NorGeoSpec in Norwegian Public Roads Administration (NPRA)

Statens vegvesen
Norwegian Public Roads Administration

Aina Anthi
Norwegian Public Roads Administration (NPRA)

Key Points

- NorGeoSpec in Norwegian Public Roads Administration (NPRA) today
- NPRA guidelines using NorGeoSpec
- Project examples
- Quality control
- Case study
- Plans for the future

Atlanterhavsvegen, Foto: Knut Opeide, NPRA

NorGeoSpec in NPRA today

NorGeoSpec = Nordic system for the certification and specification of geosynthetics and geosynthetic-related products

- NPRA implemented NorGeoSpec in 2004
- NorGeoSpec is referred to in our guidelines
- NPRA contributes to the Technical Committee

- Member from 2011:Tseday Damtew

➢ NPRA supports NorGeoSpec 2012

Existing guidelines (NPRA):

Separation

- Handbook 018 Road construction, Geotextiles for **separation**

- guideline for choosing appropriate class of product

Undergrunn	Trafikk-mengde, ÅDT	Maks. steinstørrelse mot duken, mm			
		$D_{Maks} \leq 63$	$63 < D_{Maks} \leq 200$	$200 < D_{Maks} \leq 500$	$D_{Maks} > 500$
Meget bløt	>500	3	4	5	5
$c_u \leq 25$ kPa	≤500	3	4	4	5
Bløt/middels	>500	2	3	3	4
$c_u > 25$ kPa	≤500	2	2	3	3

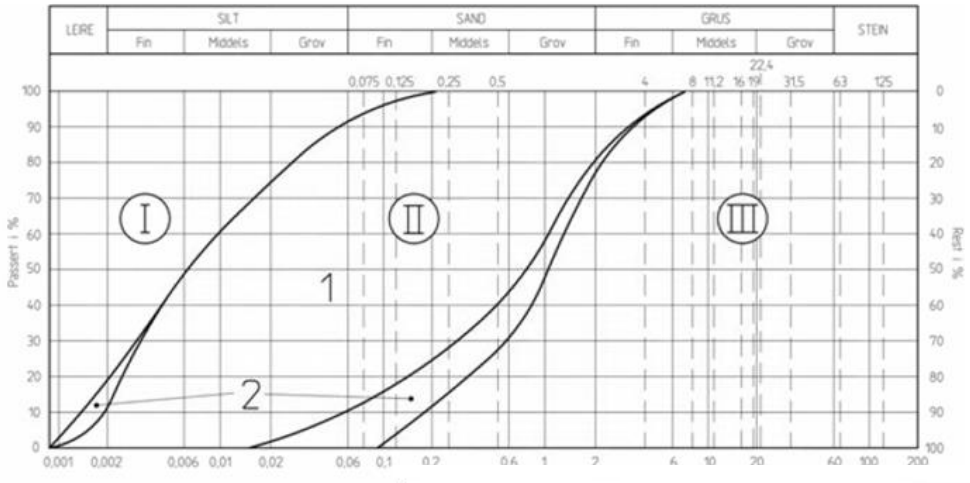
Figur 521.1 Valg av bruksklasse avhengig av bruksområde

Existing guidelines (NPRA):

filtration

- Handbook 018 Road construction, Geotextiles for **filtration**

- guideline for choosing appropriate class of product



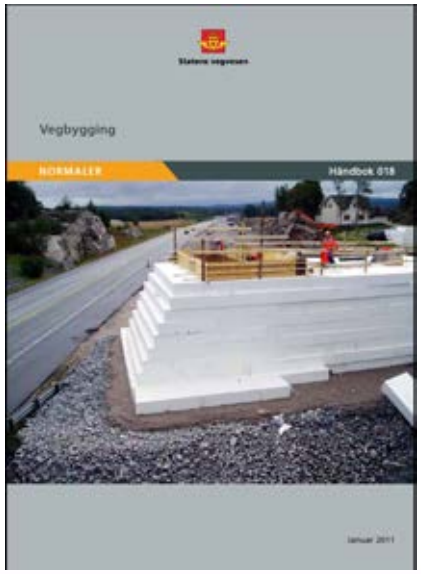
Korn-fordelings-område	Materiale	Hydrauliske krav til fiberduk	
		Poreåpning, O_{90} (mm)	Hastighets-indeks, VI_{H50} (m/s)
Område I	Kohesiv jord (leire, leirig silt, kohesiv blandingsjord)	$O_{90} < 0,15$	> 0,003
Område III	Grus og grovsand	$O_{90} < 0,15$	> 0,003
Område II	Leire	$O_{90} < 10d_{50}$ og $O_{90} < 2d_{90}$	> 0,003
	Silt	$O_{90} < d_{90}$	> 0,003
	Annet [1) 2)]	$O_{90} < 10d_{50}$ og $O_{90} < 2d_{90}$	> 0,003

New guidelines (NPRA):

Separation and filtration

- End 2014/2015:

Geosynthetics for separation and filtration: NorGeoSpec 2012 will be integrated into our guidelines and replace NorGeoSpec 2002



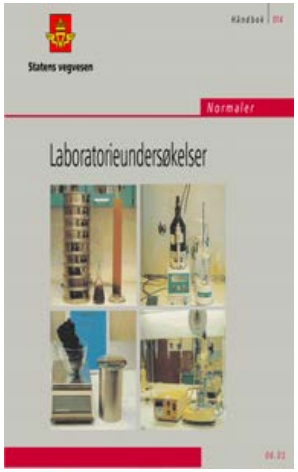
New guidelines (NPRA):

reinforcement

- End 2014/2015:

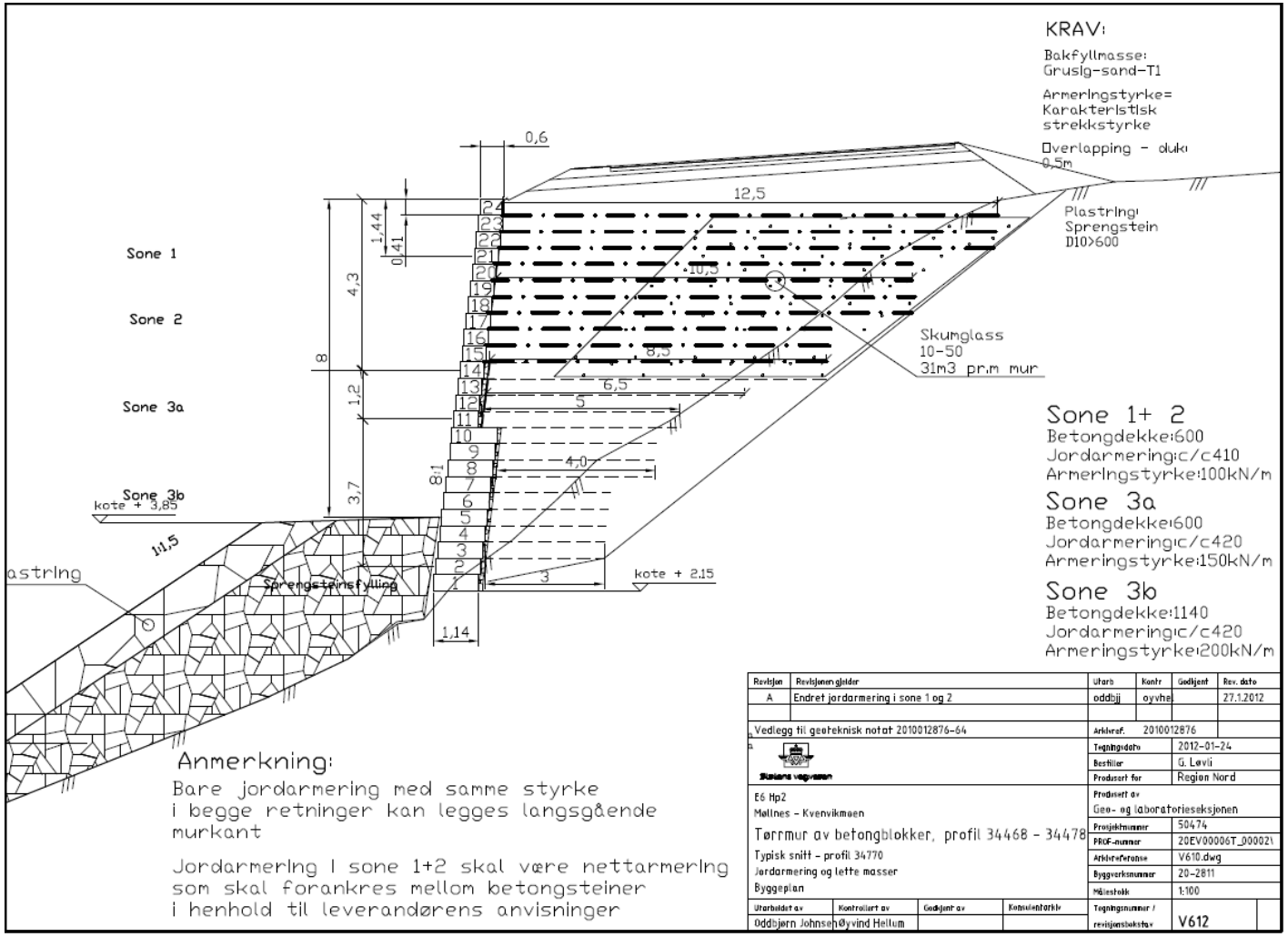
Geosynthetics for reinforcement:

New guidelines for testing geogrids using the NorGeoSpec 2012 system



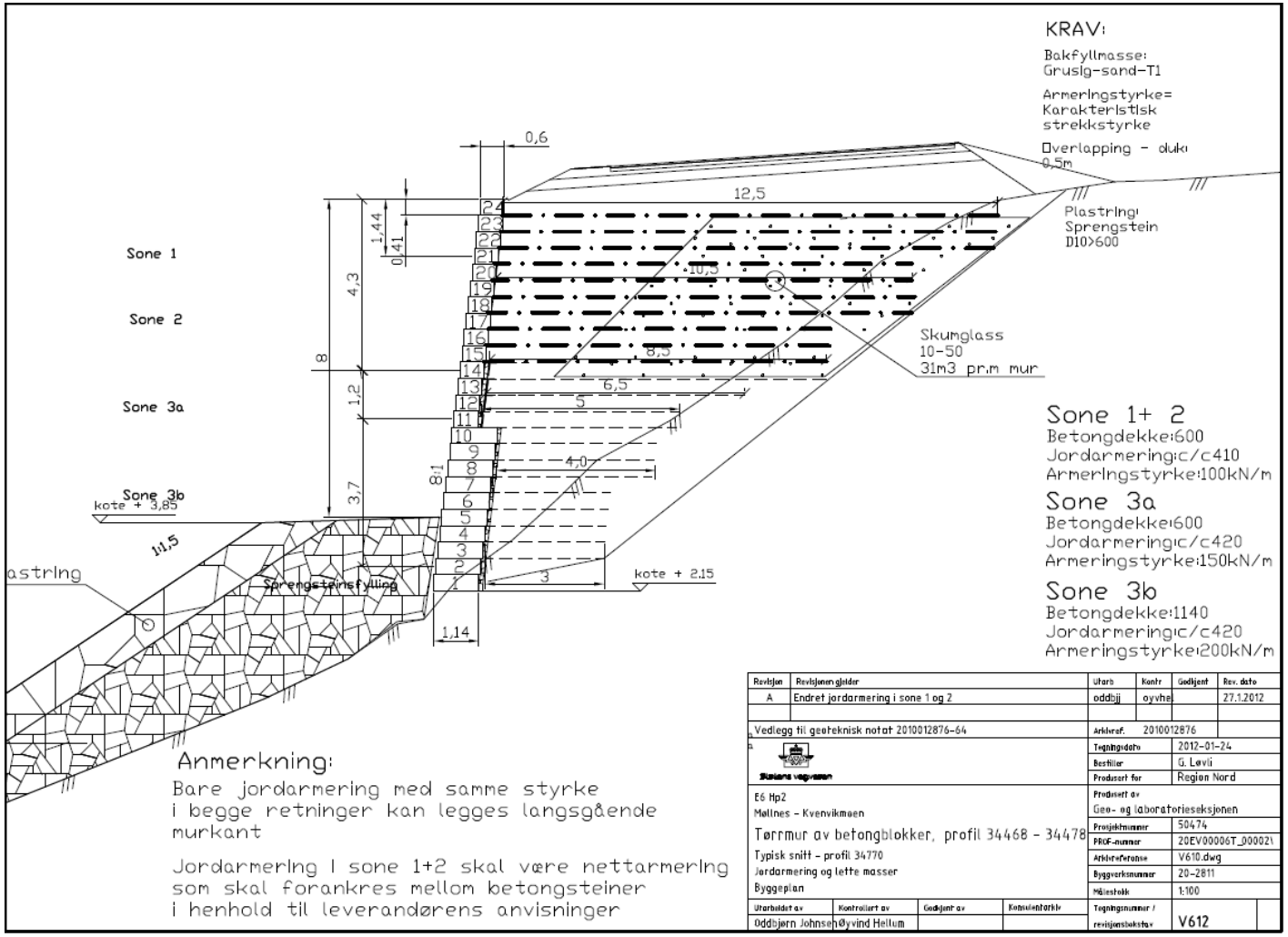
New guidelines reinforcment:

Example on a critical structure where reinforcement plays a key role



Project example

E6 Alta: geogrid and foamglas used in a retaining wall



Project example

E6 Alta, geogrid and foamglas used in a retaining wall

Project example

E6 Klemetsrud: reconstruction of failed retaining wall using geogrid and foamglas

Project example

Fv 120 Tomter:
Repairing unstable road slopes with geogrid and foamglas

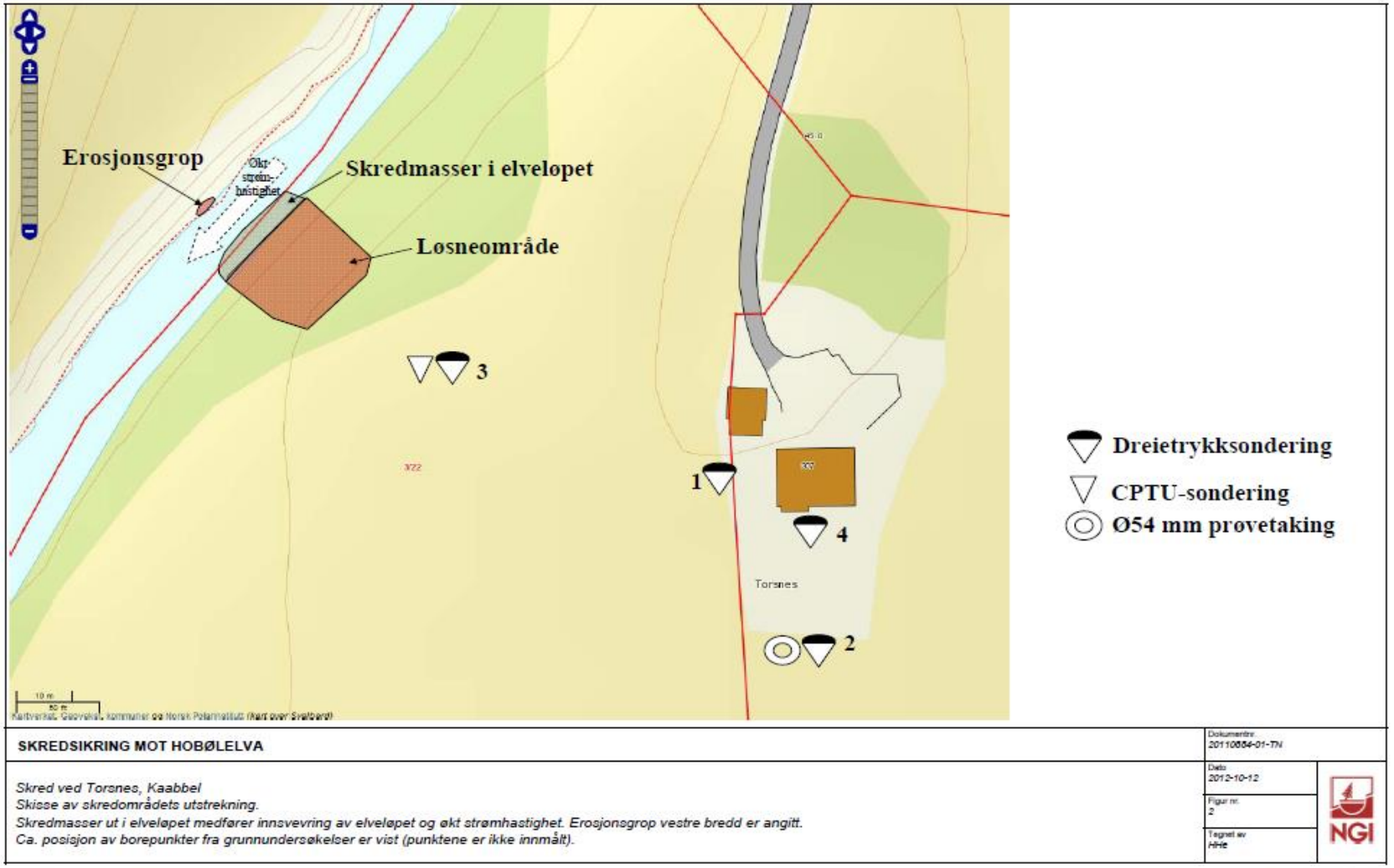
Project example

Torsnes: Quick clay slide

Project example

Torsnes: Quick clay slide

Erosion



SKREDSIKRING MOT HOBØLELVA

Dokumentnr.: 20110664-01-TN

Dato: 2012-10-12

Figur nr.: 2

Tegnet av: HHe

Skred ved Torsnes, Kaabbel
Skisse av skredområdets utstrekning.
Skredmasser ut i elveløpet medfører innsvevring av elveløpet og økt strømhastighet. Erosjonsgrop vestre bredd er angitt.
Ca. posisjon av borepunkter fra grunnundersøkelser er vist (punktene er ikke innmålt).

NGI

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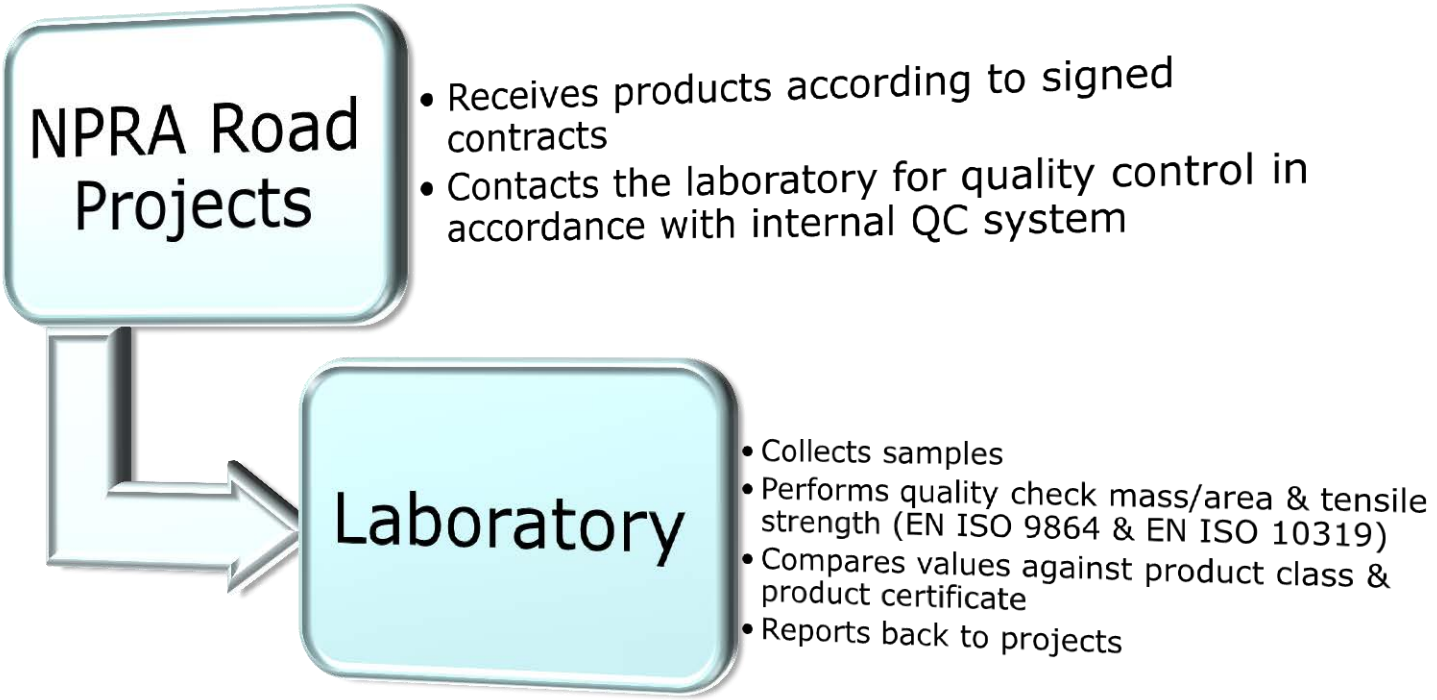
Project example

Torsnes: Quick clay slide

Erosion control using Nonwoven Geotextiles

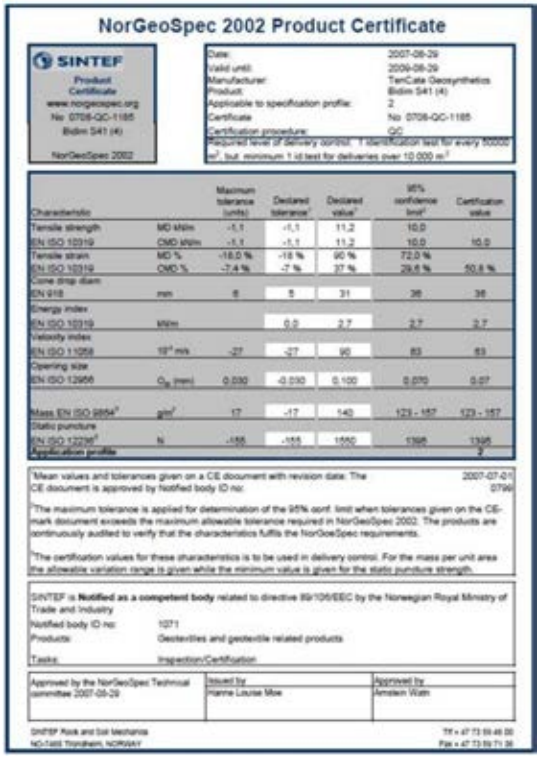
Quality control at NPRA

Procedures for quality control of nonwoven geotextile products



Quality control at NPRA

Certificate control



NorGeoSpec 2002 Product Certificate

SINTEF

Product Certificate

www.norgeospec.org

No: 0708-QC-1185

Bidim S41 (4)

NorGeoSpec 2002

Date:	2007-08-29
Valid until:	2009-08-29
Manufacturer:	TenCate Geosynthetics
Product:	Bidim S41 (4)
Applicable to specification profile:	2
Certificate	No: 0708-QC-1185
Certification procedure:	QC

Required level of delivery control: 1 identification test for every 50000 m², but minimum 1 id.test for deliveries over 10.000 m²

Characteristic		Maximum tolerance (units)	Declared tolerance[1]	Declared value[1]	95% confidence limit[2]	Certification value
Tensile strength EN ISO 10319	MD kN/m	-1.1	-1.1	11.2	10.0	10.0
	CMD kN/m	-1.1	-1.1	11.2	10.0	
Tensile strain EN ISO 10319	MD %	-18.0 %	-18 %	90 %	72.0 %	50.8 %
	CMD %	-7.4 %	-7 %	37 %	29.6 %	
Cone drop diam EN 918	mm	6	5	31	36	36
Energy index EN ISO 10319	kNm		0.0	2.7	2.7	2.7
Velocity index EN ISO 11058	10^{-2} m/s	-27	-27	90	63	63
Opening size EN ISO 12956	O_{90} (mm)	0.030	-0.030	0.100	0.070	0.07
Mass EN ISO 9864[3]	g/m²	17	-17	140	123 - 157	123 - 157
Static puncture EN ISO 12236[3]	N	-155	-155	1550	1395	1395
Application profile						2

[1] Mean values and tolerances given on a CE document with revision date: The 2007-07-01
CE document is approved by Notified body ID no: 0799

[2] The maximum tolerance is applied for determination of the 95% conf. limit when tolerances given on the CE-mark document exceeds the maximum allowable tolerance required in NorGeoSpec 2002. The products are continuously audited to verify that the characteristics fulfils the NorGeoSpec requirements.

[3] The certification values for these characteristics is to be used in delivery control. For the mass per unit area the allowable variation range is given while the minimum value is given for the static puncture strength.

SINTEF is **Notified as a competent body** related to directive 89/106/EEC by the Norwegian Royal Ministry of Trade and Industry

Notified body ID no:	1071
Products:	Geotextiles and geotextile related products
Tasks:	Inspection/Certification

Approved by the NorGeoSpec Technical committee 2007-08-29	Issued by: Hanne Louise Moe	Approved by: Arnstein Watn

SINTEF Rock and Soil Mechanics
NO-7465 Trondheim, NORWAY
Tlf + 47 73 59 46 00
Fax + 47 73 59 71 36

Geotextiles Certified according to NorGeoSpec 2002*

Manufacturer	Product	Certificate valid until	Profile	Certification procedure**
Fibertex A/S	Fibertex F-28	2010-07-01	1	QC
	Fibertex F-31	2010-07-01	2	QC
	Fibertex F-38	2010-07-01	3	QC
	Fibertex F-60	2010-07-01	4	QC
	Fibertex F-80	2010-07-01	5	QC
	Fibertex F-30	2011-04-27	2	QC
	Fibertex F-34s	2011-04-27	3	QC
	Fibertex F-47s	2011-04-27	4	QC
DuPont de Nemours	SF32 ***	2009-02-16	1	QC
	SF32-A ***	2009-02-16	1	QC
	SF49-A ***	2009-02-16	2	QC
	SF70 ***	2009-02-16	3	QC
	SF94 ***	2009-02-16	4	QC
Bonar Technical Fabrics	TS 1	2010-03-08	1	QC
	TS 2	2010-03-08	2	QC
	TS 3	2010-03-08	3	QC
	TS 4	2011-04-17	4	QC
	TS 5	2011-04-17	5	QC
TenCate Geosynthetics	Bidim S31 (4)	2009-08-29	1	QC
	Bidim S31 (E)	2009-08-29	1	QC
	Bidim S41 (4)	2009-08-29	2	QC
	Bidim S41 (E)	2009-08-29	2	QC
	Bidim S61 N	2010-11-03	3	QC
	Bidim S61 N	2010-11-03	4	QC
	Bidim S65 (E)	2009-08-29	5	QC
TenCate Geosynthetics	Polyfelt TS09 (4.01)	2009-08-29	1	QC
	Polyfelt TS09 (5.01)	2009-08-29	1	QC
	Polyfelt TS30N (4)	2009-08-29	2	QC
	Polyfelt TS30N (E)	2009-08-29	2	QC
	Polyfelt TS50 N	2010-11-03	3	QC
	Polyfelt TS65 N	2010-11-03	4	QC
	Polyfelt TS80N (E)	2009-08-29	5	QC
Geo Tipptex	Tipptex BS 6	2009-09-22	1	QC
	Tipptex BS 11	2009-09-22	2	QC
	Tipptex BS 16	2009-09-22	3	QC
	Tipptex BS 21	2009-09-22	4	QC
	Tipptex BS NG0.2	2010-09-26	2	QC
	Tipptex BS NG0.3	2010-09-26	3	QC
	Tipptex BS NG0.4	2010-09-26	4	QC
	Tipptex BS NG0.5	2010-09-26	5	QC
	NG0.1	2010-12-19	1	QC
Tessilorenta S.R.L.	HiPerTex TB 1A	2010-10-20	1	QC
	HiPerTex TB 2A	2010-10-20	2	QC
	HiPerTex TB 3A	2010-10-20	3	QC
	HiPerTex TB2	2009-09-07	2	QC
	HiPerTex TB3	2009-09-07	3	QC
	HiPerTex TB4	2009-09-07	4	QC
	HiPerTex TB5	2009-09-14	5	QC
Geoâtex 2000 SpA	GEO PP 1 NG/08	2010-02-15	1	QC
	GEO PP 2 NG/08	2010-02-15	2	QC
	GEO PP 3 NG/08	2010-02-15	3	QC
	GEO PP 4 NG/08	2010-02-15	4	QC
	GEO PP 5 NG/08	2010-02-15	5	QC
Johns Manville	T 011/180	2009-11-13	2	QC
	T 011/270	2009-11-13	3	QC
	T 011/340	2009-11-13	4	QC
JUTA a.s.	geoNETEX NG0.1	2009-07-06	1	QC
	geoNETEX NG0.2	2009-07-06	2	QC
	geoNETEX NG0.3	2009-07-06	3	QC
	geoNETEX NG0.4	2009-07-06	4	QC
	geoNETEX NG0.5	2009-07-06	5	QC
Fontana	Drefon - ST 1	2010-03-27	1	QC
	Drefon - ST 2	2010-03-27	2	QC
	Drefon - ST 3	2010-03-27	3	QC
	Drefon - ST 4	2010-03-27	4	QC
	Drefon - ST 5	2010-03-27	5	QC
Edilfloor SpA	GEODREN N1	2011-03-02	1	QC
	GEODREN N2	2011-03-02	2	QC
	GEODREN N3	2011-09-14	3	QC
	GEODREN N4	2011-05-14	4	QC
	GEODREN PPST 110	2011-03-02	1	QC
	GEODREN PPST 155	2011-03-02	2	QC
	GEODREN PPST 220	2011-03-02	3	QC
	GEODREN PPST 290	2011-03-02	4	QC
	GEODREN PPST 380	2011-03-02	5	QC
Byggros A/S	BG-TEX NG1	2009-09-22	1	QC
	BG-TEX NG2	2009-09-22	2	QC
	BG-TEX NG3	2009-09-22	3	QC
	BG-TEX NG4	2009-09-22	4	QC
	BG-TEX NG5	2009-09-22	5	QC
	BG-TEX 135 NG2	2010-09-26	2	QC
	BG-TEX 190 NG3	2010-09-26	3	QC
	BG-TEX 260 NG4	2010-09-26	4	QC
	BG-TEX 365 NG5	2010-09-26	5	QC
	NG0.1	2010-12-19	1	QC
Thrace Plastics	100NW	2010-03-26	1	QC
	140NW	2010-03-26	2	QC
	200NW	2010-03-26	3	QC
	270NW	2010-03-26	4	QC
	400NW	2010-03-26	5	QC
Propex Inc.	Propex PF05	2011-05-11	1	QC
	Propex PF10	2011-05-11	2	QC
	Propex PF15	2011-05-11	3	QC
	Propex PF20	2011-05-11	4	QC
	Propex PF25	2011-05-11	5	QC

Quality Control at NPRA

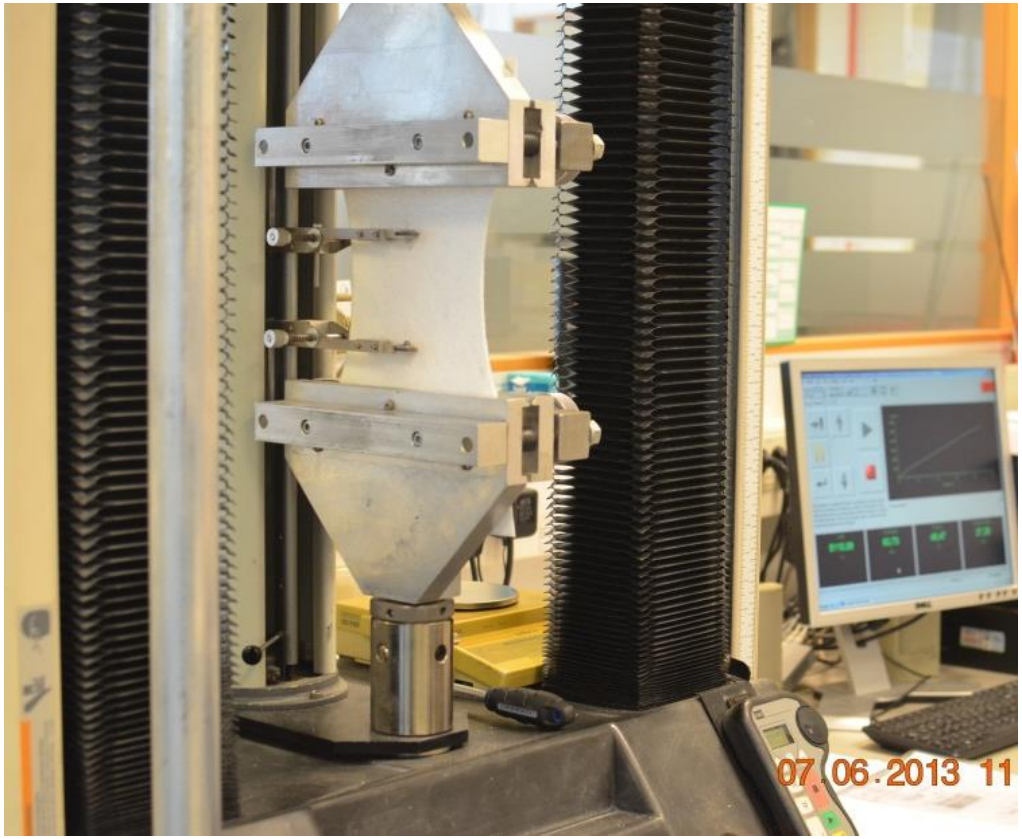
Sampling at construction site

Quality control at NPRA

Identification of test

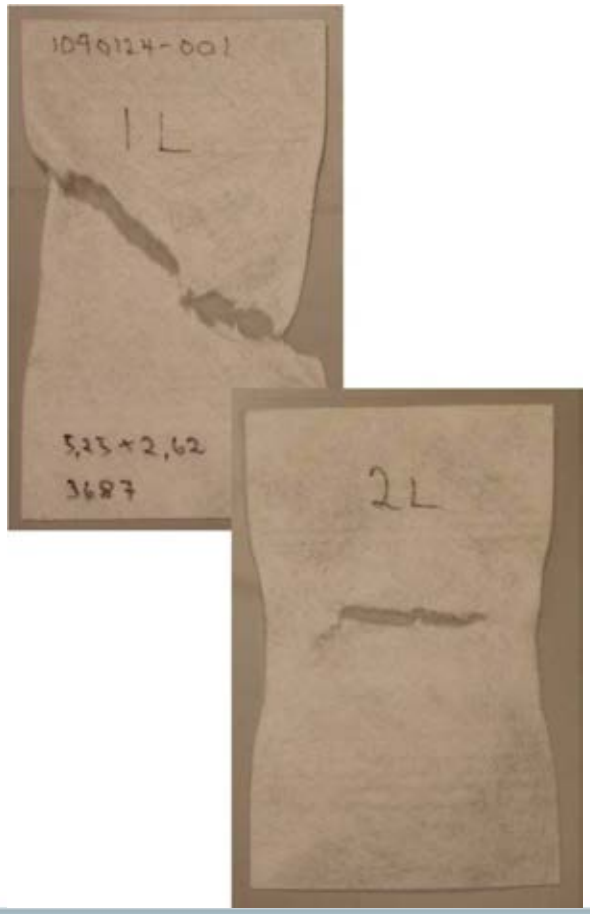
Quality Control at NPRA

Testing



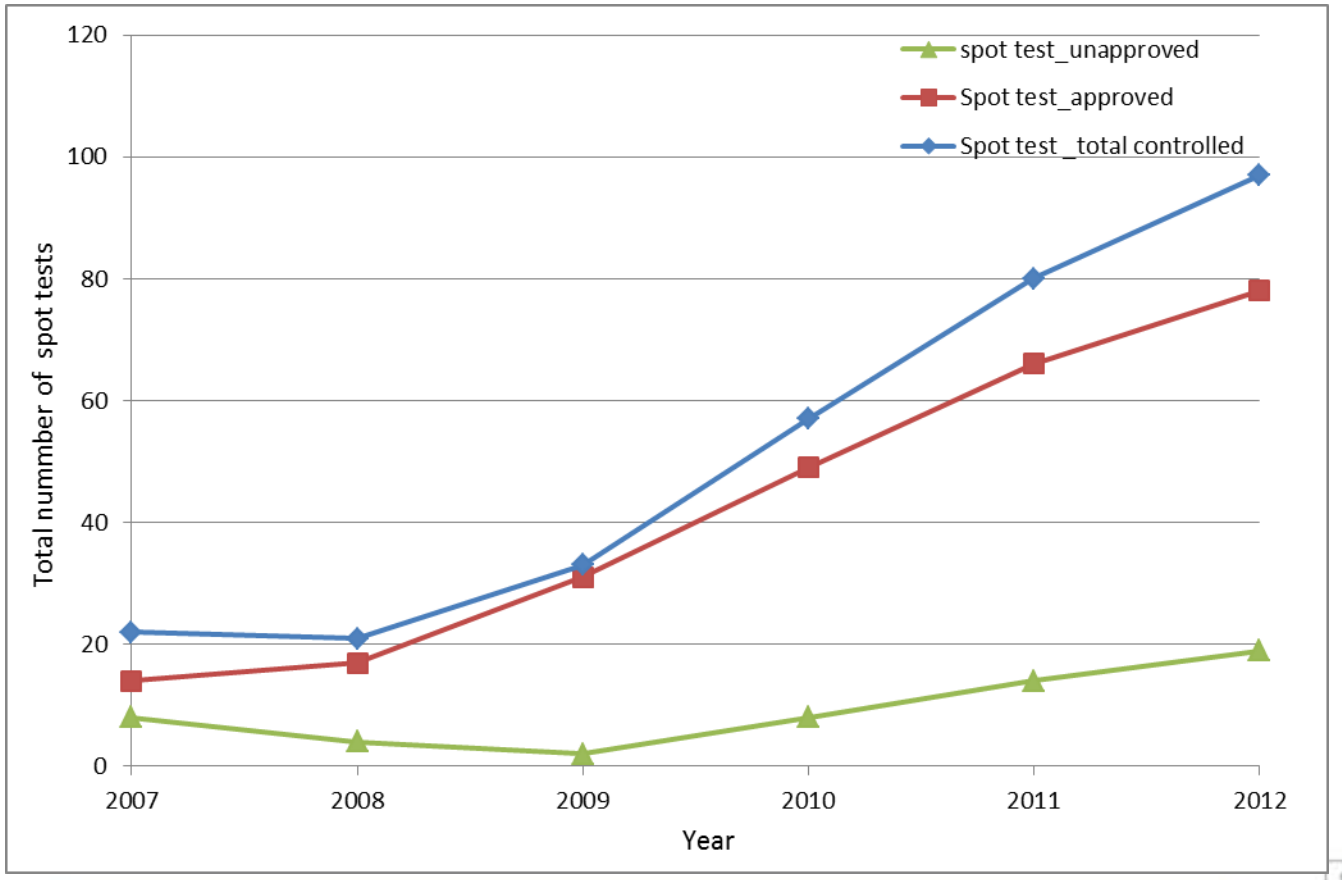
Quality Control at NPRA

Testing



Case study

Results from Spot Tests on Nonwoven Geotextiles at NPRA



Case study

Results from Spot Tests on Nonwoven Geotextiles at NPRA

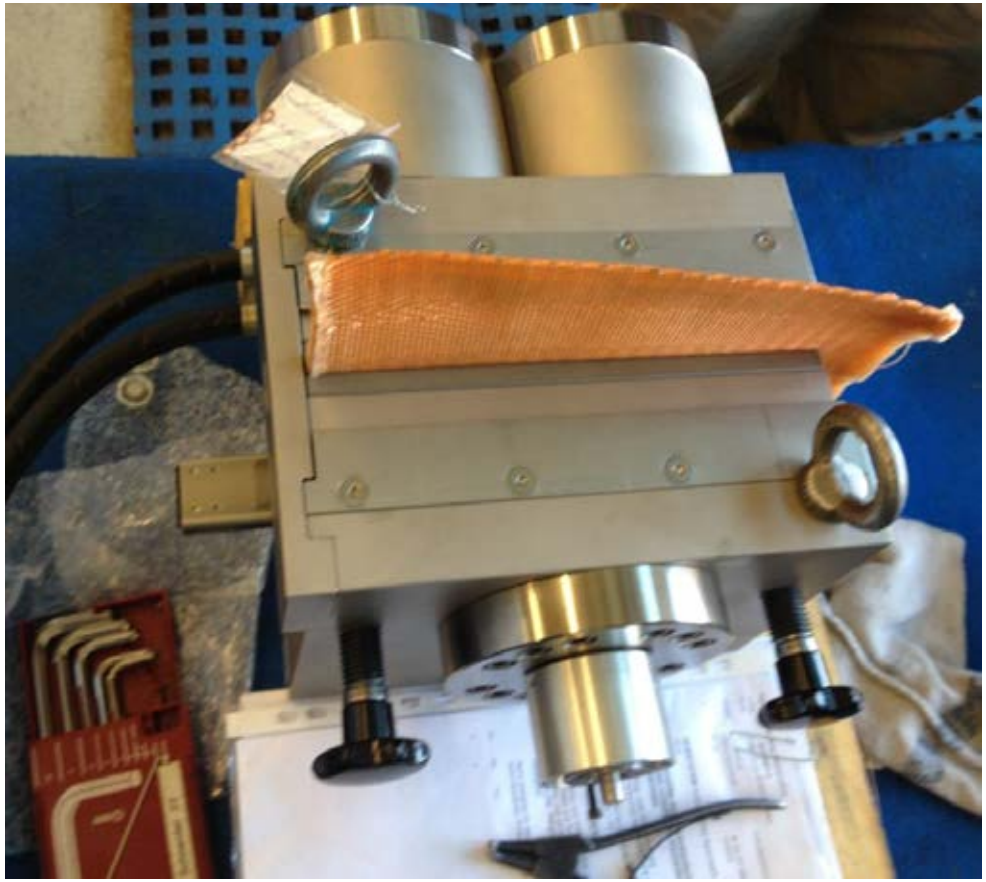
Want to know more?

- 10th International Conference on Geosynthetics

- Tseday Damtew, NPRA

Plans for the future (NPRA)

Testing geogrids, 2015



Plans for the future (NPRA)

- Collaborate with NorGeoSpec in order to assure quality of our testing procedures and equipment

- Collaborate with other laboratories to create a database of results

Thank you for your attention

Rampestreken, Romsdal in Norway

Foto: Erik Birkeland, Romsdal Budstikke