# TEST REPORT

## 22-0179IT

**Issued on** May 31st 2022

CLIENT

**NURTEKS HALI SAN.VE TIC. AŞ.**

PRODUCT NAME

**HYBRID XWR PRO**

CATEGORY

**ARTIFICIAL TURF SYSTEM**

**Assessment of the Artificial Turf System in accordance with EN 15330-1:2013 as a surface designed primarily for football**



The results are valid only for the complete system as described in this report.

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# SUBJECT

Assessment of the Artificial Turf System in accordance with EN 15330-1:2013 surfaces for sports areas – synthetic turf and needle-punched surfaces primarily designed for outdoor use – Part 1 specification for synthetic turf.
This report describes the surface tested lists detests undertaken; details the results obtained and compares the results to the requirements of EN 15330-1 for surfaces designed primarily for football.

# REFERENCE STANDARDS AND REGULATIONS USED

EN 15330-1:2013 surfaces for sports areas – synthetic turf and needle-punched surfaces primarily designed for outdoor use – Part 1 specification for synthetic turf.
EN 1969:2001 Surfaces for sports areas – Determination of thickness of synthetic sports surfaces
EN 12230:2004 Surfaces for sports areas – Determination of tensile properties of synthetic sports surfaces
EN 14808:2006 Surfaces for sports areas – Determination of shock absorption
EN 14809:2006 Surfaces for sports areas – Determination of vertical deformation
EN 12616:2004 Surfaces for sports areas – Determination of water infiltration rate
EN 12235:2004 Surfaces for sports areas – Determination of vertical ball behaviour
EN 15301-1:2007 Surfaces for sports areas – Determination of rotational resistance
EN 12234:2003 Surfaces for sports areas – Determination of ball roll behaviour
EN 12616:2013 Surfaces for sports areas – Determination of water infiltration rate
EN 13672:2004 Surfaces for sports areas – Determination of resistance to abrasion of non-filled synthetic turf
EN 12228:2003 Surfaces for sports areas – Determination of joint strength of synthetic surfaces
EN 20105-A02:1996 Textiles – Tests for colour fastness – Grey scale for assessing change in colour
EN 14836:2006 Synthetic surfaces for outdoor sports areas – Exposure to artificial weathering
EN 13864:2004 Surfaces for sports areas – Determination of tensile strength of synthetic yarns
EN 13744:2005 Surfaces for sports areas – Procedure for accelerated ageing by immersion in hot water
EN 13817:2005 Surfaces for sports areas – Procedure for accelerated ageing by exposure to hot air
ISO 8543:1998 Textile floor coverings – Methods for determination of mass
ISO 1763:1986 Carpets – Determination of number of tufts and/or loops per unit length and per unit area
ISO 4919:2012 Carpets – Determination of tuft withdrawal force
ISO 2549:1972 Hand-knotted carpets – Determination of tuft leg length above the woven ground
ISO 11357-1:2009 Plastics – Differential scanning calorimetry (DSC) – Part.1: General principles
EN 933-1:2012 Tests for geometrical properties of aggregates – Determination of particle size distribution – Sieving method
EN 14955:2006 Surfaces for sports areas – Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas
EN 1097-3:1999 Tests for mechanical and physical properties of aggregates – Determination of loose bulk density and voids
EN 430:1995 Resilient floor coverings – Determination of mass per unit area

# APPLICANT

| | |
|---|---|
| **COMPANY NAME** | **NURTEKS HALI SAN. TIC. AŞ.** |
| Address | Yesilkoy Mahallesi, Ataturk Caddesi EGS Business Park<br>No:12 B2 Blok Kat: D:179-182<br>Bakırköy Istanbul |
| **COUNTRY** | Turkey |

# ACQUISITION DATA

| | |
|---|---|
| **DATE ORDER RECEIVED** | March 17th 2022 |
| **DATE FIRST SPECIMEN RECEIVED** | April 01st 2022 |
| **DATE LAST SPECIMEN RECEIVED** | April 01st 2022 |
| **START DATE OF TESTS** | May 12th 2022 |
| **END DATE OF TESTS** | May 30th 2022 |

## PRODUCT DESCRIPTION

| | | | |
|---|---|---|---|
| **Surface Name** | **HYBRID XWR PRO** | | |
| **ARTIFICIAL GRASS** | | | |
| **Carpet Name / Pile height** | **HYBRID XWR PRO** | | **60.0**mm |
| **Threads per tuft / Tufts per 10cm. - Monofilament** | **6** | **14,0** | |
| **Nr. of tufts / Tufts per 10cm. - Fibrillated** | **1** | **14,0** | |
| **Tuft Pattern** | **STRAIGHT** | | |
| **Pile Yarn / Manufacturer** | **MS D2 XWR lime green, dark green - TN 5000/1 lime green** | **TENCATE THIOLON B.V** | |
| **Primary Backing / Manufacturer** | **H18** | **TENCATE** | |
| **Coating / Joint type** | **LATEX** | **BONDED** | |
| **Adhesive Manufacturer / Q.ty** | **AYKA FLOOR** | **200**g/ml | |
| **Tape / Manufacturer** | **HELMETIN** | **Serta Tekstil Urunleri Sanayi Ve Pazarlama LTD. ŞTI** | |
| **INFILL** | | | |
| **Performance Infill** Type: **Coated SBR** | **NURTEKS HALI SAN. TİC.AS.** | **NRT SBR RUBBER** | **16,0** kg/m² |
| **Stabilising Infill** Type: **Silica Sand** | **EMEK, FARES KUM** | **SILICA SAND** | **20,0** kg/m² |
| **Approx. total infill depth (mm)** | **53** | | |
| **SHOCKPAD** | | | |
| **Commercial Name** | **-** | | |
| **Manufacturer** | **-** | | |
| **Type** | **-** | | |
| **Thickness / Mass per unit area** | **-**mm | **-** kg/m² | |

## LABORATORY TEST RESULTS

| Property | Test method | Test condition | Units | Requirements | Mean result | Pass / fail |
|---|---|---|---|---|---|---|
| **SYSTEM** | | | | | | |
| **Vertical ball rebound** | EN 12235 | Pre-conditioning dry | % | 45 - 75 | **57** | **Pass** |
| | | Pre-conditioning wet | | | **54** | **Pass** |
| | | After simulated wear 20200 cycles | | | **61** | **Pass** |
| **Shock absorption** | EN 14808 | Pre-conditioning dry | % | 55 – 70 | **60** | **Pass** |
| | | Pre-conditioning wet | | | **58** | **Pass** |
| | | After simulated wear 20200 cycles | | | **55** | **Pass** |
| **Vertical deformation** | EN 14809 | Pre-conditioning dry | mm | 4.0 – 9.0 | **8,0** | **Pass** |
| | | Pre-conditioning wet | | | **7,3** | **Pass** |
| | | After simulated wear 20200 cycles | | | **6,5** | **Pass** |
| **Rotational resistance** | EN 15301-1 (Studded sole) | Pre-conditioning dry | Nm | 25 – 50 | **35** | **Pass** |
| | | Pre-conditioning wet | | | **34** | **Pass** |
| | | After simulated wear 20200 cycles | | | **40** | **Pass** |
| **Rotational resistance** | EN 15301-1 (Dimpled sole) | Pre-conditioning dry | Nm | 25 – 50 | **29** | **Pass** |
| | | Pre-conditioning wet | | | **27** | **Pass** |
| **Ball roll** | EN 12234 | Pre-conditioning dry | m | 4.0 – 10.0 | **6,8** | **Pass** |
| | | Pre-conditioning wet | | | **7,4** | **Pass** |
| **Abrasion resistance** | EN 13672 | Pre-conditioning dry | % | ≤2% | **NA** | |
| **Water permeability** | EN 12616 | Unaged | mm/h | ≥ 500 | **3582** | **Pass** |

| Property | Test method | Test condition | Units | Requirements | Mean result | Pass/ fail |
|---|---|---|---|---|---|---|
| **JOINTS** | | | | | | |
| **Joint strength (stitched)** | EN 12228 – Met. A | Unaged | N/mm | ≥ 1000/100mm | **-** | |
| | | Aged (EN 13744) | | | **-** | |
| **Joint strength (bonded)** | EN 12228 – Met. B | Unaged | | ≥ 60/100mm | **100** | **Pass** |
| | | Aged (EN 13744) | | ≥ 75% unaged sample | **93** | **Pass** |
| **SHOCKPAD** | | | | | | |
| **Tensile strength (shockpad/e-layer)** | EN 12230 | Unaged | N/mm | > 0.15 MPa | **-** | |
| | | | MPa | | **-** | |
| | | Air aged | N/mm | | **-** | |
| | | | MPa | | **-** | |
| **Shock absorption** | EN 14808 | Unaged | % | - | **-** | |
| **YARN** | | | | | | |
| **Colour change (pile yarn)** | EN ISO 20105-A02 | Artificial weathering (EN 14836: 2005) | Grey scale | ≥ 3 | **Dark: 4-5**<br>**Light: 4**<br>**Fibrill: 4** | **Pass** |
| **Tensile strength (pile yarn)** | EN 13864 | Artificial weathering (EN 14836: 2005) Unaged comparison | % difference | ≤ 50 | **Dark: 1%**<br>**Light: 1%**<br>**Fibrill: 17%** | **Pass** |

## IDENTIFICATION TEST RESULTS

| Characteristic | Test method | Results | Manufacturer declaration | Variation | Pass/ fail |
|---|---|---|---|---|---|
| **ARTIFICIAL TURF** | | | | | |
| **Mass per unit area** | ISO 8543 | **3266** g/ m² | **3525** g/ m² | **7 %** | **Pass** |
| **Tuft per unit area** | ISO 1763 | **8060** m² | **8260** m² | **2 %** | **Pass** |
| **Tuft withdrawal force - Unaged** | ISO 4919 | **48** N | **40** N | **Requirement** ≥85% of declaration and ≥30N **120 %** | **Pass** |
| **Tuft withdrawal force – Water aged** | ISO 4919 | **42** N | **40** N | **Requirement** ≥85% of declaration and ≥30N **105 %** | **Pass** |
| **Pile length** | ISO 2549 | **59** mm | **60** mm | **2 %** | **Pass** |
| **Pile weight** | ISO 8543 | **1941** g/ m² | **2085** g/ m² | **7 %** | **Pass** |
| **Pile Dtex** | - | **18530** Dtex | **19500** Dtex | **5 %** | **Pass** |
| **Gauge** | ISO 1763 | **5/8** Inches | **5/8** Inches | **-** | **Pass** |
| **Tensile properties** Manufactoring direction | ISO 13934-1 | **30**N/mm | **-** N/mm | **Requirement** ≥ 15 N/mm | **Pass** |
| **Tensile properties** Across **m**anufactoring direction | ISO 13934-1 | **34**N/mm | **-** N/mm | **Requirement** ≥ 15 N/mm | **Pass** |
| **Tensile properties** Difference | EN 15330-1 | **13 %** | **- %** | **Requirement** ≤30% of the highest value | **Pass** |
| **Water permeability** | EN 12616 | **4716** mm/h | **>500** mm/h | **Requirement** ≥ 500 mm/h | **Pass** |

| Characteristic | Test method | Results | Manufacturer declaration | Variation | Pass/ fail |
|---|---|---|---|---|---|
| **YARN** | | | | | |
| **Yarn characterisation** DSC | ISO11357-1 | **PE** | **PE** | **Requirement** Same number of peaks, same profile ± 4°C (peak) | **Pass** |
| **Color (RAL)** | RAL | **6003 - 6025 - 6011** | **120 40 30 - 110 40 40 - 130 40 30** | **Requirement** Similar colour | **Pass** |
| **PERFORMANCE INFILL** | | | | | |
| **Particle size** | EN 933 - 1 | **1,0 - 3,15** mm | **1,0 - 3,15** mm | **Requirement** Same d and D | **Pass** |
| **Particle shape** | EN 14955 | **A2-B3** | **A2-B3** | **Requirement** Similar shape | **Pass** |
| **Bulk density** | EN 1097-3 | **0,47** g/ $m^3$ | **0,45** g/ $m^3$ | **4 %** | **Pass** |
| **Color (RAL)** | RAL | **9005** | **-** | **Requirement** Similar colour | **Pass** |
| **STABILISING INFILL** | | | | | |
| **Particle size** | EN 933 - 1 | **0,315 - 0,8** mm | **0,315 - 0,8** mm | **Requirement** Same d and D | **Pass** |
| **Particle shape** | EN 14955 | **C1** | **C1** | **Requirement** Similar shape | **Pass** |
| **Bulk density** | EN 1097-3 | **1,49** g/ $cm^3$ | **1,50** g/ $cm^3$ | **1 %** | **Pass** |
| **SHOCKPAD** | | | | | |
| **Thickness** | EN 1969 | **-** mm | **-** mm | **- %** | **Pass** |
| **Mass per unit area** | EN 430 | **-** Kg/ $m^2$ | **-** Kg/ $m^2$ | **- %** | **Pass** |
| ***PERMITTED VARIATION ±10% OF MANUFACTURER DECLARATION*** | | | | | |

**INFILL DEPTH AND FREE PILE MEASUREMENTS**

| Description | Condition | Units | Measurements |
|---|---|---|---|
| **Sand depth** | Before conditioning | mm | **17** |
| **Rubber depth** | | | **36** |
| **Total infill depth** | After manual conditioning | | **49** |
| **Total infill depth** | After simulated wear 20200 cycles | | **41** |
| **Pile height** | After simulated wear 20200 cycles | | **57** |
| **Free pile height** | After manual conditioning | | **9** |
| | After simulated wear 20200 cycles | | **16** |

## *TEST PERFORMANCE CONDITIONS IN LABORATORY*

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

## *STORAGE TIMES*

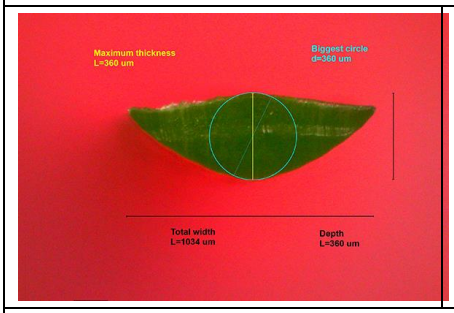
Storage of documents 4 years and samples 1 month from the issue of the report.

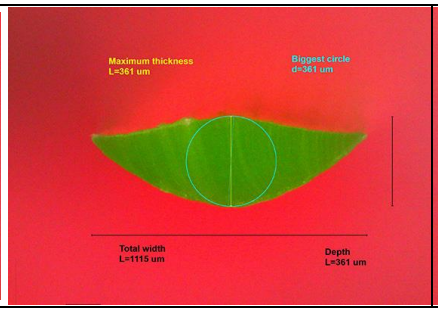
## *SAMPLING*

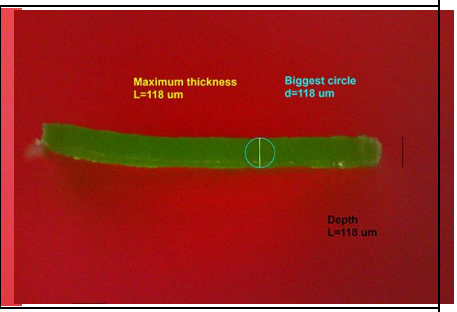
Sampling carried out by the customer.

## PILE YARN

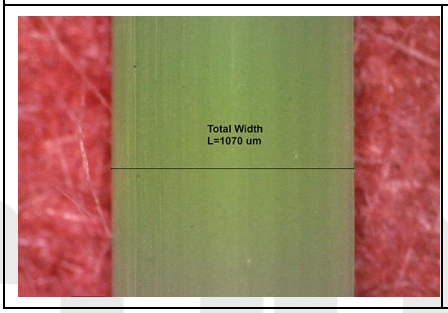
### PROFILE / THICKNESS

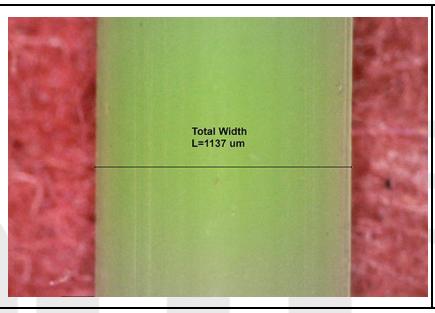


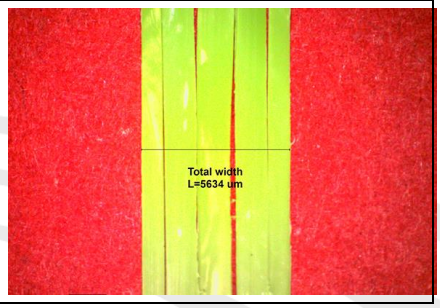




### WIDTH



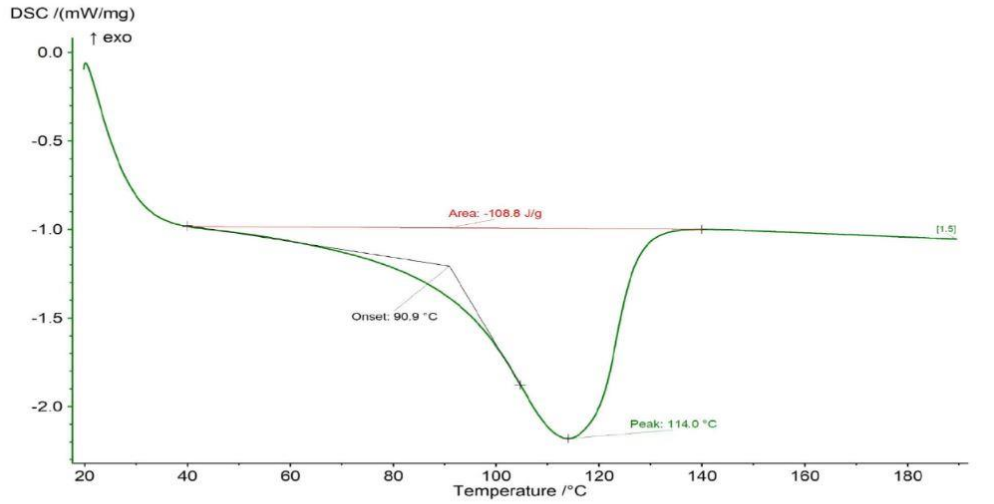




### DSC ANALYSIS Dark green YARN

LABOSPORT GROUP

| | | | |
|---|---|---|---|
| Laboratory: | Labosport Italia Srl | Identity: | 22-0177IT |
| Project: | 22-0177IT | Sample: | VS |
| Operator: | Matteo | Sample mass: | 6.54 mg |
| Date/Time: | 13/04/2022 05:24:55 | Serial number | DSC3500A-1254-L |

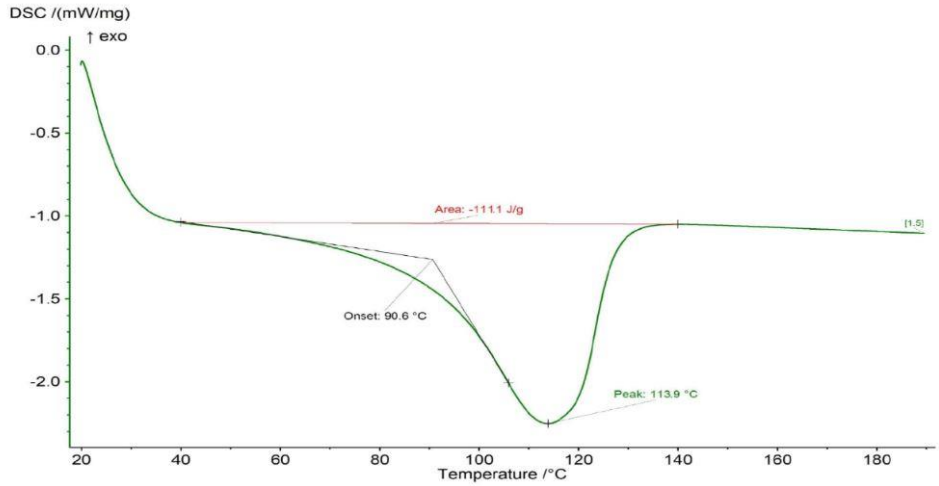



**TEST CYCLES:**
1) Heat from 20,0 °C to 190,0 °C at 20,0 °C/min
2) Hold for 5,0 min at 190,0 °C
3) Cool from 190 °C to 20,0 °C at 20,0 °C/min
4) Hold for 5,0 min at 20,0 °
5) Heat from 20,0 °C to 190,0 °C at 20,0 °C/min

NETZSCH DSC 3500 SERIES

## DSC ANALYSIS Light green YARN

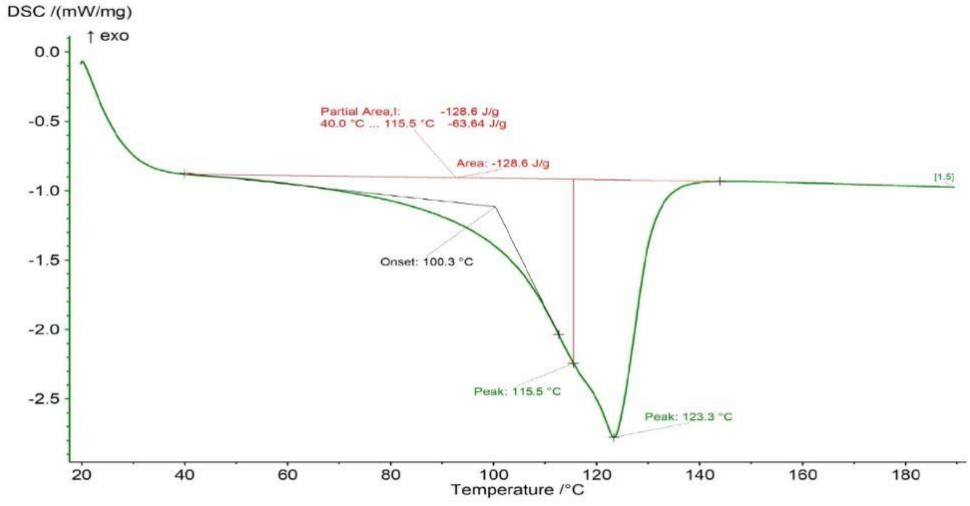
| | | | |
|---|---|---|---|
| **Laboratory:** | Labosport Italia Srl | **Identity:** | 22-0177IT |
| **Project:** | 22-0177IT | **Sample:** | VC |
| **Operator:** | Matteo | **Sample mass:** | 6.55 mg |
| **Date/Time:** | 13/04/2022 04:38:09 | **Serial number** | DSC3500A-1254-L |




**TEST CYCLES:**
1) Heat from 20,0 °C to 190,0 °C at 20,0 °C/min
2) Hold for 5,0 min at 190,0 °C
3) Cool from 190 °C to 20,0 °C at 20,0 °C/min
4) Hold for 5,0 min at 20,0 °
5) Heat from 20,0 °C to 190,0 °C at 20,0 °C/min
NETZSCH DSC 3500 SERIES

## DSC ANALYSIS Fibrillated Lime Green YARN

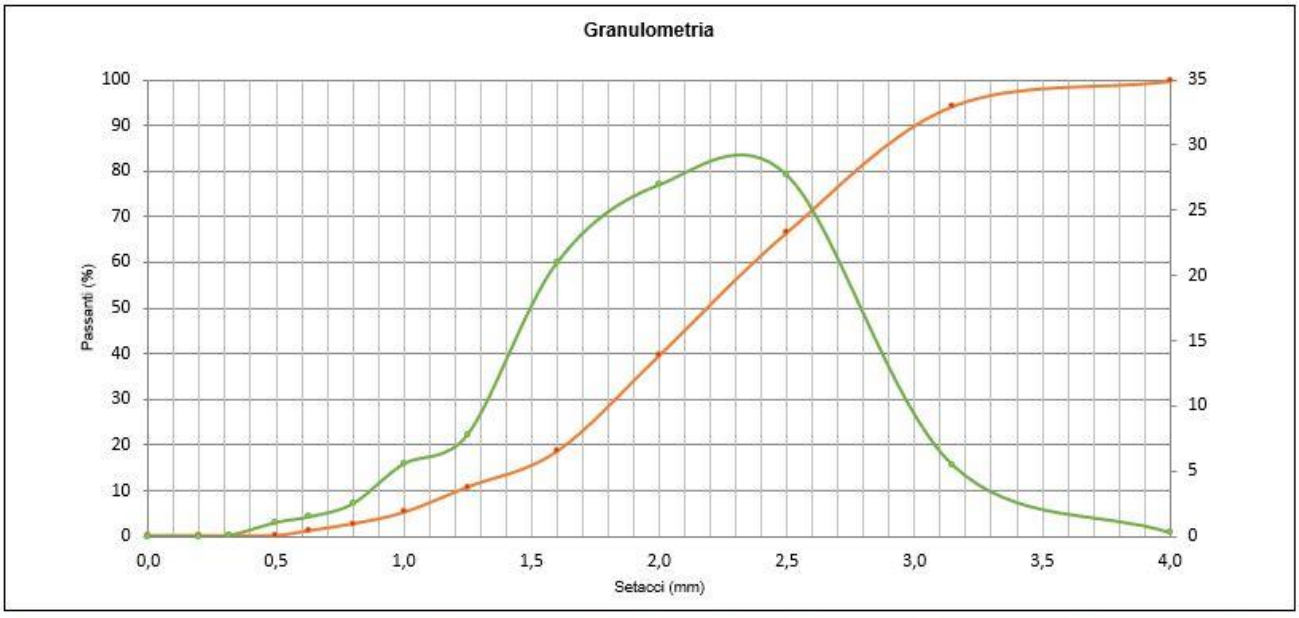
| | | | |
|---|---|---|---|
| **Laboratory:** | Labosport Italia Srl | **Identity:** | 22-0177IT |
| **Project:** | 22-0177IT | **Sample:** | V FIBRILLATO |
| **Operator:** | Matteo | **Sample mass:** | 6.59 mg |
| **Date/Time:** | 13/04/2022 03:51:23 | **Serial number** | DSC3500A-1254-L |




**TEST CYCLES:**
1) Heat from 20,0 °C to 190,0 °C at 20,0 °C/min
2) Hold for 5,0 min at 190,0 °C
3) Cool from 190 °C to 20,0 °C at 20,0 °C/min
4) Hold for 5,0 min at 20,0 °
5) Heat from 20,0 °C to 190,0 °C at 20,0 °C/min
NETZSCH DSC 3500 SERIES

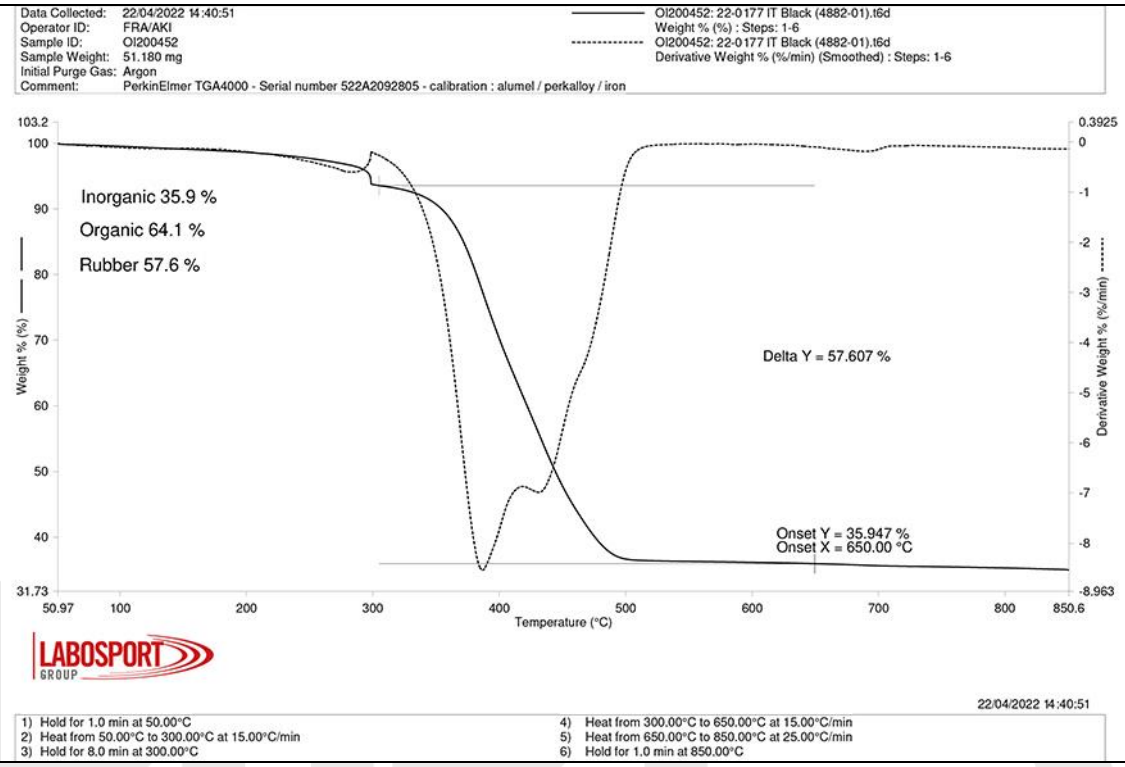
## PERFORMANCE INFILL

### PARTICLE GRADING




| Setacci (mm) | 0 | 0,2 | 0,315 | 0,5 | 0,63 | 0,8 | 1,0 | 1,25 | 1,6 | 2,0 | 2,5 | 3,15 | 4,0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rifiutati (%) | 0 | 0 | 0 | 1 | 1 | 2 | 6 | 8 | 21 | 27 | 28 | 5 | 0 |
| Passanti (%) | 0 | 0 | 0 | 0 | 1 | 3 | 5 | 11 | 19 | 40 | 67 | 94 | 100 |

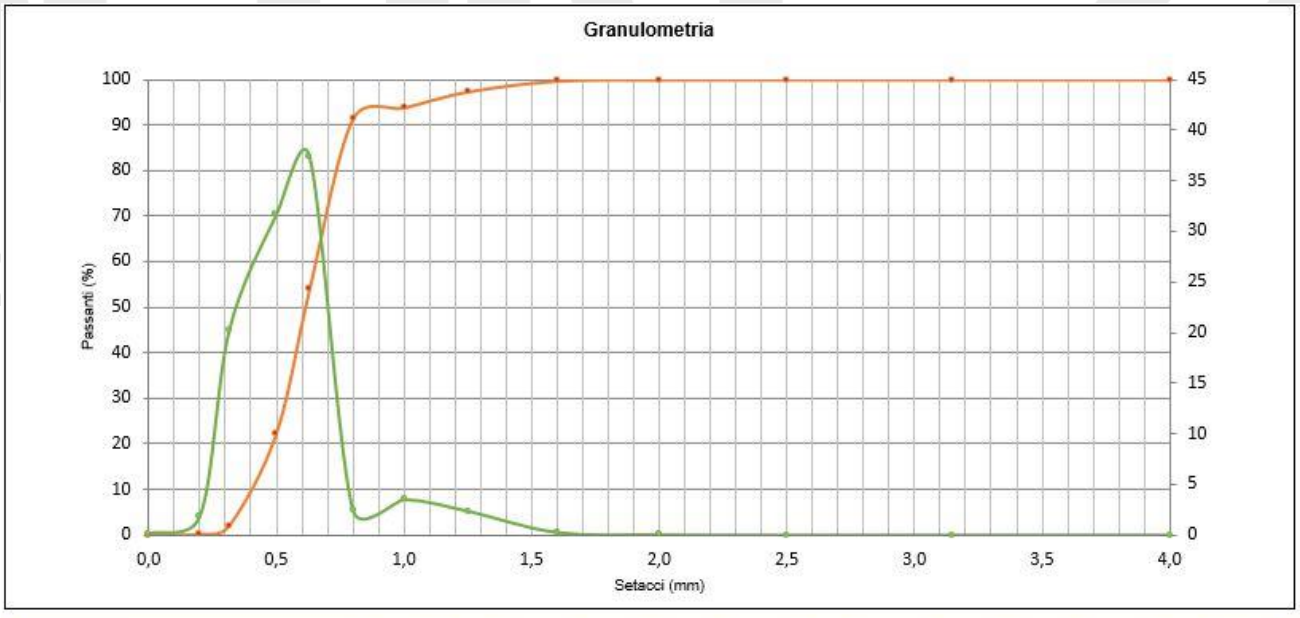
## TGA ANALYSIS




**% organic 64,1** **% inorganic 35,9**

## STABILISING INFILL

### PARTICLE GRADING



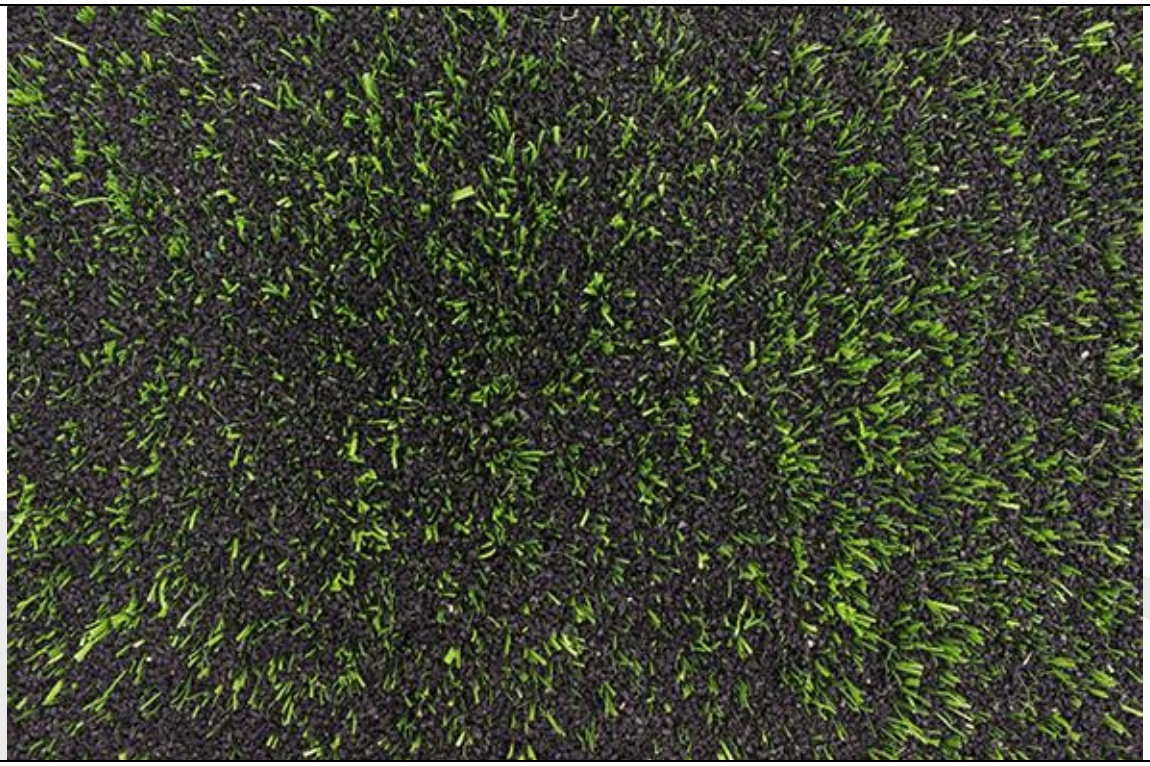
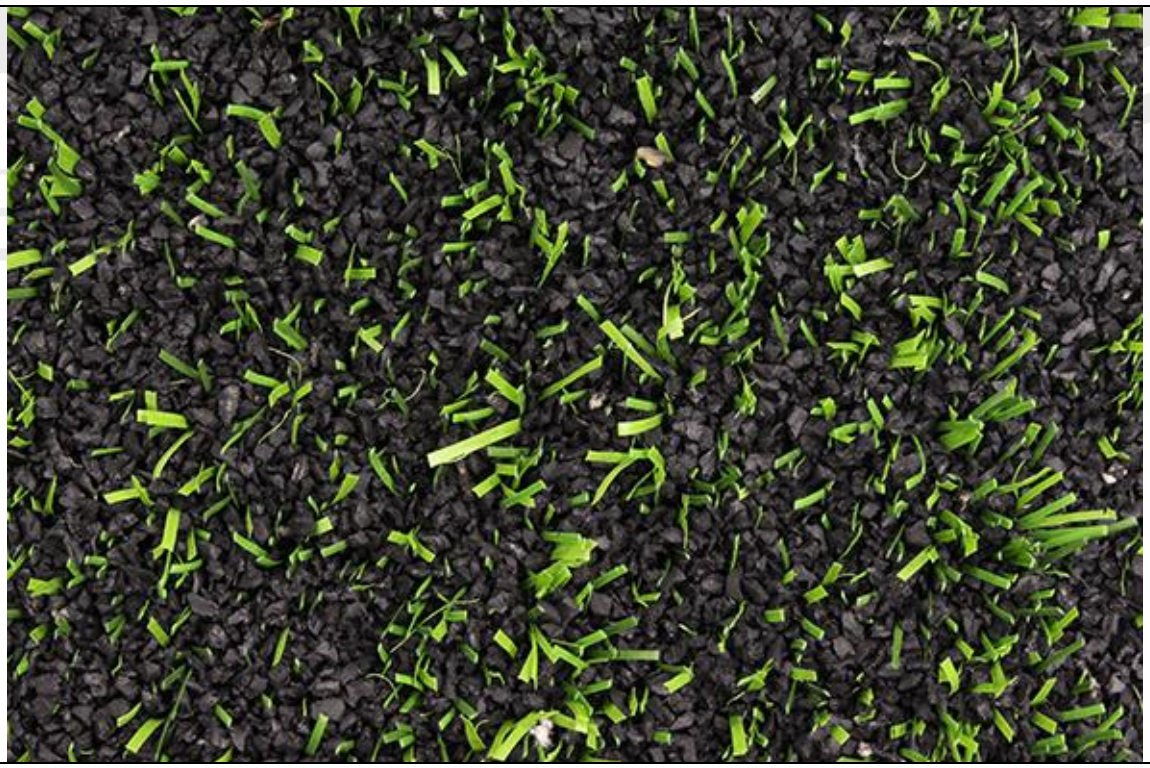

| Setacci (mm) | 0 | 0,2 | 0,315 | 0,5 | 0,63 | 0,8 | 1,0 | 1,25 | 1,6 | 2,0 | 2,5 | 3,15 | 4,0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rifiutati (%) | 0 | 2 | 20 | 32 | 37 | 2 | 4 | 2 | 0 | 0 | 0 | 0 | 0 |
| Passanti (%) | 0 | 0 | 2 | 22 | 54 | 91 | 94 | 97 | 100 | 100 | 100 | 100 | 100 |

## SHOCKPAD

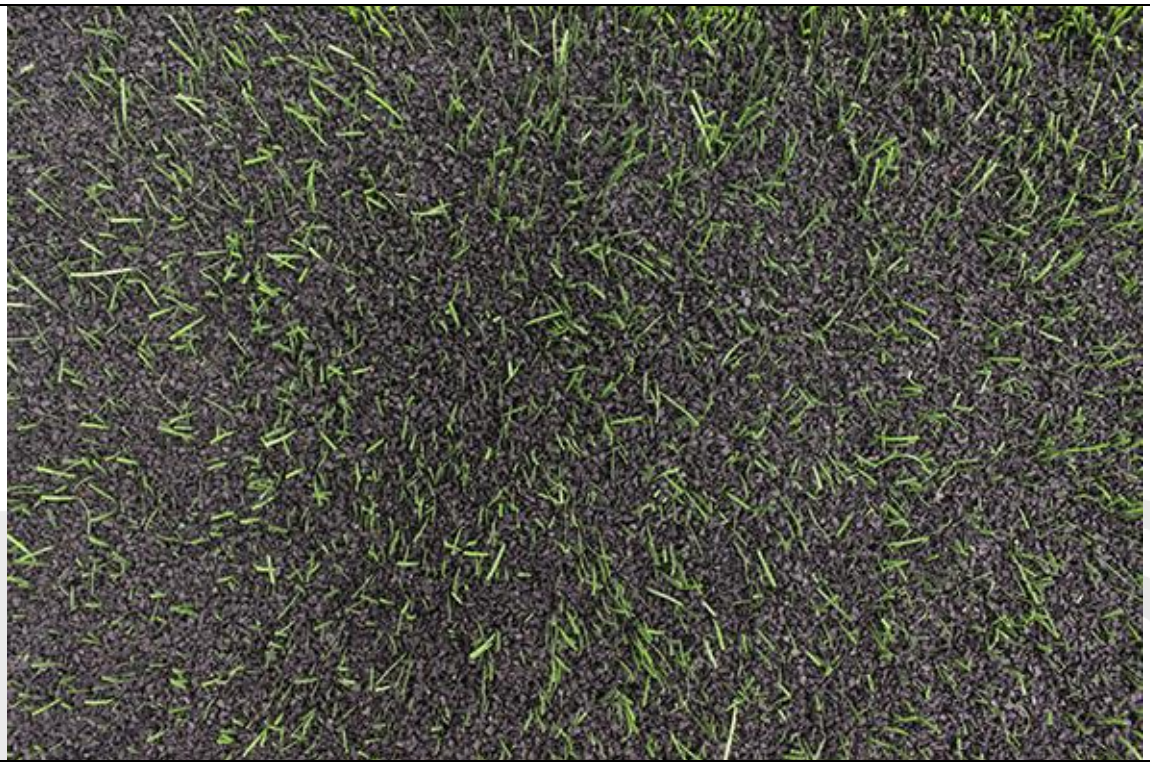
| SIDE - A |
| --- |
| |

| SIDE - B |
| --- |
| |

## SYSTEM PHOTOGRAPHS

| PRE-CONDITIONING |
| --- |
| GENERAL VIEW |
|  |
| CLOSE UP |
|  |

## SYSTEM PHOTOGRAPHS

| AFTER SIMULATED WEAR 20200 CYCLES |
| --- |
| GENERAL VIEW |
|  |
| CLOSE UP |
|  |

## *ADDITIONAL INFORMATION*

The synthetic turf sports surface **HYBRID XWR PRO** has been found to fully comply with the laboratory test requirements of EN 15330-1:2013 surfaces for sports areas – synthetic turf and needle-punched surfaces primarily designed for outdoor use – Part 1 specification for synthetic turf when tested as a surface designed primarily for football.

## *REPORTED BY*

Executive Manager
Roberto Armeni

Synthetic Surface Manager
Davide Giorgini