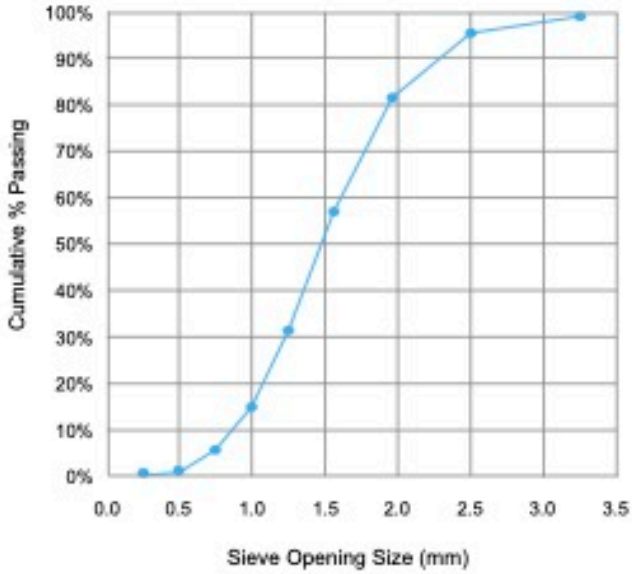
BROCKFILL
THE ENGINEERED INFILL FOR ATHLETES

Typical Properties & Specification

Product Name	BrockFILL™
Product Description	Artificial turf infill made from engineered wood particles
Bulk Density	17 lbs / cu ft.
Packaging	47 cu. ft Supersacks (approx. 800 lbs) or 40 lb bales
Moisture Content	10-15% (at time of production)
Color	Natural to Medium Brown

Sieve Analysis - Typical Results
(In accordance with BS EN 933-1:2012)

Sieve Size (mm)	% Passing	Typical Range
3.35	100	99-100%
2.50	95	90-100%
2.00	81	70-95%
1.60	56	40-75%
1.25	31	20-45%
1.0	14	5-25%
0.8	6	0-10%
0.5	1	0-5%
0.32	0.7	0-3%



Test	Method	Result
Pesticide Testing	AOAC Method 2007.01	PASS
Chlorinated Acidic Herbicides	FDA PAM II Method 180.292	PASS
CAM 17 Metals and Hexavalent Chromium	EPA Method 3050B; EPA Method 6020	PASS
Leachable CAM 17 Metals and Hexavalent Chromium	EPA Method 1312; EPA Method 6020	PASS
Leachable Semi-Volatile Organic Compounds including Phenols	EPA Method 1312; EPA Method 8270C	PASS

DATA ARE TYPICAL PROPERTIES ONLY. THIS DOCUMENT DOES NOT CREATE ANY WARRANTY, EXPRESS OR IMPLIED
Test reports available upon request
Patent Pending

Brock USA LLC - April 2019

Technical Data Sheet

Product name	**LigaTurf Cross 245 13/8**

Application	**Professional**

Description	**Football turf sand-rubber infill; Polytan Monofilament with ENTANGLEMENT technology; 100 % Polytan PE formulation with CoolPlus function; single extrusion uncut, without fibrillation; system 1: straight without curling; system 2: Polytan texturized with PreciTex technology; Polytan TwinTuft Technology; PolyCoat 100% PU Coating with TuftGuard function; BiColour scheme with lime/fieldgreen components;**

Yarn data system 1		SI unit
Materials	100 % Polytan PE	
Number of filaments	6	
Thickness app.	365	µm
Weight app.	13000	dtex

Yarn data system 2		SI unit
Materials	100 % Polytan PE	
Number of filaments	4	
Thickness app.	255	µm
Weight app.	8000	dtex

Construction data		
Pile heigth app.	45	mm
Machine gauge	3/8	"
Stitch density app.	133	/m
Number of stitches app.	14000	/m²
Number of filaments app.	140000	/m²
Yarn weight app.	1485	g/m²

Backing construction	
Primary backing 1	100 % PP woven fabric, UV stabilised
Primary backing 2	100 % PP stabilising fabric
Coating	PolyCoat 100% PU coating, waterproof and antifungal

Product data		
Prodution technolgy	Tufting velours, zig - zag	
Maximum witdth	4	m
Maximum length	depending on installation width	
Total height app.	42	mm
Coating weight app.	650	g/m²
Total weight	2325	g/m²

Gerneral data	
Turf colour	lime / fieldgreen
Line colour	white or yellow, other colours on request
Elastic layer	Polytan EL layer in-situ

Maintenance	**Details for maintenance see Polytan maintenance brochure**

In order to maintain our surfaces to the highest and most up to date technical standards, we reserve the right to modify the product data. We advise that the technical values regarding yarn thickness and dtex, as well as the weight, are approximate values and could vary due to technical reasons by +/- 10 %. (January 2020)

Polytan GmbH
Gewerbering 3, 86666 Burgheim
info@polytan.com, www.polytan.de

Technical Data Sheet

Additional information

Product name	**LigaTurf Cross 245 13/8**

Application	**Professional**

Quality data		SI unit	Norm
Water permeability	500	mm/h	
Tuft pull out force app.	50	N	
Tensile strength MD *>	15	N/mm	
Tensile strength MD *>	15	N/mm	
Colour fastness min.	3	Grey scale	
		* Rugby > 25 N/mm	

System design				
Elastic layer				
	Polytan EL min.	20	mm	in-situ, on engineered base
	Polytan ET min.	35	mm	in-situ, on dynamic base
Upper layer				
	Sand	hydro classified, clean dried silica sand		
Top layer				
	Rubber	Fusion GT, Cork, EPDM ST, EPDM R, RPU		

Installation data	
Carpet installation	floating and clamped
Seals	glued with Polytan wet-adhesive or two component-adhesive

Certificates	-

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FIFA LABORATORY TEST REPORT

TM Football Turf I 2015
01.01.2015

Product	LigaTurf RS+ CoolPlus WCE 245 Y PFS 65 BrockFILL
FIFA Licensee	Polytan GmbH
Test Institute	Sports Labs Ltd.

Test Number	114766
External Test Number	11739/4000
Date of Test	15.11.2021
Test Result	Passed
Quality Level	FIFA Quality & Quality PRO
Test Type	Initial

Licensee

Main Address

Name	Polytan GmbH
Address	Polytan GmbH Gewerbering 3
ZIP / City	86666 / BURGHEIM
Website	www.polytan.de
Contact Email	info@polytan.com
Contact Phone	+49/843287 0

Test institute

Main Address

Name	Sports Labs Ltd.
Address	Sports Labs Ltd. 1 Adam Square Brucefield Industrial Park
ZIP / City	EH54 9DE / LIVINGSTON
Website	www.sportslabs.co.uk
Contact Email	info@sportslabs.co.uk
Contact Phone	+44/1506 44 755

Approval

Test Institute Director	Sean Ramsay - Associate Director
Signature	
Date	15.11.2021

Test Institute Engineer	Craig Melrose - Laboratory Manager
Signature	
Date	15.11.2021

1 – Test Results

Name	Comment	Result
1 - Summary		
Vertical ball rebound FIFA Quality		Passed
Vertical ball rebound FIFA Quality Pro		Passed
Angle ball rebound FIFA Quality		Passed
Angle ball rebound FIFA Quality Pro		Passed
Reduced ball roll FIFA Quality		Passed
Reduced ball roll FIFA Quality Pro		Passed
Shock absorption FIFA Quality		Passed
Shock absorption FIFA Quality Pro		Passed
Deformation FIFA Quality		Passed
Deformation FIFA Quality Pro		Passed
Rotational resistance FIFA Quality		Passed
Rotational resistance FIFA Quality Pro		Passed
Skin / surface friction		Passed
Skin abrasion		Passed
1 - Test Details | Object		
Product Name		LigaTurf RS+ CoolPlus WCE 245 Y PFS 65 BrockFILL
Product ID		-
Synthetic Turf System		LigaTurf RS+ CoolPlus WorldCup Edition 245 20/4
Performance infill		BrockFILL
Stabilising infill		Sand
Shock-pad or elastic layer		ProPlay
Sub-base composition		Rigid Engineered Base / Unbound aggregate
2 - Test Details | Test Institute		
Date(s) of test		15.11.2021
Report created by		E Steyn
Laboratory Test report number		11739/4000
Test Institute Project number		11739
3 – Product Declaration (Manufacturer)		

Name	Comment	Result
Manufacturer		Polytan / Polytex GmbH
Tuft pattern		PolyTuft
Yarn manufacturer | yarn 1		Polytan / Polytex GmbH
Detailed tuft decitex (Dtex) [g/10000m]		2167 x 3 + 2167 x 3
Product name, code | yarn 1		LigaTurf RS+ CoolPlus
Pile yarn profile | yarn 1		Rhombus
Pile thickness (µ m) | yarn 1		360.0
Pile colour (RAL) | value 1 | yarn 1		Field green
Pile colour (RAL) | value 2 | yarn 1		Lime green
Pile colour (RAL) | value 3 | yarn 1		-
Pile width (mm) | yarn 1		1.05
Number of tufts/m2 | yarn 1	ISO1773	10550.00
Pile length (mm) | yarn 1	ISO 2549	45.00
Pile weight (g/m2) | yarn 1	ISO 8543	1370.00
Pile yarn characterization | yarn 1		PE
Pile yarn dtex | yarn 1		13000
Yarn manufacturer | yarn 2		
Product name, code | yarn 2		
Pile yarn profile | yarn 2		
Pile thickness (µ m) | yarn 2		
Pile colour (RAL) | value 1 | yarn 2		
Pile colour (RAL) | value 2 | yarn 2		
Pile colour (RAL) | value 3 | yarn 2		
Pile width (mm) | yarn 2		
Number of tufts/m2 | yarn 2	ISO1773	
Pile length (mm) | yarn 2	ISO 2549	
Pile weight (g/m2) | yarn 2	ISO 8543	
Pile yarn characterization | yarn 2		
Pile yarn dtex | yarn 2		
Yarn manufacturer | yarn 3		
Product name, code | yarn 3		
Pile yarn profile | yarn 3		
Pile thickness (µ m) | yarn 3		
Pile colour (RAL) | value 1 | yarn 3		
Pile colour (RAL) | value 2 | yarn 3		
Pile colour (RAL) | value 3 | yarn 3		

Name	Comment	Result
Pile width (mm) | yarn 3		
Number of tufts/m2 | yarn 3	ISO1773	
Pile length (mm) | yarn 3	ISO 2549	
Pile weight (g/m2) | yarn 3	ISO 8543	
Pile yarn characterization | yarn 3		
Pile yarn dtex | yarn 3		
Primary backing | Product name, code		PP woven fabric, UV stabilized
Primary backing | Manufacturer		Diverse
Re-enforcement scrim | Product name, code		PP woven fabric
Re-enforcement scrim | Manufacturer		Diverse
Secondary backing | Product name, code		PolyCoat
Secondary backing | Manufacturer		Polytan / Polytex GmbH
Secondary backing | Dry application rate (g/m2)		1000.0
Carpet | Minimum tuft withdrawal force (N)		45
Carpet | Carpet mass per unit area [g/m2]		2565.0
Method of jointing		Bonded
Bonded joints | Adhesive brand name		Polytex P
Bonded joints | Adhesive manufacturer		Polytan / Polytex GmbH
Bonded joints | Application rate (g/m)		200 - 300
Bonded joints | Jointing film brand name		Non-woven web
Bonded joints | Jointing film manufacturer		Diverse
Stitched seams | Tread brand name/product code		-
Stitched seams | Tread manufacturer		-
Stitched seams | Stitch rate (stitch per lm)		
Performance Infill | Product name, code		BrockFILL
Performance Infill | Manufacturer		Nature
Performance Infill | Material type		Natural wood
Performance Infill | Material grading		0.8 – 2.5 mm

Name	Comment	Result
Performance Infill | Particle shape	prEN 14955	Irregular, low spherical
Performance Infill | Particle size range	EN 933-Part 1	0.8 – 2.5 mm
Performance Infill | Bulk density (g/cm3)	EN 1097-3	0.270
Performance Infill | Application rate (kg/m2)		4.5
Stabilising Infill | Product name, code		Sand
Stabilising Infill | Manufacturer		Diverse
Stabilising Infill | Material type		Hydro classified, clean dried silica sand
Stabilising Infill | Material grading		0.3 – 1.0 mm
Stabilising Infill | Particle shape	prEN 14955	Round, grained
Stabilising Infill | Particle size range	EN 933-Part 1	0.3 – 1.0 mm
Stabilising Infill | Bulk density (g/cm3)	EN 1097-3	1.50
Stabilising Infill | Application rate (kg/m2)		18.0
Shockpad, E-layer | Product name, code		ProPlay 20
Shockpad, E-layer | Manufacturer		Schmitz Foam
Shockpad, E-layer | Type		Prefabricated shockpad
Shockpad, E-layer | Composition		Thermal bonded, closed celled, cross-linked polyethylene foam (PEX)
Shockpad, E-layer | Bulk density (g/cm3)		0.13
Shockpad, E-layer| Thickness	EN 1969	20.0
Shockpad, E-layer | Shock absorption (%)	FIFA 4a	57.0
Shockpad, E-layer | Deformation	FIFA 5a	8.2
Shockpad, E-layer | Tensile strength (MPa)		0.15
Shockpad, E-layer | Mass per unit area (kg/m2)		2.5
Other, detail		
3 – Test Results | Player / Surface Interaction		
Rotational Resistance | Initial | Dry (Quality)	27 - 48 Nm	43

Name	Comment	Result
Rotational Resistance | Initial | Dry (Pro)	32 - 43 Nm	43
Rotational Resistance | Initial | Wet (Quality)	27 - 48 Nm	43
Rotational Resistance | Initial | Wet (Pro)	32 - 43 Nm	43
Rotational Resistance | after simulated wear | 3'000 cycles (5*)	32 - 43 Nm	43
Rotational Resistance | after simulated wear | 3'000 cycles (20*)	32 - 43 Nm	
Rotational Resistance | after simulated wear | 6'000 cycles (5*)	27 - 48 Nm	48
Rotational Resistance | after simulated wear | 6'000 cycles (20*)	27 - 48 Nm	
3 – Test Results | Product identification field product		
Performance infill | Theremographic analysis | Organic [%] - Product Declaration		100.0
Performance infill | Theremographic analysis | Elastomer [%] - Product Declaration		0.0
Performance infill | Theremographic analysis | Inorganic [%] - Product Declaration		0.0
4 – Product Identification		
Artificial Turf | Carpet mass per unit area [g/m2]		2692
Artificial Turf | Tufts per unit area [m2]		11075
Artificial Turf | Pile lenght above backing [mm]		46.0
Artificial Turf | Pile weight [g/m2]		1325
Detailed tuft decitex (Dtex) [g/10000m]		2106 x 3 + 2069 x 3
Artificial Turf | Water permeability of carpet [mm/h]		4715
Artificial Turf | Free pile height		15
Performance infill | Particle size range [mm]		0.8 - 3.15 mm
Performance infill | Particle shape		A2
Performance infill | Bulk density [g/cm3]		0.257
Performance infill | Infill depth [mm]		18

Name	Comment	Result
Performance infill | Thermographic analysis | organic [%]		100
Performance infill | Theremographic analysis | inorganic [%]		0
Stabilising infill | Particle size range [mm]		0.5 - 1.0 mm
Stabilising infill | Particle shape		C2
Stabilising infill | Bulk density [g/cm3]		1.49
Shock pad / E-layer | Shock absorption [%]	if part of supplied system	60.0
Shock pad / E-layer | Deformation	if part of supplied system	8.4
Shock pad / E-layer | Thickness	if part of supplied system	20.2
Other, detail		
5 – Test Results | Ball / Surface interaction		
Vertical Ball Rebound | Initial | Dry (Quality)	0.6 - 1m	0.77
Vertical Ball Rebound | Initial | Dry (Pro)	0.6 - 0.85m	0.77
Vertical Ball Rebound | Initial | Wet (Quality)	0.6 - 1m	0.79
Vertical Ball Rebound | Initial | Wet (Pro)	0.6 - 0.85m	0.79
Vertical Ball Rebound | after simulated wear | 3'000 cycles (5*)	0.6 - 0.85m	0.82
Vertical Ball Rebound | after simulated wear | 6'000 cycles (5*)	0.6 - 1m	0.84
Vertical Ball Rebound | after simulated wear | 3'000 cycles (20*)	0.6 - 0.85m	
Vertical Ball Rebound | after simulated wear | 6'000 cycles (20*)	0.6 - 1m	
Angle Ball Rebound | Dry	45 - 80 %	51
Angle Ball Rebound | Wet	45 - 80 %	65
Reduced Ball Roll | Initial | Dry (Quality)	4 - 10 m	4.3
Reduced Ball Roll | Initial | Dry (Pro)	4 - 8 m	4.3
Reduced Ball Roll | after simulated wear | 3'000 cycles (5*) | Dry	4 - 8 m	4.8

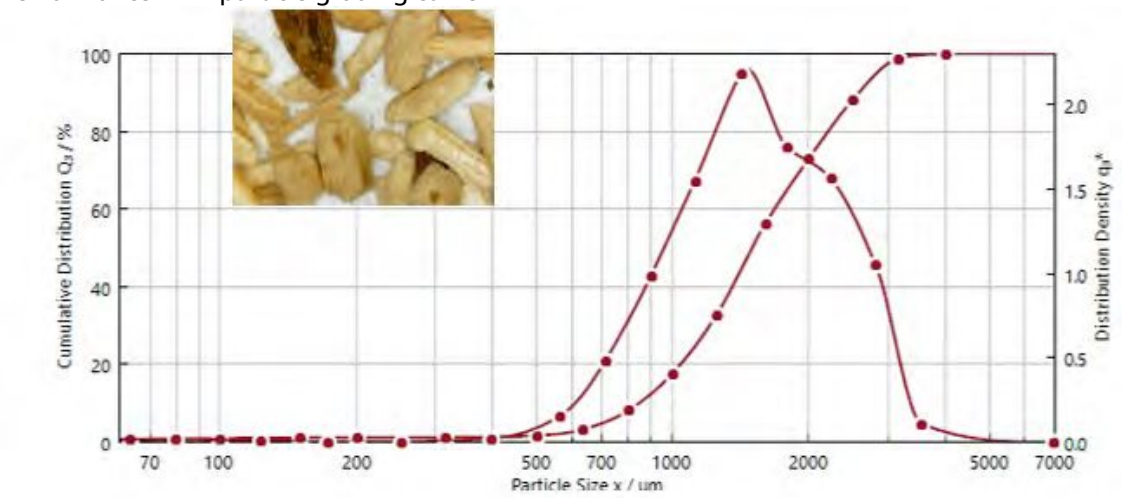
Name	Comment	Result
Reduced Ball Roll | after simulated wear | 3'000 cycles (5*) | Wet	4 - 8 m	5.0
Reduced Ball Roll | after simulated wear | 3'000 cycles (20*) | Dry	4 - 8 m	
Reduced Ball Roll | after simulated wear | 3'000 cycles (20*) | Wet	4 - 8 m	
Reduced Ball Roll | after simulated wear | 6'000 cycles (5*) | Dry	4 - 12 m	5.5
Reduced Ball Roll | after simulated wear | 6'000 cycles (5*) | Wet	4 - 12 m	5.7
Reduced Ball Roll | after simulated wear | 6'000 cycles (20*)| Dry	4 - 12 m	
Reduced Ball Roll | after simulated wear | 6'000 cycles (20*)| Wet	4 - 12 m	
Shock absorption | Initial | Dry (Quality)	57 - 68 %	64.3
Shock absorption | Initial | Dry (Pro)	62 - 68 %	64.3
Shock absorption | Initial | Wet (Quality)	57 - 68 %	64.9
Shock absorption | Initial | Wet (Pro)	62 - 68 %	64.9
Shock absorption | after simulated wear | 3'000 cycles (5*)	62 - 68 %	63.7
Shock absorption | after simulated wear | 3'000 cycles (20*)	62 - 68 %	
Shock absorption | after simulated wear | 6'000 cycles (5*)	57 - 68 %	62.7
Shock absorption | after simulated wear | 6'000 cycles (20*)	57 - 68 %	
Shock absorption | 50°C	57 - 68 %	64.30
Shock absorption | -5°C	57 - 68 %	63.00
Other, detail		
5 – Test Results | Player / Surface interaction		
Deformation | Initial | Dry (Quality)	4 - 11 mm	9.0
Deformation | Initial | Dry (Pro)	4 - 10 mm	9.0
Deformation | Initial | Wet (Quality)	4 - 11 mm	9.4
Deformation | Initial | Wet (Pro)	4 - 10 mm	9.4
Deformation | after simulated wear | 3'000 cycles (5*)	4 - 10 mm	9.2

Name	Comment	Result
Deformation | after simulated wear | 3'000 cycles (20*)	4 - 10 mm	
Deformation | after simulated wear | 6'000 cycles (5*)	4 - 11 mm	8.9
Deformation | after simulated wear | 6'000 cycles (20*)	4 - 11 mm	
Skin / surface friction | Dry	0.35 - 0.75 µ	0.73
Skin / surface friction | Dry | 3'000 cycles	0.35 - 0.75 µ	0.73
Skin / surface friction | Dry | 6'000 cycles	0.35 - 0.75 µ	0.71
Skin abrasion | Dry	± 30 %	23
Skin abrasion | Dry | 3'000 cycles	± 30 %	22
Skin abrasion | Dry | 6'000 cycles	± 30 %	21
6 – Environmental impact (arficial, light, water)		
Pile yarn 1 | Colour change | after artificial weathering	≥ Grey scale 3	4
Pile yarn 2 | Colour change | after artificial weathering	≥ Grey scale 3	4
Pile yarn 3 | Colour change | after artificial weathering	≥ Grey scale 3	
Pile yarn 1 | Peak Breakage Force | before artificial weathering		25.10
Pile yarn 1 | Peak Breakage Force | after artificial weathering		22.9
Pile yarn 1 | Peak Breakage Force | Green Reference value before artificial weathering		25.30
Pile yarn 1 | Peak Breakage Force | Variation after weathering from Green Reference value	Change ≤ 25 %	9.50
Pile yarn 2 | Peak Breakage Force | before artificial weathering		25.30
Pile yarn 2 | Peak Breakage Force | after artificial weathering		21.5
Pile yarn 2| Peak Breakage Force | Green Reference value before artificial weathering		25.30
Pile yarn 2 | Peak Breakage Force | Variation after weathering from Green Reference value	Change ≤ 25 %	15.00
Pile yarn 3 | Peak Breakage Force | before artificial weathering		
Pile yarn 3 | Peak Breakage Force | after artificial weathering		

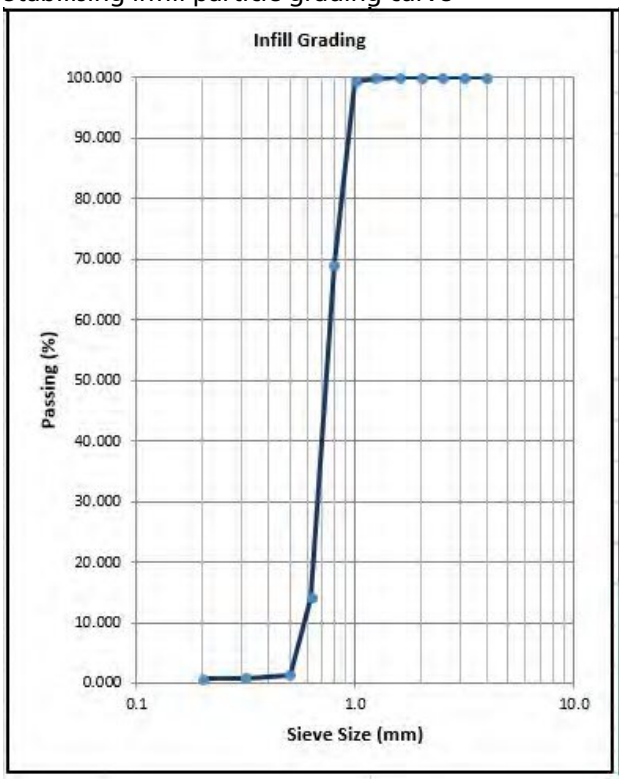
Name	Comment	Result
Pile yarn 3| Peak Breakage Force | Green Reference value before artificial weathering		
Pile yarn 3 | Peak Breakage Force | Variation after weathering from Green Reference value	Change ≤ 25 %	
Polymeric infill | Colour change | after artificial weathering	≥ Grey scale 3	N/A - Natural infill
Polymeric infill | Visual change in composition | after artificial weathering	No change	N/A - Natural infill
Complete system | Water permeability	> 180 mm/h	1386
Stitched joints | Strength | un-aged	≥ 1000N/100mm	
Stitched joints | Strength | water aged	≥ 1000N/100mm	
Bonded joints | Strength | un-aged	≥ 75/100mm	138
Bonded joints | Strength | water aged	≥ 75/100mm	132
Carpet tuft | Withdrawal force | un-aged	≥ 40N	58
Carpet tuft | Withdrawal force | water aged	≥ 40N	46
Heat | Category	for information	Category 2
Splash | Characteristics	for information	> 1.5 %
7 - Miscellaneous (shock pad, sub-base - if part of the system)		
Shock Pad / E-layer | tensile strength | un-aged	≥ 0.15 MPa	0.34
Sub-base | Composition		
Sub-base | Particle size range		
Sub-base | Particle shape		
Sub-base | Thickness		
Sub-base | Compaction & test method		
Other, detail		

2 – Test Images

Performance infill particle grading curve



Stabilising infill particle grading curve



Sieve Size (mm)	Passing (%)
4.000	100.0
3.150	100.0
2.500	100.0
2.000	100.0
1.600	100.0
1.250	100.0
1.000	99.5
0.800	69.1
0.630	14.1
0.500	1.3
0.315	0.8
0.200	0.7
Passing to base tray	0.6

Simulated wear - Before 1

Simulated wear - Before 2

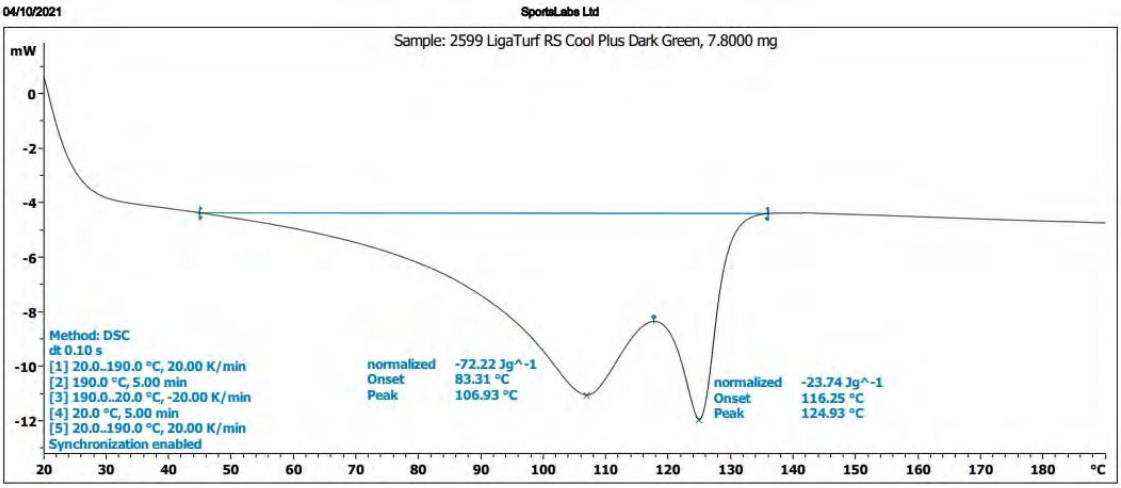
Simulated wear - After 1

Simulated wear - After 2

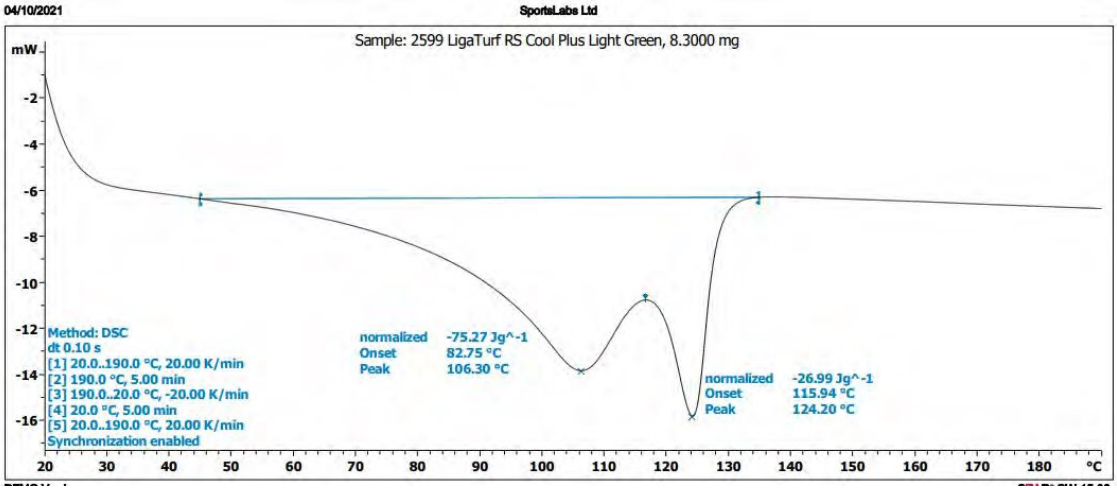
Simulated wear - After 3

Simulated wear - After 4

Yarn Characteristics DSC



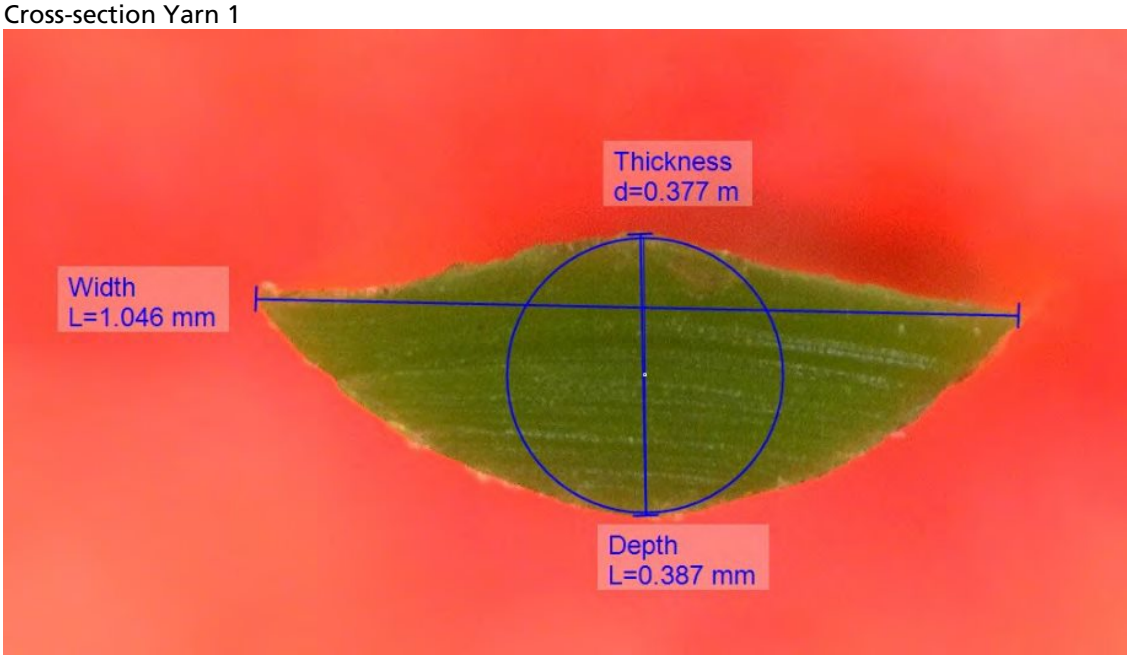
Yarn Characteristics DSC - 2



Stabilising Infill - picture

Performance Infill - picture

Cross-section Yarn 1



Cross-section Yarn 2