TEST REPORT

18-0680IT

Issued on September 11th 2018

CLIENT

ELASTRADE SRL

PRODUCT NAME

POWERFILL GREEN

TYPE

PERFORMANCE INFILL

Tests according to:

NF P90-112, EN 15330-1 and FIFA, WORLD RUGBY requirements

Reproduction of this report is only authorized in its entirety

The results are solely considered valid for the specimen subjected to testing

This report was drawn up from the reports 16-0001IT et 17-0139IT

TEST PROGRAMME

The granule was tested to verify its characteristics according to NF P90-112, EN 15330-1 and FIFA, WORLD RUGBY requirements.

REFERENCE DOCUMENTS

REFERENCE STANDARDS AND REGULATIONS USED

NF P90-112 :2016 Sports grounds – Unbound mineral surfaces for outdoor sport areas – Specifications for construction

EN 15330-1 :2013 Surfaces for sports areas. Synthetic turf and needle-punched surfaces primarily designed for outdoor use. Specification for synthetic turf surfaces for football, hockey, rugby union training, tennis and multi-sports use

FIFA Manual 2015 edition

World Rugby Manual 2016 edition

EN 1097-3:1998 Tests for mechanical and physical properties of aggregates. Determination of loose bulk density and voids

DIN 18035-7:2014-10 Sports ground. Part 7: Synthetic turf areas

EN 933-1:2012 Tests for geometrical properties of aggregates. Determination of particle size distribution. Sieving method

EN 14955:2005 Surfaces for sports areas. Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas.

EN 14836 :2006 Synthetic surfaces for outdoors sports areas. Exposure to artificial weathering

EN 20105-A02 :1995 Textiles. Tests for colour fastness. Grey scale for assessing change in colour

DIN 38414-17:1989 German standard methods for the examination of water, waste water and sludge – Sludge and sediments (group S) – Part 17: Determination of the organically bound halogens amenable to extraction (EOX) (S 17)

EN 13744 :2004 Surfaces for sports areas. Procedure for accelerated ageing by immersion in hot water

EN 13817 :2004 Surfaces for sports areas. Procedure for accelerated ageing by exposure to hot air

STORAGE TIMES

Storage of documents 4 years and samples 1 month from the issue of the report.

TEST CONDITION

Air temperature	Relative humidity
23°C ± 2°C	50% ± 5%

APPLICANT

COMPANY NAME	**ELASTRADE SRL**
ADDRESS	Starda Statale 17 Km 94.700 67035 Pratola Peligna (AQ)
COUNTRY	Italy

DATA ACQUISITION

DATE ORDER RECEIVED	September 06th 2018
DATE FIRST SPECIMEN RECEIVED	December 18th 2015
DATE LAST SPECIMEN RECEIVED	March 09th 2017
START DATE OF TESTS	December 18th 2015
END DATE OF TESTS	June 30th 2017

SAMPLE IDENTIFICATION

SAMPLE'S PICTURES

Product color : Green

TESTS RESULTS

SAMPLE'S PICTURES BEFORE AND AFTER UVB


Before UVB


After UVB

☒ NO significant change ☐ SIGNIFICANT change

SAMPLE'S PICTURES BEFORE AND AFTER UVA


Before UVA


After UVA

☒ NO significant change ☐ SIGNIFICANT change

Colour fastness after UVB 313nm

L*a*b coordinates on new granule											**Mean**
L	39.66	39.45	38.51	39.76	39.66	39.87	40.55	38.95	40.53	39.58	39.65
a	-2.53	-2.74	-2.63	-2.68	-2.25	-2.81	-2.12	-2.53	-2.56	-2.93	-2.58
b	4.30	4.05	4.74	4.77	4.93	4.09	4.48	4.81	5.11	5.64	4.69
L*a*b coordinates on UVB granule											**Mean**
L	38.43	37.96	37.88	37.82	38.75	38.95	37.79	37.13	39.37	38.59	38.27
a	-2.34	-2.41	-2.63	-2.98	-2.07	-2.94	-1.78	-1.83	-2.55	-2.61	-2.41
b	3.63	3.26	3.36	3.21	4.32	3.82	3.38	3.55	4.73	4.68	3.79
ΔE values in comparison between new and aged granule											**Mean**
	1.41	1.72	1.52	2.51	1.11	0.97	2.99	2.32	1.22	1.42	1.66
Grey scale value											

Requirement	**Result**	**Pass/Fail**
Grey scale ≥ 3	4	Pass

Colour fastness after UVA 340nm 5000 hours

L*a*b coordinates on new granule											Mean
L	30.41	31.48	33.11	32.44	37.71	32.36	31.41	33.78	30.18	32.23	32.51
a	-11.11	-12.20	-12.10	-12.78	-12.45	-12.39	-12.55	-12.46	-11.63	-12.08	-12.18
b	12.41	13.39	12.97	12.74	12.59	12.81	12.58	12.96	12.22	12.77	12.74
L*a*b coordinates on UVB granule											**Mean**
L	31.24	30.59	30.33	28.18	31.69	30.58	30.97	31.15	29.85	29.58	30.42
a	-9.22	-7.12	-9.45	-9.58	-10.25	-9.00	-9.22	-10.52	-9.36	-9.48	-9.32
b	12.31	12.90	12.31	13.28	10.76	10.95	10.98	9.85	11.45	10.85	11.56
ΔE values in comparison between new and aged granule											**Mean**
2.1	5.2	3.9	5.4	2.9	4.3	3.7	4.5	2.4	4.2		3.4

Grey scale value		
Requirement	**Result**	**Pass/Fail**
Grey scale ≥ 3	3	Pass

IDENTIFICATION			
Particle size new			
Requirement	**Declared value**	**Result**	**Pass/fail**
d ≥0.5 D ≤ 3.15mm.	0.8 - 2.5mm.	1.0 - 2.5mm	Pass
Bulk density (g/cm³)			
Requirement	**Declared value**	**Result**	**Pass/Fail**
Compliant with the declared ≤ 10%	0.48g/cm³	0.49 g/cm³	Pass
Particle shape			
Requirement	**Declared value**	**Result**	**Pass/Fail**
According to EN 14955 and compliant with declared	A2-B3	A2-B3	Pass
Water permeability			
Requirement	**Declared value**	**Result**	**Pass/Fail**
≥ 0.0001 (m/s)	- (m/s)	0.0097 (m/s)	Pass
TESTS AFTER HOT WATER + HOT AIR AGEING			
Particle size			
Requirement	**Declared value**	**Results**	**Pass/Fail**
No variations, no change and no agglomeration	0.8 - 2.5mm.	1.0 - 2.5mm	Pass
Hardness			
Requirement	**Declared value**	**Result**	**Pass/Fail**
No variations	-	No variation	Pass

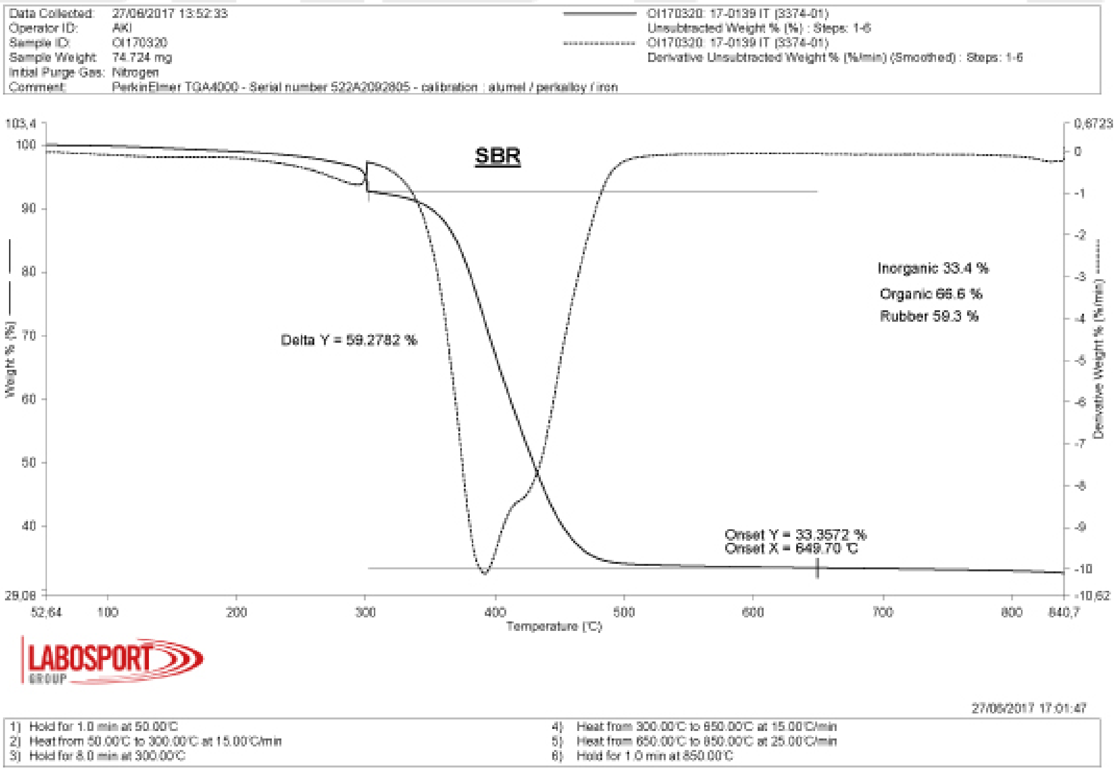
CHEMICAL TESTS RESULTS

Heavy metals detection (DIN 18035-7) - Eox

Elements	References	DIN Requirements	Results
Lead Pb	NF EN ISO 11885	≤ 0,025 mg/l	0.001 mg/l
Cadmium Cd	NF EN ISO 11885	≤ 0,005 mg/l	0.001 mg/l
Chrome total Cr	NF EN ISO 11885	≤ 0,050 mg/l	0.001 mg/l
Chrome Hexavalent Cr	NF T90-043 DIN 38405-24	≤ 0,008 mg/l	0.008 mg/l
Mercury Hg	NF EN 13506 DIN 12846	≤ 0,0010 mg/l	<0.0001 mg/l
Tin Sn	NF EN ISO 11885	≤ 0,040 mg/l	<0.001 mg/l
Dissolved Organic Coal (COD)	NF EN 1484	≤ 50 mg/l	8.6 mg/l
Zinc	NF EN ISO 11885	≤ 0.5 mg/l	0.128 mg/l
EOX	DIN 38414-17	≤ 100 mg/Kg	25.7 mg/Kg
Result	Pass		

GRAPHICS

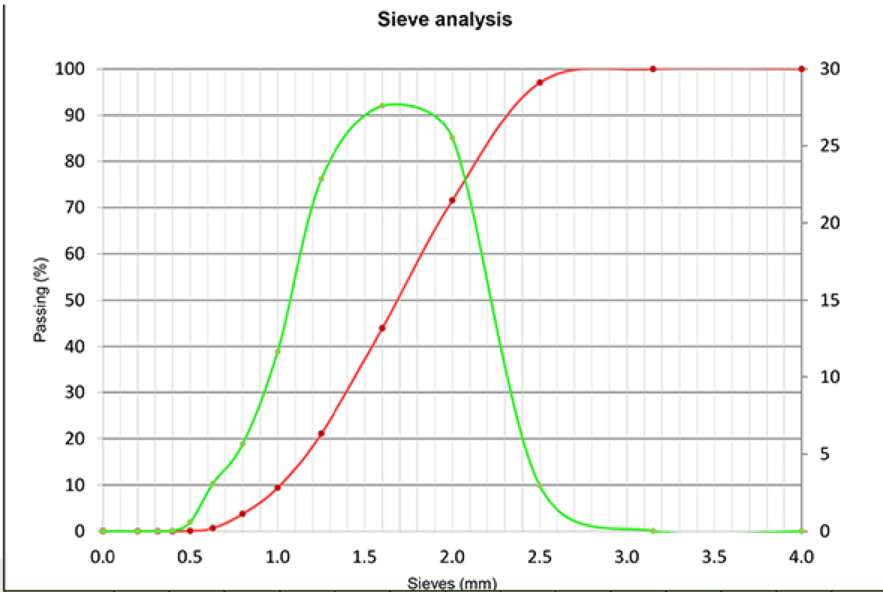
TGA



Inorganic **33.4**% **Organic 65.6**% Rubber **59.3**%

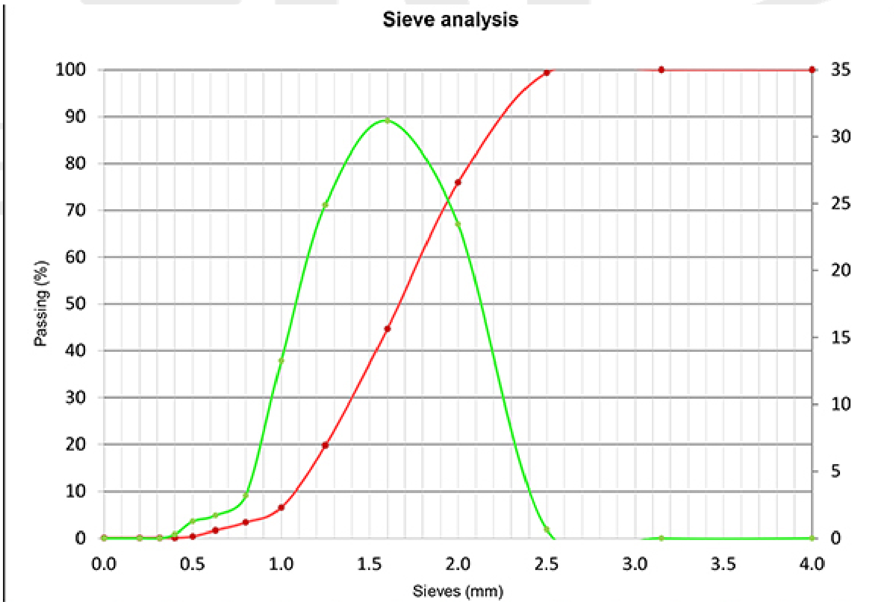
Rubber requirement >20%

Particle size new



Sieves (mm.)	0	0.2	0.315	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.15	4.00
Refusal (%)	0	0	0	0	1	3	6	12	23	28	26	3	0	0
Passing (%)	0	0	0	0	0	1	4	9	21	44	72	97	100	100

Particle size after ageing



Sieves (mm.)	0	0.2	0.315	0.4	0.5	0.63	0.8	1	1.25	1.6	2	2.5	3.15	4.00
Refusal (%)	0	0	0	0	1	2	3	13	25	31	23	1	0	0
Passing (%)	0	0	0	0	0	2	3	7	20	45	76	99	100	100

SYNTHESIS

Test	Requirements	Compliance
Identification	NF P 90-112	Pass
Hot water + hot air ageing	NF P 90-112 (2016)	Pass
UVA 340nm 5000 hours ageing	FIFA 2015 and World Rugby 2016	Pass
UVB 313nm ageing	NF P90-112 (2016)	Pass
Chemical tests	NF P 90-112 (2016)	Pass

EQUIPMENT USED

EN 1097-3:1998 Tests for mechanical and physical properties of aggregates. Determination of loose bulk density and voids

Equipment	Model	Serial number	Code
Matraccio	NA	NA	STR156
Bilancia	PS6000/C/1	219667/08	STR043

EN 14836 :2006 Synthetic surfaces for outdoors sports areas. Exposure to artificial weathering

Equipment	Model	Serial number	Code
QUV	QUV/SE	06-13927-73-SE	STR009
Calibratore QUV	CR10	06-3101-2-CR10	STR092

EN 20105-A02:1995 Textiles. Tests for colour fastness. Grey scale for assessing change in colour

Equipment	Model	Serial number	Code
Spectro Guide	Spectro-guide	1057950	STR015

EN 933-1:2012 Tests for geometrical properties of aggregates. Determination of particle size distribution. Sieving method

Equipment	Model	Serial number	Code
Setaccio Endecotts	5.00 mm		STR126
Setaccio Endecotts	4,00 mm	5766963	STR045
Setaccio Endecotts	3,15 mm	5770785	STR046
Setaccio Endecotts	2,50 mm	5761804	STR047
Setaccio Endecotts	2,00 mm	5787146	STR048
Setaccio Endecotts	1,60 mm	5787078	STR049
Setaccio Endecotts	1,25 mm	5746702	STR050
Setaccio Endecotts	1,00 mm	5787346	STR051
Setaccio Endecotts	800 μ m	5766244	STR052
Setaccio Endecotts	630 μ m	5774245	STR053
Setaccio Endecotts	500 μ m	5775406	STR054
Setaccio Endecotts	400 μ m	5766741	STR055
Setaccio Endecotts	315 μ m	5732092	STR056

ADDITIONAL INFORMATION

None

CONCLUSIONS

None

Directeur du laboratoire
Roberto Armeni

INTERNATIONAL ASSOCIATION FOR SPORTS SURFACE SCIENCES
ISSS

Responsable du laboratoire
Davide Giorgini