TEST REPORT

21-0639IT

Issued on September 16th 2022

CLIENT

ELASTRADE SRL

PRODUCT NAME

POWERFILL GREEN 2

PRODUCT TYPE

SBR

Laboratory tests

Polymeric infill materials primarily used outdoor

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Licenza 0206 del 22/04/2021

TEST LIST AND TESTING CONDITIONS

§ 6.3 Particle size distribution
Conditioning of the sample not required.
Test performed at a temperature of 23 °C ± 5 °C.

UNI EN 14955:2006 - Surfaces for sports areas - Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas
Conditioning of the sample not required.
Test performed at a temperature of 23 °C ± 5 °C.

§ 6.5 Bulk density
Conditioning of the sample not required.
Test performed at a temperature of 23 °C ± 2 °C and relative humidity of 50 % ± 5 %.

ISO 11358-2:2021 - Plastics — Thermogravimetry (TG) of polymers — Part 2: Determination of activation energy
Test carried out by an external laboratory.

§ 7.1 Elastic properties
Conditioning of the sample for a minimum of 24 h at 23 °C ± 2 °C.
Test performed at a temperature of 23 °C ± 2 °C.

EN 17467:2022 - Surfaces for sports areas - Test method for the determination of the residual deformation of synthetic or organic infill granules after static load
Conditioning of the sample for a minimum of 24 h at 23 °C ± 2 °C.
Test performed at a temperature of 23 °C ± 2 °C.

§ 7.4 Surface temperature during exposure to infra-red energy
Conditioning of the sample for a minimum of 24 h at 23 °C ± 2 °C.
Test performed at a temperature of 23 °C ± 2 °C.

§ 7.5 Resistance to melting / permanent agglomeration
Conditioning of the sample for a minimum of 24 h at 23 °C ± 2 °C.
Test performed at a temperature of 23 °C ± 2 °C.

EN 15051-1:2013 - Workplace exposure - Measurement of the dustiness of bulk materials - Part 1: Requirements and choice of test methods
Test carried out by an external laboratory.

§ 7.7 Water infiltration
Conditioning of the sample not required.
Test performed at a temperature of 23 °C ± 5 °C.

EN 20105-A02:1996 – Textiles - Tests for colour fastness - Grey scale for assessing change in colour
Conditioning of the sample not required.
Test performed at a temperature of 23 °C ± 5 °C.

§ 9.1 PAH content
Test carried out by an external laboratory.

EN 71-3:2021 – Safety of toys - Part 3: Migration of certain elements
Test carried out by an external laboratory

§ 9.3 Leaching of chemical elements through immersion in water
Test carried out by an external laboratory

IMPORTANT INFORMATION

Reproduction of this test report is only authorized in its entirety.
The results are intended to be valid only for the surface tested as received.
The laboratory declines all responsibility for all information provided by the customer.

SUBJECT

Determination of the parameters relating to the test methods listed in the prEN 15330-5 reported in the section "Test list and testing conditions".

REFERENCE DOCUMENTS

prEN 15330-5:2022 - Surfaces for sport areas — Synthetic turf and textile sports surfaces

EN 933-1:2012 - Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method
EN 933-2:2020 - Tests for geometrical properties of aggregates — Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures
EN 14955:2005 - Surfaces for sports areas — Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas
EN 1097-3:1998 - Tests for mechanical and physical properties of aggregates — Part 3: Determination of loose bulk density and voids
ISO 11358-2:2021 - Plastics — Thermogravimetry (TG) of polymers — Part 2: Determination of activation energy
EN ISO 7500-1:2018 - Metallic materials - Calibration and verification of static uniaxial testing machines — Tension/compression testing machines — Calibration and verification of the force-measuring system
EN 17467:2022 - Surfaces for sports areas — Test method for the determination of the residual deformation of synthetic or vegetal infill granules after static load
EN 14810:2006 - Surfaces for sports areas — Determination of spike resistance
EN 20105-A02:1994 - Textiles — Tests for colour fastness — Grey scale for assessing change in colour
EN 15051-1:2013 - Workplace exposure — Measurement of the dustiness of bulk materials — Requirements and chouce of test methods
EN 12616:2013 - Surfaces for sports areas — Determination of water infiltration rate
EN 14836:2018 - Surfaces for sports areas — Synthetic surfaces for outdoor sports areas — Test method for artificial weathering
EN 1367-1:2007 - Tests for thermal and weathering properties of aggregates - Part 1: Determination of resistance to freezing and thawing
EN 71-3:2019+A1:2021- Safety of toys — Migration of certain elements
CEN/TS 16384:2012 - Synthetic sport systems — Leaching test
Commission Regulation (UE) 2021/1199 of 20th July 2021

STORAGE TIMES

Documents are stored for 4 years and samples 1 month from the issue of the Test report.

SAMPLING

The sampling is carried out by the customer.

LOCATION OF PERFORMANCE OF THE TESTS

The test ISO 11358-2, EN 15051-1, § 9.1 PAH content, EN 71-3, § 9.3 Leaching of chemical elements through immersion in water are carried out by an external laboratory, the other tests are carried out at Labosport Italia Srl premises.

APPLICANT

Company	**ELASTRADE SRL**
Address	Via dei Termini, 18/A 24040 Osio Sopra (BG)
Country	Italy

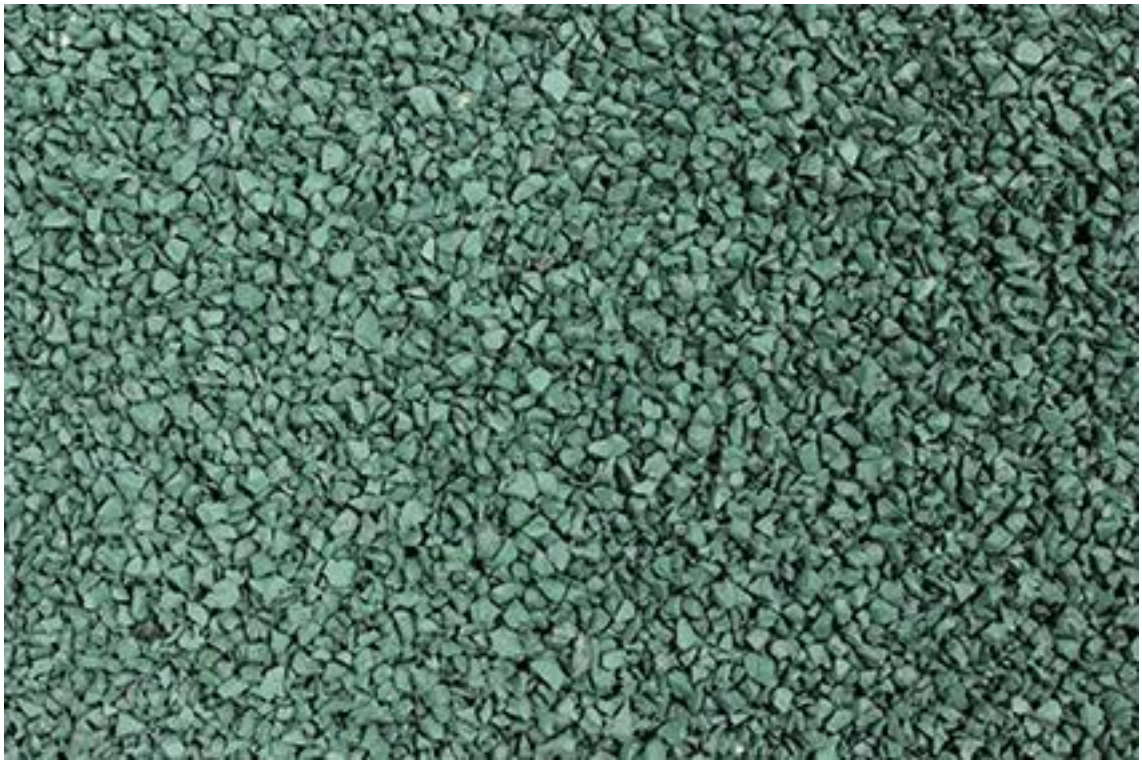
ACQUISITION DATA

Order received on	September 10th 2021
First sample received on	September 24th 2021
Last sample received on	September 24th 2021
Beginning of tests	September 28th 2021
Ending of tests	September 9th 2022

PRODUCT IDENTIFICATION (INFORMATION DETECTED BY THE LABORATORY)

Type of the product: SBR

Colour of the product: Green



Generic image

Macro-image

PRODUCT IDENTIFICATION (INFORMATION PROVIDED BY THE CUSTOMER)

Property	Value
Chemical nature of the product	SBR
Colour of the product	Green
Bulk density	0,48 Mg/m^3
Particle shape	A2
Particle size	d 0,8 mm – D 2,5 mm
Polymer characterisation	Organic: 65,6 %
	Inorganic: 34,4 %
	Rubber: 59,2 %

TEST RESULTS

§ 6.3 Particle size distribution

	Particle size	Requirements	Pass / Fail
Unaged product (reference product)	d 0,8 mm – D 2,5 mm	At least 80 % of a production sample shall be equal to or greater than declared sieve (d) and no infill shall pass the next sieve down. At least 80 % of a production sample shall be equal to or smaller than declared sieve (D).	Pass
After durability test	d 0,8 mm – D 2,5 mm	At least 80 % of the infill within the d – D range of the reference sample	Pass
After freeze / thaw cycles	d 0,8 mm – D 2,5 mm	At least 80 % of the infill within the d – D range of the reference sample	Pass
After UVA + durability test	d 0,8 mm – D 2,5 mm	At least 80 % of the infill within the d – D range of the reference sample	Pass

Note
None.

UNI EN 14955:2006 - Surfaces for sports areas - Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas

	Particle shape	Requirements	Pass / Fail
Unaged product (reference product)	A2	Same shape of the manufacturer's product declaration	Pass
After durability test	A2	Same particle shape classification as the reference sample	Pass
After freeze / thaw cycles	A2	Same particle shape classification as the reference sample	Pass
After UVA + durability test	A2	Same particle shape classification as the reference sample	Pass

Note
None.

§ 6.5 Bulk density

	Bulk density		Requirements	Pass / Fail
Unaged product (reference product)	1) 0,49 Mg/m³ 2) 0,49 Mg/m³ 3) 0,49 Mg/m³	Mean: 0,49 Mg/m³	± 15 % of the manufacturer's product declaration	Pass
After durability test	1) 0,49 Mg/m³ 2) 0,49 Mg/m³ 3) 0,49 Mg/m³	Mean: 0,49 Mg/m³	± 15 % of the reference sample	Pass
After freeze / thaw cycles	1) 0,49 Mg/m³ 2) 0,49 Mg/m³ 3) 0,49 Mg/m³	Mean: 0,49 Mg/m³	± 15 % of the reference sample	Pass
After UVA + durability test	1) 0,49 Mg/m³ 2) 0,49 Mg/m³ 3) 0,49 Mg/m³	Mean: 0,49 Mg/m³	± 15 % of the reference sample	Pass

Note
None.

§ 7.1 Elastic properties

	Result	Classification - Range
Unaged product (reference product)	37 %	Medium elasticity - > 20 % ≤ 40 %
After artificial weathering (UVA)	36 %	-
Requirement: ± 5 % of the reference product	Pass	

Note
None.

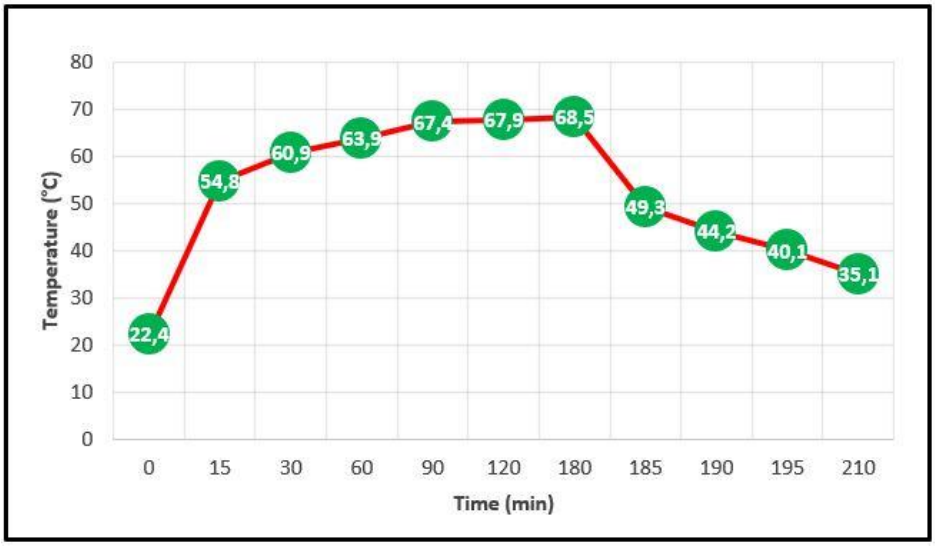
EN 17467:2022 - Surfaces for sports areas - Test method for the determination of the residual deformation of synthetic or organic infill granules after static load

Result	6,8 %
Requirement: ≤ 50 %	Pass
Visual inspection	No visible variation
Requirement: the granule shall not be agglomerated and shall no be visible signs of oil secretion	Pass

Note
None.

§ 7.4 Surface temperature during exposure to infra-red energy

Result	Class - Temperature range
68,5 °C	3 - > 65 °C



Surface temperature's graph

Note
None.

§ 7.5 Resistance to melting / permanent agglomeration

Result	Class - Temperature range
140 °C - 0 % of agglomerated product	3 - ≥ 120 °C

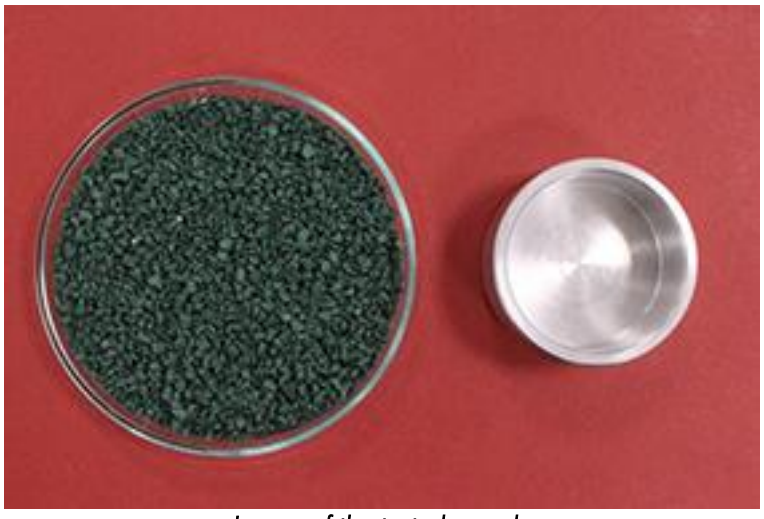


Image of the tested sample

Note
None.

EN 15051-1:2013 - Workplace exposure - Measurement of the dustiness of bulk materials - Part 1: Requirements and choice of test methods – Method A

Inhalable dustiness mass fraction	33,7 mg/kg	Thoracic dustiness mass fraction	17,5 mg/kg	Respirable dustiness mass fraction	0 mg/kg
Result (category of dustiness)			Very low		
Requirement: Very Low or Low classification			Pass		

Table 1 — Dustiness classification for rotating drum method

Category of dustiness	Inhalable dustiness mass fraction, $w_{I,A}$ mg/kg	Thoracic dustiness mass fraction, $w_{T,A}$ mg/kg	Respirable dustiness mass fraction, $w_{R,A}$ mg/kg
Very low	< 300	< 80	< 10
Low	300 to 650	80 to 300	10 to 60
Moderate	> 650 to 3 000	> 300 to 1 000	> 60 to 210
High	> 3 000	> 1 000	> 210

Note
None.

§ 7.7 Water infiltration

A 300mm diameter single cylinder Infiltrometer was used for the test. The sample is closed by pressure between two rubber gaskets by tightening the appropriate bolts.
The water temperature used during the test is 17 °C. The surface temperature of the sample is 23 °C.
The test was performed on March 22th 2022.

Test 1	Test 2	Test 3	Mean value
29736 mm/h	29736 mm/h	33984 mm/h	31029 mm/h
Requirement: > 500 mm/h		Pass	

Note
None.

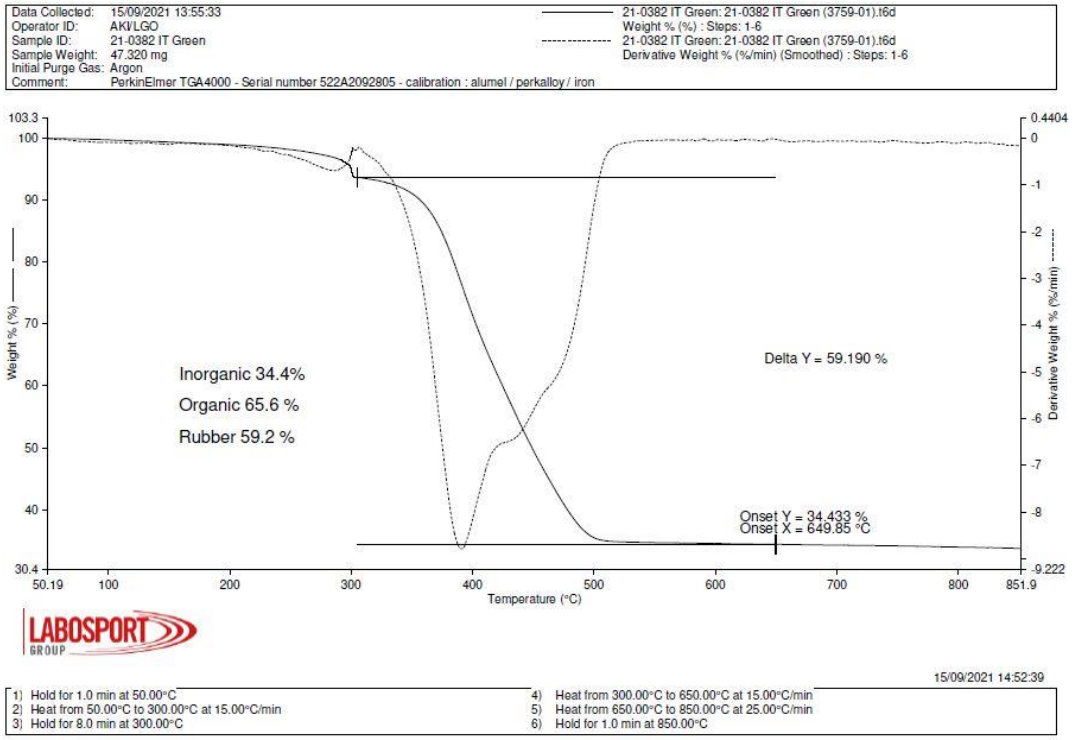
EN 20105-A02:1996 – Textiles - Tests for colour fastness - Grey scale for assessing change in colour

After artificial weathering (UVA)	3
After durability test	3
Requirement – Grey scale ≥ 3	Pass

Note
None.

ISO 11358-2:2021 - Plastics — Thermogravimetry (TG) of polymers — Part 2: Determination of activation energy

Organic %	65,6 %
Inorganic %	34,4 %
Rubber %	59,2 %
Requirement: Rubber % ± 5 % absolute of the declaraded value	Pass



TGA graph

SUMMARY TABLE OF TEST RESULTS

PROPERTIES	CONDITION	UNITS	RESULTS	REQUIREMENTS	PASS / FAIL
Particle size distribution	Unaged (reference product)	mm	d 0,8 - D 2,5	At least 80 % than declared value	Pass
	After durability test	mm	d 0,8 - D 2,5	At least 80 % than reference product	Pass
	After freeze / thaw cycles	mm	d 0,8 - D 2,5	At least 80 % than reference product	Pass
	After UVA + durability test	mm	d 0,8 - D 2,5	At least 80 % than reference product	Pass
Particle shape	Unaged (reference product)	-	A2	Same shape than declared valued	Pass
	After durability test	-	A2	Same shape than reference product	Pass
	After freeze / thaw cycles	-	A2	Same shape than reference product	Pass
	After UVA + durability test	-	A2	Same shape than reference product	Pass
Bulk density	Unaged (reference product)	Mg/m^3	0,49	± 15 % of the declared value	Pass
	After durability test	Mg/m^3	0,49	± 15 % of the reference product	Pass
	After freeze / thaw cycles	Mg/m^3	0,49	± 15 % of the reference product	Pass
	After UVA + durability test	Mg/m^3	0,49	± 15 % of the reference product	Pass
Elastic properties	Unaged (reference product)	%	37 Medium elasticity - >20 % ≤40 %	-	-
	After artificial weathering (UVA)	%	36	± 5 % of the reference product	Pass
Resistance to residual deformation after static load	Unaged	%	6,8	≤ 50 %	Pass
		-	No visible variation	no agglomerated granules, no iol secrection	Pass
Surface temperature during exposure to infra-red energy	Unaged	°C	68,5 3 - > 65 °C	-	-
Resistance to melting / permanent agglomeration	Unaged	°C	140 3 - > 120 °C	-	-
Inhalable dust content	Unaged	-	Very low	Very Low or Low	Pass
Water infiltration	Unaged	mm/h	31029	> 500	Pass

PROPERTIES	CONDITION	UNITS	RESULTS	REQUIREMENTS	PASS / FAIL
Colour fastness	After artificial weathering (UVA)	-	3	≥ 3	Pass
	After durability test	-	3	≥ 3	Pass
Polymer characterisation	Unaged	%	Organic: 65,6	-	-
		%	Inorganic: 34,4	-	-
		%	Rubber: 59,2	± 5 % of the declaraded value	Pass

§ 9.1 PAH content

POLYAROMATIC HYDROCARBON (PAH)	RESULTS	LIMIT
Benzo[a]pyrene (BaP)	0,33 mg/kg	The total extractable PAH8 content shall be less than 20 mg/kg
Benzo[e]pyrene (BeP)	0,50 mg/kg	
Benzo[a]anthracene (BaA)	0,51 mg/kg	
Chrysene (CHR)	0,25 mg/kg	
Benzo[b]fluoranthene (BbFA)	0,26 mg/kg	
Benzo[j]fluoranthene (BjFA)	0,26 mg/kg	
Benzo[k]fluoranthene (BkFA)	<0,2 mg/kg	
Dibenzo[a,h]anthracene (DBAhA)	<0,2 mg/kg	
Total extractable PAH8 content	<2,25 mg/kg	
Result of the test	Pass	

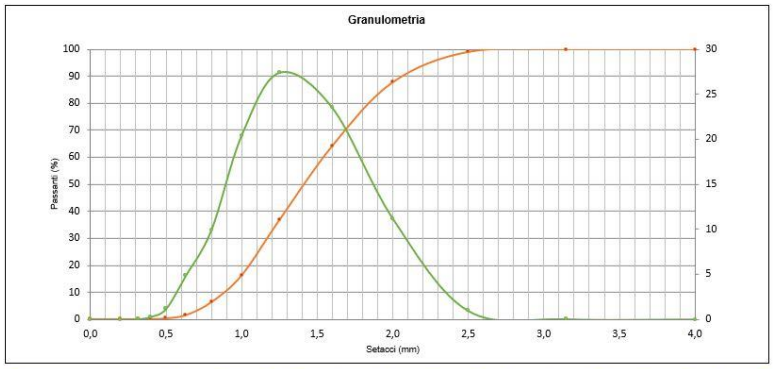
EN 71-3:2021 – Safety of toys - Part 3: Migration of certain elements

ELEMENT	RESULTS	LIMIT (Categoty III)
Alluminium	5 mg/kg	70000 mg/kg
Antimony	<0,5 mg/kg	560 mg/kg
Arsenic	<0,5 mg/kg	47 mg/kg
Barium	14 mg/kg	18750 mg/kg
Boron	<0,5 mg/kg	15000 mg/kg
Cadmium	<0,5 mg/kg	17 mg/kg
Chromium (III)	<0,5 mg/kg	460 mg/kg
Chromium (VI)	<0,2 mg/kg	0,2 mg/kg
Cobalt	<0,5 mg/kg	130 mg/kg
Copper	3 mg/kg	7700 mg/kg
Lead	1,3 mg/kg	23 mg/kg
Manganese	2 mg/kg	15000 mg/kg
Mercury	<0,05 mg/kg	94 mg/kg
Nickel	<0,5 mg/kg	930 mg/kg
Selenium	<0,5 mg/kg	460 mg/kg
Strontium	<0,5 mg/kg	56000 mg/kg
Tin	<0,5 mg/kg	180000 mg/kg
Organic tin	<0,5 mg/kg	12 mg/kg
Zinc	63 mg/kg	46000 mg/kg
Result of the test	Pass	

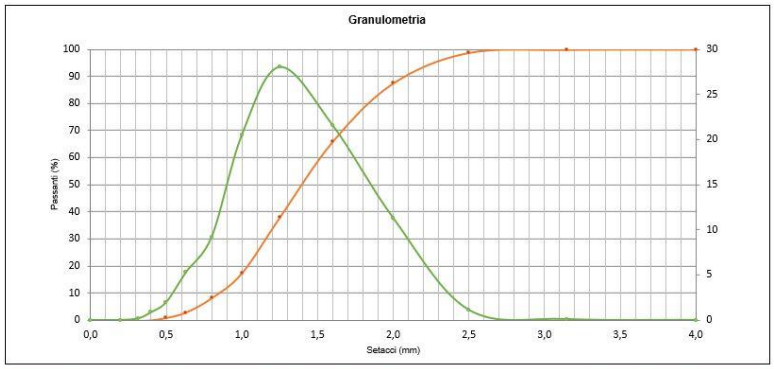
§ 9.3 Leaching of chemical elements through immersion in water

ELEMENT	RESULTS	LIMIT
Arsenic (As)	<0.005 mg/l	≤ 0,1mg/l
Barium (Ba)	<0.00004 mg/l	≤ 0,5 mg/l
Cadmium (Cd)	<0,001 mg/l	≤ 0,005 mg/l
Cobalt (Co)	<0.0002 mg/l	≤ 0,5 mg/l
Chromium VI (CrVI)	<0,008 mg/l	≤ 0,008 mg/l
Total chromium content (Cr)	<0,002 mg/l	≤ 0,05 mg/l
Molybdenum (Mo)	<0.0005 mg/l	≤ 0,5 mg/l
Nickle (Ni)	<0.005 mg/l	≤ 0,5 mg/l
Lead (Pb)	<0,005 mg/l	≤ 0,025 mg/l
Mercury (Hg)	<0,00000015 mg/l	≤ 0,001 mg/l
Tin (Sn)	<0,005 mg/l	≤ 0,04 mg/l
Vanadium (V)	<0.0005 mg/l	≤ 0,05 mg/l
Zinc (Zn)	0,29 mg/l	≤ 0,5 mg/l
DOC (dissolved organically bound carbon)	17,3 mg/l	≤ 50 mg/l
EOX (extractible organic halides)	<20 mg/kg	≤ 100 mg/kg
Result of the test	Pass	

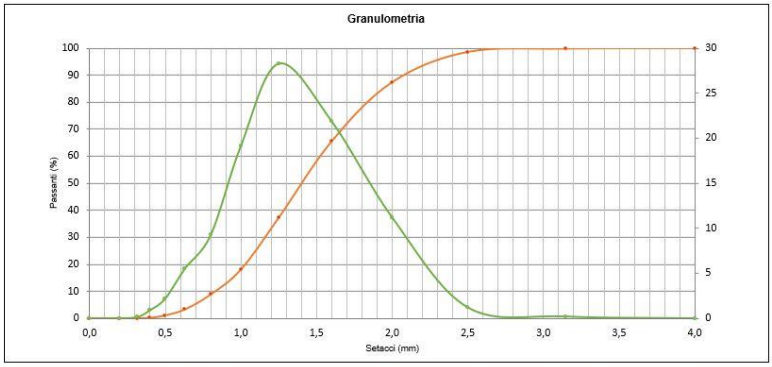
ANNEX 1: PARTICLE SIZE DISTRIBUTION GRAPH

Unaged product (reference product)	

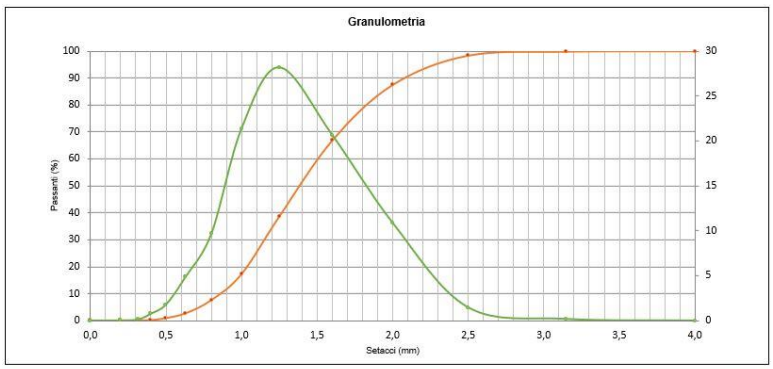
Setacci (mm)	0	0,2	0,315	0,4	0,5	0,63	0,8	1,0	1,25	1,6	2,0	2,5	3,15	4
Rifiutati (%)	0	0	0	0	1	5	10	20	27	24	11	1	0	0
Passanti (%)	0	0	0	0	0	2	6	16	37	64	88	99	100	100

After durability test	

Setacci (mm)	0	0,2	0,315	0,4	0,5	0,63	0,8	1,0	1,25	1,6	2,0	2,5	3,15	4
Rifiutati (%)	0	0	0	1	2	5	9	21	28	22	11	1	0	0
Passanti (%)	0	0	0	0	1	3	8	17	38	66	87	99	100	100

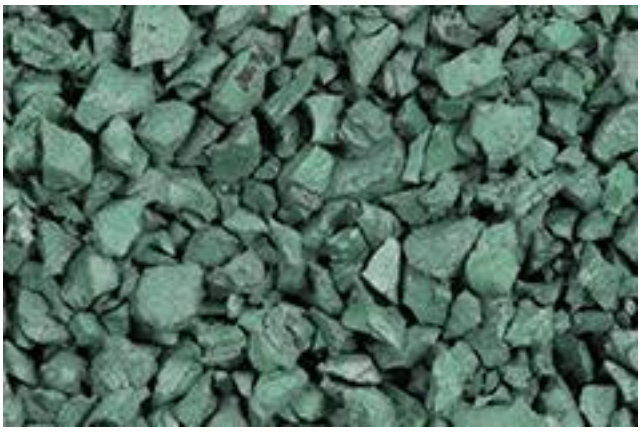
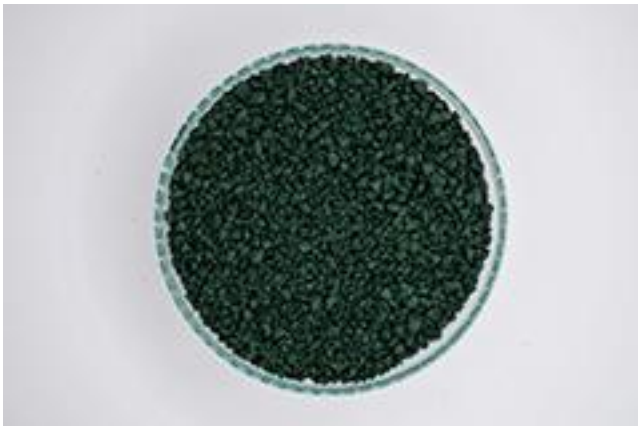
After freeze / thaw cycles	

Setacci (mm)	0	0,2	0,315	0,4	0,5	0,63	0,8	1,0	1,25	1,6	2,0	2,5	3,15	4
Rifiutati (%)	0	0	0	1	2	6	9	19	28	22	11	1	0	0
Passanti (%)	0	0	0	0	1	3	9	18	37	66	87	99	100	100

After UVA + durability test	

Setacci (mm)	0	0,2	0,315	0,4	0,5	0,63	0,8	1,0	1,25	1,6	2,0	2,5	3,15	4
Rifiutati (%)	0	0	0	1	2	5	10	21	28	21	11	1	0	0
Passanti (%)	0	0	0	0	1	3	8	17	39	67	87	98	100	100

ANNEX 2: SAMPLE PICTURES

Unaged product (reference product)	
After durability test	
After freeze / thaw cycles	
After UVA + durability test	

STRUMENTS USED

§ 6.3 Particle size distribution

Equipment	Manufacturer	Model	Technical sheet
Vibrosifter	Matest	A059/12	STR002
Ventilated stove	Froilabo-Firlabo	AC60	STR003
Sieves	Matest	400mm	From STR240 to STR256 and STR043
Balance	Radwag	PS6000/C/1	STR043
Datalogger	Testo	177-H1	STR018

UNI EN 14955:2006 - Surfaces for sports areas - Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas

Equipment	Manufacturer	Model	Technical sheet
Microscope	Dino-Lite	AM7915MZT	STR037

§ 6.5 Bulk density

Equipment	Manufacturer	Model	Technical sheet
Balance	Radwag	PS6000/C/1	STR043
Alluminium cup	Labosport International	NA	STR304
Datalogger	Testo	177-H1	STR018

§ 7.1 Elastic properties

Equipment	Manufacturer	Model	Technical sheet
Dynamometer	Zwick/Roell	10kN ProLine	STR376
Load cell	Zwick/Roell	XForce P	STR375
Datalogger	Testo	177-H1	STR018

EN 17467:2022 - Surfaces for sports areas - Test method for the determination of the residual deformation of synthetic or organic infill granules after static load

Equipment	Manufacturer	Model	Technical sheet
Dynamometer	Zwick/Roell	10kN ProLine	STR376
Load cell	Zwick/Roell	XForce P	STR375
Ventilated stove	Froilabo-Firlabo	AC60	STR003
Timer	RS Component	328-011	STR077
Datalogger	Testo	177-H1	STR018

§ 7.4 Surface temperature during exposure to infra-red energy

Equipment	Manufacturer	Model	Technical sheet
Cabinet	Labosport International	NA	STR378
Multi-channel datalogger	Graphtec	Midi ligger GL240	STR379

§ 7.5 Resistance to melting / permanent agglomeration

Equipment	Manufacturer	Model	Technical sheet
Dynamometer	Zwick/Roell	10kN ProLine	STR376
Load cell	Zwick/Roell	XForce P	STR375
Ventilated stove	Froilabo-Firlabo	AC60	STR003
Timer	RS Component	328-011	STR077
Datalogger	Testo	177-H1	STR018

§ 7.7 Water infiltration

Equipment	Manufacturer	Model	Technical sheet
Aluminum cylinder	Labosport International	Cylinder	STR311
Ruler	NA	NA	STR310
Stopwatch	NA	NA	STR023
Thermometer	Testo	720	STR302

EN 20105-A02:1996 – Textiles - Tests for colour fastness - Grey scale for assessing change in colour

Equipment	Manufacturer	Model	Technical sheet
Spectrophotometer	BYK-Gardner	Spectro guide	STR015
Datalogger	Testo	177-H1	STR018

ADDITIONS, DEVIATIONS OR EXCLUSIONS FROM THE TEST METHOD

None.

COMMENTS RELATED TO TESTS

None.

ADDITIONAL INFORMATIONS

None.

Laboratory Director
Roberto Armeni

End of the Test Report