



FIFA LABORATORY TEST REPORT

Product name	EVOLUTION GEO
FIFA Licensee	Nurteks Hali San.ve Tic. A.S.
FIFA accredited Test Institute	Labosport Italia S.r.l.
Laboratory Test report number	15-0038IT
Date of test	19.01.2015

Football Turf Laboratory Test Report

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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)

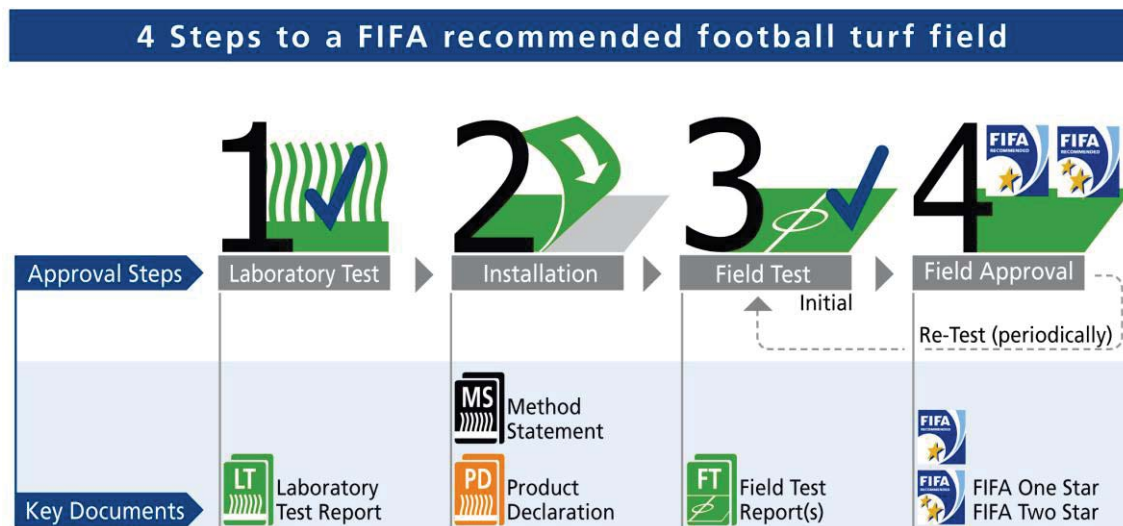
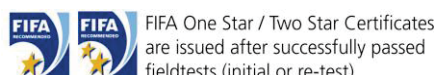


Fig. 1.2 Approval process steps and the related documents / parties

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.

Football Turf Laboratory Test Report

2 – Test Object, Participants

2.1 Test Numbers


Report Identification	Laboratory Test report number	15-0038IT
	Test Institute Project number	15-0038IT

2.2 Test Objects



Product Name	EVOLUTION GEO
Product Identification code	-
Name of the synthetic turf system	EVOLUTION GEO
Performance infill	GEOFILL V
Stabilising infill	SAND
Shock-pad or elastic layer (if applicable)	XPE FOAM
Sub-base composition	Rigid engineered Base

2.3 Participants, Addresses


Applicant • FIFA preferred producer • Licensee 	Name	Nurteks Hali San.ve Tic. A.S.			
	Address	Nurteks Hali San.ve Tic. A.S., ISTANBUL			
	Contact	Phone	+ 90 212 511 19 86	email	export@nurteks.com.tr


FIFA accredited Test Institute	Name	Labosport Italia S.r.l.			
	Address	Labosport Italia S.r.l., CERNUSCO LOMBARDONE			
	Contact	Phone	+39 039 8946215	email	roberto.armeni@labosport.it

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	Davide Giorgini	
	Position	Laboratory manager	
	Date	04.02.2015	

Report approved by	Name	Roberto Armeni	
	Position	Laboratory director	
	Date	04.02.2015	

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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:

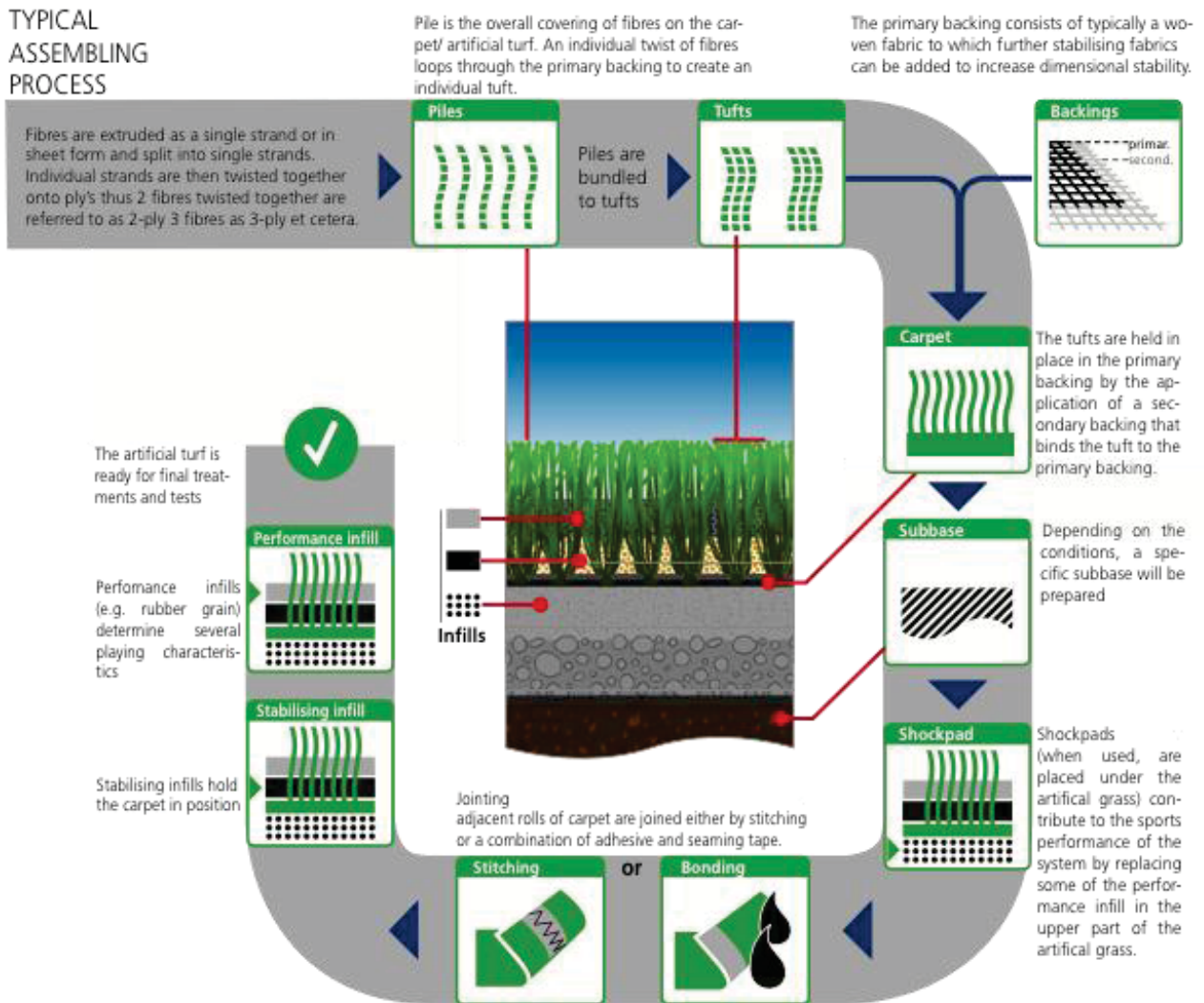


Fig. 1.3 Products / materials used to build up artificial turf

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4 – Product Information / Specifications

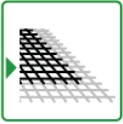
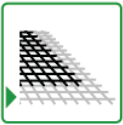






4.2 Artificial turf (1/2)

Manufacturer	NURTEKS HALI SAN TIC A.S.			
Tuft pattern				
Pile yarns	Yarn A	Yarn B	Yarn C	Standard Test Method
Yarn Manufacturer	TENCATE			
Product name, code	EVOLUTION			
Pile yarn profile				–
Pile thickness [μ m]	250			–
Pile colour [RAL]	1	FIELD GREEN		–
	2	OLIVE GREEN		–
	3			–
Pile width [mm]	1,5 mm			–
No of tufts/m²	8200			ISO1773
Pile length [mm]	57,5			ISO 2549
Pile weight [g/m ²]	1250			ISO 8543
Pile yarn characterization	PE			–
Pile yarn dtex	12000			–

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4 – Product Information / Specifications

4.2 Artificial turf (2/2)			
	Primary backing	Product name / code	K16
		Manufacturer	BES-KA
	Re- enforcement scrim	Product name / code	
		Manufacturer	
	Secondary backing	Product name / code	LATEKS
		Manufacturer	DOW CHEMICALS
		Dry application rate [g/m ²]	1100 g/m ²
	Carpet	Minimum tuft withdrawal force [N]	30N
		Carpet mass per unit area [g/m ²]	2700
	Method of jointing		
	Bonded joints	Adhesive brand name	AYKA FLOOR
		Adhesive manufacturer	AYKA FLOOR
		Application rate [g/lm]	
		Jointing film brand name	HELMETIN
Jointing film manufacturer		SERTA TEKS	
	Stitched seams	Tread brand name/product code	
		Tread manufacturer	
		Stitch rate [stitch per lm]	

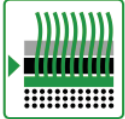
4.3 Performance infill			
		Specifications	Standard Test Method
	Product name / code	GEOFILL V	
	Manufacturer	ITALGREEN SPA	
	Material type	Organic vegetable infill	
	Material grading	0,8-2,5	
	Particle shape	A1-C3	prEN 14955
	Particle size range	0,8-2,5	EN 933-Part 1
	Bulk density [g/cm³]	0,14	EN 1097-3
	Application rate [kg/m²]	7.0 kg/m ²	

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4 – Product Information / Specifications

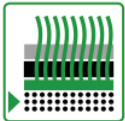
4.4 Stabilising infill

	Specifications	Standard Test Method
Product name / code	SILICA SAND	
Manufacturer	EMEK AND FARES KUM	
Material type	SILICA SAND	
Material grading	0.2-1.0	
Particle shape	B2-C2	prEN 14955
Particle size [range]	0.2-1.0	EN 933-Part 1
Bulk density [g/cm³]	1,40	EN 1097-3
Application rate [kg/m²]	20 kg/m ²	



4.5 Shockpad / elastic layer*

	Specifications	Standard Test Method
Product name / code	XPE SHOCKPAD	
Manufacturer	BERKOSAN	
Type	FOAM	
Composition**		
Bulk density [g/cm³]	0,005	
Thickness	10 mm	EN 1979
Shock absorption [%]	37	FIFA 4a
Deformation	7,3	FIFA 5a
Tensile strength [N]	0,4	
Mass per unit area [kg/m²]	0,5 kg	



* 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



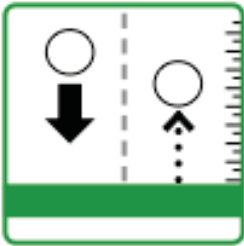






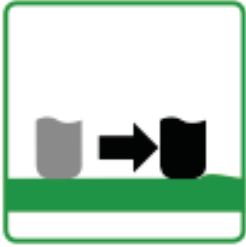
FIFA Licensee's comments / hints

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	Parameter	Comments / hints
1- Vertical ball rebound 	<p>The higher the value the higher the ball will rebound. The ball should not bounce too high or too low.</p> <p>Ball / surface interaction</p>	5- Shock absorption 	<p>Shock absorbcency 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.</p> <p>Player / surface interaction</p>
2- Angled ball rebound 	<p>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</p> <p>Ball / surface interaction</p>	6- Deformation 	<p>A surface that deforms too much will result in overstretching of ligaments particularly the around the ankle.</p> <p>Player / surface interaction</p>
3- Ball roll 	<p>The higher the value the faster the ball will run over the surface. The ball should not be too fast or too slow.</p> <p>Ball / surface interaction</p>	7.1- Linear friction Stud decelerat. value 	<p>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.</p> <p>Player / surface interaction</p>
4- Rotational resistance 	<p>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.</p> <p>Player / surface interaction</p>	7.2- Linear friction Stud slide value 	<p>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.</p> <p>Player / surface interaction</p>

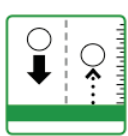


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5 – Detailed Test Results

5.2 Product identification

	Artificial Turf	Property		Test result
		Carpet mass per unit area [g/m ²]		2720
		Tufts per unit area [m ²]		8308
		Pile length above backing [mm]		54.6
		Pile weight [g/m ²]		1244
		Water permeability of carpet [mm/h]		3854
Yarn cross section and thickness			275	
	Performance infill	Particle size range		0.8 - 2.5
		Particle shape		A1-C3
		Bulk density [g/cm ³]		0.14
		Thermographic analysis	% organic	-
% inorganic	-			
	Stabilising infill	Particle size range		0.2 - 1.0
		Particle shape		B2-C2
		Bulk density [g/cm ³]		1.42
	Shockpad / elastic layer (if part of system supplied)	Shock absorption [%]		37
		Deformation		7.3
		Thickness		10.2







5.3 Ball / surface interaction

Property	Condition		Test Results	FIFA Approval requirements		P = passed F = failed	
				One Star	Two Star	One Star	Two Star
	Initial, un-aged	Dry	0.74	0.6 – 1m	0.6-0.85 m	Passed	Passed
		Wet	0.72			Passed	Passed
	After simulated wear	5'200 cycles	-				
		20'200 cycles	0.83	0.6 – 1m		Passed	Passed
	Dry		59	45 – 80%	45 – 80%	Passed	Passed
	Wet		66			Passed	Passed
	Dry		5.3	4 – 10m	4 – 8m	Passed	Passed
	Wet		5.7			Passed	Passed

Football Turf Laboratory Test Report

5 – Detailed Test Results


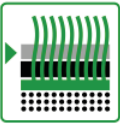




5.4 Player / surface interaction

Property	Condition		Test Results	FIFA Approval requirements		P = passed F = failed	
				One Star	Two Star	One Star	Two Star
 Shock absorption	Initial, Un-aged	Dry	66	55 – 70%	60 – 70%	Passed	Passed
		Wet	67			Passed	Passed
	After simulated wear	5'200 cycles	-				
		20'200 cycles	64			Passed	Passed
	40°C		68	55 – 70%	60 – 70%	Passed	Passed
	– 5°C ⁽¹⁾		70			Passed	Passed
	 Deformation	Initial	Dry	9.9	4 – 11mm	4 – 10mm	Passed
Wet			9.9	Passed			Passed
After simulated wear		5'200 cycles	-				
		20'200 cycles	9.1	4 – 11mm		Passed	Passed
 Rotational resistance		Initial	Dry	33	25–50Nm	30–45Nm	Passed
	Wet		32	Passed			Passed
	After simulated wear	5'200 cycles	-				
		20'200 cycles	39	25–50Nm		Passed	Passed
 Linear friction	Stud deceleration value	Dry	4.5	3.0 – 7.0g	3.0 – 5.5g	Passed	Passed
		Wet	3.6			Passed	Passed
	Stud slide value	Dry	190	120 – 220	130 – 210	Passed	Passed
		Wet	170			Passed	Passed
	 Skin / surface friction	Dry		0.70	0.35 – 0.75 μ	0.35 – 0.75 μ	Passed
 Skin abrasion		Dry	23	\pm 30 %	\pm 30 %	Passed	Passed


Football Turf Laboratory Test Report

5 – Detailed Test Results

5.5 Environmental impact (artificial, light, water)

						FIFA Requirements P= passed F= failed	
Property	Aspect		Condition	Test result		P/F	
 Pile yarns	Colour change	1	After artificial weathering	Light green 4-5	≥ Grey scale 3	Passed	
		2		Dark green 4-5		Passed	
		3		-			
	Yarn tensile strength	1		Light green -2%	Change ≤ 50%	Passed	
		2		Dark green -2%		Passed	
		3		-			
 Polymeric infill	Colour change		4	≥ Grey scale 3	Passed		
	Visual change in composition		No change	No change	Passed		
 Complete system	Water permeability		N/A	2429	>180 mm/h	Passed	
 Stitched joints	Strength		Un-aged	-	≥ 1000N/100mm		
			Water aged	-			
 Bonded joints	Strength		Un-aged	48	≥ 25N/100mm	Passed	
			Water aged	72		Passed	
 Carpet tuft	Withdrawal force		Un-aged	54	≥ 30N	Passed	
			Water aged	39		Passed	

5.6 Miscellaneous

 Shockpad Elastic layer	Tensile strength	Un-aged	0.41	≥ 0.15 MPa	Passed
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Football Turf Laboratory Test Report

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

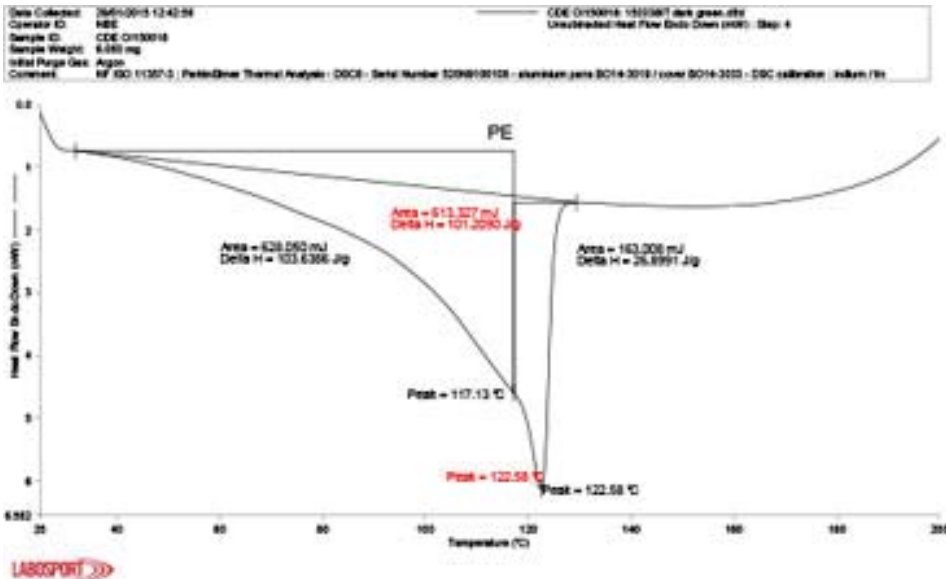
- 5.7.1 DSC (Differential Scanning Colorimetry) scans of pile yarn
- 5.7.2 Performance infill particle grading curve / Stabilising infill particle grading curve
- 5.7.3 TGA (Thermo Gravimetric Analysis) of performance infill
- 5.7.4 Composition of unbound sub-base (if tested as part of system) Sub-base particle grading curve
- 5.7.5 Simulated wear, photos before / after

Football Turf Laboratory Test Report

5 – Detailed Test Results

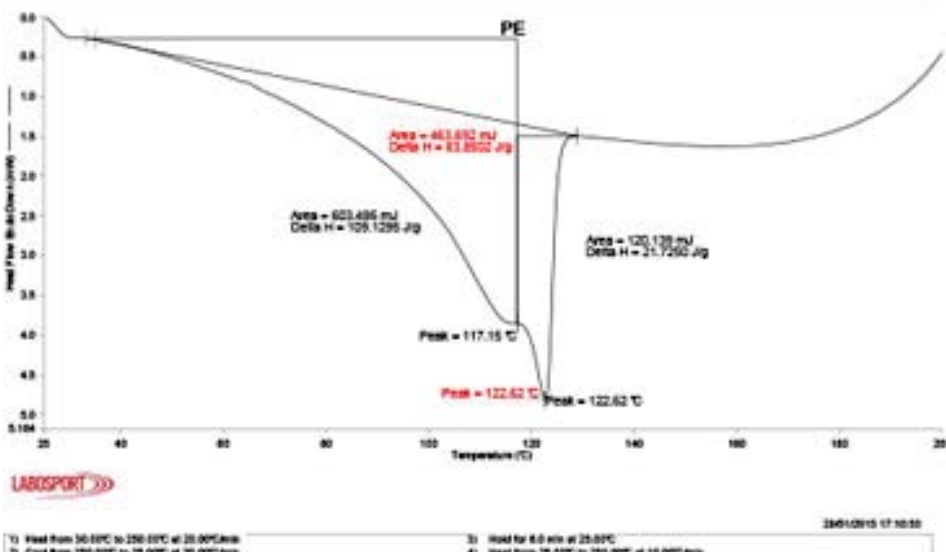
5.7 Explanatory graphs / pictures

5.7.1 DSC Differential Scanning Colorimetry scans of pile yarn



1) Heat from 30.00°C to 250.00°C at 20.00°C/min
 2) Cool from 250.00°C to 25.00°C at 20.00°C/min
 3) Hold for 8.0 min at 25.00°C
 4) Heat from 25.00°C to 250.00°C at 10.00°C/min
 2015.09.15 17:37:20

Data Collected: 2015.09.15 14:52:04
 Operator ID: NBE
 Sample ID: CDE 0190018
 Sample Weight: 6.683 mg
 Inlet Purge Gas: Argon
 Comment: MF ISO 11357-3 | PerkinElmer Thermal Analysis | DSC1 - Serial Number 52089100103 - aluminum pans 8014-3018 / cover 8014-3020 - DSC calibration - Indium 794
 CDE 0190018: 1500567 LIGHT green.dsc
 Unrestricted Heat Flow Data Open (mW) - Step 4



1) Heat from 30.00°C to 250.00°C at 20.00°C/min
 2) Cool from 250.00°C to 25.00°C at 20.00°C/min
 3) Hold for 8.0 min at 25.00°C
 4) Heat from 25.00°C to 250.00°C at 10.00°C/min
 2015.09.15 17:10:50

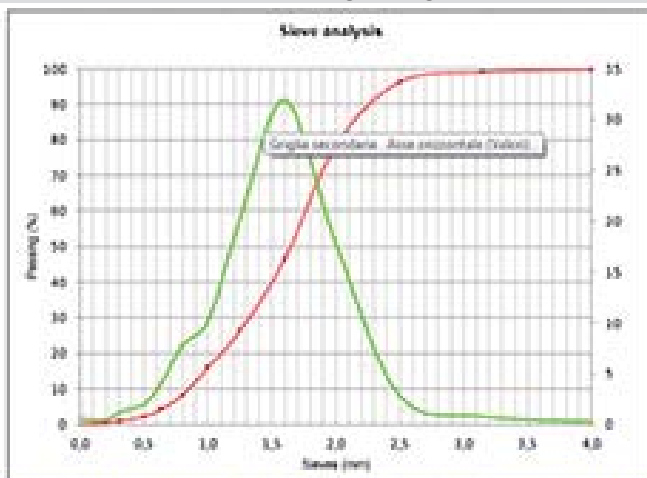
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5 – Detailed Test Results

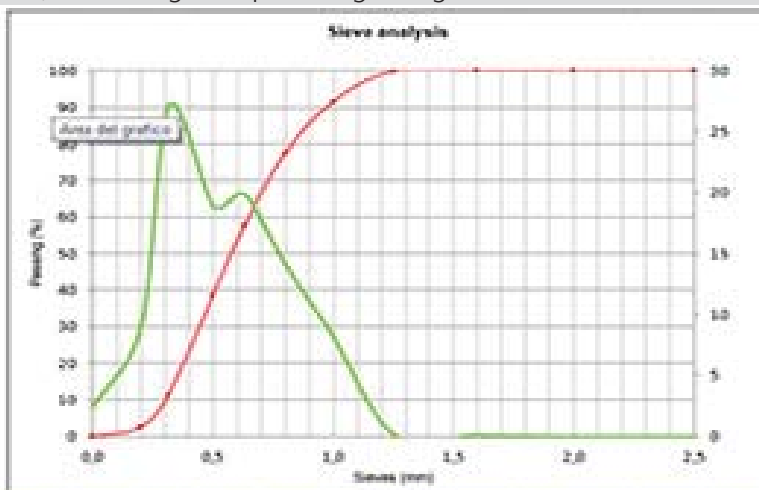
5.7 Explanatory graphs / pictures

5.7.2 a) Performance infill particle grading curve



Sieve (mm.)	0	0,2	0,315	0,5	0,63	0,8	1	1,25	1,6	2	2,5	3,15	4,00
Retention (%)	1	0	1	2	4	8	10	20	32	18	3	1	0
Passing (%)	3	1	1	2	4	8	18	28	40	70	96	99	100

5.7.2 b) Stabilising infill particle grading curve



Sieve (mm.)	0	0,2	0,315	0,5	0,63	0,8	1	1,25	1,6	2	2,5
Retention (%)	2	8	27	19	20	14	8	0	0	0	0
Passing (%)	0	2	11	29	18	77	92	100	100	100	100

Comments:

Football Turf Laboratory Test Report

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.3 TGA of performance infill


Comments:

Football Turf Laboratory Test Report

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


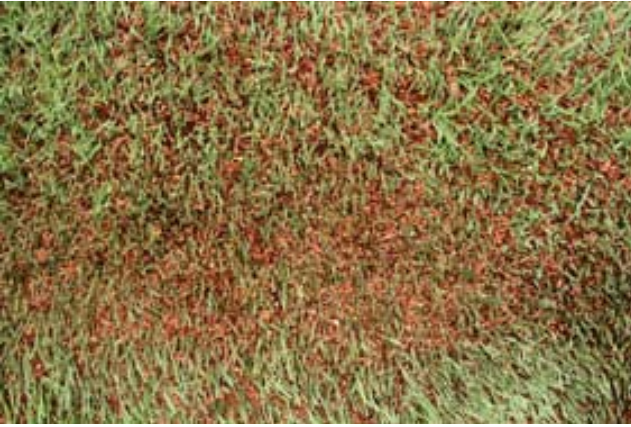


Comments: _____

Football Turf Laboratory Test Report

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

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

Before wear	After wear
	
	

Football Turf Laboratory Test Report

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

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



5.7.6 Photos of performance infill and stabilising infill

