Christoph Hessing

SINTEF Community

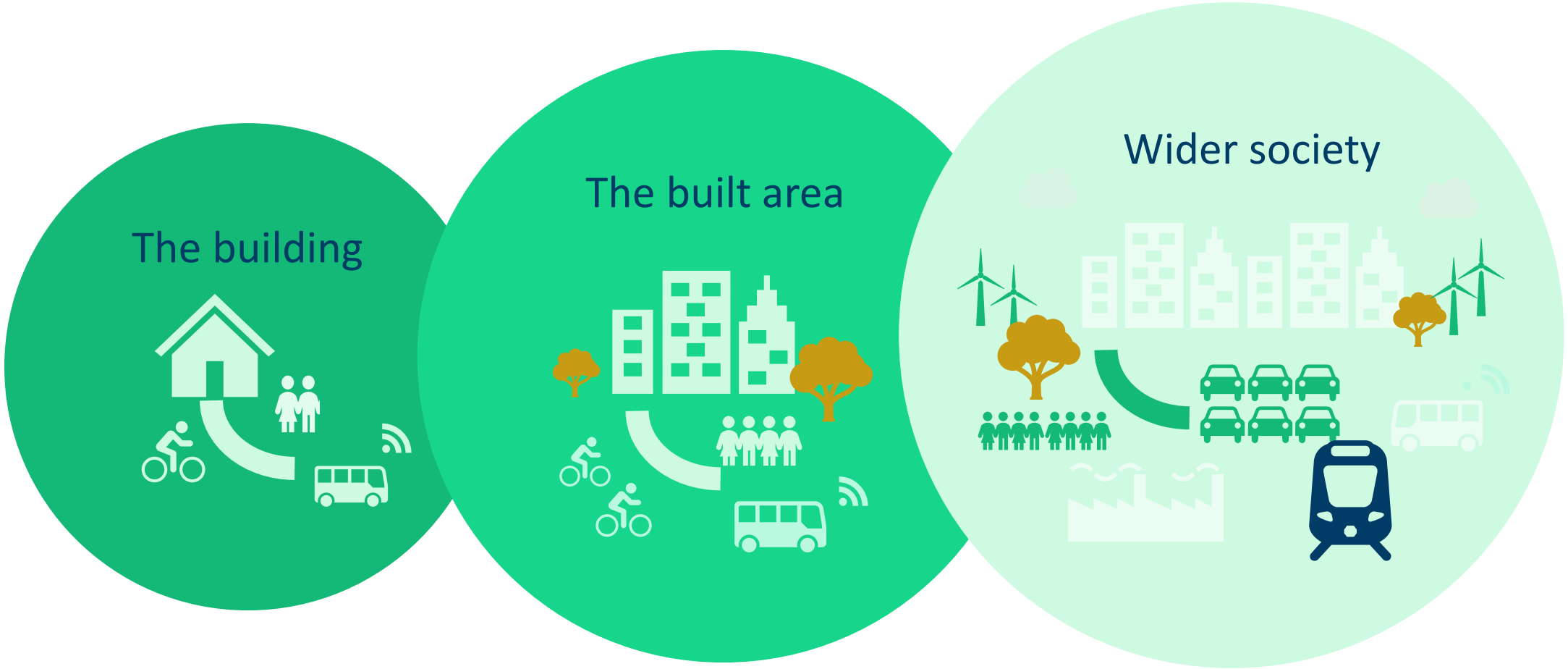
NorGeoSpec

Geosynthetics, fit for purpose.

- About SINTEF
- Geosynthetics
  - Functions
  - Applications
- Product quality
- CE marking
- NorGeoSpec system
- Development

SINTEF Community

We develop future solutions for the built society



Product documentation and certification

- SINTEF ensures quality, values and the environment through our approval and certification services.
- Meets the demands for quality documentation in the regulations on technical requirements for construction works
- We approve and certify according to national and international rules.

www.sintefcertification.no

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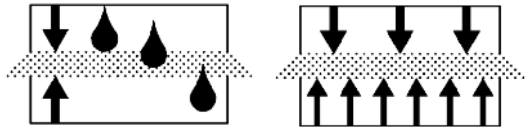
Geosynthetics - functions

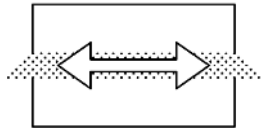
Filtration and separation



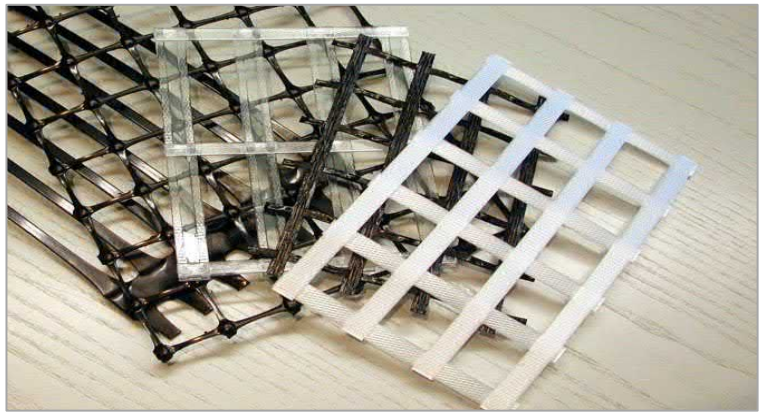
Product examples

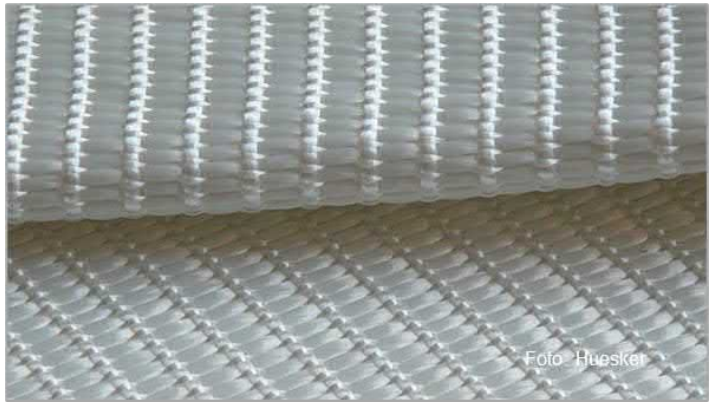
Geosynthetics - functions

Reinforcement



Product examples





Geosynthetics - applications

Geosynthetics - applications

Geosynthetics - applications

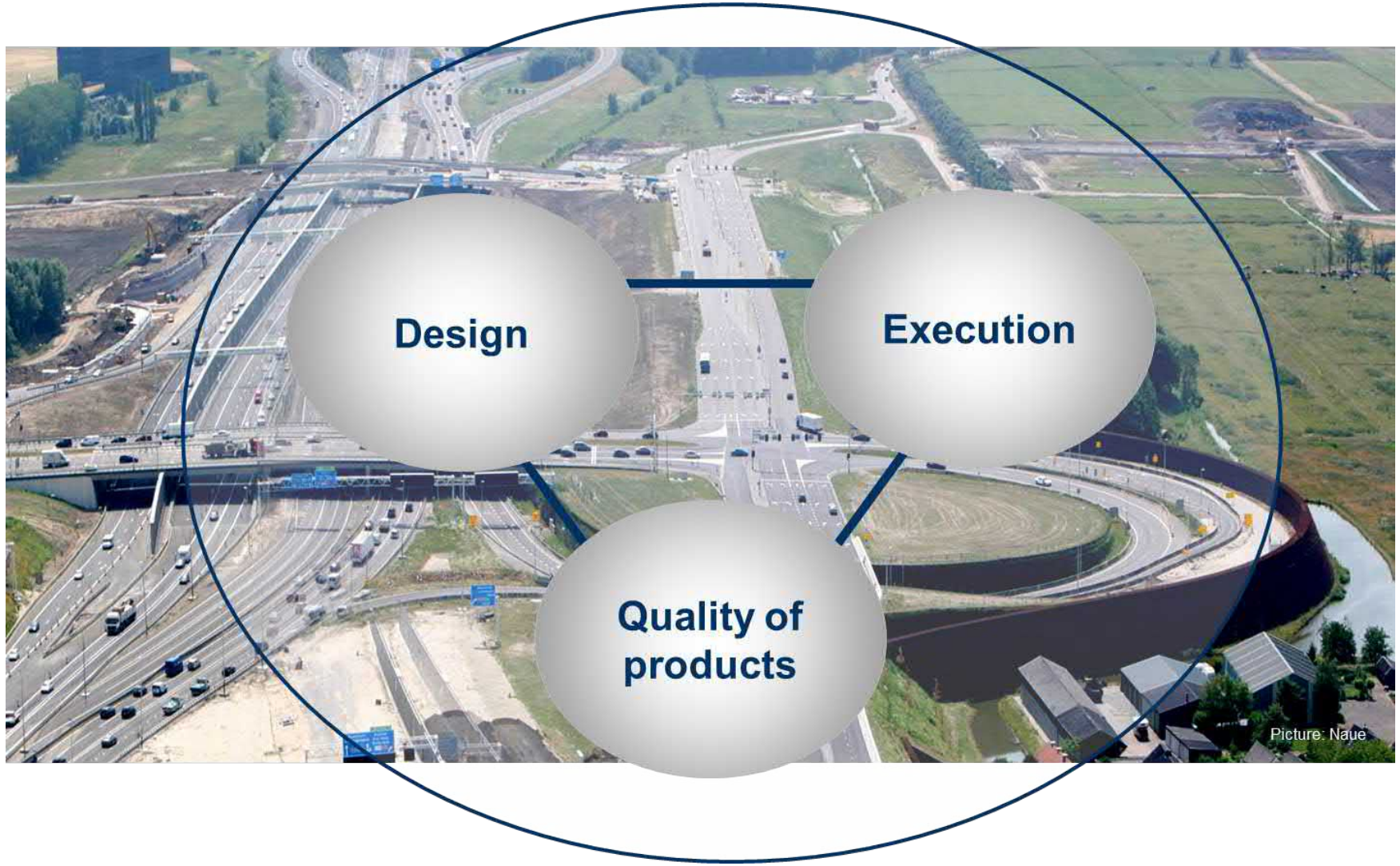
Geosynthetics - applications

Geosynthetics - applications

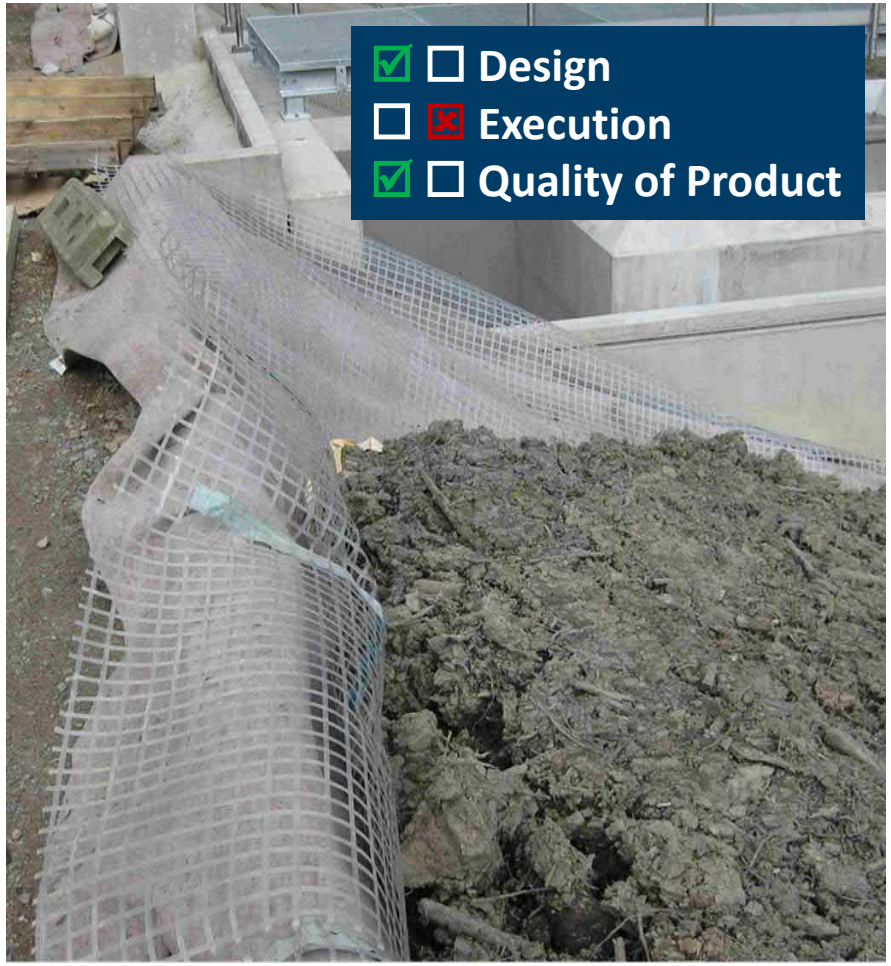

Foto: Tensar

Foto: Huesker

Quality of a project



Quality of a project: Execution or design?



The geogrid has to be embedded in the anchoring trench!

The anchoring trench has to be designed properly.

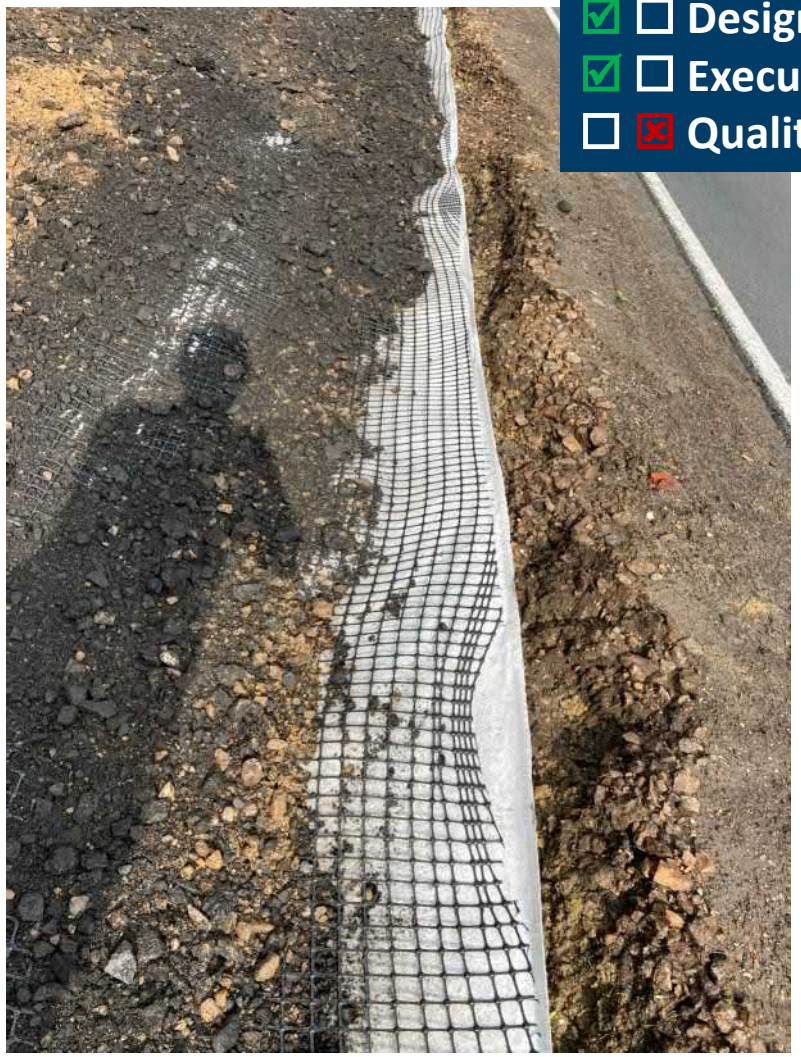
Quality of a project: Execution

Propper installation required.

Reinforcement must be laid flat!

Quality of a project: Product

☑ ☐ Design
☑ ☐ Execution
☐ ☒ Quality of Product



Production / Quality defects

Production / Quality defects

Quality of a project: Product

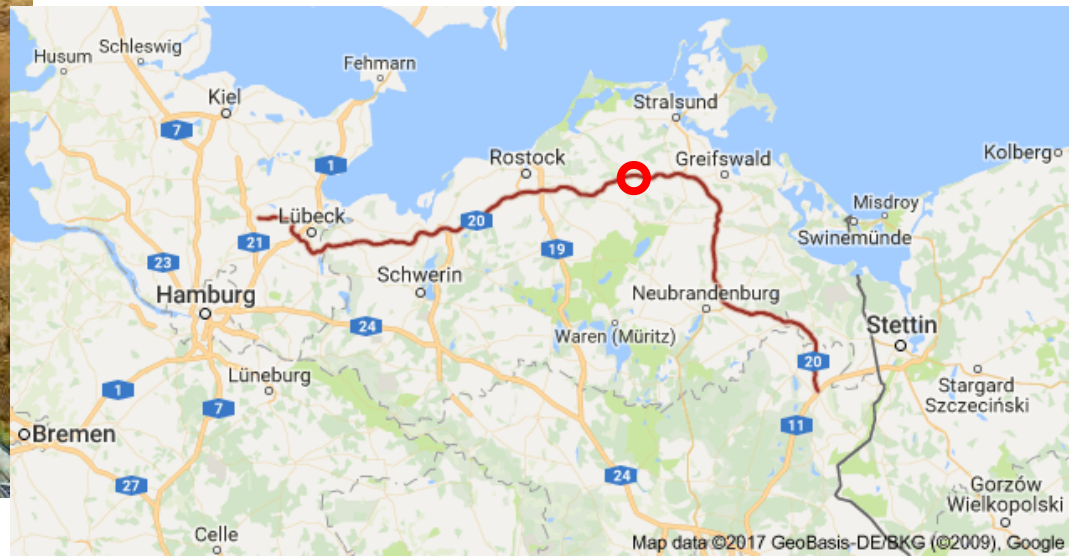
Goods without label and/or printing on material

CE- marked products failed in testing

Quality of a project: Hattrick

- ☐ ☒ Design
- ☐ ☒ Execution
- ☐ ☒ Quality of Product

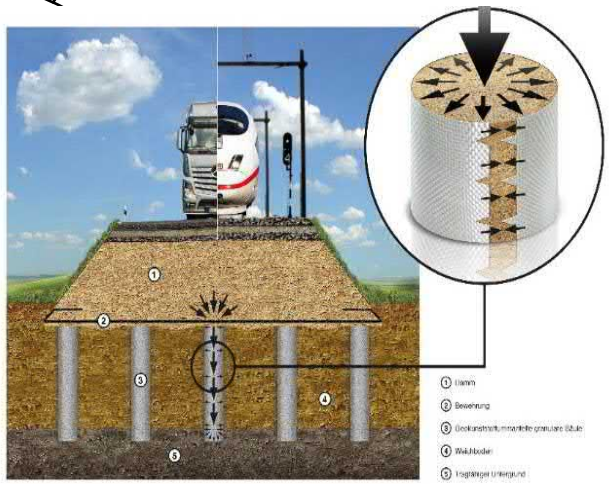
Motorway A20, 27.10.2017



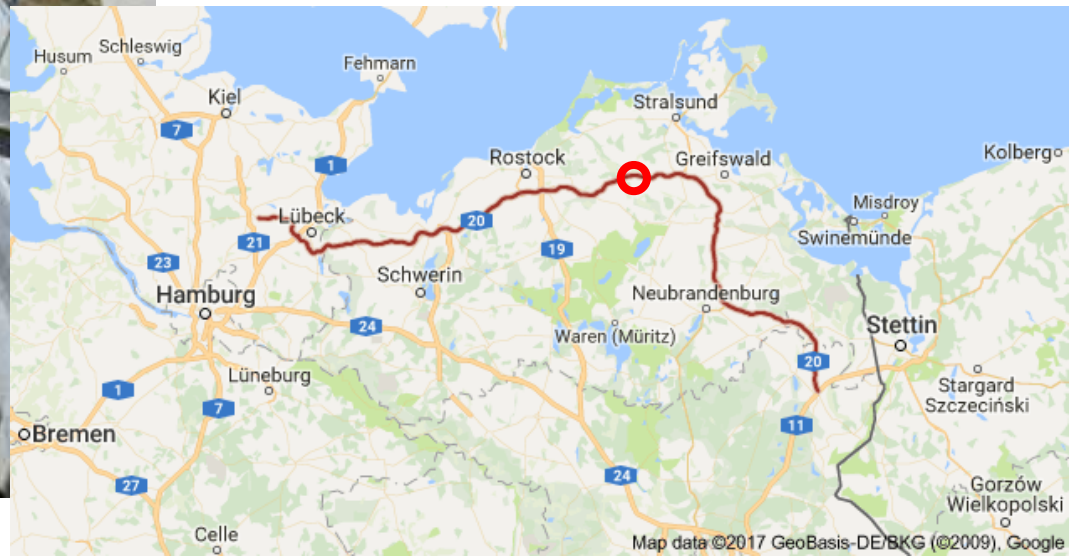
Quality of a project: Hattrick

- ☒ Design
- ☒ Execution
- ☒ Quality of Product

Motorway A20, 27.10.2017



Why not using geosynthetics?



CE marking

The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable harmonised standards

- the manufacturer takes responsibility to ensure that the construction product is in compliance with the performance specified in DoP (Declaration of Performance)
- there are no CE-approved building materials, only CE-marked construction products
- CE marking says little about the product quality,
- The CE marking is not a quality mark

CE marked products can be freely traded throughout the EEA

CE Mark China Export

Conformité Européene

CE marking

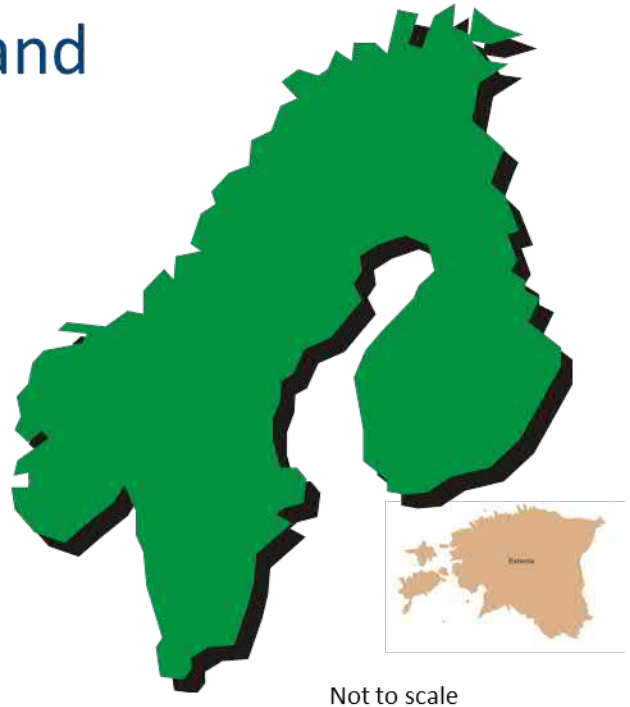
- A CE mark does not mean that a product can be used in any building
- A construction product should not only be freely tradable, but also suitable for the purpose
- System 2+ (Geosynthetics) gives all responsibilities to the producer

NorGeoSpec

NorGeoSpec 2012

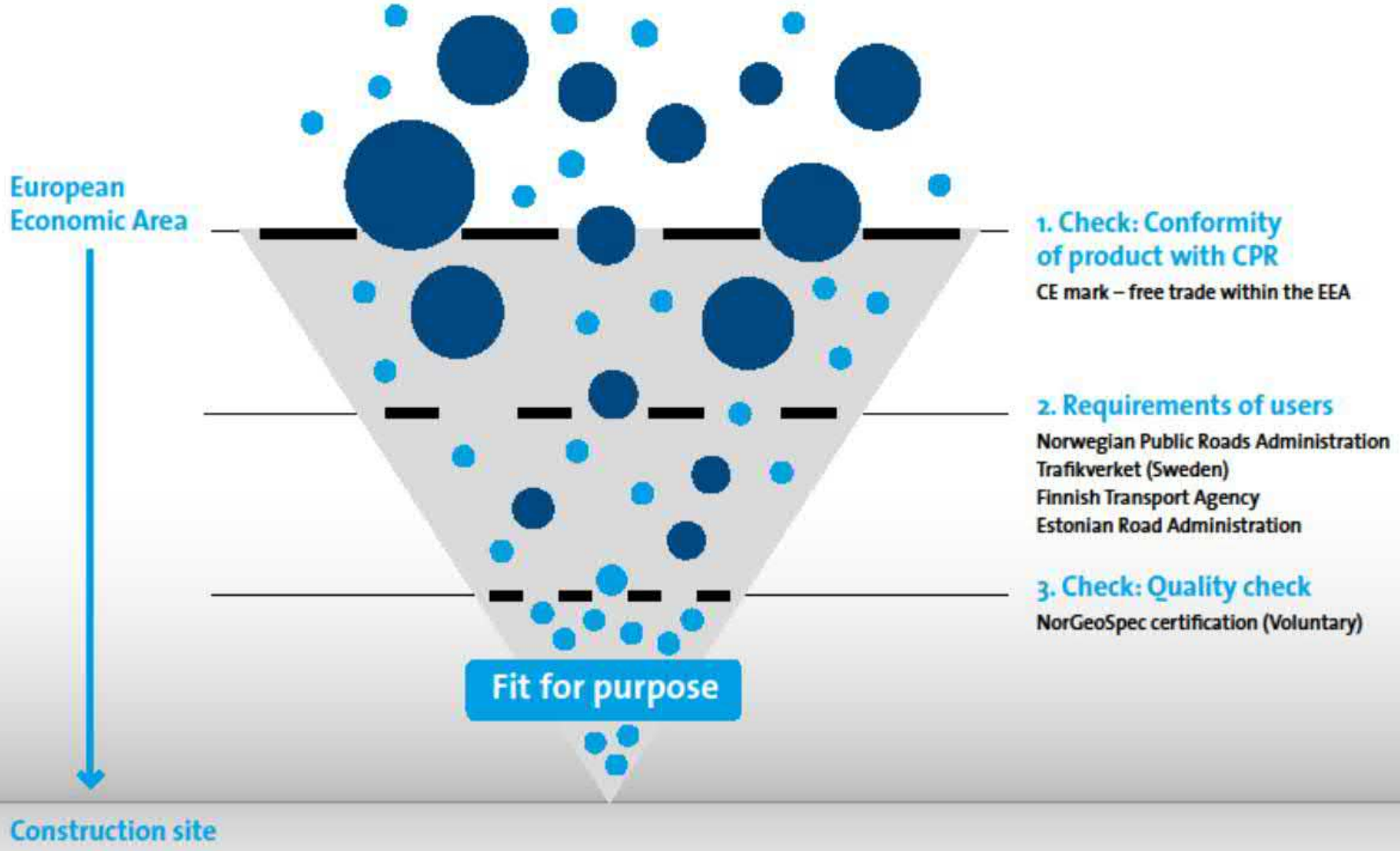
Nordic system for certification and specification of geosynthetics

- Finland
- Norway
- Sweden
- Estonia



Not to scale

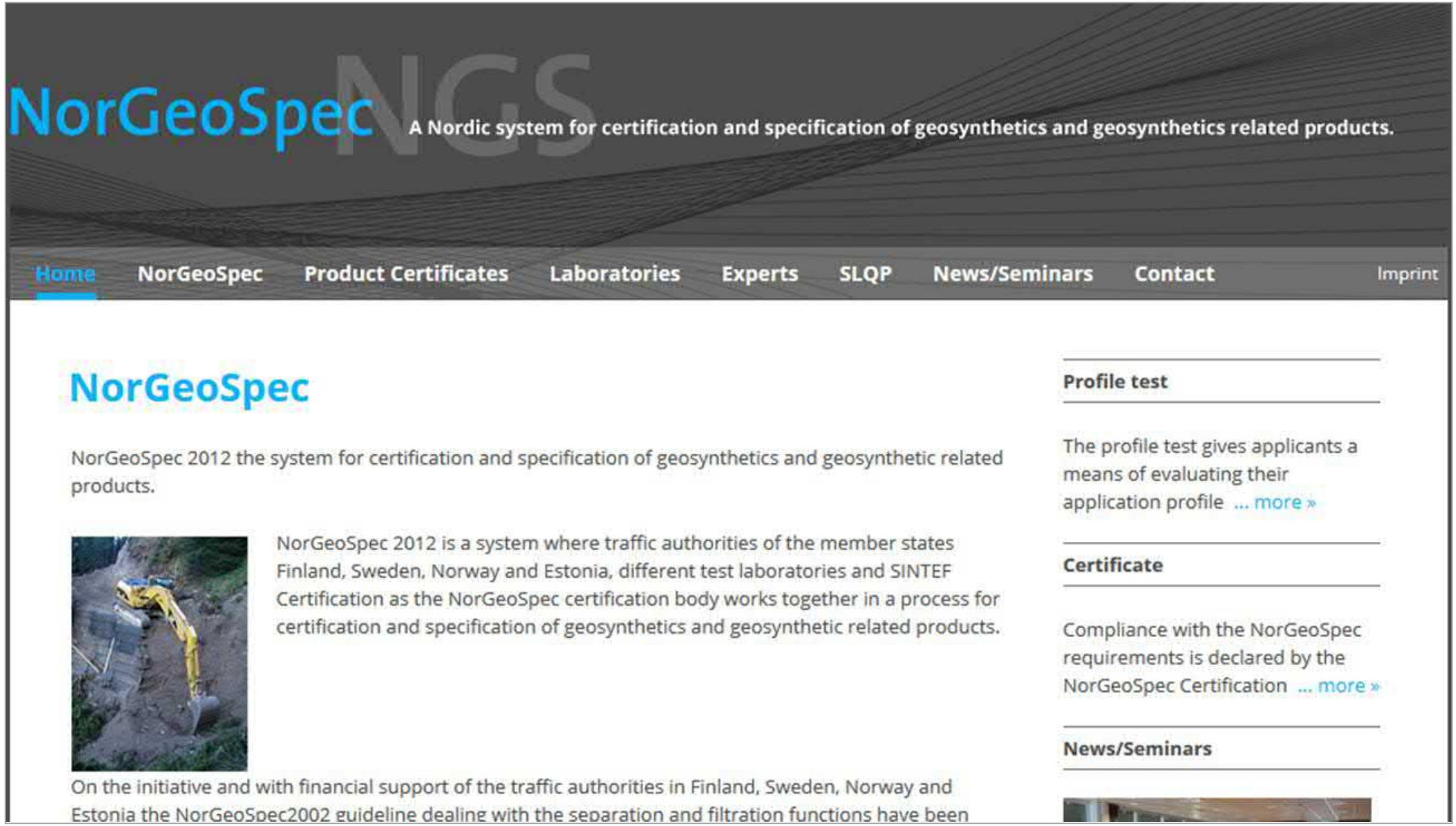
NorGeoSpec


European
Economic Area
1. Check: Conformity
of product with CPR
CE mark – free trade within the EEA
2. Requirements of users
Norwegian Public Roads Administration
Trafikverket (Sweden)
Finnish Transport Agency
Estonian Road Administration
3. Check: Quality check
NorGeoSpec certification (Voluntary)
Fit for purpose
Construction site

NorGeoSpec

Certification process

- **Initial certification**
  - *Initial factory inspection*
  - *Initial product sampling and testing*
  - *Product certification and publishing*
- **Random product control**
  - *Sampling and testing*
    - *In the warehouse of the manufacturer*
    - *on construction site*
- **Re-certification every two years**



www.norgeospec.org

Compliance with the requirements can be achieved by obtaining:

- a Quality Product Certification (QPC), Function: Separation and Filtration, Reinforcement (obligatory)
- a Quality Product Specification (QPS), Function: Separation and Filtration

Producer stock (example)

The applicant receives a Certificate with the results of the procedure.
The applicant accepts publication of the list of its certified or attested products and their NorGeoSpec 2012 Product Certificates on the NorGeoSpec website.

The NorGeoSpec Product Certificate is valid for a 2-year period, provided that the rules as defined in this document are observed.

www.norgeospec.org

Geotextiles Certified according to NorGeoSpec 2012

Manufacturer	Product	Certificate valid until	Function	Profile	Certification procedure*
Fibertex A/S	Fibertex F-20	2023-04-19 1)	S+F	1	QPC + QPS
	Fibertex F-27	2023-04-19 1)	S+F	2	QPC + QPS
	Fibertex F-34	2023-04-19 1)	S+F	3	QPC + QPS
	Fibertex F-47	2023-04-19 1)	S+F	4	QPC + QPS
	Fibertex F-60	2023-04-19 1)	S+F	5	QPC + QPS
DuPont de Nemours	SF32	2023-11-30	S+F	1	QPC + QPS
	SF45	2023-11-30	S+F	2	QPC + QPS
	SF65	2023-11-30	S+F	3	QPC + QPS

NorGeoSpec 2012 Product Certificate

Quality Product Certification
Separation and Filtration

This product has been found to be fit for use in accordance with NorGeoSpec 2012 System for the function given above.

Certificate no.:	NGS-50340
Date:	09.05.2023
Valid until:	08.05.2025
Manufacturer:	TenCate Geosynthetics Austria GmbH
Product:	Polyfelt TS50N
Product Type:	GTX-N
Raw material:	PP
Function:	Separation and Filtration

Issued by

Christian Recker, SINTEF Project Manager

Approved by

Arnstein Watn, Head of the Technical Committee

The products are regularly audited and tested to verify that the characteristics fulfil the NorGeoSpec 2012 Rev.: 01/14.12.2016 requirements.
Approved by the NorGeoSpec Technical Committee: 17.05.2023

NorGeoSpec Certification body: SINTEF · Postboks 124 Blindern · 0314 Oslo
SINTEF is appointed Notified Body by the Norwegian Building Authority, related to Regulation (EU) No. 305/2011 – Construction Products. Notified Body No. 1071.

Certificate no.: NGS-50340

Quality Product Certification
Separation and Filtration

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]
...ss per unit ...a	EN ISO 9864		g/m²	(-)	185	± 18.5	± 18.5	166.5 - 203.5
Ten... ...trength	EN ISO 10319	MD	kN/m	13.35	13.35	-1.335	-1.33	≥ 15.01
	EN ISO 10319		kN/m	20.00	20.00	-2.00	-2.00	
...e strain ... tens... ...rength	EN ISO 10319	MD	%	90.0	90.0	-18.0	-18.0	≥ 46.0
	EN ISO 10319	CMD	%	25.0	25.0	-5.0	-5.0	
Static pu... ...ure test (CBR test)	EN ISO 12236		kN	2.250	2.250	-0.225	-0.225	≥ 2.025
...ynam... ...perforation test	EN ISO 13433		mm	22	22	+5.5	+4.4	≤ 26.4
E... ...r index	NorGeoSpec 2012		kN/m	(-)	3.2		0.0	≥ 3.2
Water p... ...meability normal to the plane, without load	EN ISO 11058		m/s	0.090	0.090	-0.027	-0.027	≥ 0.063
Characteristic opening size	EN ISO 12956		µm	100	100	± 30.0	± 30.0	70.0 - 130.0
Service life			years	100	100			

1) Manufacturer's Declaration of performance acc. hEN standards
2) Manufacturer's declared values
3) Max. possible NorGeoSpec tolerance according to table 1 Part 1 and Part 2 of the guideline
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

Quality Product Certification: Separation and Filtration — **Application profile:** 3

NorGeoSpec Certification body: SINTEF Building and Infrastructure · Forskningsveien 3B · 0373 Oslo
SINTEF is appointed Notified Body by the Norwegian Building Authority, related to Regulation (EU) No. 305/2011 – Construction Products. Notified Body No. 1071.

NorGeoSpec 2012 Product Certificate

Quality Product Certification
Reinforcement

This product has been found to be fit for use in accordance with NorGeoSpec 2012 System for the above given function.

Certificate no.:	NGS-50346
Date:	06.02.2023
Valid until:	05.02.2025
Manufacturer:	NAUE GmbH & Co KG
Product:	Secugrid 40/40 Q6
Product Type:	GGR
Raw material:	PP
Function:	Reinforcement

Issued by

Christian Recker, SINTEF project manager

Approved by

Arnstein Watn, Head of the Technical committee

The products are regularly audited and tested to verify that the characteristics fulfil the NorGeoSpec 2012 Rev.: 01/14.12.2016 requirements.
Approved by the NorGeoSpec Technical committee: 17.05.2023

Quality Product Certification
Reinforcement

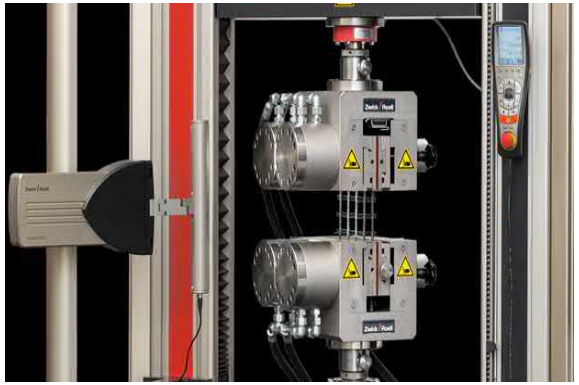
Characteristic		Standard	Unit	Declared value	Max. tolerance	Certification value
Mass per unit area		EN ISO 9864	g/m²	360	± 36	**324 - 396**
Dimension		NorGeoSpec 2012				
Tensile elements	MD	Annex F	Production width[1]	120	± 0	**120**
	CMD	Annex F	Elements/m	25	± 0	**25**
Grid apertures	MD	Annex F	mm	34	± 5.1	**28.9 - 39.1**
	CMD	Annex F	mm	34	± 5.1	**28.0 - 38.0**
Mechanical tests						
Nominal tensile strength	MD	EN ISO 10319	kN/m	40.00	- 0.00	**40.00**
	CMD	EN ISO 10319	kN/m	40.00	- 0.00	
Tensile strain at nominal strength	MD	EN ISO 10319	%	4.0	± 0.8	**3.2 - 4**
	CMD	EN ISO 10319	%	4.0	± 0.8	**4.8**
Tensile stiffness at 2% tensile strain	MD	EN ISO 10319	kN/m	900	0	**900**
	CMD	EN ISO 10319	kN/m			
Tensile stiffness at 5% tensile strain	MD	EN ISO 10319	kN/m	640	- 0	**640**
	CMD	EN ISO 10319	kN/m	640	- 0	**640**
Tensile stiffness at 10% tensile strain	MD	EN ISO 10319	kN/m			
	CMD	EN ISO 10319	kN/m			
Static puncture test		EN ISO 12236	KN			
Dynamic perforation resistance		EN ISO 13433	mm			
Durability (Declared value)						
Service life			...rs	☐ 25	☐ 50	☒ 100
Information about reduction factors are given on page ... of this certificate.						

[1] Production width – 5m

Declared values
Reinforcement

Declared values						
Reduction factor for creep rupture [1,2]	RF_{CR}	1.40	BBA - HAPAS Certificate 14/H218 - Product Sheet 1			
Reduction factor for environmental effects	RF_{CH}					
Chemical			Application in natural soils at a pH-value between 4 and 9 and a soil temperature <25°C			
Oxidation						
Hydrolysis		1.01	BBA - HAPAS Certificate 14/H218 - Product Sheet 1			
Reduction factor for weathering	RF_W					
Or max. exposure time						
1 month		x				
2 weeks						
1 day						
Reduction factor for installation damage	$RF_{ID,fine}$	1.06	$RF_{ID,medium}$	1.08	$RF_{ID,coarse}$	1.09
Used test method	Procedure for installation damage test for BBA Assessments modified to conform with ASTM D5818 requirements					
Compaction	Ride-on steel-wheeled roller (4550 kg) + vibratory capability, compaction rd. 90 % modified proctor					
Particle size	$RF_{ID,fine}$ = sand $D_{50} \leq 32$ mm $RF_{ID,medium}$ = sandy gravel $D_{50} \leq 8$ mm $RF_{ID,coarse}$ = coarse gravel $D_{50} \leq 2$ mm					

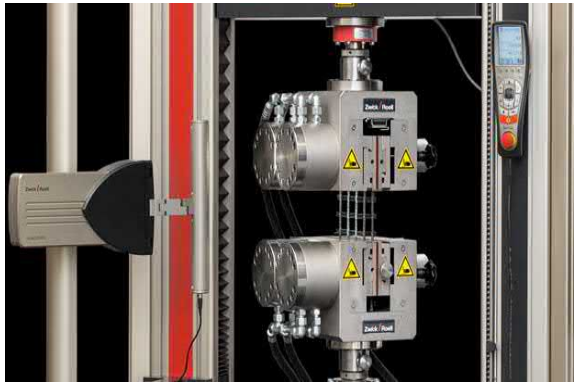
NGS in Finland



Function: Separation and filtration (InfraRYL 21120)

- *CE-mark and DoP (hEN according to purpose of use)*
- *Profiles N1…N5; requirements are identical to NGS Part 2 Annex A Table 1*
- ***<u>If product has NGS Product Certification (PC) and Product Specification (PS) there is no requirement to take samples on site and test the product</u>***
  - *If requested by designer or client and it's written in project specification, it's still possible.*

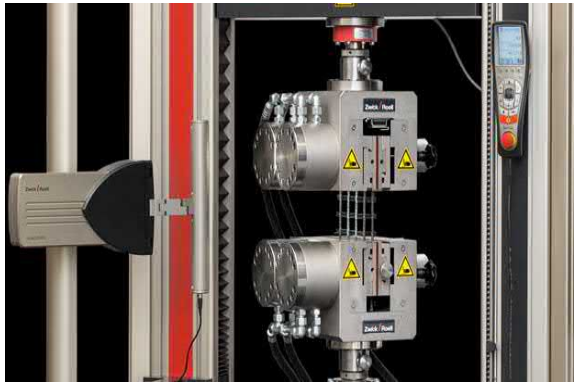
NGS in Finland



Function: Separation and filtration (InfraRYL 21120)

- *If product has no NGS certificate, sampling on site shall be done according to InfraRYL*
  - *≥ 1.000 m²* ➔ *1 sample (A+B sample)*
  - *≥ 10.000 m²* ➔ *1 sample / 10.000 m²*
- *Annex 11: (Description) Product Certification system for geosynthetics and related products by impartial body (NorGeoSpec)*

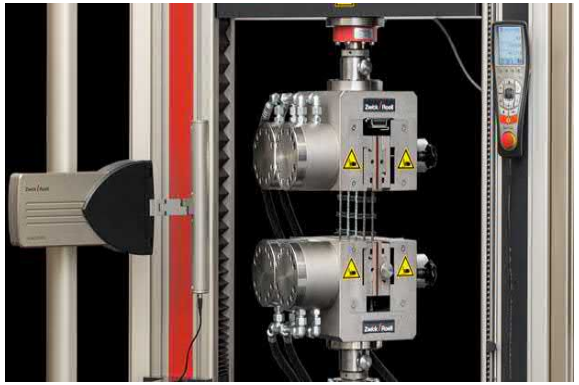
NGS in Finland



Function: Reinforcement (InfraRYL 14152)

- *CE-mark and DoP (hEN according to purpose of use) or CE-mark based on ETA*
- *If **no NGS Product Certification (PC)** or similar product certification (impartial body) sampling on site shall be done according to InfraRYL*
  - *≥ 1.000 m² ➔ 1 sample (A+B) / 5.000 m²*
- *If product **has NGS Product Certification (PC)** or similar sampling on site shall be done according to InfraRYL*
  - *≥ 1.000 m² ➔ 1 sample (A+B) / 20.000 m²*

NGS in Finland



Function: Reinforcement (InfraRYL 14152)

- *When amount is less than 1.000 m², but the significance of the geosynthetic reinforcement to the safety factor against failure or to excessive deformation is "crucial" in CC2/CC3-structures, it's recommended that products should be tested*
- *tests (as a minimum):*
  - *grid apertures and dimensions (geogrids)*
  - *Mass per unit area (other products)*
  - *tensile strength and strain*

NorGeoSpec

Development of NorGeoSpec

- **Nordic conditions (ROUGH)**
  - *Cold temperatures*
  - *Fill materials*
  - *Site conditions*
- **New functions and application profiles**
  - *Filtration profiles*
  - *Reinforcement*
  - *Sealing*
- **User experience**

Table 1: Required values – Product Specification

	Function: separation and filtration							
Characteristic	**Testing standard**	**Unit**	**Maximum tolerance [1]**	**Required[2] 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
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		kN/m		1.2	2.1	3.2	4.5	6.5
Min velocity index	EN ISO 11058	10^{-3} m/s	-30%	3	3	3	3	3
Max characteristic opening size, O_{90}	EN ISO 12956	mm	±30%	0.2	0.2	0.2	0.15	0.15
Max tolerance for mass per unit area	EN ISO 9864	g/m²	±10%					
Max tolerance for static puncture strength	EN ISO 12236	kN	-10%					

NorGeoSpec

Development of NorGeoSpec

- **Nordic conditions (ROUGH)**
  - *Cold temperatures*
  - *Fill materials*
  - *Site conditions*
- **New functions and application profiles**
  - *Filtration profiles*
  - *Reinforcement*
  - *Sealing*
- **User experience**

Performance assessment (Service Life up to 25, 50 and 100 years)

If a product service life up to 25, 50 and 100 years is to be certified for a product, the product or product family must fulfil all the conditions and requirements set out in relevant hen application standards (functions separation and filtration) and additional requirements of ISO/TR 20432 and ISO TS 13434 (Function reinforcement):

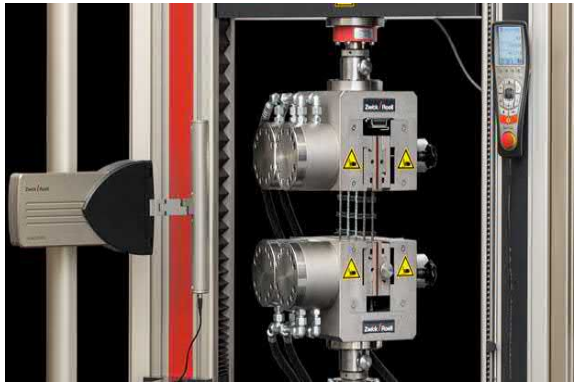
- the reduction factor determination should be made by an expert recognised by the NCB
- the tests forming the basis of the service life and reduction factor determination may not be older than 5 years and must have been carried out in accordance with, or based on, the procedures detailed in Table 2, Reduction factor determination.
- the tests forming the basis of the product service life and reduction factor determination shall be carried out in laboratories which are accredited in accordance with EN ISO/IEC 17025 and / or recognised by the NCB .

Should any doubt exist regarding the competence of individual laboratories, the NCB reserves the right to reject the results of such laboratories. In individual cases, testing may be carried out in the producer's laboratory (if this laboratory is appropriately equipped). In such cases, the NCB will convince itself of the competence of the producer's laboratory.

The producer must regularly update the data which formed the basis for the product lifetime estimate. The nature and extent of this testing are agreed between the producer and the NCB, and form part of the certification.

Summary

- With NorGeoSpec certified products
  - *you get what you specify as a designer*
  - *you get what you buy as a project owner and contractor*
- clear rules for product assessment
- value companies which invest in good quality
- NorGeoSpec certificates makes life easier for all parties involved to deliver quality projects



Contact

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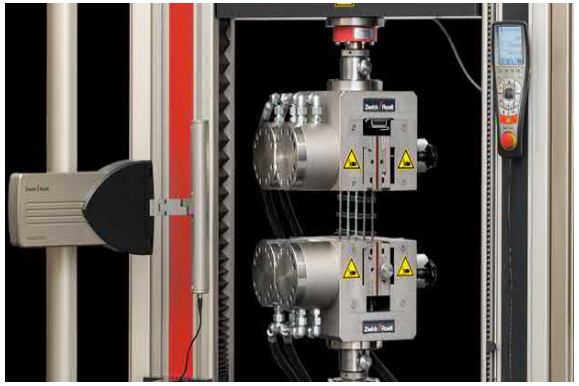
48149 Münster
Germany



A Nordic system for certification and specification of geosynthetics
NGS NorGeoSpec 2012