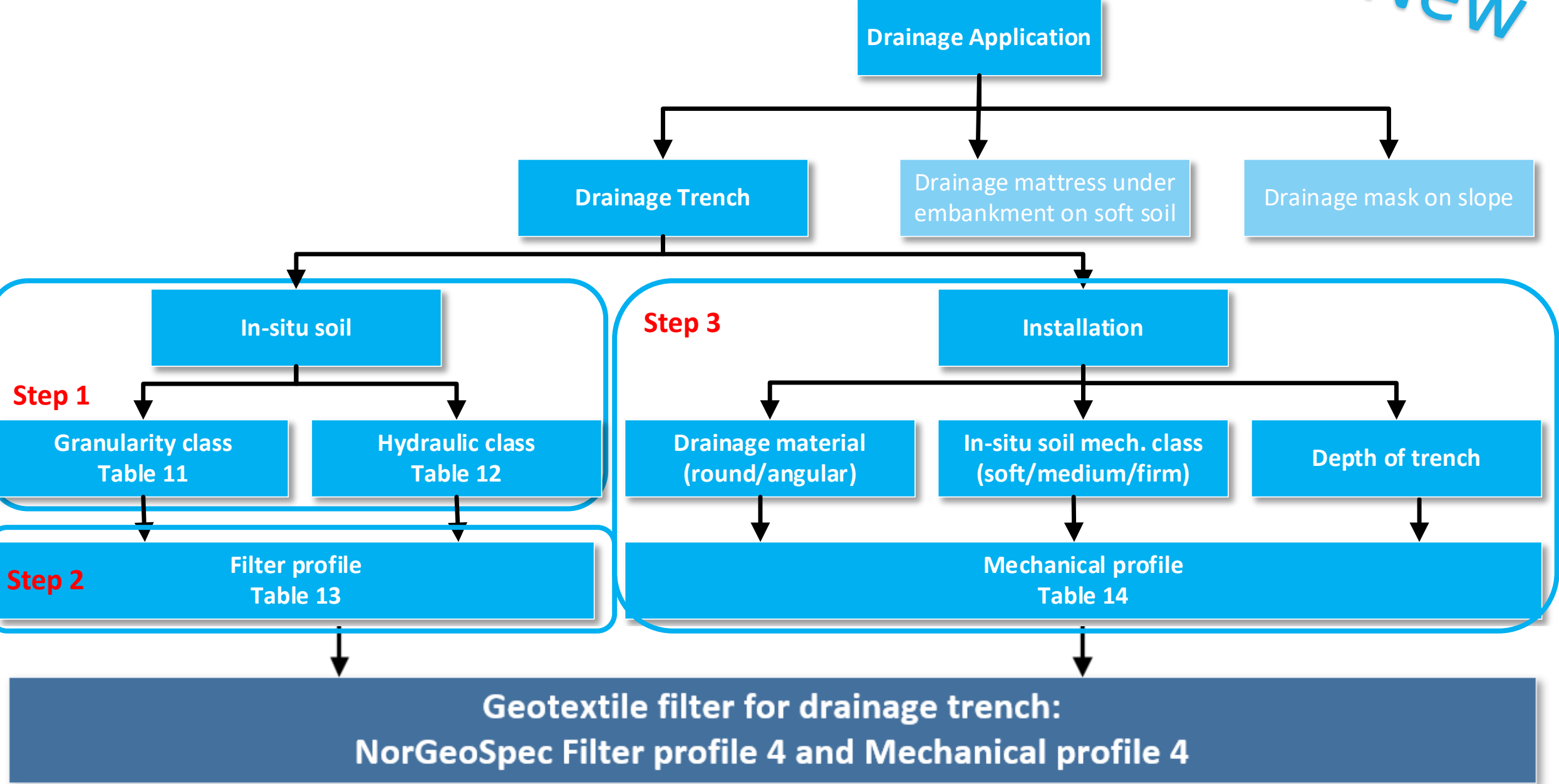


Table 14: selection of “Mechanical” profile of the geotextile for drainage trench

Drainage trench depth	$H \leq 1 \text{ m}$		$1 \text{ m} < H \leq 2 \text{ m}$	
Drainage material	rounded	angular	rounded	angular
In-situ soil mech. class				
S0 Soft	Mp 3	Mp 4	Mp 4	Mp 5
S1 Medium	Mp 2	Mp 3	Mp 4	Mp 5
S2 Firm	Mp 2	Mp 3	Mp 3	Mp 4

Filtration in drainage systems – Flow Chart

New



Product Specification

Filtration in drainage systems

- Based on the selected profiles the product requirements are defined
 - Filter profiles (Table 8)

Table 8: Required values for the Filter profile (Fp) – Product Specification

Characteristic	Testing standard	Unit	Maximum tolerance ²³	Function: filtration (drainage system)					
				Required ²⁴ NGS declared mean values					
				Product Specification Filter profiles					
				Fp 1	Fp 2	Fp 3	Fp 4	Fp 5	Fp 6
Min. water permeability normal to the plane without load (velocity index V_{H50})	EN ISO 11058	$l/(m^2 \cdot s)$ ²⁵	-30%	5	0.5	0.5	5	0.5	30
Max. char. Opening size, O_{90}	EN ISO 12956	μm	+30%	150	150	200	300	300	500
Min. char. Opening size, O_{90}		μm	-30%	63	63	63	63	63	63
Max. tolerance for mass per unit area	EN ISO 9864	g/m^2	$\pm 10\%$						

Product Specification

Filtration in drainage systems

- Based on the selected profiles the product requirements are defined
 - Filter profiles (Table 8)
 - Mechanical profiles (Table 9)

Table 9: Required values for the Mechanical profile (Mp) - Product Specification

Function: filtration (drainage system)								
Characteristic	Testing standard	Unit	Maximum tolerance ²⁶	Required ²⁷ values corresponding to 95% confidence limit				
				Product Specification Mechanical profiles				
				Mp 1	Mp 2	Mp 3	Mp 4	Mp 5
Min. energy index		kN/m	-	not in use	2.1	3.2	4.5	6.5
Max. tolerance for mass per unit area		g/m ²	±10%					

Product Specification

Filtration in drainage systems

- drainage trench
- drainage mattress under embankment on soft soil
- drainage mask on slope

Worked examples in Technical Note 3

SINTEF Community Høgskoleringen 7a 7465 Trondheim NORWAY Project Leader: Christoph Hessing Telephone: +49 151 720 43588 Email: christoph.hessing@sintef.no	Technical Note 3
	NorGeoSpec
	Examples for definition of specification for geotextile filter in drainage systems

Introduction

This technical note shows some examples of definition of specification of geotextile filters in different drainage systems as per NorGeoSpec, Rev. 2, Part 2 - Product Specification (PS), Annex I.

The examples show:

- a filtration geotextile used in a drainage trench,
- a filtration geotextile used under a drainage mattress over soft soil and
- a filtration geotextile used under a drainage mask on a slope



Product Specification

Filtration in drainage systems

- drainage trench
- drainage mattress under embankment on soft soil
- drainage mask on slope

Worked examples in Technical Note 3

1 Example of filtration geotextile in a drainage trench.

The in-situ soil is a medium soft well graded silty soil in which it is planned to realise a small drainage trench filled with crushed rock ($H \leq 1.0$ m).

According to Annex I, paragraph 2, the process starts with defining the granularity class of the in-situ soil and its hydraulic properties to define the "Filter" profile of the geotextile:

1.1 Definition of the "Filter" profile of the geotextile

1.1.1 Determination of the Granularity class of the in-situ soil

The Granularity class of the in-situ soil is defined based on NGS Part 2, Annex I Table 11.

NGS Part 2, Annex I, Table 11			
G1	G2	G3 Well graded granularity	G4 Uniform granularity
Clean sand & gravels ¹	Fine soils ²	Mixed soils Cu ≥ 5	Mixed soils Cu < 5
Cu = d ₉₀ / d ₁₀			

Example drainage trench
The in-situ soil is a medium soft well graded silty soil, which can be classified in G3 well graded

1.1.2 Determination of Hydraulic class of the in-situ soil

The Hydraulic class of the in-situ soil is defined based on NGS Part 2, Annex I Table 12.

NGS Part 2, Annex I, Table 12				Example drainage trench
H1	H2	H3	H4	<i>The in-situ soil is a soft well graded silty soil, which can be classified reasonably in H3</i>
Very permeable $k_s: 10^{-2}$ to 10^{-4} m/s	permeable $k_s: 10^{-4}$ to 10^{-5} m/s	Low permeable $k_s: 10^{-5}$ to 10^{-6} m/s	<i>Very low</i> permeable $k_s: 10^{-6}$ to 10^{-12} m/s	
Gravel	Sand	Silt	Clay	

This allows to define the "Filter" profile of the geotextile to be used.

¹ Clean gravels and sands & gravels and sands with some fines but passing 63 μ m < 12 %

² passing 63 μ m > 35 % and $D_{max} \leq 45$ mm ($I_p > 12$)



Product Specification

Filtration in drainage systems

- drainage trench
- drainage mattress under embankment on soft soil
- drainage mask on slope

Worked examples in Technical Note 3

1.1.3 Determination of the "Filter" profile of the geotextile

The "Filter" profile of the geotextile is defined based on NGS Part 2, Annex I Table 13

NGS Part 2, Annex I, Table 13				
In-situ soil granularity	In-situ soil permeability			
	H1 Very permeable	H2 permeable	H3 Low permeable	H4 Very low permeable
G1 clean sand & gravels	Fp 6	-	-	-
G2 Fine soils	-	-	-	Fp 3 ²
G3 Mixed soils Cu ≥ 5	-	-	Fp 4	Fp 5
G4 Mixed soils Cu < 5	-	-	Fp 1	Fp 2

Example drainage trench

Considering the in-situ soil with a granularity Class **G3** & a hydraulic Class **H3**, the "Filter" profile is **Fp 4**

According to Annex I, paragraph 2.1, the process continues with defining the "Mechanical" profile of the geotextile. It is based on:

- the Mechanical Class of the in-situ soil (soft, medium or firm):
- the type of drainage material used in the trench (rounded or angular):
- the drainage trench depth ($H \leq 1$ m or $1 \text{ m} < H \leq 2$ m).

1.2 Definition of the "Mechanical" profile of the geotextile

The "Mechanical" profile of the filtration geotextile is defined based on NGS Part 2, Annex I Table 14.

NGS Part 2, Annex I, Table 14				
Drainage trench depth	H ≤ 1 m		1 m < H ≤ 2 m	
Drainage material	rounded	angular	rounded	angular
In-situ soil mech. class				
S0 soft	Mp 3	Mp 4	Mp 4	Mp 5
S1 medium	Mp 2	Mp 3	Mp 4	Mp 5
S2 firm	Mp 2	Mp 3	Mp 3	Mp 4

Example drainage trench

Considering that the in-situ soil is Medium soft → S1, the drainage material is crushed rock → angular and the depth is ≤ 1 m, the "Mechanical" profile is Mp 3

³ passing 63 µm > 35 % and Dmax ≤ 45 mm (Ip > 12)

Product Specification

Filtration in drainage systems

- drainage trench
- drainage mattress under embankment on soft soil
- drainage mask on slope

Worked examples in Technical Note 3

1.3 Specification Profile of the filtration geotextile in a drainage trench.

For an in-situ soil which is a medium soft well graded silty soil in which it is planned to realise a small drainage trench filled with crushed rock ($H \leq 1.0$ m), the geotextile filter specification is defined by

NorGeoSpec certified geotextile for drainage systems
Fp 4 / Mp 3

Which can be also written:

NorGeoSpec certified geotextile for drainage systems

Nominal water permeability (EN ISO 11058) (velocity index V_{H50})	$V_{H50} \geq 5 \text{ l}/(\text{m}^2 \cdot \text{s})$
Nominal opening size (EN ISO 12956)	$63 \mu\text{m} \leq O_{90} \leq 300 \mu\text{m}$
Min. Energy Index	$\geq 3.2 \text{ kN/m}$



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New certificates

NorGeoSpec Product Certificate

Quality Product Certification

This product has been found to be fit for use in accordance with the NorGeoSpec System for the function as stated below.

Certificate no.:	NGS-50482
Manufacturer:	BontexGeo Kft.
Product:	Tipptex® NGS3
Product Type:	GTX-N
Raw material:	PP
Function:	☒ Separation and Filtration in roads and other trafficked areas ☒ Filtration in drainage systems

This certificate was issued on 31.01.2026 and will remain valid as long as the product fulfils the NorGeoSpec requirements, the product and the manufacturing conditions in the plant are not modified significantly. The validity of the certificate shall be checked on www.norgeospec.org or by using the QR code shown. Only certificates listed on www.norgeospec.org are valid.

The hash value of this certificate is:
9a1981263ddf13e5e59ed3b1872c4398807cdde579e2f75dc5d92aa4f9dc2

The products are regularly audited and tested to verify that the characteristics fulfil the NorGeoSpec, Rev. 02 / 01.09.2025 requirements.



Issued by

Christoph HESSING

Christoph HESSING, SINTEF Community

Approved by

Christian RECKER

Christian RECKER, SINTEF Community



NorGeoSpec

Certificate no.: NGS-50482

Quality Product Certification

Quality Product Certification		DoP ¹⁾		NGS			
Characteristic	Test method	Unit	DoP declared mean value	NGS declared mean value ²⁾	NGS max. tolerance ³⁾	NGS declared tolerance ⁴⁾	NGS control limits ⁵⁾
Mass per unit area	EN ISO 9864	g/m ²	(-)	195.0	± 19.5	± 19.5	175.5 - 214.5
Mechanical tests							
Tensile strength	MD	EN ISO 10319	kN/m	16.70	16.70	-1.67	-1.67
	CMD	EN ISO 10319	kN/m	16.70	16.70	-1.67	-1.67
Elongation at max. load	MD	EN ISO 10319	%	45.0	45.0	-9.0	-9.0
	CMD	EN ISO 10319	%	50.0	50.0	-10.0	-10.0
Static puncture test (CBR test)	EN ISO 12236	kN	2.350	2.350	-0.235	-0.235	≥ 2.115
Dynamic perforation test	EN ISO 13433	mm	22.0	22.0	+5.5	+4.4	≤ 26.4
Energy index	NorGeoSpec	kN/m	(-)	3.2		0.0	≥ 3.2
Hydraulic tests							
Water permeability normal to the plane, without load (velocity index V _{rel})	EN ISO 11058	l/(m ² ·s)	55.0	55.0	-16.5	-16.5	≥ 38.5
Characteristic opening size	EN ISO 12956	µm	85.0	85.0	± 25.5	± 25.5	59.5 - 110.5
Durability							
Service life		years	100				100
Proven for installation under low temperatures	NGS, Annex G.2	(-)	(-)	down to 0°C down to -10°C	☒ yes ☒ yes / ☐ no		

Quality Product Certification: ☒ Separation and Filtration in roads and other trafficked areas Application profile: 3

Quality Product Certification: ☒ Filtration in drainage systems Filter profile (Fp)⁶⁾: 1, 2, 3, 4, 5, 6 Mechanical profile (Mp): 3

¹⁾ Manufacturer's Declaration of Performance acc. hEN standards

²⁾ Manufacturer's declared values

³⁾ Max. possible NorGeoSpec tolerance according to NGS, Table 1

⁴⁾ Manufacturer's declared tolerance; the tolerance for the NorGeoSpec certificate shall be equal or less than the "NGS max. tolerance" (see Table 1 Part 1 and Part 2 of the guideline)

⁵⁾ NorGeoSpec control limit values regarding fitness for use; these "NGS control limits" are calculated based on the "NGS declared mean values" and the "NGS declared tolerances"; the product has to satisfy these "NGS control limits" during the NorGeoSpec certification process and random product testing

⁶⁾ The product specification for filter profiles is based on NGS declared mean values.

(-) = no performance declared; N/R = not required; N/A = not applicable



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