TEST REPORT

Technical evaluation of organic infills for artificial turf system

Tests performed according to EN 1097, EN 14955, EN 15301-1, EN 12616, EN 15306, ASTM D5644, ASTM F3189 and ASTM F355-A standards

Report Number **R17124US-A2**

Product **ProFormance Cork** | **High density cork**
TTII/GreenPlay | *Various*

Client **Domenic Carapella**
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Date **January 26th, 2018**

This report contains 5 pages in total. It replaces and cancels report R18006US-A1 of January 26th, 2018, please delete the previous document. Reproduction of this report is authorized only in its entire form. Results reported are valid only for the products tested. To declare the conformity (or not), the uncertainty of the results was not taken into account. Detailed results are available on request.

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INFORMATION

Product description	Organic infills (corks) for artificial turf system, with shockpad				
Sample number	BDX 52 turf: US00038		Proplay 20D pad : US00016		
	ProFormance Cork : US00039		High density cork : US00043		
Manufacturer	Act Global		Schmitzfoam		
	TTII / GreenPlay		*Various*		
Date of reception	November 2017				
Date of the tests	November 2017 / January 2018				
Temperature (°C)	**Min**	23	**Max**	24	
Humidity (%)	**Min**	48	**Max**	50	
Configuration tested					
Name of the turf	BDX 52				
Pile length	52 mm *(2.1 in.)*				
Infill layers	**ProForm. Cork system**	**Hi. density cork system**	**Approx. infill depth**		
Superior	ProFormance Cork : 3.7 kg/m² *(0.8 lb/ft²)*	High density cork : 6.5 kg/m² *(1.3 lb/ft²)*	26 mm *(1.0 in.)*		
Inferior	Silica sand : 19.5 kg/m² *(4.0 lb/ft²)*	Silica sand : 19.5 kg/m² *(4.0 lb/ft²)*	13 mm *(0.5 in.)*		
Approximate final infill depth	39 mm *(1.5 in)*				
Underlayment	Proplay 20D	20 mm *(0.8 in)*			

ProFormance Cork system

High density cork

ProFormance Cork

High density cork

RESULTS

Identification testing:

Property	Test method	Units	Results	
			ProFormance Cork	high density cork
Particle size	ASTM D5644	mm	**1.0 – 2.5**	**0.8 – 2.0**
		Mesh	*8 – 18*	*10 – 20*
Bulk density	EN 1097	kg/m³	**140**	**250**
		lb/ft³	*8.7*	*15.6*
Particle shape	EN 14955	-	**Angular – A1**	**Angular – A1**

Performance testing:

Property	Method	Results before simulated wear		Results after Lisport 20k cycles*	
		With ProFormance Cork	*With high density cork*	*With ProFormance Cork*	*With high density cork*
Shock absorption	ASTM F3189 (AAA)	**70 %**	**62 %**	**67 %**	**61 %**
Vertical deformation		**11 mm**	**7 mm**	**10 mm**	**6.5 mm**
Energy restitution		**31 %**	**44 %**	**35 %**	**40 %**
Rotational resistance	EN 15301-1	**31 N.m**	**41 N.m**	**40 N.m**	**44 N.m**
Impact attenuation	ASTM F355-A	**82 G**	**99 G**	**93 G**	**114 G**
Infiltration rate	EN 12616	**19456 mm/h**	**18415 mm/h**	**4699 mm/h**	**2464 mm/h**
		766 in/h	*725 in/h*	*185 in/h*	*97 in/h*

**Lisport™ ageing performed according to EN 15306 Standard.*

SIMULATED WEAR – *LISPORT 20,200 CYCLES*

Measurements:

Exposure	Pile flattening		Infill Dispersion		Infill compaction	
	ProFormance Cork	*high density cork*	*ProFormance Cork*	*high density cork*	*ProFormance Cork*	*high density cork*
0 cycles	0 %	0 %	0 %	0 %	0 %	0 %
5,000 cycles	4 %	12 %	2 %	1 %	10 %	10 %
10,000 cycles	4 %	15 %	2 %	0 %	15 %	15 %
15,000 cycles	6 %	19 %	3 %	0 %	19 %	21 %
20,200 cycles	10 %	21 %	3 %	0 %	23 %	28 %

Level : 1: none / 2: light / 3: moderate / 4: important / 5: high

Pictures – General view of the sample:

BDX 52 + ProFormance Cork – before Lisport wearing

BDX 52 + High density cork – Before Lisport wearing

BDX 52 + ProFormance Cork – after 20k Lisport cycles

BDX 52 + High density cork – after 20k Lisport cycles

Pictures – Close-up view:

BDX 52 + ProFormance Cork – before Lisport wearing

BDX 52 + High density cork – Before Lisport wearing

BDX 52 + ProFormance Cork – after 20k Lisport cycles

BDX 52 + High density cork – after 20k Lisport cycles

RESULTS COMPARISON

Prior Lisport simulated wear when ProFormance Cork is used compared to high density cork, tested as part of artificial turf systems, we obtain:

- higher shock absorption values
- lower impact attenuation (Gmax) values
- lower rotational resistance values
- similar infiltration rate
- high vertical deformation values
- lower energy return values

After 20,000 cycles of Lisport simulated wear when ProFormance Cork is used compared to high density cork, tested as part of artificial turf systems, we obtain:

- higher shock absorption values
- lower impact attenuation (Gmax) values
- lower rotational resistance values
- higher infiltration rate
- high vertical deformation values
- lower energy return values

Note: all pre and post-Lisport results falls within most common national/international standards requirements.

COMMENTS

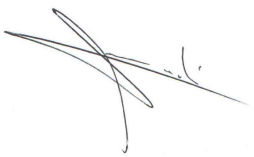
The characteristic of an infill that will most likely affect the performances of an artificial turf system is the particle size distribution. However, the infill density will make it more or less resilient to impact or mechanical wearing (such as Lisport studded rollers) and might influence its brittleness hence increase or limit the infill compaction level of an artificial turf sample / field over time.

Based on the results obtained, ProFormance Cork used as part of the tested system, shows more interesting values before and after Lisport simulated wear for shock absorption and impact attenuation (Gmax), as well as rotational resistance, considering it usually increase with infill compaction over time. Vertical deformation and energy return are less interesting but still in an acceptable range. It should be noted that these performances were quite consistent over the simulated wear, even if the presence of a shockpad most probably helped.

In fact, the major difference observed between all test results was the infiltration rate that shows the turf system drains 50% less water with high density cork than with ProFormance Cork. This fact might be explained by a higher friability of higher density corks as demonstrated by the amount dust covering the turf yarn and the higher compaction level after 20,000 cycles of Lisport.

In the reality of artificial turf fields, a more important friability of higher density corks will most likely require more regular maintenance (de-compaction), replenishment (maintain initial infill depth) and might affect the water drainage capacity of the field.

REPORTED BY



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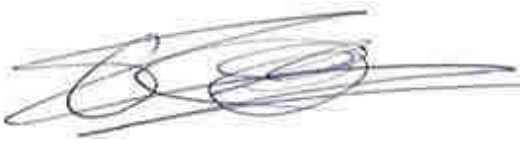

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