Leiths (Scotland) Ltd
Rigifa
Cove
Aberdeen
AB12 3LR

Date of Issue: 16.05.2013

TS 2010
PRODUCT PROPOSAL

TAIT STAGE 1

Laboratory Validation
Of
Necessary Properties

Mixing Plant:	**Blackhills Quarry, Cove, Aberdeen.**
Mix Designation:	**SMA 6 surf (Nypol 103, 0.3% fibres)**

Constituents

Aggregates

SIZE	SOURCE	TYPE
4/6,3mm	Blackhills Quarry	Crushed Rock
0/4mm	Blackhills Quarry	Crushed Rock

Binder

TYPE	GRADE	
Nypol 103	75/130 - 75 PMB	

Filler

TYPE	SOURCE
Crushed limestone	Highland Lime, Torlundy, Highlands.

Fibre

TYPE	SOURCE
Viatop Premium	J Rettenmaier

List of attached information

Property	Test method / procedure	Comments
Coarse aggregate – particle Density	BS EN 1097 – 6: 2000	See CE certificate
Coarse aggregate – resistance to polishing	BS EN 1097 – 8: 2009	See CE certificate
Coarse aggregate – resistance to abrasion	BS EN 1097 – 8: 2009, Annex A	See CE certificate
Coarse aggregate – resistance to fragmentation	BS EN 1097 – 2: 2010	See CE certificate
Coarse aggregate – resistance to wear	BS EN 1397 – 1: 1996 Micro Deval method	See CE certificate
Air voids content	BS EN 13108 – 20: 2006	See attached report
Binder content	BS EN 12697 – 1:2005	See attached report
Binder penetration	BS EN 1426: 2007	See attached product information sheet
Binder softening point	BS EN 1427: 2007	See attached product information sheet
Grading	BS EN 12697 – 2: 2002	See attached report
Binder drainage	DD 232	See attached report
Resistance to permanent deformation	BS EN 12697 – 22: 2003	See attached report

LEITHS
TECHNICAL SERVICES

DECLARED TARGET GRADING AND TARGET COMPOSITION LIMITS

MIX	SMA 6 surf (Nypol103, 0.3% fibres)
SPECIFICATION	BS EN 13108 – 5 / PD 6691 / TS 2010
SUPPLIER	Leiths (Scotland) Ltd
SOURCE	Blackhills Coating Plant, Aberdeen.

SIEVE SIZE (mm)	DECLARED TARGET GRADING (% PASSING)	LIMITS FOR COMPOSITION (TS 2010: Table 2.1A)
10	100	100
6,3	94	93 – 100
4	42	32 – 45
2	27	25 – 35
0,500	15	-
0,250	13	-
0,063	9,0	8 - 14

Binder Content (%)	7,1	6,9 – 7,3

Issued By:
Date of Issue: 20.03.2013

CE

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Fax: 01224 897590

13
Certificate No. BLKQ-A006

EN 13043

Aggregates for Bituminous Mixtures

Aggregate Type	Declared	Crushed Rock
Particle shape	Category	FI_{25}
Particle size	Designation	2/6.3mm G_C 80/20
Fines Content	Category	f_4
Particle density	Declared Value	2.71 Mg/m^3
Resistance to Fragmentation /Crushing	Category	LA_{30}
Resistance to Polishing / Abrasion/Wear		
Polished stone value	Category	PSV_{50}
Aggregate abrasion value	Category	AAV_{10}
Resistance to Wear of Coarse Aggregate	Category	$M_{DE}15$
Durability against Freeze/Thaw	Category	MS_{25}
	Category	$WA_{24}2$

CE

0086-CPR-595350

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13
Certificate No. BLKQ-B834

BS EN 13108 – 5

Stone Mastic Asphalt

B834 SMA 6 surf (Nypol 103) Rigatex TS2010 - Blackhills Asphalt Plant

General requirements

Temperature of the mixture		150 °C to 200 °C
Grading (passing)	10 mm test sieve	100 %
	6,3 mm test sieve	94 %
	4 mm test sieve	42 %
	2 mm test sieve	27 %
	0,063 mm test sieve	9,0 %
Binder content		$B_{min\ 7,0}$ (7,1 %)
Water Sensitivity	BS EN 12697 – 12: 2008	$ITSR_{90}$
Binder Drainage	BS EN 12697 – 18: 2004	$D_{0,3}$
Resistance to permanent deformation		
- small size device: wheel tracking slope	BS EN 12697 – 22: B in Air	$WTS_{AIR\ 0,05}$ (0,02mm)
- small size device: proportional rut depths	BS EN 12697 – 22: B in Air	$PRD_{AIR\ 1,5}$ (1,3%)

Leiths (Scotland) Ltd confirms that the asphalt concrete referred to in this certificate complies with the requirements of BS EN 13108 – 5, including Annex ZA

Authorised by:	*N. Anderson. Group Technical Director*
Date Valid from	01/03/2013
Date Valid to	Currently Valid
Date of Certificate Issue	06 September 2013

LEITHS
TECHNICAL SERVICES

UKAS TESTING 1908

Authorised Signatories
N. Anderson
Technical Manager
A. Trickett – Bell
Laboratory Manager

Client: Leiths (Scotland) Ltd.
Rigifa
Cove
Aberdeen
Attn: Neil Anderson

DETERMINATION OF AIR VOIDS CONTENT

Report No.: P.12.BLACKHILLS.P12192		Sample Ref.: P12192	
Scheme / Site: Client:	**SMA 6 surf TS 2010 Specification** Leiths (Scotland) Ltd.		
Material: Specification:	**SMA 6 surf PMB (Nypol 103, 0.3% fibres, 7.1% binder)** TS 2010		
Source: Location:	Leiths – Blackhills Coating Plant N/A		
Test Method:	BS EN 12697 – 8		
Date Sampled From: Date Sampled To: Sampled By: Sample Type:	03.11.2009 03.11.2009 Lab Staff Bulk	Date Received: Date Tested From: Date Tested To: Certificate Received:	03.11.2009 03.11.2009 05.11.2009 Yes

TEST RESULTS

Sample No.	Bulk Density (kg/m^3)	Air Voids Content (%)	Mean Air Voids Content (%)	Specification
P12192/1	**2309**	**3.6**	**3.5**	$V_{min3.5}$; $V_{max4.0}$.
P12192/2	**2313**	**3.4**		
P12192/3	**2310**	**3.5**		

REMARKS

Sample complies with the requirements.
Air Voids calculated by using maximum density in report no. P.11.BLACKHILLS.P12192

Issued by: A Trickett-Bell

Date of Issue: 08.11.2009

LEITHS
TECHNICAL SERVICES

UKAS TESTING
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Laboratory Manager

Client: Leiths Technical Services
Rigifa
Cove
Aberdeen
Attn: Neil Anderson

DETERMINATION OF BINDER DRAINAGE

Report No.: P.14.BLACKHILLS.P12192		Sample Ref.: P12192	
Scheme / Site: Client:	**SMA 6 surf TS 2010 Specification** Leiths (Scotland) Ltd.		
Material: Specification:	**SMA 6 surf PMB (Nypol 103, 0.3% fibres, 7.1% binder)** BS EN 13108 – 5 / PD 6691 / TS 2010		
Source: Location:	Leiths – Blackhills Coating Plant Laboratory Trial		
Test Method:	BS DD 232: 1996		
Date Sampled From: Date Sampled To: Sampled By: Sample Type:	03.11.2009 03.11.2009 Lab Staff Bulk	Date Received: Date Tested From: Date Tested To: Certificate Received:	03.11.2009 10.11.2009 12.11.2009 Yes

TEST RESULTS

BINDER DRAINAGE @ 7.1% Bitumen	**0.0%**

REMARKS

Issued By: A Trickett-Bell

Date of Issue: 09.05.2013

LEITHS
TECHNICAL SERVICES

UKAS TESTING 1908

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Aberdeen
Attn: Neil Anderson

DETERMINATION OF MAXIMUM DENSITY

Report No.: P.11.BLACKHILLS.P12192		Sample Ref.: P12192	
Scheme / Site: Client:	**SMA 6 surf TS 2010 Specification** Leiths (Scotland) Ltd.		
Material: Specification:	**SMA 6 surf PMB (Nypol 103, 0.3% fibres, 7.1% binder)** BS EN 13108 – 5 / PD 6691 / TS 2010		
Source: Location:	Leiths – Blackhills Coating Plant Laboratory Trial		
Test Method:	BS EN 12697 – 5: 2002: Method A		
Date Sampled From: Date Sampled To: Sampled By: Sample Type:	03.11.2009 03.11.2009 Lab Staff Bulk	Date Received: Date Tested From: Date Tested To: Certificate Received:	03.11.2009 05.11.2009 06.11.2009 Yes

TEST RESULTS

Sample No.	Maximum Density (kg/m^3)	Mean Maximum Density (kg/m^3)
P12192/1	**2395**	**2394**
P12192/3	**2393**	

REMARKS

Issued By: A Trickett-Bell

Date of Issue: 10.11.2009

NYNAS UK AB
Technical Service Report
Leiths 6mm and 10mm SMA Nypol 103 testing

Background

Leiths requested that Nynas assist them in testing 6mm and 10mm SMAs using Nypol 103 for wheeltracking.

Results

Resistance to Permanent Deformation (BS EN 12697-22 Small device procedure B)

The aggregates for wheeltracking were supplied pre-blended, with the 10mm SMA slabs produced using Nypol 103 at a binder content of 6.7% and fibres at 0.3% to a density of 2.330Mg/m^3. The slabs were produced 40mm thick and tested for 10,000 cycles at 60°C.

	Rut depth at 10,000 cycles (mm)	Proportional rut depth at 10.000 cycles	Wheeltracking slope (mm/1000cycles)
P15015 Run 1	1.3	3.3%	0.03
P15015 Run 2	1.4	3.6%	0.03

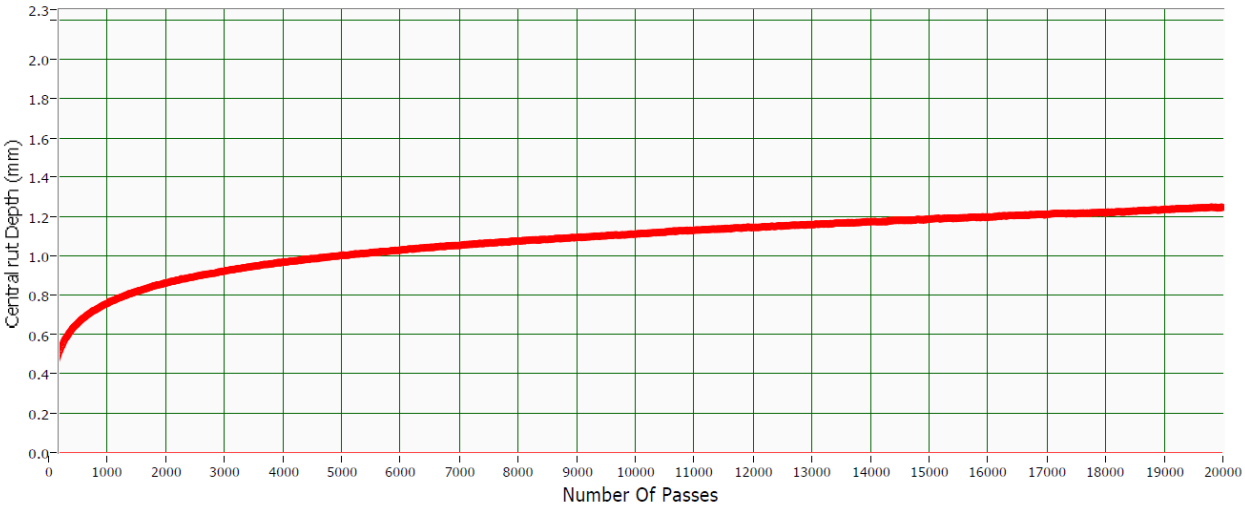
The 6mm SMA slabs produced again using Nypol 103 but at a binder content of 7.1% and fibres at 0.3% to a density of 2.300Mg/m^3. The slabs were produced 30mm thick and tested for 10,000 cycles at 60°C.

	Rut depth at 10,000 cycles (mm)	Proportional rut depth at 10.000 cycles	Wheeltracking slope (mm/1000cycles)
P12192 Run 1	1.2	4.4%	0.03
P12192 Run 2	1.4	4.7%	0.04

I M Lancaster 16-05-13

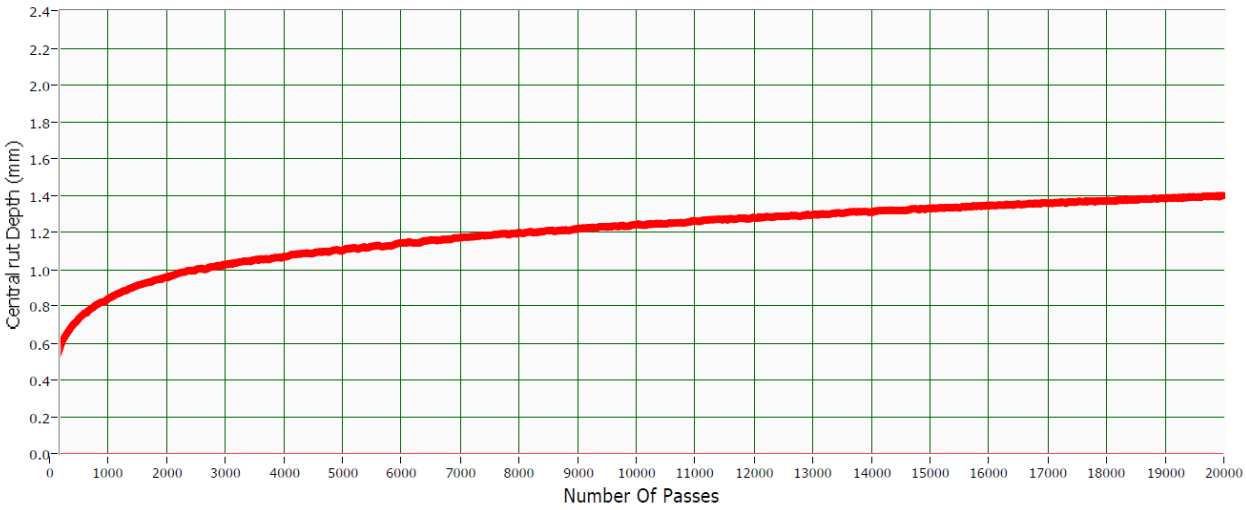
Wheeltracker EN 12697-22

TEST REFERENCE	Leiths 6mm SMA Nypol 103 7pt1 A	Final Rut Depth	1.2	(mm)
Rut Profile Data	C:\wtrackEN\wtdata\Leiths 6mm SMA Nypol 103 7pt1 A.txt	Rut Rate	0.02	(mm/1000 Passes)
			0.03	(mm/1000 Cycles)



Wheeltracker EN 12697-22

TEST REFERENCE	Leiths 6mm SMA Nypol 103 7pt1 B	Final Rut Depth	1.4	(mm)
Rut Profile Data	C:\wtrackEN\wtdata\Leiths 6mm SMA Nypol 103 7pt1 B.txt	Rut Rate	0.02	(mm/1000 Passes)
			0.04	(mm/1000 Cycles)



Nypol 103

Previous name : Nynas Nypol 200

Nypol 103 is a highly modified elastomeric binder with exceptional resistance to permanent deformation and cracking. It is a versatile binder suitable for most types of asphalt mixtures and a wide range of paving applications. It complies with EN 14023 and the Nynas sales specification.

PMB 75/130-75

Table 1 : Specification information

	Test description	Method	Unit	Min	Max	Class
Consistency at intermediate temperature	**Penetration at 25ºC**	EN 1426	0.1mm	75	105 [2]	7
Consistency at elevated service temperature	**Softening Point**	EN 1427	°C	75	95 [2]	3
Cohesion	**by Force Ductility at 5°C**	EN 13589	J/cm^2	3	-	2
Durability	**Change in mass**	EN12607-1	%-wt	-	1.00	5
Resistance to hardening EN 12607-1	**Retained Penetration**	EN 1426	%	55	-	6
	Increase in softening point	EN 1426	%	-	8	2
Other characteristics	**Flash Point**	EN ISO 2592	°C	250	-	2

Table 2 : Additional information

	Test description	Method	Unit	Min	Max	Class
Safety & Handling *	**Minimum pumping temperature**	-	°C	140	-	-
	Typical handling temperatures	-	°C	170	185	-
	Maximum safe handling & storage temperature	-	°C	-	190	-
Technical characteristic	**Fraass breaking point**	EN 12593	°C	-	-20	9
	Elastic recovery at 25°C	EN 13398	%	80	-	2
	Storage stability Difference in softening point	EN 13399 EN 1427	°C	-	5	2
	Typical density at 25ºC	EN 3838	g/cm^3	1.020 [1]		-
	Solubility in toluene	EN 12592	%	99	-	-

* For specific information on binder handling and storage please refer to the Product Information and Safety Data sheets.

[1] Typical value

[2] Nynas specification

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SdS available on nynas.com

Although the data reported in the present document is, to the best of our knowledge, accurate and reliable, Nynas shall not be liable for any loss or damage that may occur.

Data sheet

Grade premium

VIATOP®

VIATOP® premium is a pelletized blend of 90 % by weight ARBOCEL® ZZ 8 - 1 and 10 % by weight bitumen.

Characteristics of the pellets

grey, cylindrical pellets

content ARBOCEL® ZZ 8 – 1	approx. 90 %
average pellet length	2 mm - 8 mm
average pellet thickness	4 mm +/- 1 mm
bulk density	470 g/l - 540 g/l
sieve analysis: finer than 3.55 mm	max. 10 %

Non-toxic and physiologically safe.

Characteristics of ARBOCEL® ZZ 8 - 1

grey, fine fibrilled and long-fibred cellulose.

basic raw material	technical raw cellulose
cellulose content	80 % +/- 5 %
pH-value (5 g/100 ml)	7.5 +/- 1
average fibre length	1100 µm
average fibre thickness	45 µm

Characteristics of the bitumen used

Road construction bitumen according to DIN EN 12591.

Needle penetration (according to DIN 52 010) at 25 °C in 1/10 mm	approx. 50 - 70
Softening point (ring and ball, according to DIN 52 011) in °C	46 - 54

J. Rettenmaier & Söhne GmbH + CO
Fibers designed by Nature
Holzmuehle 1
D-73494 Rosenberg

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Date of Issue: 30.05.2013

Leiths (Scotland) Ltd
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TS 2010
PRODUCT PROPOSAL
STAGE 2

Product Mix Trial

Mixing Plant:	**Blackhills Quarry, Cove, Aberdeen.**
Mix Designation:	**SMA 6 surf (Nypol 103, 0.3% fibres)**

List of attached information

Property	Test method / procedure	Comments
Air Voids in mat	BS 594987: 2010: Annex G	See attached report
Binder Content	BS EN 12697 – 1:2005	See attached report
Grading	BS EN 12697 – 2: 2002	See attached report
Texture	BS 598 – 105: 1990	See attached report

LEITHS
TECHNICAL SERVICES

UKAS TESTING 1908

Authorised Signatories
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Technical Manager
A. Trickett – Bell
Laboratory Manager

Client: Leiths (Scotland) Ltd.
Rigifa
Aberdeen
AB12 3LR

Attn: Sean Cocker

BITUMINOUS ANALYSIS

Test Method: BS EN 12697 – 1: 2000 (Binder by Difference) / BS EN 12697 – 2: 2002 (Grading)

Report No.: P.02.BLKQ TAIT.R36751		Sample Ref.: R36751	
Scheme / Site: Client:	**SMA 6 surf TS2010 – TAIT Stage 2** Leiths		
Material: Specification:	**SMA 6 surf TS2010 (Nypol 103)** TS 2010	Ticket No.: -	
Source: Location:	Blackhills Coating Plant North Last Quarry – Entrance at road junction		
Date Sampled From: Date Sampled To: Sampled By: Sample Type:	28.05.2013 28.05.2013 CS Bulk	Date Received: Date Tested From: Date Tested To: Certificate Received:	28.052013 28.05.2013 29.05.2013 Yes

TEST RESULTS

Sieve Size	% Passing	Specification
10mm	100	100
6,3mm	93	93 – 100
4mm	45	32 – 45
2mm	27	25 - 35
1mm	21	-
0,500mm	18	-
0,250mm	14	-
0,125mm	12	-
0,063mm	9,5	8 - 14

Constituent	Result	Specification
Determined Binder Content (%)	6,9	6,9 – 7,3 (7,1)

* Denotes outwith specification.
Remarks:
Sample complies with the sampling and analysis requirements

Issued by: A Trickett-Bell

Date of Issue: 30.05.2013

LEITHS
TECHNICAL SERVICES

UKAS TESTING 1908

Authorised Signatories
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Laboratory Manager

Client: Leiths (Scotland) Ltd.
Rigifa
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Aberdeen
Attn: Neil Anderson

DETERMINATION OF AIR VOIDS CONTENT

Report No.: P.12.BLKQ TAIT.R36751		Sample Ref.: R36751	
Scheme / Site: Client:	**SMA 6 surf TS 2010 TAIT Stage 2** Leiths (Scotland) Ltd.		
Material: Specification:	**SMA 6 surf TS2010 (Nypol 103, 0.3% fibres, 7.1% binder)** TS 2010		
Source: Location:	Leiths – Blackhills Coating Plant N/A		
Test Method:	BS EN 12697 – 8		
Date Sampled From: Date Sampled To: Sampled By: Sample Type:	29.05.2013 29.05.2013 Lab Staff Cores	Date Received: Date Tested From: Date Tested To: Certificate Received:	29.05.2013 29.05.2013 30.05.2013 Yes

TEST RESULTS

Sample No.	Bulk Density (kg/m^3)	Air Voids Content (%)	Mean Air Voids Content (%)	Specification
R36751/1	**2288**	**4.4**	**4.9**	V_{min2}; V_{max6}.
R36751/1	**2275**	**5.0**		
R36751/3	**2268**	**5.3**		

REMARKS

Sample complies with the requirements.
Air Voids calculated by using maximum density in report no. P.11.BLACKHILLS.P12192

Issued by: A Trickett-Bell

Date of Issue: 30.05.2013

LEITHS
TECHNICAL SERVICES

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1908

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Laboratory Manager

Client: Leiths (Scotland) Ltd.
Rigifa
Cove
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Attn: B Lund

DETERMINATION OF TEXTURE DEPTH – SAND PATCH METHOD

Report No.: R.04.A90 CHARLESTON.R36774		Sample Ref.: R36774	
Scheme / Site:	**A90 Charleston – SMA Trial at North Last Quarry Road**		
Client:	Leiths (Scotland) Ltd.		
Material:	**SMA 6 surf TS2010 (Nypol 103)**		
Specification:	LTS Proprietary Mix		
Source:	Leiths –Blackhills Quarry		
Location:	See Below		
Test Method:	BS 598: Part 105: 1990: 4		
Date Sampled From:	N/A	Date Received:	28.05.2013
Date Sampled To:	N/A	Date Tested From:	31.05.2013
Sampled By:	Lab Staff	Date Tested To:	31.05.2013
Sample Type:	N/A	Certificate Received:	No

TEST RESULTS

LOCATION	TEXTURE DEPTH (mm)	LOCATION	TEXTURE DEPTH (mm)
Towards Quarry Entrance	0.78		
Towards Quarry Entrance	0.84		
Away from Quarry Entrance	0.80		
AVERAGE	0.8		

REMARKS

Surface Condition: Dry, Lightly Trafficked

Issued By: A Trickett-Bell

Date of Issue: 31.05.2013

Date of Issue: 22.05.2014

Leiths (Scotland) Ltd
Rigifa
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Aberdeen
AB12 3LR

TS 2010
PRODUCT PROPOSAL
STAGE 3

Trunk Road Network Trial

Mixing Plant:	**Blackhills Quarry, Cove, Aberdeen.**
Mix Designation:	**SMA 6 surf (Nypol 103, 0.3% fibres)**

Constituents

Aggregates

SIZE	SOURCE	TYPE
4/6,3mm	Blackhills Quarry	Crushed Rock
0/4mm	Blackhills Quarry	Crushed Rock

Binder

TYPE	GRADE	
Nypol 103	75/130-75 PMB	

Filler

TYPE	SOURCE
Crushed limestone	Highland Lime, Torlundy, Highlands.

Fibre

TYPE	SOURCE
Viatop Premium	J Rettenmaier

List of attached information

Property	Test method / procedure	Comments
Air Voids in mat	BS 594987: 2010: Annex I	See attached report
Binder Content	BS EN 12697 – 1:2005	See attached report
Grading	BS EN 12697 – 2: 2002	See attached report
Texture	BS EN 13036 – 1: 2010	Not available
Grip test number after 4 weeks	BS 7941 – 2: 2000	See attached report
Grip test number after 6 months	BS 7941 – 2: 2000	See attached report

LEITHS
TECHNICAL SERVICES

UKAS TESTING 1908

Authorised Signatories
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Technical Manager
A. Trickett – Bell
Laboratory Manager

Client: Leiths (Scotland) Ltd.
Rigifa
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Aberdeen

Attn: B Lund

BITUMINOUS ANALYSIS TEST REPORT

Test Method: BS EN 12697 – 1: 2000 (Soluble binder content – by difference)
Test Method: BS EN 12697 – 2: 2002 (Particle size distribution)

Report No.: P.02.A90 CHARLESTON.R36789		Sample Ref.: R36789 / R36792 / R36793 / R36856	
Scheme / Site: Client:	**A90 Charleston to Damhead (Northbound)** Leiths (Scotland) Ltd.		
Material: Specification:	**SMA 6 surf RIGATEX TS2010 (Nypol 103)** BS EN 13108 – 5 / PD 6691 / BS 594987		
Source: Location:	Leiths – Blackhills Coating Plant Southbound.		
Date Sampled From: Date Sampled To: Sampled By: Sample Type:	02.06.2013 Lab Staff Bulk	Date Received: Date Tested From: Date Tested To: Certificate Received:	02.06.2013 to 02.06.2013 Yes

TEST RESULTS

Results are in Tabulated Form

REMARKS

Tolerances applied to the declared target grading in accordance with BS EN 13108 – 21: Table A.1 Individual Samples.

Issued By: A Trickett-Bell

Date of Issue: 24.06.2013

LEITHS

TECHNICAL SERVICES

REPORT REF: P.02.A90 CHARLESTON.R36789

TABULATED TEST RESULTS – RIGIFA LABORATORY

SCHEME / SITE: **A90 CHARLESTON – DAMHEAD (NORTHBOUND)** MATERIAL: **SMA 6 surf RIGATEX TS2010 (Nypol 103)** SPECIFICATION: **BS EN 13108 – 5 / PD 6691**
SOURCE: **BLACKHILLS COATING PLANT, COVE**.

Sieve Size (mm)		10	6,3	4	2	1	0,500	0,250	0,125	0,063	Binder	Remarks
Target Grading		100	94		27		15	13		9.0	7.1	
Tolerance		98 – 100	87 – 100		21 – 33		11 – 19	9 – 17		7.0 – 11.0	6.9 – 7.3	
Sample No.	Date Made											
R36789	02/06/2013	98	90	46	24	18	16	14	12	9.5	6.9	
R36792	02/06/2013	100	91	46	26	20	16	14	12	9.4	7.1	
R36793	02/06/2013	100	92	49	28	22	18	15	13	8.9	7.2	
R36856	09/06/2013	100	91	39	21	17	14	12	11	8.9	7.1	
Average		**100**	**91**	**45**	**25**	**19**	**16**	**14**	**12**	**9.2**	**7.1**	
SD		1.0	0.8	4.2	3.0	2.2	1.6	1.3	0.8	0.3	0.1	

= Denotes non-compliance (if present)

Issued By:

Date of Issue: 24.06.2013

LEITHS
TECHNICAL SERVICES

UKAS TESTING 1908

Authorised Signatories
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Laboratory Manager

Client: Leiths (Scotland) Ltd.
Rigifa
Cove
Aberdeen

Attn: B Lund

INDIRECT DENSITY GAUGE TEST REPORT

Test Method: BS 594987: 2007: Annex G

Report No.: P.02.A90 CHARLESTON.R36933C		Sample Ref.: R36933C	
Scheme / Site:	**A90 Charleston to Damhead (Northbound)**		
Client:	Leiths (Scotland) Ltd.		
Material:	**SMA 6 surf Rigatex (Nypol 103) TS2010**		
Specification:	TS2010 clause NG 2.4.2 paragraph 2		
Source:	Leiths – Blackhills Coating Plant		
Location:	Northbound.		
Date Sampled From:	01.06.2013	Date Received:	01.06.2013 to 22.06.2013
Date Sampled To:	22.06.2013	Date Tested From:	01.06.2013
Sampled By:	Lab Staff	Date Tested To:	22.06.2013
Sample Type:	Bulk	Certificate Received:	Yes

TEST RESULTS

Results are in Tabulated Form

REMARKS

Void content calculated using maximum density of 2394 kg/m^3(Maximum Density value taken from mix design and corroborated by samples tested during Trunk Road Network trial)

This report has been re-issued. The results have been re-calculated in accordance with a rolling mean of 3 consecutive results, as opposed to a rolling mean of 6 results as previously reported.

Issued By: A Trickett-Bell

Date of Issue: 08.07.2013

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INDIRECT DENSITY GAUGE TEST REPORT

Scheme / Site:	A90 Charleston to Damhead	**Report No.: P.02.A90 CHARLESTON.R36993C**	
Location:	Northbound, Slow Lane.	Sample No.:	R36933C

Chainage	Wheel Track (N or O)	In-Situ Density (kg/m^3)	In-Situ void content (%)	Average 3 readings (%)
530	N	2279	4.8	
550	O	2319	3.1	
620	N	2322	3.0	3.7
650	O	2247	6.1	4.1
670	N	2265	5.4	4.8
690	O	2307	3.6	5.0
710	N	2289	4.4	4.5
730	O	2270	5.2	4.4
750	N	2288	4.4	4.7
770	O	2296	4.1	4.6
790	N	2270	5.2	4.6
810	O	2326	2.8	4.0
830	N	2332	2.6	3.5
1370	N	2332	2.6	2.7
1390	O	2299	4.0	3.1
1410	N	2270	5.2	3.9
1430	O	2295	4.1	4.4
1450	N	2328	2.8	4.0
1470	O	2315	3.3	3.4
1490	N	2340	2.2	2.8
1510	O	2290	4.3	3.3
1530	N	2300	3.9	3.5
1550	O	2316	3.3	3.8
1570	N	2252	5.9	4.4
1590	O	2241	6.4	5.2

Chainage	Wheel Track (N or O)	In-Situ Density (kg/m^3)	In-Situ void content (%)	Average 6 readings (%)

LEITHS
TECHNICAL SERVICES

UKAS TESTING
1908

INDIRECT DENSITY GAUGE TEST REPORT

Scheme / Site:	A90 Charleston to Damhead	**Report No.: P.02.A90 CHARLESTON.R36933C**	
Location:	Northbound, Fast Lane.	Sample No.:	R36933C

Chainage	Wheel Track (N or O)	In-Situ Density (kg/m^3)	In-Situ void content (%)	Average 3 readings (%)
650	N	2244	6.3	
670	O	2329	2.7	
690	N	2293	4.2	4.4
710	O	2280	4.7	3.9
730	N	2284	4.6	4.5
750	O	2277	4.9	4.7
770	N	2316	3.2	4.2
790	O	2315	3.3	3.8
810	N	2352	1.7	2.8
830	O	2308	3.6	2.9
1370	O	2299	4.0	3.1
1390	N	2256	5.8	4.5
1410	O	2260	5.6	5.1
1430	N	2283	4.6	5.3
1450	O	2318	3.2	4.5
1470	N	2256	5.8	4.5
1490	O	2297	4.1	4.3
1510	N	2315	3.3	4.4
1530	O	2230	6.8	4.7
1550	N	2316	3.3	4.5
1570	O	2265	5.4	5.2
1590	N	2272	5.1	4.6

Chainage	Wheel Track (N or O)	In-Situ Density (kg/m^3)	In-Situ void content (%)	Average 3 readings (%)

Measurement of Wet Skid Resistance using the GripTester braked wheel fixed slip device – BS7941-2:2000

Location	A90 Charlestown to Damhead N/B	GripTester No	GT-501
Test Date	14/08/13	Test Wheel No	A6 051208
Client	REF: BTR/13/273 Neil Anderson Leiths (Scotland) Ltd. Rigifa, Cove, Aberdeen AB12 3LR	Weather	Dry and Clear
Survey Team	S Thompson (Technician) J Bruce (Technician)	Test Number	140813_1126 140813_1138

Material Tested: Panel 1, 3 & 5 – TS2010 Spec. 10mm PSV53
Panel 2 & 4 – TS2010 Spec. 6mm PSV68+

Location **details from planned works	Direction	Length	Lane	Site Class*	Average Grip Number	Minimum Grip Number*
Panel 1: Ch 0 – 674	N/B	674m	1		0.64	0.62
Panel 2: Ch 674 – 878	N/B	204m	1		0.66	0.62
Panel 3: Ch 878 – 1583	N/B	705m	1		0.64	0.62
Panel 4: Ch 1583 – 1736	N/B	153m	1		0.63	0.62
Panel 5: Ch 1736 – 2349	N/B	613m	1		0.63	0.62

* From Table 2.4 TS2010 Surface Course Specification & Guidance

FOR AND ON BEHALF OF
BEAR SCOTLAND Ltd.

S Thompson – Planned Maintenance Technician
Date: 20/08/13

Griptest Scheme Summary

VaryC

Scheme: A90 Charlestown to Damhead
Survey Date: 14/08/2013
Laid Date: 23/06/2013
Reason: 4 weeks Actual time (weeks) 7

			Patch 1			Patch 2			Patch 3			Patch 4			Patch 5	
			Length		Gap	Length		Gap	Length		Gap	Length		Gap	Length	
			660			200			690			150			600	
File		Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result
1126	Run 1	1891	2565	0.634	2565	2769	0.655	2769	3474	0.637	3474	3627	0.612	3627	4240	0.629
1138	Run 2	1863	2536	0.647	2536	2740	0.673	2740	3444	0.649	3444	3597	0.641	3597	4209	0.636
Chainages		0	660		660	860		860	1550		1550	1700		1700	2300	
Calculated panel length			674			204			705			153			613	
Patch Average				**0.64**			**0.66**			**0.64**			**0.63**			**0.63**

Length of Site	2300

Total Length of Patches	2300

Details in from survey data
Details from Constructed data
Use chainage detail to calculated average Gn
Calculated

				Difference	
Survey	End chainage		Length of survey	M	%
Run 1	4240		2349	49	2.1%
Run 2	4209		2346	46	2.0%

Note:- VaryCH

Site Details recieved:
P1 - ch0>660 - 10mm 53psv
P2 - ch660>860 - 6mm 68+psv
P3 - ch860>1550 - 10mm 53psv
P4 - ch1550>1700 - 6mm 68psv
P5 - ch1700>2300 - 10mm 53psv

Scheme Average **0.64** Gn

SCRIM (factor)	0.89	**0.57**

Measurement of Wet Skid Resistance using the GripTester braked wheel fixed slip device – BS7941-2:2000

Location	A90 Charlestown to Damhead N/B	GripTester No	GT-501
Test Date	15/05/14	Test Wheel No	A65-140427
Client	REF: LEPO-035032 Neil Anderson Leiths (Scotland) Ltd. Rigifa, Cove, Aberdeen AB12 3LR	Weather	Dry and Clear
Survey Team	S Thompson (Engineer) J Bruce (Technician)	Test Number	150514-1218 150514-1246

Material Tested: Panel 1, 3 & 5 – TS2010 Spec. 10mm PSV53
Panel 2 & 4 – TS2010 Spec. 6mm PSV68+

Location **details from planned works	Direction	Length	Lane	Site Class*	Average Grip Number	Minimum Grip Number*
Panel 1: Ch 0 – 680	N/B	680m	1		0.67	0.62
Panel 2: Ch 680 – 886	N/B	206m	1		0.69	0.62
Panel 3: Ch 886 – 1597	N/B	711m	1		0.68	0.62
Panel 4: Ch 1597 – 1752	N/B	155m	1		0.64	0.62
Panel 5: Ch 1752 – 2370	N/B	618m	1		0.64	0.62

* From Table 2.4 TS2010 Surface Course Specification & Guidance

FOR AND ON BEHALF OF
BEAR SCOTLAND Ltd.

S Thompson – Planned Maintenance Engineer
Date: 16/05/14

Griptest Scheme Summary

VaryC

Scheme: A90 Charlestown to Damhead
Survey Date: 15/05/2014
Laid Date: 23/06/2013
Reason: Actual time (weeks) 47

			Patch 1 Length			Patch 2 Length			Patch 3 Length			Patch 4 Length			Patch 5 Length	
			660			200			690			150			600	
File		Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result
1218	Run 1	1893	2573	0.661	2573	2779	0.685	2779	3490	0.666	3490	3645	0.633	3645	4263	0.64
1246	Run 2	1895	2575	0.684	2575	2781	0.695	2781	3492	0.69	3492	3646	0.652	3646	4264	0.641
Chainages		0	660		660	860		860	1550		1550	1700		1700	2300	
Calculated panel length			680			206			711			155			618	
Patch Average				**0.67**			**0.69**			**0.68**			**0.64**			**0.64**

Length of Site	2300

Total Length of Patches	2300

Details in from survey data
Details from Constructed data
Use chainage detail to calculated average Gn
Calculated

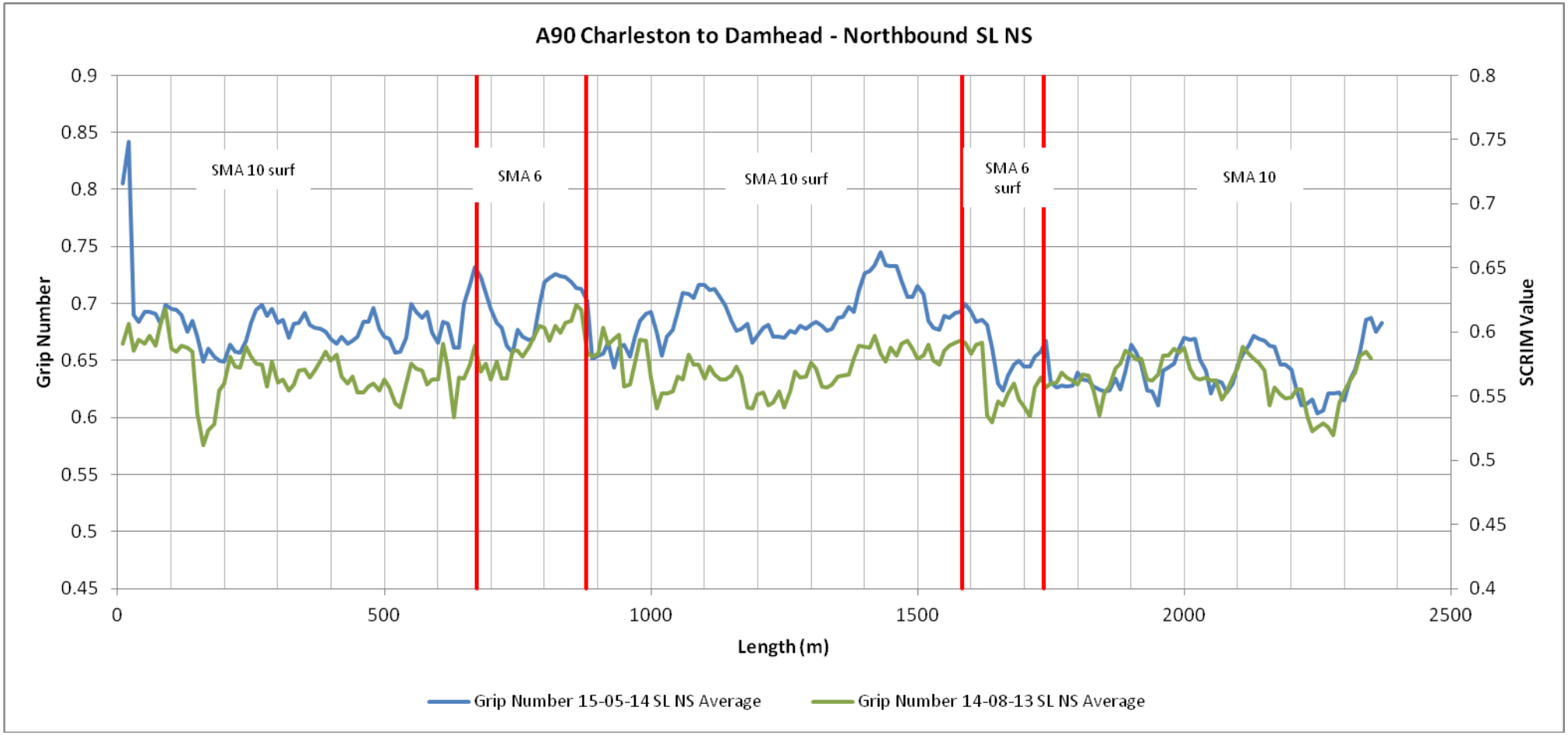
Survey	End chainage	Length of survey	Difference M	Difference %
Run 1	4263	2370	70	3.0%
Run 2	4264	2369	69	3.0%

Note:- VaryCH

Site Details recieved:
P1 - ch0>660 - 10mm 53psv
P2 - ch660>860 - 6mm 68+psv
P3 - ch860>1550 - 10mm 53psv
P4 - ch1550>1700 - 6mm 68psv
P5 - ch1700>2300 - 10mm 53psv

Scheme Average **0.67** Gn

SCRIM (factor)	0.89	**0.59**


A90 Charleston to Damhead - Northbound SL NS
SMA 10 surf
SMA 6
SMA 10 surf
SMA 6 surf
SMA 10
Grip Number
SCRIM Value
Length (m)
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0
500
1000
1500
2000
2500
Grip Number 15-05-14 SL NS Average
Grip Number 14-08-13 SL NS Average

A90 Charleston to Damhead Map of site.