FIFA Quality Concept for Football Turf

FIFA LABORATORY TEST REPORT

Product name	Bellin-Amsterdam
FIFA Licensee	
FIFA accredited Test Institute	Labosport Ltd

Laboratory Test report number	LSUK.14-0036
Date of test	12.02.2014

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1 – Introduction / The Process of certification

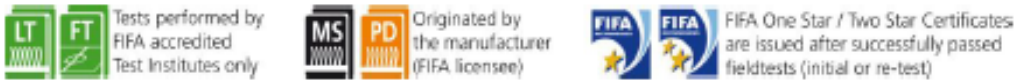
In order to be certified, football turf fields must reach the performance and quality criteria established to be as close as possible to playing characteristics of natural grass. To this end, each field must undergo four steps as outlined below:

- a thorough composition and resilience test of the product in the laboratory (step 1)
- the installation of the product as declared, applying the outlined procedures (step 2)
- a test of the final installation for the relevant characteristics of the field as a whole system (step 3)
- if successful, certification as FIFA 1 STAR or FIFA 2 STAR field (step 4)

After expiration of the certificate, the field can be retested (step 3/4)

Fig. 1.2 Approval process steps and the related documents / parties

Legend:



This process is part of the FIFA Quality Concept for Football Turf in order to

- replicate the playing qualities of good quality natural grass,
- create a playing environment that does not increase the risk of injury to players
- achieve adequate durability (providing it is properly maintained)

For more details on *FIFA Quality Concept for Football Turf* see www.fifa.com.

This document covers the complete step 1, FIFA LABORATORY TESTS REPORT. Consider:

- Tests are performed on a representative sample of the manufacturer's sample delivered to the FIFA accredited test institutes
- The test report is only valid if reproduced in its entirety
- The results are only valid for the complete Football Turf (related product) as stated in 2.1
- The related product is eligible for undergoing a field test on a final installation.

IMPORTANT:

To reach FIFA Recommended Two Star (One Star) field certification, as next steps

- the installation has to comply with the related Product Declaration / Method Statement (step 2)
- a successfully passed subsequent FIELD TEST (step 3/4)

This FIFA LABORATORY TEST REPORT may only be used in relationship to Football Turf fields that are going to be submitted for certification under the *FIFA Quality Concept of Football Turf*. Any other use of this report is a violation of the report's copy right which is held by FIFA and breaches the terms of the FIFA Quality Concept of Football Turf licensing agreement.

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2 – Test Object, Participants

2.1 Test Numbers

Report Identification	Laboratory Test report number	LSUK.14-0036
	Test Institute Project number	LSUK.14-0036

2.2 Test Objects

Product Name	Bellin-Amsterdam
Product Identification code	
Name of the synthetic turf system	Bellin-Amsterdam
Performance infill	SBR
Stabilising infill	Quartz sand
Shock-pad or elastic layer (if applicable)	N/A
Sub-base composition	Rigid engineered Base

2.3 Participants, Addresses

Applicant • FIFA preferred producer • Licensee	Name	Qingdao Bellinturf Industrial Co., LTD			
	Address	Qingdao Bellinturf Industrial Co., LTD, JIAOZHOU Q			
	Contact	Phone	+86-532/866 22211	email	info@bellinturf.com
FIFA accredited Test Institute	Name	Labosport Ltd			
	Address	Labosport Ltd, HEANOR, DERBYSHIRE			
	Contact	Phone	+44 (0) 1773 765007	email	info@labosport.co.uk

3 – Test Conclusion, Product Approval

The presented Football Turf surface satisfies the FIFA LABORATORY TEST requirements of

FIFA One Star	Passed	«passed» or «failed»
FIFA Two Star	Passed	«passed» or «failed»

IMPORTANT: A successfully passed test of the final installation (FIFA FIELD TEST) is mandatory to obtain FIFA One Star / Two Star Certification!

Report originated by	Name	James Blackburn
	Position	Laboratory Manager
	Date	12.02.2014
Report approved by	Name	Alastair Cox
	Position	Director
	Date	12.02.2014

4 – Product Information / Specifications

4.1 Overview – a typical product composition

The basic structure and composition of artificial turf varies. To reach the goal of defined quality and specific functional performances, a set of the relevant parameters for the products / materials used was defined.
Materials / products typically used are as follows:

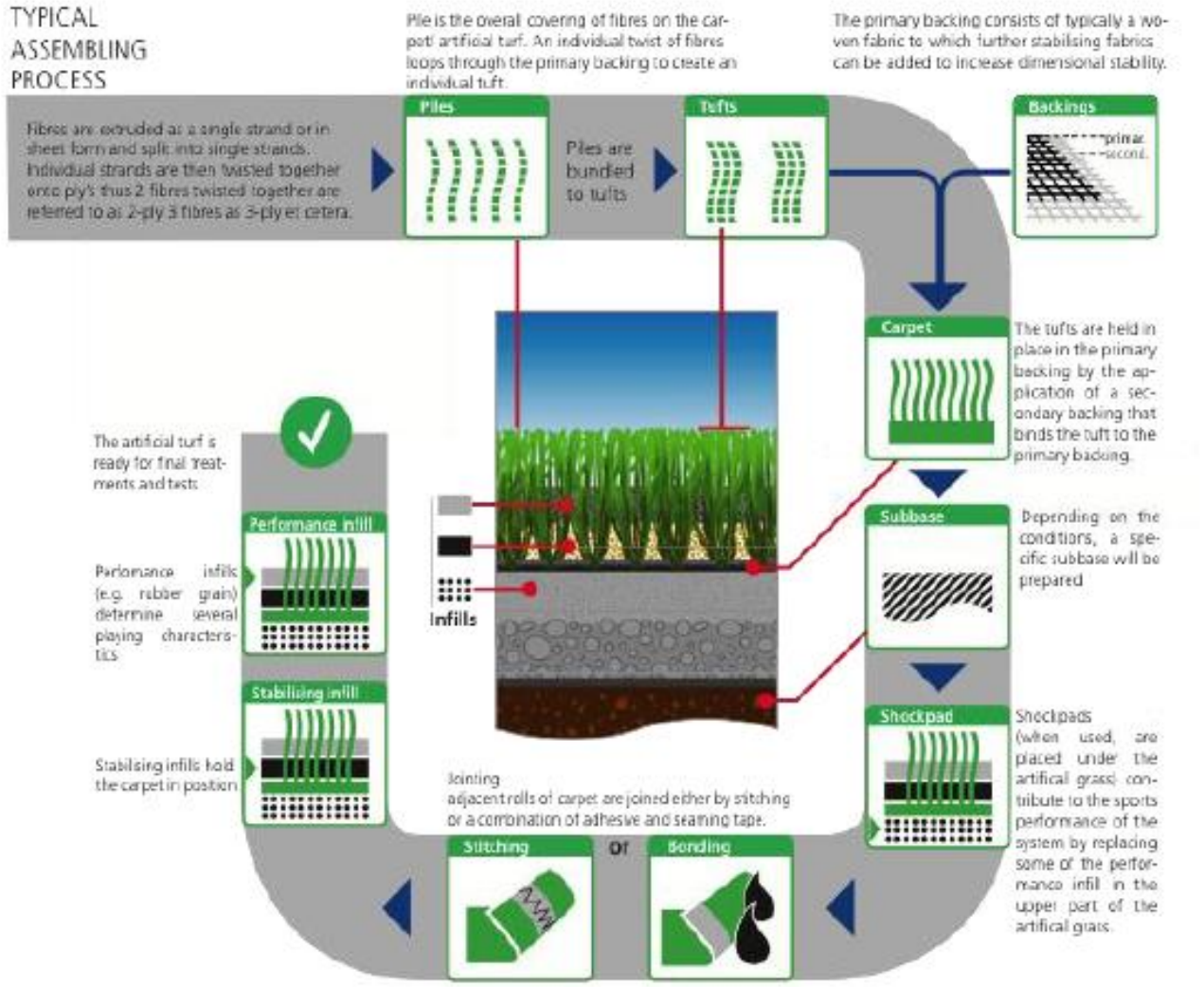

Fig. 1.3 Products / materials used to build up artificial turf

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4 – Product Information / Specifications

4.2 Artificial turf (1/2)

Manufacturer		Bellinturf Industrial Limited			
Tuft pattern		Straight			
Pile yarns		Yarn A	Yarn B	Yarn C	**Standard Test Method**
Yarn Manufacturer		Qingdao Consan Import & Export Co Ltd			
Product name, code		Monofilament			
Pile yarn profile		Diamond			–
Pile thickness [μ m]		280			–
Pile colour [RAL]	**1**	6001			–
	2				–
	3				–
Pile width [mm]		1.22			–
No of tufts/m²		10,710			ISO1773
Pile length [mm]		55			ISO 2549
Pile weight [g/m²]		1,700			ISO 8543
Pile yarn characterization		PE			–
Pile yarn dtex		13000			–

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4 – Product Information / Specifications

4.2 Artificial turf (2/2)

	**Primary backing**	Product name / code	PP cloth
		Manufacturer	Yihua Bonar Yarns & Fabrics Co Ltd
	Re- enforcement scrim	Product name / code	Gridding
		Manufacturer	Yihua Bonar Yarns & Fabrics Co Ltd
	**Secondary backing**	Product name / code	SBR glue
		Manufacturer	Styron S/Blatexco., LTD Shanghai Branch
		Dry application rate [g/m²]	335
	**Carpet**	Minimum tuft withdrawal force [N]	30
		Carpet mass per unit area [g/m2]	3,250
	**Method of jointing**		
	Bonded joints	Adhesive brand name	Two component polyurethane
		Adhesive manufacturer	Shanghai Tresbon Building Decoration M
		Application rate [g/lm]	350 - 400
		Jointing film brand name	LD7812WPE30
		Jointing film manufacturer	Freudenberg Spunweb (Shanghai) Tradi
	**Stitched seams**	Tread brand name/product code	-
		Tread manufacturer	-
		Stitch rate [stitch per lm]	-

4.3 Performance infill

	Specifications	Standard Test Method
Product name / code	Black Rubber Granules	
Manufacturer	Yantai Consan Rubber & Plastic Co Ltd	
Material type	SBR	
Material grading	2 - 3.15mm	
Particle shape	Irregular	prEN 14955
Particle size range	2 - 3.15mm	EN 933-Part 1
Bulk density [g/cm³]	0.49	EN 1097-3
Application rate [kg/m²]	14	

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4 – Product Information / Specifications

4.4 Stabilising infill

	Specifications	Standard Test Method
Product name / code	Quartz sand	
Manufacturer	Bellinturf Industrial Limited	
Material type	Quartz sand	
Material grading	0.5 - 1.6mm	
Particle shape	Irregular	prEN 14955
Particle size [range]	0.5 - 1.6mm	EN 933-Part 1
Bulk density [g/cm³]	1.65	EN 1097-3
Application rate [kg/m²]	20	

4.5 Shockpad / elastic layer*

	Specifications	Standard Test Method
Product name / code	N/A	
Manufacturer		
Type		
Composition**		
Bulk density [g/cm³]		
Thickness		EN 1979
Shock absorption [%]		FIFA 4a
Deformation		FIFA 5a
Tensile strength [N]		
Mass per unit area [kg/m²]		

* if part of system supplied
** type, rubber granule grading, binder content, etc

Football Turf Laboratory Test Report

4 – Product Information / Specification

4.6 Maintenance requirements (recommendations)

Equipment / material		Remarks
Tractor Unit		Purpose - the power unit that pulls the maintenance tools over the field
Drag	Brush	A maintenance attachment that re-distributes the infill and brings the fibres into a more upright position
	Mat	A maintenance tool used to re-distribute infill
Ball roll ramp		A testing device used to assess the speed of a football over the surface
Maintenance logbook		Is used to record all the maintenance activities that take place on the Football Turf Surface
Top up infill materials		to top up penalty spot and corner areas
...		For further maintenance requirements, please consult the manufacturer's recommendations for your specific system

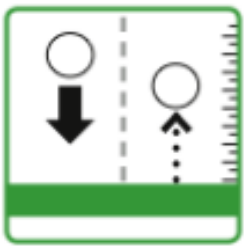
FIFA Licensee's comments / hints

Football Turf Laboratory Test Report

5 – Detailed Laboratory Test Results

5.1 Overview – ball and player to surface interactions

How is the field to play? By means of the following 8 parameters, this question can be answered very well. Furthermore, some values allow conclusions regarding maintenance in order to keep the field in top shape.

Parameter	Comments / hints
1- Vertical ball rebound 	The higher the value the higher the ball will rebound. The ball should not bounce too high or too low. Ball / surface interaction
2- Angled ball rebound 	Angled ball rebound is a combination of the hardness of the field and the resistance from the fibres to the ball and thus a high reading can come from a hard surface, or a low grip surface or a combination of both Ball / surface interaction
3- Ball roll 	The higher the value the faster the ball will run over the surface. The ball should not be too fast or too slow. Ball / surface interaction
4- Rotational resistance 	This simulates the player's ability to alter direction, too high a value and stress can occur across knee ligaments, too low and the player will not be able to grip the surface and may slip causing ligament damage. Player / surface interaction

Parameter	Comments / hints
5- Shock absorption 	Shock absorbency is an indicatic of how hard the field feels to th player. A value that is too lo indicates a hard field and cau: damage to player's joints too so and the surface is energy sappir resulting in increases in fatigu and over-use injuries. Player / surface interaction
6- Deformation 	A surface that deforms too much will result in overstretching of ligaments particularly the around the ankle. Player / surface interaction
7.1- Linear friction Stud decelerat. value 	If when stopping, the player's ankle is subject to too high a deceleration, damage to the ankle can occur. Therefore too high a value will result in an increased risk to ankle injuries. Player / surface interaction
7.2- Linear friction Stud slide value 	A player needs to accelerate and decelerate rapidly. To achieve this effect the player needs to obtain grip from the surface. Too high a grip will lead to injury too low a grip will result in the boot slipping in the surface and the player cannot accelerate or decelerate safely. Player / surface interaction

Football Turf Laboratory Test Report

5 – Detailed Test Results

5.2 Product identification

	Property		Test result	
Artificial Turf	Carpet mass per unit area [g/m²]		2,957	
	Tufts per unit area [m²]		10,625	
	Pile length above backing [mm]		55	
	Pile weight [g/m²]		1,638	
	Water permeability of carpet [mm/h]		>2000	
	Yarn cross section and thickness			277
Performance infill	Particle size range		1.6 - 2.5mm	
	Particle shape		Irregular A3	
	Bulk density [g/cm³]		0.49	
	Thermographic analysis	% organic	68.3	
		% inorganic	31.7	
Stabilising infill	Particle size range		0.2 - 0.63mm	
	Particle shape		Sub-round C2	
	Bulk density [g/cm³]		1.58	
Shockpad / elastic layer (if part of system supplied)	Shock absorption [%]		-	
	Deformation		-	
	Thickness		-	

5.3 Ball / surface interaction

Property		Condition		Test Results	FIFA Approval requirements: One Star	FIFA Approval requirements: Two Star	P = passed F = failed: One Star	P = passed F = failed: Two Star
Vertical ball rebound	Initial, un-aged	Dry		0.82	0.6 –1m	0.6-0.85 m	Passed	Passed
		Wet		0.78			Passed	Passed
	After simulated wear	5'200 cycles		0.82				Passed
		20'200 cycles		0.97	0.6 – 1m		Passed	
Angled ball rebound	Dry			50	45 – 80%	45 – 80%	Passed	Passed
	Wet			61			Passed	Passed
Ball roll	Dry			7.5	4 – 10m	4 – 8m	Passed	Passed
	Wet			7.5			Passed	Passed

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5 – Detailed Test Results

5.4 Player / surface interaction

Property		Condition		Test Results	FIFA Approval requirements: One Star	FIFA Approval requirements: Two Star	P = passed F = failed: One Star	P = passed F = failed: Two Star
	**Shock absorption**	Initial, Un-aged	Dry	64	55 – 70%	60 – 70%	Passed	Passed
			Wet	64			Passed	Passed
		After simulated wear	5'200 cycles	60				Passed
			20'200 cycles	56	55 – 70%		Passed	
		40°C		66		60 – 70%	Passed	Passed
		– 5°C[1]		63			Passed	Passed
	**Deformation**	Initial	Dry	9.0	4 – 11mm	4 – 10mm	Passed	Passed
			Wet	8.5			Passed	Passed
		After simulated wear	5'200 cycles	7.5				Passed
			20'200 cycles	6.5	4 – 11mm		Passed	Passed
	**Rotational resistance**	Initial	Dry	33	25–50Nm	30–45Nm	Passed	Passed
			Wet	31			Passed	Passed
		After simulated wear	5'200 cycles	34				Passed
			20'200 cycles	43	25–50Nm		Passed	Passed
	**Linear friction**	Stud deceleration value	Dry	3.7	3.0 – 7.0g	3.0 – 5.5g	Passed	Passed
			Wet	3.9			Passed	Passed
		Stud slide value	Dry	183	120 – 220	130 – 210	Passed	Passed
			Wet	186			Passed	Passed
	**Skin / surface friction**	Dry		0.71	0.35 – 0.75 μ	0.35 – 0.75 μ	Passed	Passed
	Skin abrasion	Dry		26	± 30 %	± 30 %	Passed	Passed

Football Turf Laboratory Test Report

5 – Detailed Test Results

5.5 Environmental impact (artificial, light, water)

Property		Aspect		Condition	Test result	FIFA Requirements P= passed F= failed	P/F
	Pile yarns	Colour change	1	After artificial weathering	4/5	≥ Grey scale 3	Passed
			2				
			3				
		Yarn tensile strength	1		28.2%	Change ≤ 50%	Passed
			2				
			3				
	Polymeric infill	Colour change			5	≥ Grey scale 3	Passed
		Visual change in composition			No change	No change	Passed
	Complete system	Water permeability		N/A	>3,000	>180 mm/h	Passed
	Stitched joints	Strength		Un-aged		≥ 1000N/100mm	
				Water aged			
	Bonded joints	Strength		Un-aged	127	≥ 25N/100mm	Passed
				Water aged	120		Passed
	Carpet tuft	Withdrawal force		Un-aged	35	≥ 30N	Passed
				Water aged	32		Passed

5.6 Miscellaneous

	Shockpad Elastic layer	Tensile strength	Un-aged		≥ 0.15 MPa	

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5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.1 DSC (Differential Scanning Colorimetry) scans of pile yarn

5.7.2 Performance infill particle grading curve / Stabilising infill particle grading curve

5.7.3 TGA (Thermo Gravimetric Analysis) of performance infill

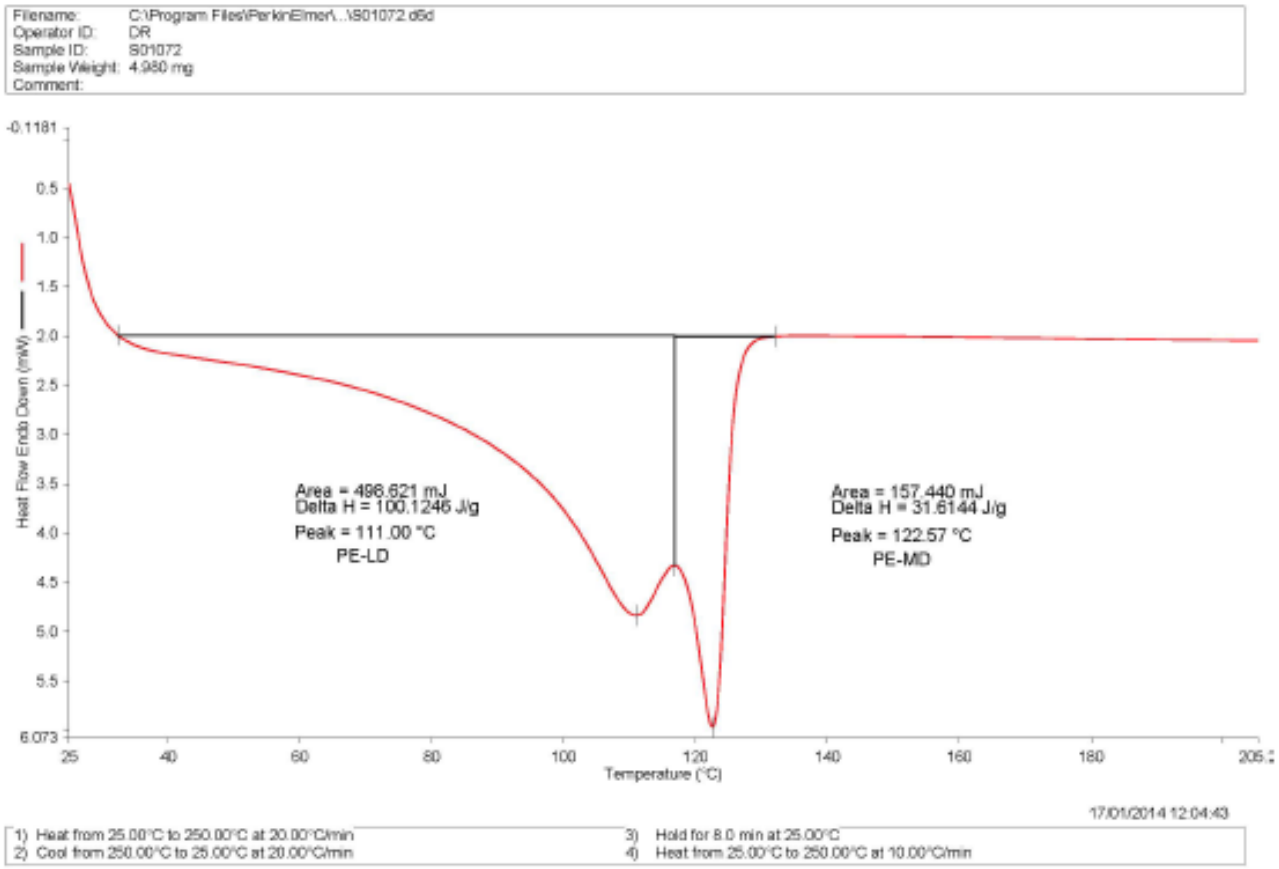
5.7.4 Composition of unbound sub-base (if tested as part of system) Sub-base particle grading curve

5.7.5 Simulated wear, photos before / after

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.1 DSC Differential Scanning Colorimetry scans of pile yarn



Comments:

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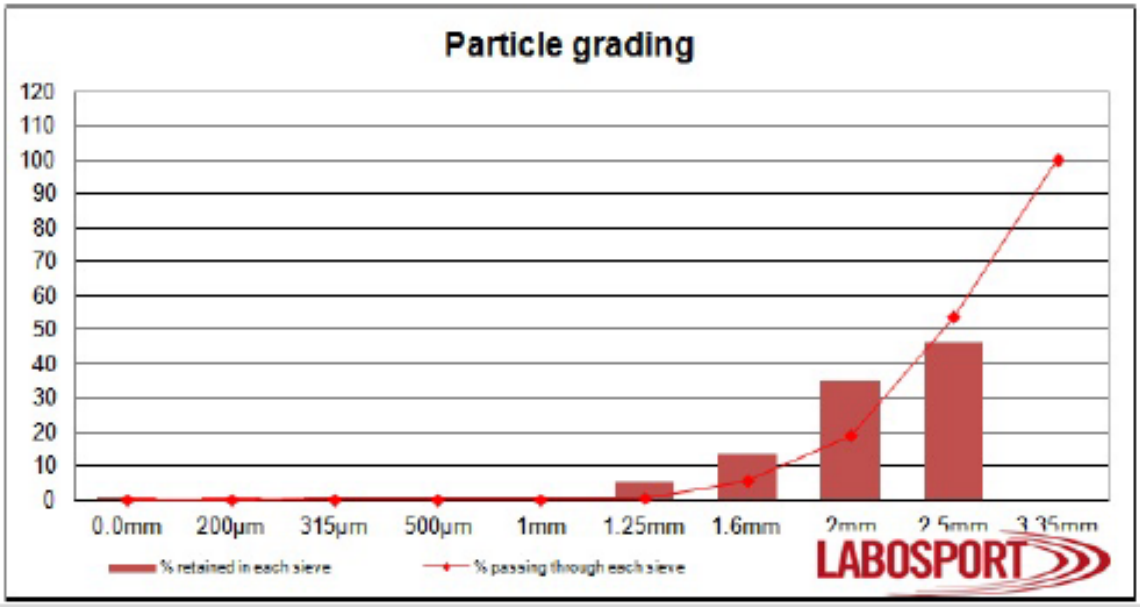
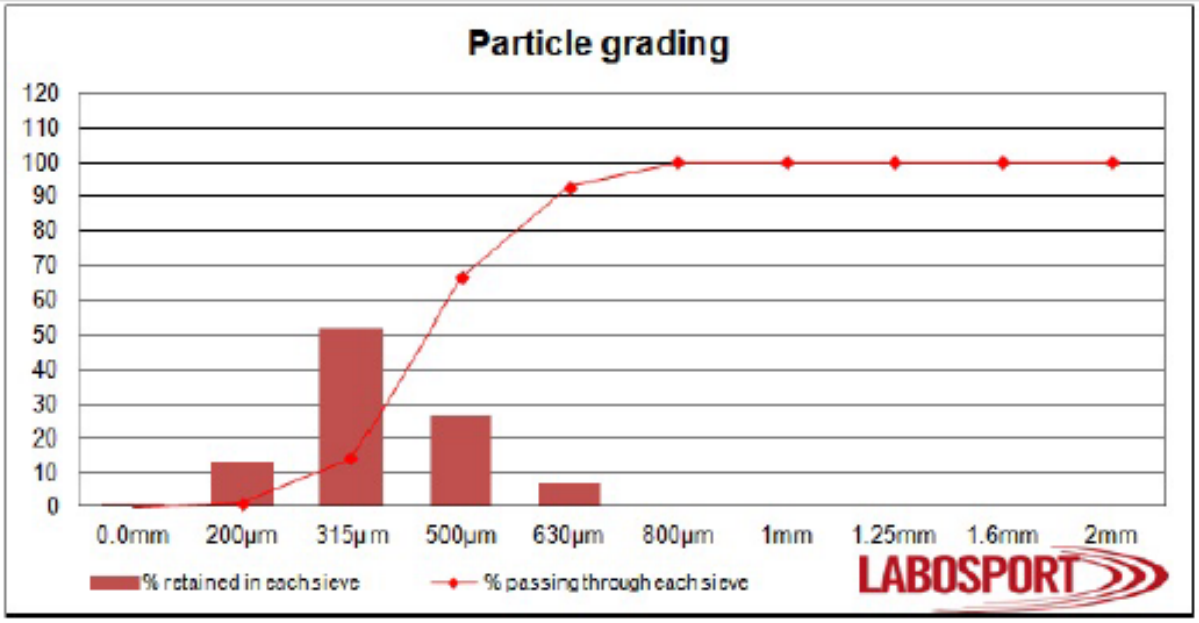
5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.2 a) Performance infill particle grading curve



5.7.2 b) Stabilising infill particle grading curve



Comments:

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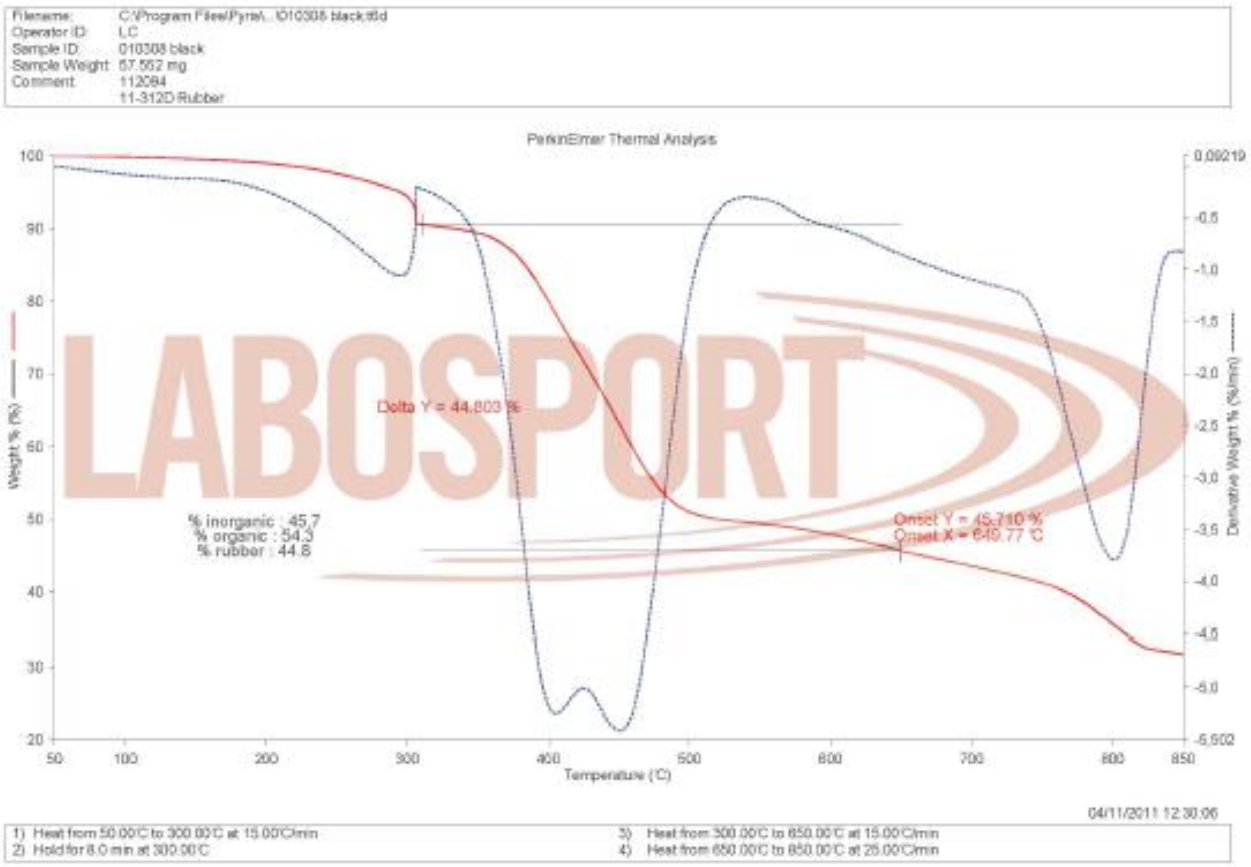
5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.3 TGA of performance infill



Comments:

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.4 Sub base (if tested as part of system)

Composition	
Particle size range	
Particle shape	
Thickness	
Compaction & test method	

Sub-base particle grading curve

Comments:

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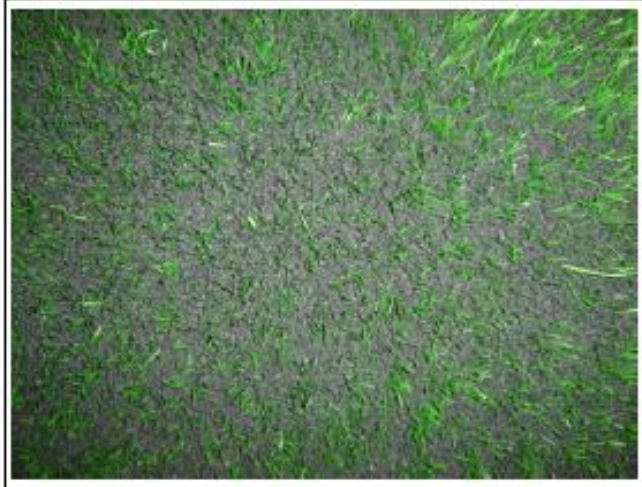
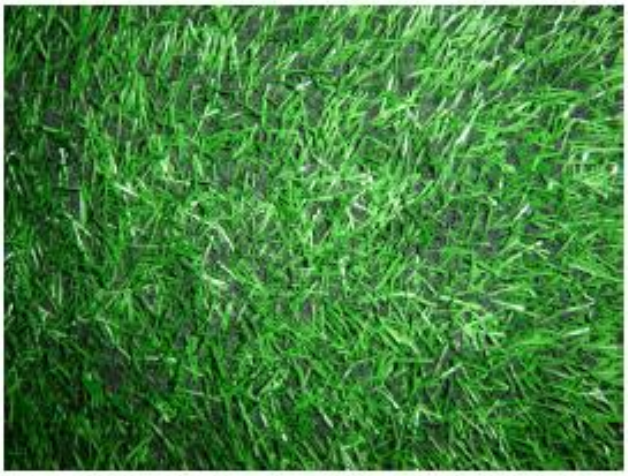
5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.5 Simulated wear (photos before / after wear) Page: 1

Before wear	After wear
	
	

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5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.5 Simulated wear (photos before / after wear) Page: 2

Before wear	After wear
	

5.7.6 Photos of performance infill and stabilising infill

Performance infill	Stabilising infill