FIFA Quality Programme for Football Turf

FIFA LABORATORY TEST REPORT

Manual 2015

Product name	DUOFILAMENT XLE
Product type (Field/Lines)	Field
FIFA Licensee	Nurteks Hali San.ve Tic. A.S.
FIFA accredited Test Institute	Labosport Italia S.r.l.

Laboratory Test report number	16-0874IT
Date of test	23.12.2016

Football Turf Laboratory Test Report

Football Turf Laboratory Test Report

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 FIFA QUALITY or FIFA QUALITY PRO 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 Programme 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 Programme for Football Turf* see www.fifa.com/quality.

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 QUALITY PRO (or QUALITY) 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 Programme 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 Programme of Football Turf licensing agreement.

Football Turf Laboratory Test Report

2 – Test Object, Participants

2.1 Test Numbers

Report Identification	Laboratory Test report number	16-0874IT
	Test Institute Project number	16-0874IT

2.2 Test Objects

Product Name	DUOFILAMENT XLE
Product Identification code	-
Name of the synthetic turf system	DUOFILAMENT XLE
Performance infill	EPDM
Stabilising infill	SAND
Shock-pad or elastic layer (if applicable)	-
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		email	
FIFA accredited Test Institute	Name	Labosport Italia S.r.l.			
	Address	Labosport Italia S.r.l., CERNUSCO LOMBARDONE			
	Contact	Phone	+390398962684	email	roberto.armeni@labosport.it

3 – Test Conclusion, Product Approval

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

FIFA QUALITY	Passed	«passed» or «failed»
FIFA QUALITY PRO	Passed	«passed» or «failed»

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

Report originated by	Name	Davide Giorgini
	Position	Laboratory manager
	Date	23.12.2016
Report approved by	Name	Roberto Armeni
	Position	Laboratory director
	Date	23.12.2016

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:

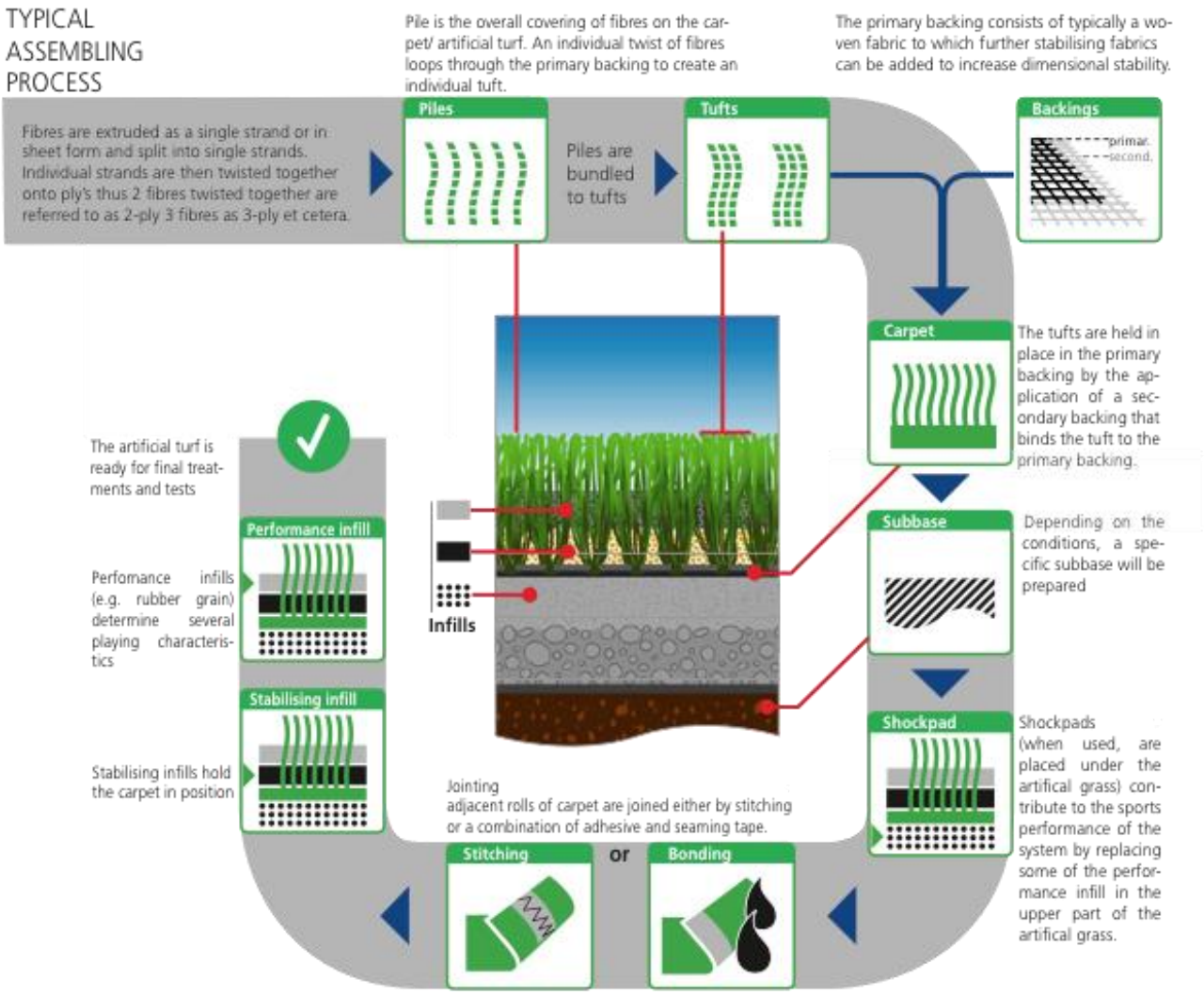


Fig. 1.3 Products / materials used to build up artificial turf

Football Turf Laboratory Test Report

4 – Product Information / Specifications

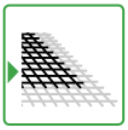
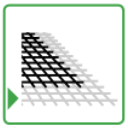
4.2 Artificial turf (1/2)

Manufacturer		NURTEKS HALI SAN. VE TİC. A.Ş.			
Tuft pattern		STRAIGHT			
Pile yarns		Yarn A	Yarn B	Yarn C	**Standard Test Method**
Yarn Manufacturer		GULSAN	GULSAN		
Product name, code		GLS SP20 9302	GLS SP20 9302		
Pile yarn profile		See details below	See details below	See details below	_
Pile thickness [μ m]		300	300		_
Pile colour [RAL]	**1**	6011	6025		_
	2	-	-		_
	3	-	-		_
Pile width [mm]		1,4	1,4		_
No of tufts/m²		9000	9000		ISO1773
Pile length [mm]		57,5	57,5		ISO 2549
Pile weight [g/m²]		725	725		ISO 8543
Pile yarn characterization		PE	PE		_
Pile yarn dtex		12000	12000		_

Football Turf Laboratory Test Report

4 – Product Information / Specifications

4.2 Artificial turf (2/2)

	**Primary backing**	Product name / code	H18
		Manufacturer	TENCATE
	Re- enforcement scrim	Product name / code	-
		Manufacturer	-
	**Secondary backing**	Product name / code	SBR LATEX
		Manufacturer	STYRON
		Dry application rate [g/m²]	1100
	**Carpet**	Minimum tuft withdrawal force [N]	>30
		Carpet mass per unit area [g/m2]	2800
	Method of jointing		
	**Bonded joints**	Adhesive brand name	HENKEL R710/TAMTUT T333
		Adhesive manufacturer	HENKEL-TAMTUT
		Application rate [g/lm]	200 g/m2
		Jointing film brand name	Helmetin
		Jointing film manufacturer	Serta Tekstil
	**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	NRT EPDM RUBBER	
Manufacturer	NURTEKS HALI SAN. TİC. AŞ	
Material type	BLACK EPDM	
Material grading	1,6-3,35	
Particle shape	Angular medium sphericity – A2	prEN 14955
Particle size range	1,6-3,35	EN 933-Part 1
Bulk density [g/cm³]	0,48	EN 1097-3
Application rate [kg/m²]	17.0	

Football Turf Laboratory Test Report

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	
Material grading	0,2-1	
Particle shape	Round high sphericity – C1	prEN 14955
Particle size [range]	0,2-1	EN 933-Part 1
Bulk density [g/cm³]	1.5	EN 1097-3
Application rate [kg/m²]	15.0	

4.5 Shockpad / elastic layer*

	Specifications	Standard Test Method
Product name / code	-	
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

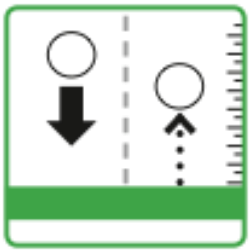
FIFA Licensee's comments / hints

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 caus 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

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]		2818
	Tufts per unit area [m²]		9531
	Pile length above backing [mm]		59.3
	Pile weight [g/m²]		1528
	Water permeability of carpet [mm/h]		1426
	Free pile height		9
	Yarn cross section and thickness		See Annex
Performance infill	Particle size range		1.25-3.15
	Particle shape		A2
	Bulk density [g/cm³]		0.47
	Infill depth		50 total
	Thermographic analysis	% organic	53.2
		% inorganic	46.8
Stabilising infill	Particle size range		0.2-1.0
	Particle shape		A3
	Bulk density [g/cm³]		1.33
Shockpad / elastic layer (if part of system supplied)	Shock absorption [%]		-
	Deformation		-
	Thickness		-

5.3 Ball / surface interaction

Property		Condition		Test Results	**FIFA** Approval requirements QUALITY	PRO	**P** = passed **F** = failed QUAL-ITY	PRO
Vertical ball rebound		Initial, un-aged	Dry	0.77	0.6 –1m	0.6-0.85 m	Passed	Passed
			Wet	0.73			Passed	Passed
		After simulated wear	3'020 cycles	0.81				Passed
			6'020 cycles	0.86	0.6 – 1m		Passed	
Angled ball rebound		Dry		58	45 – 80%	45 – 80%	Passed	Passed
		Wet		69			Passed	Passed

Football Turf Laboratory Test Report

	**Reduced Ball roll**	Initial, un-aged	Dry	6.3	4 – 10m	4 – 8m	Passed	Passed
		After simulated wear 3'020 cycles	Dry	6.4				Passed
			Wet	6.6				Passed
		After simulated wear 6'020 cycles	Dry	6.9	4 – 12m		Passed	
			Wet	7.5			Passed	

Football Turf Laboratory Test Report

5 – Detailed Test Results

5.4 Player / surface interaction

Property		Condition		Test Results	**FIFA** Approval requirements QUALITY	QUALITY PRO	**P** = passed **F** = failed QUAL-ITY	PRO
	**Shock absorption**	Initial, Un-aged	Dry	65	57 – 68%	62 – 68%	Passed	Passed
			Wet	64			Passed	Passed
		After simulated wear	3'020 cycles	64				Passed
			6'020 cycles	59	57 – 68%		Passed	
		50°C		67		62 – 68%	Passed	Passed
		– 5°C(1)		67			Passed	Passed
	**Deformation**	Initial	Dry	9.5	6 – 11mm	6 – 10mm	Passed	Passed
			Wet	9.5			Passed	Passed
		After simulated wear	3'020 cycles	8.0				Passed
			6'020 cycles	8.0	6 – 11mm		Passed	
	**Rotational resistance**	Initial	Dry	34	27–48Nm	32–43Nm	Passed	Passed
			Wet	31				Passed
		After simulated wear	3'020 cycles	39				Passed
			6'020 cycles	44	27–48Nm		Passed	
	**Skin / surface friction**	Dry		0.71	0.35 – 0.75 μ	0.35 – 0.75 μ	Passed	Passed
	Skin abrasion	Dry		24	± 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	Light green 4 RAL 6(	≥ Grey scale 3	Passed
			2		Dark green 4-5 RAL		Passed
			3		-		
		Yarn tensile strength	1		Light green -3.3% R/	Change ≤ 50%	Passed
			2		Dark green -3.3% RA		Passed
			3		-		
	**Polymeric infill**	Colour change			5 Black EPDM	≥ Grey scale 3	Passed
		Visual change in composition			No change	No change	Passed
	**Complete system**	Water permeability		N/A	1332	>180 mm/h	Passed
	**Stitched joints**	Strength		Un-aged	-	≥ 1000N/100mm	
				Water aged	-		
	**Bonded joints**	Strength		Un-aged	37	≥ 75N/100mm	Passed
				Water aged	28		Passed
	**Carpet tuft**	Withdrawal force		Un-aged	65	≥ 30N	Passed
				Water aged	42		Passed
	Heat	category			Category 3	Information	
	Splash	Splash characteristic			> 1.5%	Information	

5.6 Miscellaneous

	**Shockpad Elastic layer**	Tensile strength	Un-aged	-	≥ 0.15 MPa	

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

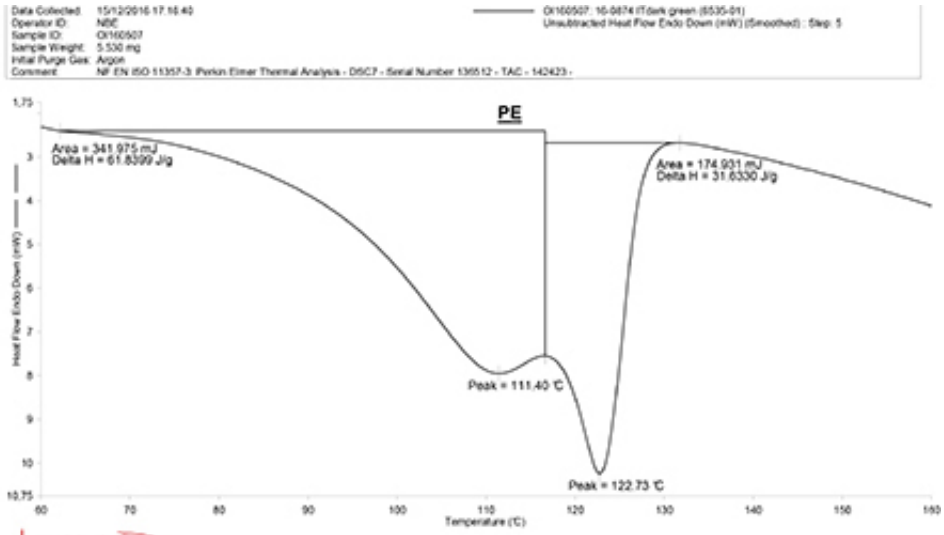
5.7.5 Simulated wear, photos before / after

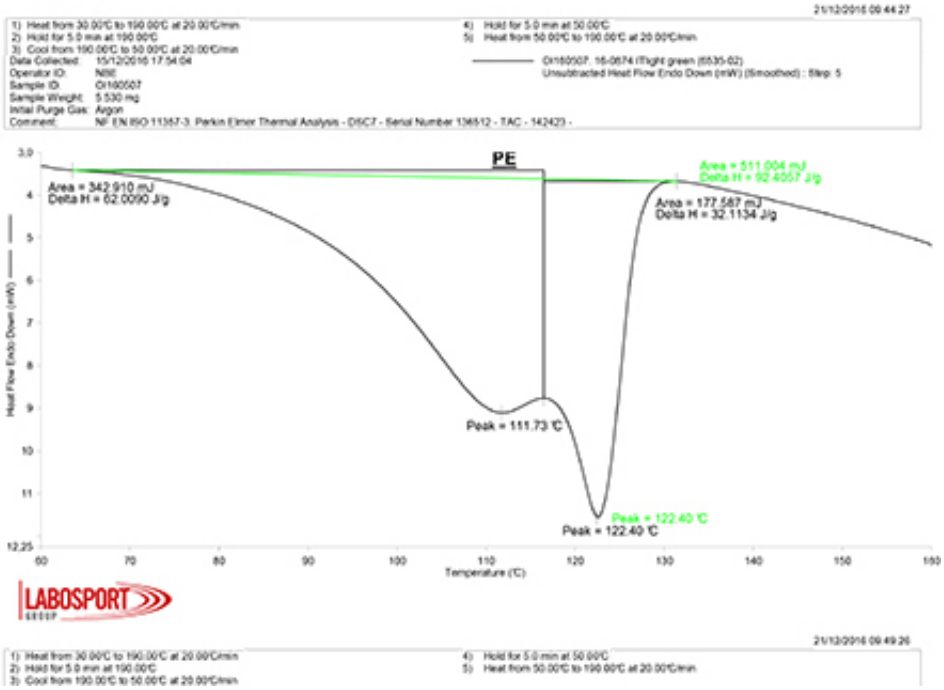
Football Turf Laboratory Test Report

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.1 DSC Differential Scanning Colorimetry scans of pile yarn





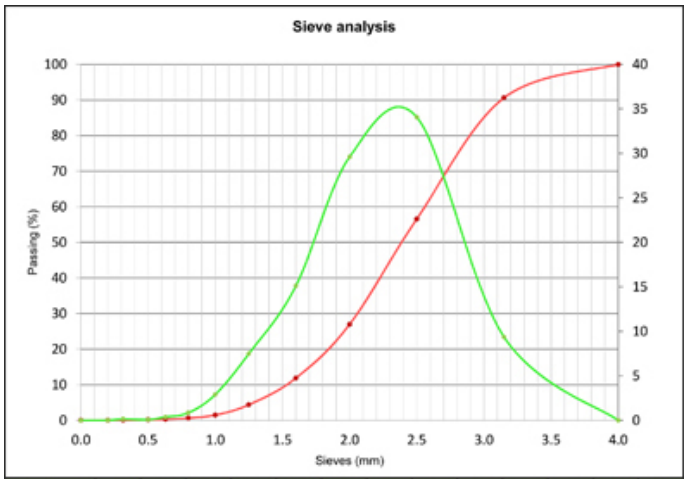
Comments:

Football Turf Laboratory Test Report

5 – Detailed Test Results

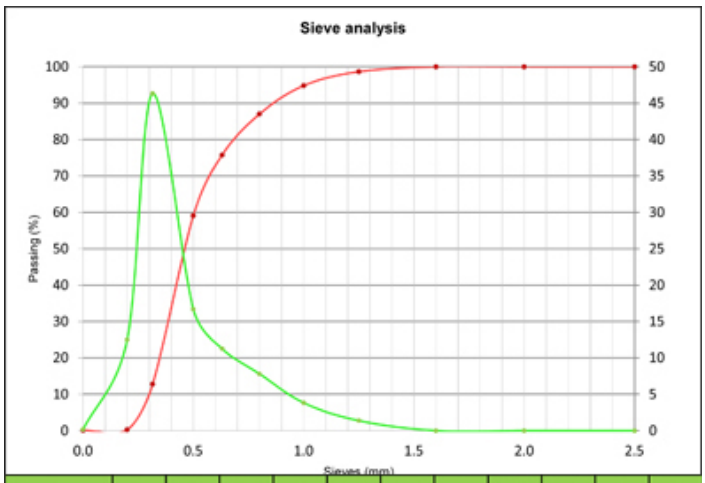
5.7 Explanatory graphs / pictures

5.7.2 a) Performance infill particle grading curve



Sieves (mm.)	0	0.2	0.315	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.15	4.00
Refusal (%)	0	0	0	0	0	1	3	7	15	30	34	9	0
Passing (%)	0	0	0	0	0	1	1	4	12	27	57	91	100

5.7.2 b) Stabilising infill particle grading curve



Sieves (mm.)	0	0.2	0.315	0.5	0.63	0.8	1	1.25	1.6	2	2.5
Refusal (%)	0	12	46	17	11	8	4	1	0	0	0
Passing (%)	0	0	13	59	76	87	95	99	100	100	100

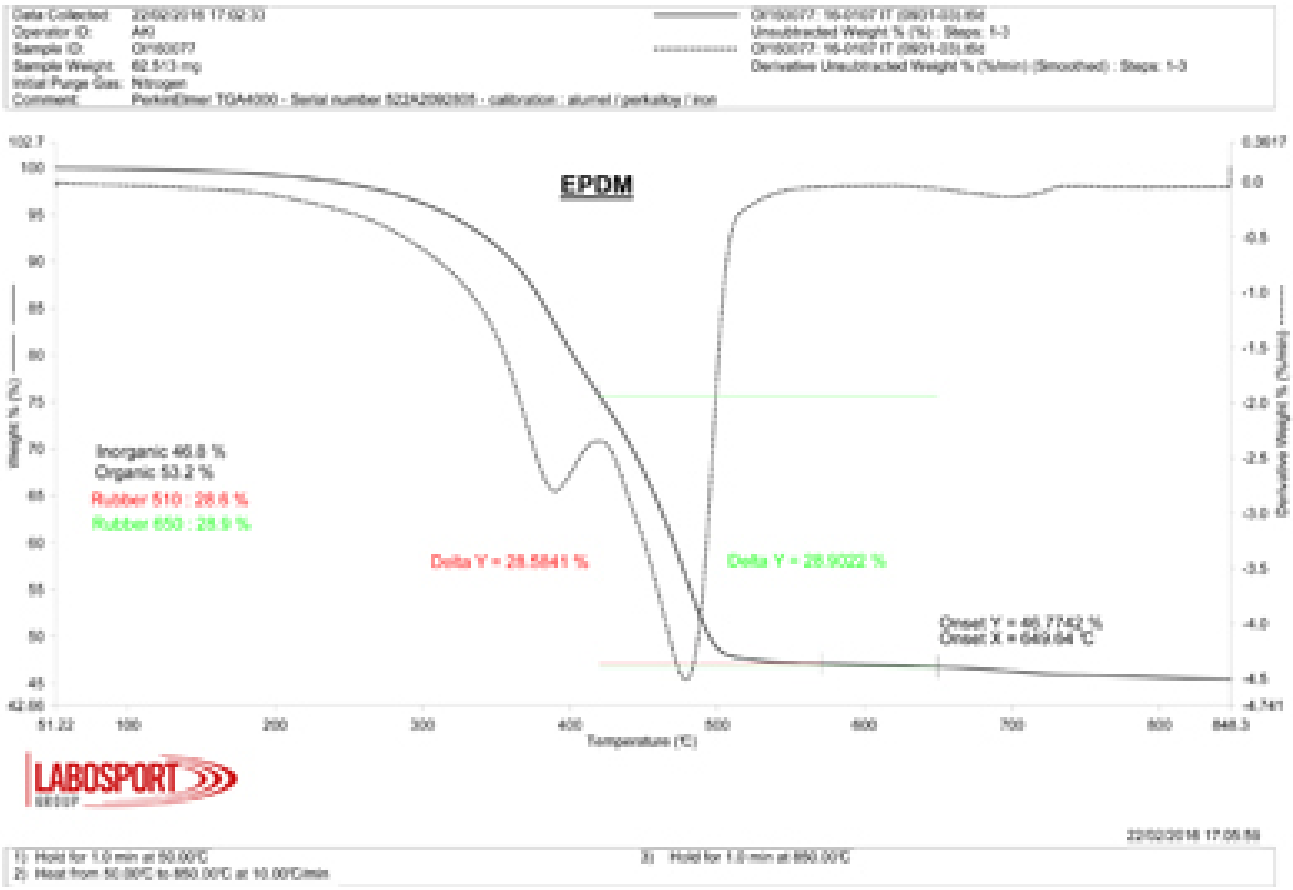
Comments:

Football Turf Laboratory Test Report

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.3 TGA of performance infill



Comments:

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

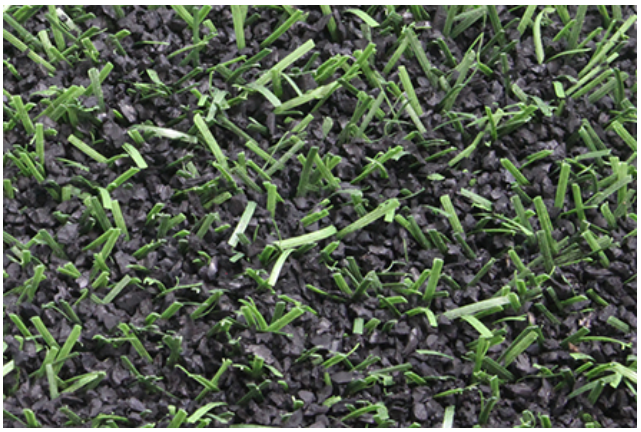
Comments:

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
	
5 CICLI	3005 CICLI
	
5 CICLI	3005 CICLI

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

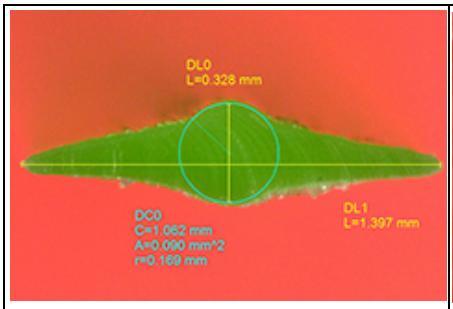
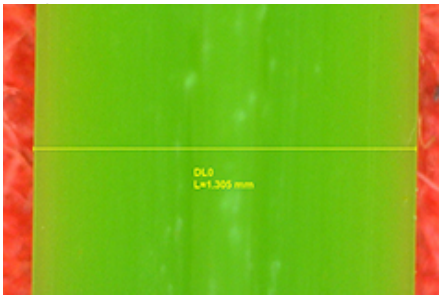
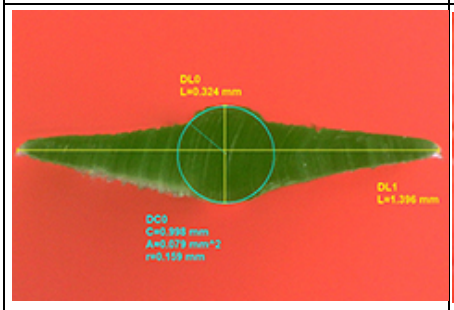
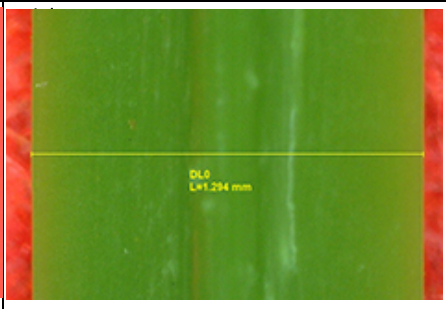
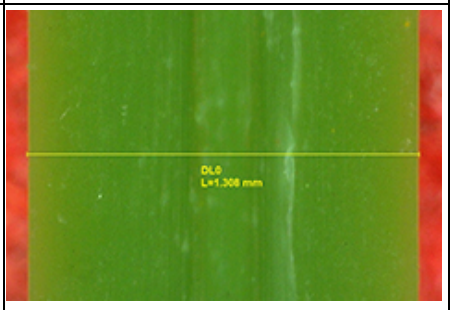
Before wear	After wear
	 6005 CICLI
	 6005 CICLI

Football Turf Laboratory Test Report

5 – Detailed Test Results

5.7 Explanatory graphs / pictures

5.7.5 Yarn characteristics

		
		
Cross-section Yarn 3	Side A Yarn 3	Side B Yarn 3

Details of dimension measurements

Yarn 1 thickness 328 micron width 1.3mm - Yarn 2 thickness 324 micron width 1.3mm