



FIFA LABORATORY TEST REPORT

TM Football Turf | 2015
01.01.2015

| | |
|-----------------------------|-------------------------------|
| Product | XWR |
| FIFA Licensee | Nurteks Hali San.ve Tic. A.S. |
| Test Institute | Labosport Italia S.r.l. |
| Test Number | 103187 |
| External Test Number | 21-0030IT |
| Date of Test | 26.02.2021 |
| Test Result | Passed |
| Quality Level | FIFA Quality PRO |
| Test Type | Initial |



Licensee

Main Address

| | |
|----------------------|---|
| Name | Nurteks Hali San.ve Tic. A.S. |
| Address | Nurteks Hali San.ve Tic. A.S. Yesilköy Mah. Atatürk Cad. EGS Blokleri No:12 B2 Blok Kat:4 |
| ZIP / City | 34149 / ISTANBUL |
| Website | |
| Contact Email | sales@nurteks.com.tr |
| Contact Phone | |


Test institute


Main Address

| | |
|----------------------|--|
| Name | Labosport Italia S.r.l. |
| Address | Labosport Italia S.r.l. Via Monza, 80 |
| ZIP / City | 23870 / CERNUSCO LOMBARDONE |
| Website | www.labosport.com |
| Contact Email | labosport@labosport.it |
| Contact Phone | +39/ 039 896 26 84 |



Approval

| | |
|--------------------------------|---|
| Test Institute Director | Roberto Armeni |
| Signature |  |
| Date | 25.03.2021 |

| | |
|--------------------------------|---|
| Test Institute Engineer | Matteo Giorgini |
| Signature |  |
| Date | 25.03.2021 |



1 – Test Results

| Name | Comment | Result |
|---|---------|----------------------------------|
| 1 - Summary | | |
| Vertical ball rebound FIFA Quality Pro | | Passed |
| Angle ball rebound FIFA Quality Pro | | Passed |
| Reduced ball roll FIFA Quality Pro | | Passed |
| Shock absorption FIFA Quality Pro | | Passed |
| Deformation FIFA Quality Pro | | Passed |
| Rotational resistance FIFA Quality Pro | | Passed |
| Skin / surface friction | | Passed |
| Skin abrasion | | Passed |
| 1 - Test Details Object | | |
| Product Name | | XWR |
| Product ID | | - |
| Synthetic Turf System | | - |
| Performance infill | | SBR |
| Stabilising infill | | SILICA |
| Shock-pad or elastic layer | | FOAM |
| Sub-base composition | | CONCRETE |
| 2 - Test Details Test Institute | | |
| Date(s) of test | | 26.02.2021 |
| Report created by | | Matteo Giorgini |
| Laboratory Test report number | | 21-0030IT |
| Test Institute Project number | | 21-0030IT |
| 3 – Product Declaration (Manufacturer) | | |
| Manufacturer | | Nurteks Halı San. Tic. As. |
| Tuft pattern | | Straight |
| Yarn manufacturer yarn 1 | | TenCate Thiolon B.V. |
| Product name, code yarn 1 | | MS D2 132/6 XWR FIELD GREEN, S17 |
| Pile yarn profile yarn 1 | | Ellipse |
| Pile thickness (µm) yarn 1 | | 360.0 |
| Pile colour (RAL) value 1 yarn 1 | | RAL 120 40 30 |



| Name | Comment | Result |
|--------------------------------------|----------|---------------------------------|
| Pile colour (RAL) value 2 yarn 1 | | - |
| Pile colour (RAL) value 3 yarn 1 | | - |
| Pile width (mm) yarn 1 | | 1.10 |
| Number of tufts/m2 yarn 1 | ISO1773 | 8260.00 |
| Pile length (mm) yarn 1 | ISO 2549 | 42.00 |
| Pile weight (g/m2) yarn 1 | ISO 8543 | 555.00 |
| Pile yarn characterization yarn 1 | | PE |
| Pile yarn dtex yarn 1 | | 7000 |
| Yarn manufacturer yarn 2 | | TenCate Thiolon B.V |
| Product name, code yarn 2 | | MS D2 132/6 XWR LIME GREEN, S18 |
| Pile yarn profile yarn 2 | | Elipse |
| Pile thickness (µ m) yarn 2 | | 360.0 |
| Pile colour (RAL) value 1 yarn 2 | | RAL 110 40 40 |
| Pile colour (RAL) value 2 yarn 2 | | - |
| Pile colour (RAL) value 3 yarn 2 | | - |
| Pile width (mm) yarn 2 | | 1.10 |
| Number of tufts/m2 yarn 2 | ISO1773 | 8260.00 |
| Pile length (mm) yarn 2 | ISO 2549 | 42.00 |
| Pile weight (g/m2) yarn 2 | ISO 8543 | 555.00 |
| Pile yarn characterization yarn 2 | | PE |
| Pile yarn dtex yarn 2 | | 7000.0 |
| Yarn manufacturer yarn 3 | | - |
| Product name, code yarn 3 | | - |
| Pile yarn profile yarn 3 | | - |



| Name | Comment | Result |
|--|----------|------------|
| Pile thickness (μ m) yarn 3 | | 0.0 |
| Pile colour (RAL) value 1 yarn 3 | | - |
| Pile colour (RAL) value 2 yarn 3 | | - |
| Pile colour (RAL) value 3 yarn 3 | | - |
| Pile width (mm) yarn 3 | | 0.00 |
| Number of tufts/m ² yarn 3 | ISO1773 | 0.00 |
| Pile length (mm) yarn 3 | ISO 2549 | 0.00 |
| Pile weight (g/m ²) yarn 3 | ISO 8543 | 0.00 |
| Pile yarn characterization yarn 3 | | 0 |
| Pile yarn dtex yarn 3 | | 0.0 |
| Primary backing Product name, code | | H18 |
| Primary backing Manufacturer | | Tencate |
| Re-enforcement scrim Product name, code | | - |
| Re-enforcement scrim Manufacturer | | - |
| Secondary backing Product name, code | | SBR Latex |
| Secondary backing Manufacturer | | Styron |
| Secondary backing Dry application rate (g/m ²) | | 1100.0 |
| Carpet Minimum tuft withdrawal force (N) | | 40 |
| Carpet Carpet mass per unit area [g/m ²] | | 2570.0 |
| Method of jointing | | Bonded |
| Bonded joints Adhesive brand name | | Ayka Floor |



| Name | Comment | Result |
|--|---------------|---------------------------|
| Bonded joints Adhesive manufacturer | | Ayka Floor |
| Bonded joints Application rate (g/m) | | 200 |
| Bonded joints Jointing film brand name | | Helmetin |
| Bonded joints Jointing film manufacturer | | Serta Tekstil |
| Stitched seams Tread brand name/product code | | - |
| Stitched seams Tread manufacturer | | - |
| Stitched seams Stitch rate (stitch per 1m) | | 0.000 |
| Performance Infill Product name, code | | NRT SBR RUBBER |
| Performance Infill Manufacturer | | NURTEKS HALI SAN. TİC.AŞ. |
| Performance Infill Material type | | BLACK SBR |
| Performance Infill Material grading | | 1,0-3,15 |
| Performance Infill Particle shape | prEN 14955 | A2-B3 |
| Performance Infill Particle size range | EN 933-Part 1 | 1,0-3,15 |
| Performance Infill Bulk density (g/cm ³) | EN 1097-3 | 0.450 |
| Performance Infill Application rate (kg/m ²) | | 10.5 |
| Stabilising Infill Product name, code | | Silica Sand |
| Stabilising Infill Manufacturer | | Emek, Fares Kum |
| Stabilising Infill Material type | | Silica |
| Stabilising Infill Material grading | | 0,315-0,8 |
| Stabilising Infill Particle shape | prEN 14955 | Round high sphericity-C1 |



| Name | Comment | Result |
|---|---------------|------------------|
| Stabilising Infill Particle size range | EN 933-Part 1 | 0,315-0,8 |
| Stabilising Infill Bulk density (g/cm ³) | EN 1097-3 | 1.50 |
| Stabilising Infill Application rate (kg/m ²) | | 10.0 |
| Shockpad, E-layer Product name, code | | Foamex Shock Pad |
| Shockpad, E-layer Manufacturer | | Berkosan |
| Shockpad, E-layer Type | | Foam |
| Shockpad, E-layer Composition | | - |
| Shockpad, E-layer Bulk density (g/cm ³) | | 40.00 |
| Shockpad, E-layer Thickness | EN 1969 | 8.8 |
| Shockpad, E-layer Shock absorption (%) | FIFA 4a | 24.8 |
| Shockpad, E-layer Deformation | FIFA 5a | 5.8 |
| Shockpad, E-layer Tensile strength (MPa) | | 0.17 |
| Shockpad, E-layer Mass per unit area (kg/m ²) | | 0.0 |
| Other, detail | | - |
| 3 – Test Results Player / Surface Interaction | | |
| Rotational Resistance Initial Dry (Pro) | 32 - 43 Nm | 41 |
| Rotational Resistance Initial Wet (Pro) | 32 - 43 Nm | 38 |
| 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 | 0 |
| 3 – Test Results Product identification field product | | |
| Performance infill Thermographic analysis Elastomer [%] - | | 58.7 |



| Name | Comment | Result |
|---|---------|------------|
| Product Declaration | | |
| Performance infill Thermographic analysis Inorganic [%] - Product Declaration | | 35.2 |
| Performance infill Thermographic analysis Organic [%] - Product Declaration | | 64.8 |
| 4 – Product Identification | | |
| Artificial Turf Carpet mass per unit area [g/m ²] | | 2567 |
| Artificial Turf Tufts per unit area [m ²] | | 9072 |
| Artificial Turf Pile length above backing [mm] | | 42.0 |
| Artificial Turf Pile weight [g/m ²] | | 1125 |
| Detailed tuft decitex (Dtex) [g/1000m] | | 13694 |
| Artificial Turf Water permeability of carpet [mm/h] | | 5625 |
| Artificial Turf Free pile height | | 11 |
| Performance infill Particle size range [mm] | | 0,8 - 3,15 |
| Performance infill Particle shape | | A2 - B3 |
| Performance infill Bulk density [g/cm ³] | | 0.470 |
| Performance infill Infill depth [mm] | | 29 |
| Performance infill Thermographic analysis organic [%] | | 62 |
| Performance infill Thermographic analysis inorganic [%] | | 38 |



| Name | Comment | Result |
|---|----------------------------|-----------|
| Stabilising infill Particle size range [mm] | | 0,5 - 1,0 |
| Stabilising infill Particle shape | | C2 |
| Stabilising infill Bulk density [g/cm ³] | | 1.36 |
| Shock pad / E-layer Shock absorption [%] | if part of supplied system | 24.8 |
| Shock pad / E-layer Deformation | if part of supplied system | 5.8 |
| Shock pad / E-layer Thickness | if part of supplied system | 8.8 |
| Other, detail | | - |
| 5 – Test Results Ball / Surface interaction | | |
| Vertical Ball Rebound Initial Dry (Pro) | 0.6 - 0.85m | 0.79 |
| Vertical Ball Rebound Initial Wet (Pro) | 0.6 - 0.85m | 0.75 |
| Vertical Ball Rebound after simulated wear 3'000 cycles (5*) | 0.6 - 0.85m | 0.85 |
| Vertical Ball Rebound after simulated wear 3'000 cycles (20*) | 0.6 - 0.85m | 0.00 |
| Angle Ball Rebound Dry | 45 - 60 % | 55 |
| Angle Ball Rebound Wet | 45 - 80 % | 65 |
| Reduced Ball Roll Initial Dry (Pro) | 4 - 8 m | 7.1 |
| Reduced Ball Roll after simulated wear 3'000 cycles (5*) Dry | 4 - 8 m | 7.5 |
| Reduced Ball Roll after simulated wear 3'000 cycles (5*) Wet | 4 - 8 m | 7.7 |
| Reduced Ball Roll after simulated wear 3'000 cycles (20*) Dry | 4 - 8 m | 0.0 |
| Reduced Ball Roll after simulated | 4 - 8 m | 0.0 |



| Name | Comment | Result |
|--|---------------------|--------|
| wear 3'000 cycles (20*) Wet | | |
| Shock absorption Initial Dry (Pro) | 62 - 68 % | 64.9 |
| Shock absorption Initial Wet (Pro) | 62 - 68 % | 64.5 |
| Shock absorption after simulated wear 3'000 cycles (5*) | 62 - 68 % | 62.6 |
| Shock absorption after simulated wear 3'000 cycles (20*) | 62 - 68 % | 0.0 |
| Shock absorption 50°C | 57 - 68 % | 66.20 |
| Shock absorption -5°C | 57 - 68 % | 66.90 |
| Other, detail | | - |
| 5 – Test Results Player / Surface interaction | | |
| Deformation Initial Dry (Pro) | 4 - 10 mm | 10.0 |
| Deformation Initial Wet (Pro) | 4 - 10 mm | 10.0 |
| Deformation after simulated wear 3'000 cycles (5*) | 4 - 10 mm | 9.5 |
| Deformation after simulated wear 3'000 cycles (20*) | 4 - 10 mm | 0.0 |
| Skin / surface friction Dry | 0.35 - 0.75 μ | 0.60 |
| Skin / surface friction Dry 3'000 cycles | 0.35 - 0.75 μ | 0.68 |
| Skin / surface friction Dry 6'000 cycles | 0.35 - 0.75 μ | 0.00 |
| Skin abrasion Dry | \pm 30 % | 17 |
| Skin abrasion Dry 3'000 cycles | \pm 30 % | 26 |
| Skin abrasion Dry 6'000 cycles | \pm 30 % | 0 |
| 6 – Environmental impact (artificial, light, water) | | |
| Pile yarn 1 Colour change after artificial weathering | \geq Grey scale 3 | 5 |
| Pile yarn 2 Colour change | \geq Grey scale 3 | 5 |



| Name | Comment | Result |
|---|----------------|--------|
| after artificial weathering | | |
| Pile yarn 3 Colour change after artificial weathering | ≥ Grey scale 3 | 0 |
| Pile yarn 1 Peak Breakage Force before artificial weathering | | 15.20 |
| Pile yarn 1 Peak Breakage Force after artificial weathering | | 15,1 |
| Pile yarn 1 Peak Breakage Force Green Reference value before artificial weathering | | 15.20 |
| Pile yarn 1 Peak Breakage Force Variation after weathering from Green Reference value | Change ≤ 25 % | 0.70 |
| Pile yarn 2 Peak Breakage Force before artificial weathering | | 13.60 |
| Pile yarn 2 Peak Breakage Force after artificial weathering | | 14,3 |
| Pile yarn 2 Peak Breakage Force Green Reference value before artificial weathering | | 13.60 |
| Pile yarn 2 Peak Breakage Force Variation after weathering from Green Reference value | Change ≤ 25 % | 5.10 |
| Pile yarn 3 Peak Breakage Force before artificial weathering | | 0.00 |
| Pile yarn 3 Peak Breakage Force after artificial weathering | | - |



| Name | Comment | Result |
|---|---------------------|------------|
| Pile yarn 3 Peak Breakage Force Green Reference value before artificial weathering | | 0.00 |
| Pile yarn 3 Peak Breakage Force Variation after weathering from Green Reference value | Change \leq 25 % | 0.00 |
| Polymeric infill Colour change after artificial weathering | \geq Grey scale 3 | 5 |
| Polymeric infill Visual change in composition after artificial weathering | No change | No change |
| Complete system Water permeability | $>$ 180 mm/h | 3843 |
| Stitched joints Strength un-aged | \geq 1000N/100mm | 0 |
| Stitched joints Strength water aged | \geq 1000N/100mm | 0 |
| Bonded joints Strength un-aged | \geq 75/100mm | 100 |
| Bonded joints Strength water aged | \geq 75/100mm | 93 |
| Carpet tuft Withdrawal force un-aged | \geq 40N | 63 |
| Carpet tuft Withdrawal force water aged | \geq 40N | 52 |
| Heat Category | for information | Category 3 |
| 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 | \geq 0.15 MPa | 0.17 |
| Sub-base Composition | | - |

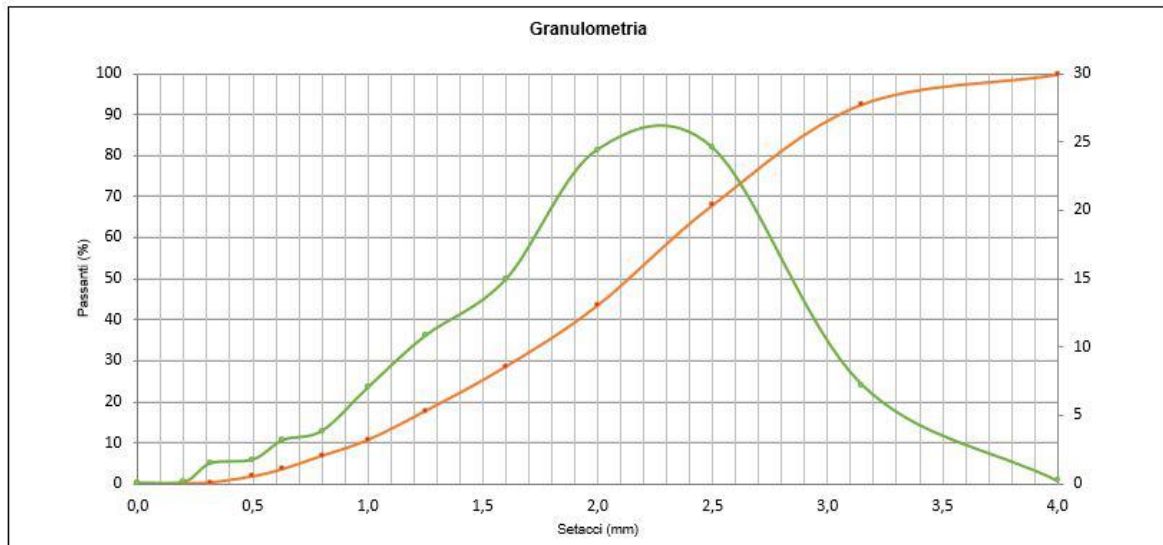


| Name | Comment | Result |
|-------------------------------------|---------|--|
| Sub-base Particle size range | | - |
| Sub-base Particle shape | | - |
| Sub-base Thickness | | - |
| Sub-base Compaction & test method | | - |
| Other, detail | | <p>Due to different DSC devices and potential difference in the test method used, the shape and peak temperatures of the DSC analysis may differ from the FIFA requirement.</p> <p>MS D2 132/6 XWR FIELD GREEN, S17 UVA report SPORTSLABS number 16744/1375 issued on 07/07/2016.</p> <p>MS D2 132/6 XWR LIME GREEN, S18 UVA report SPORTSLABS number 16744/1798 issued on 07/07/2016.</p> |



2 – Test Images

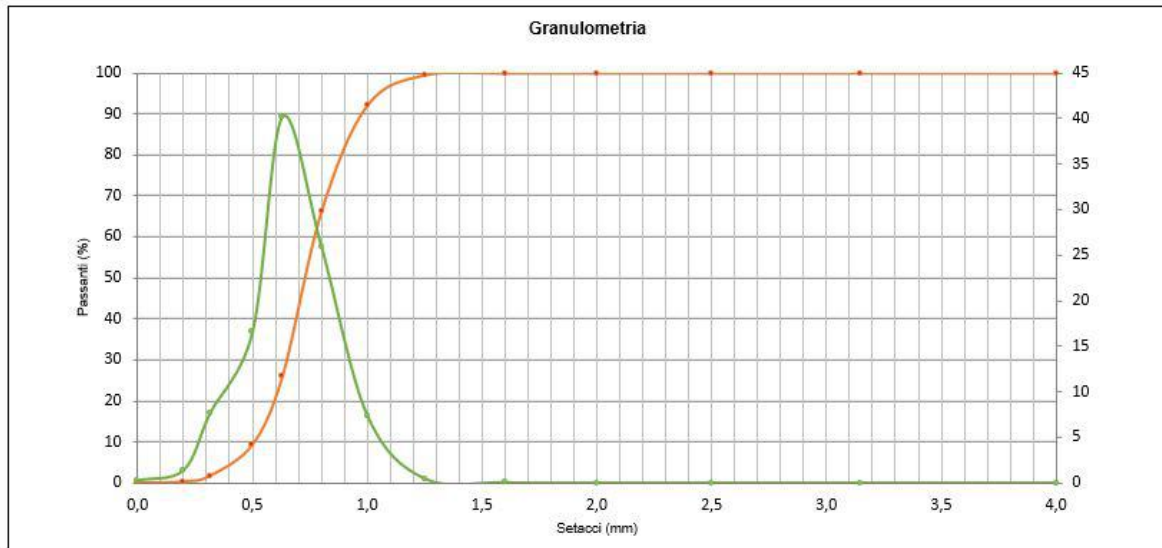
Performance infill particle grading curve



| 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 | 2 | 2 | 3 | 4 | 7 | 11 | 15 | 24 | 25 | 7 | 0 |
| Passanti (%) | 0 | 0 | 0 | 2 | 4 | 7 | 11 | 18 | 29 | 44 | 68 | 93 | 100 |



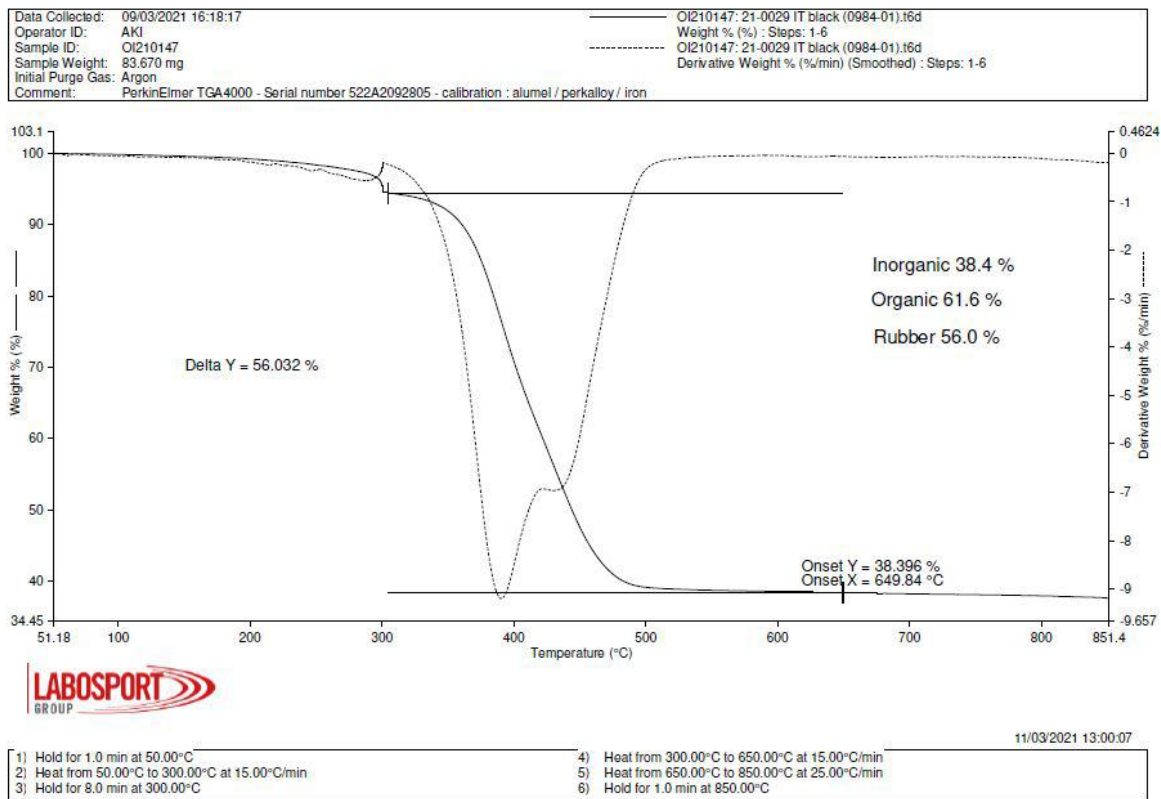
Stabilising infill particle grading curve



| 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 | 1 | 8 | 17 | 40 | 26 | 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| Passanti (%) | 0 | 0 | 2 | 9 | 26 | 66 | 92 | 100 | 100 | 100 | 100 | 100 | 100 |



TGA of performance infill



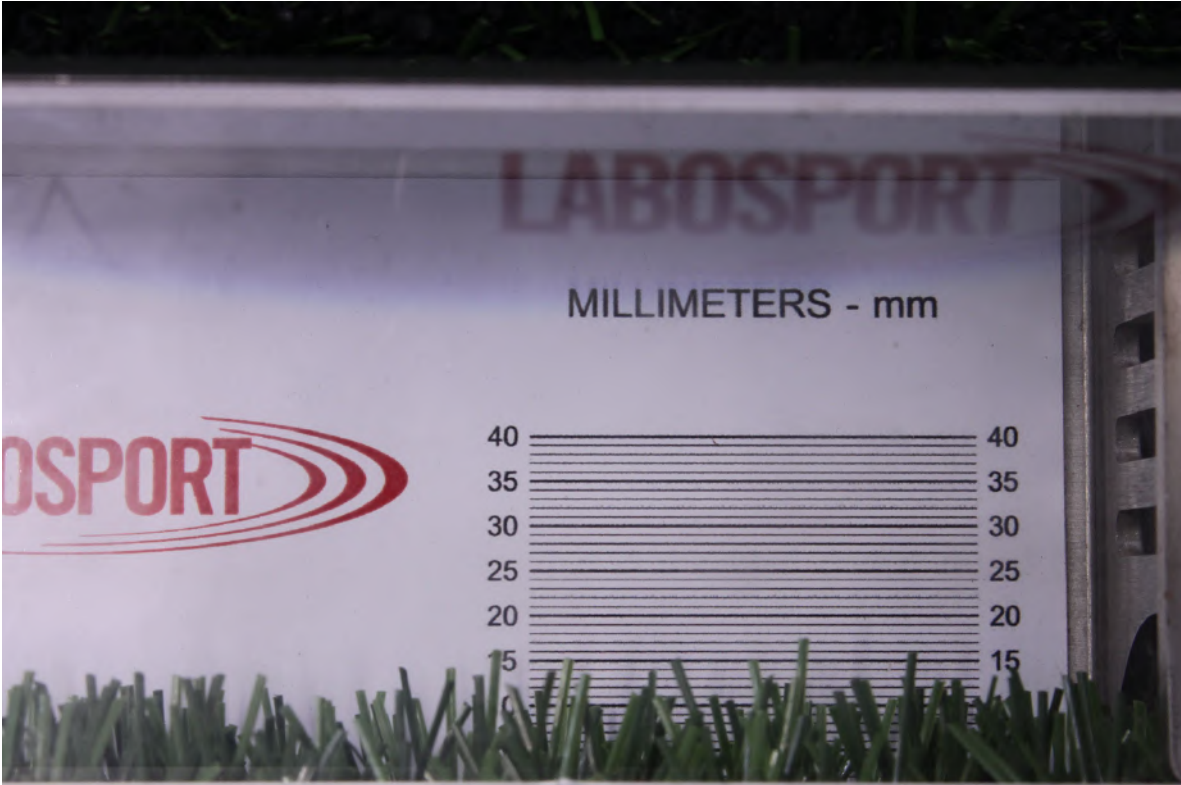


Simulated wear - Before 1





Simulated wear - Before 2

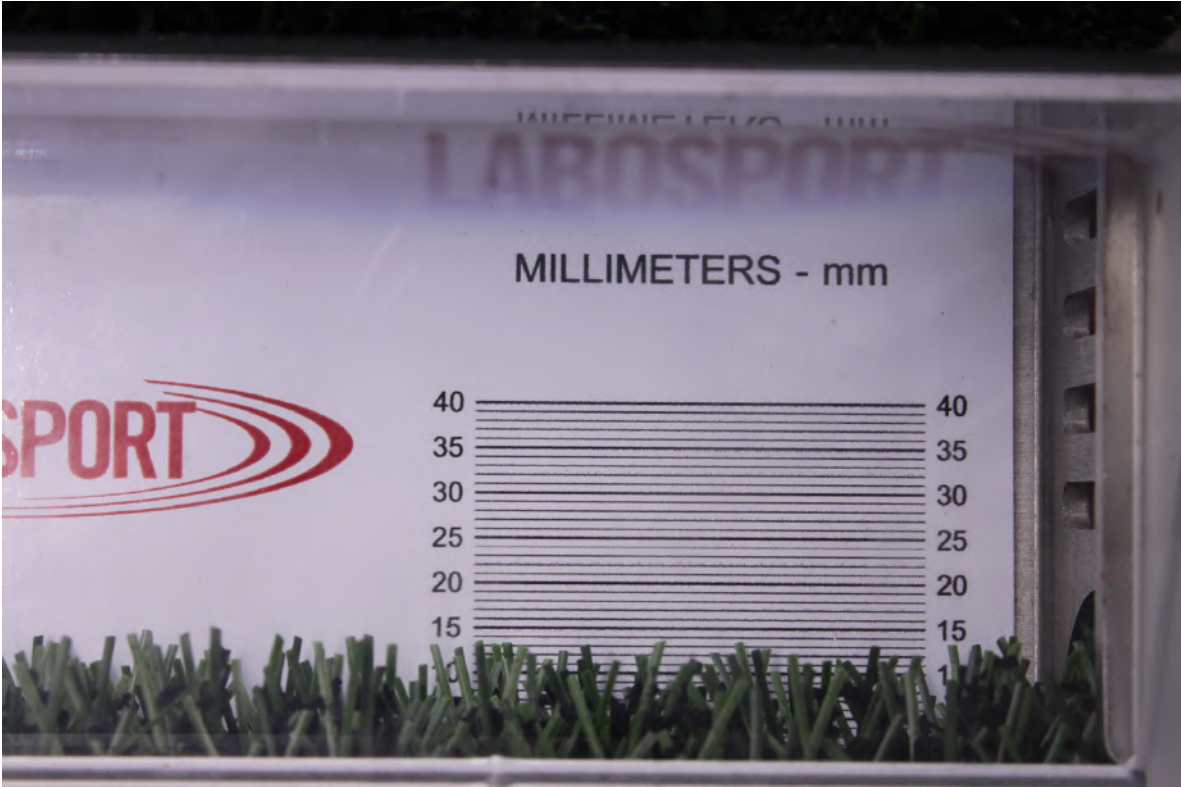


Simulated wear - After 1





Simulated wear - After 2

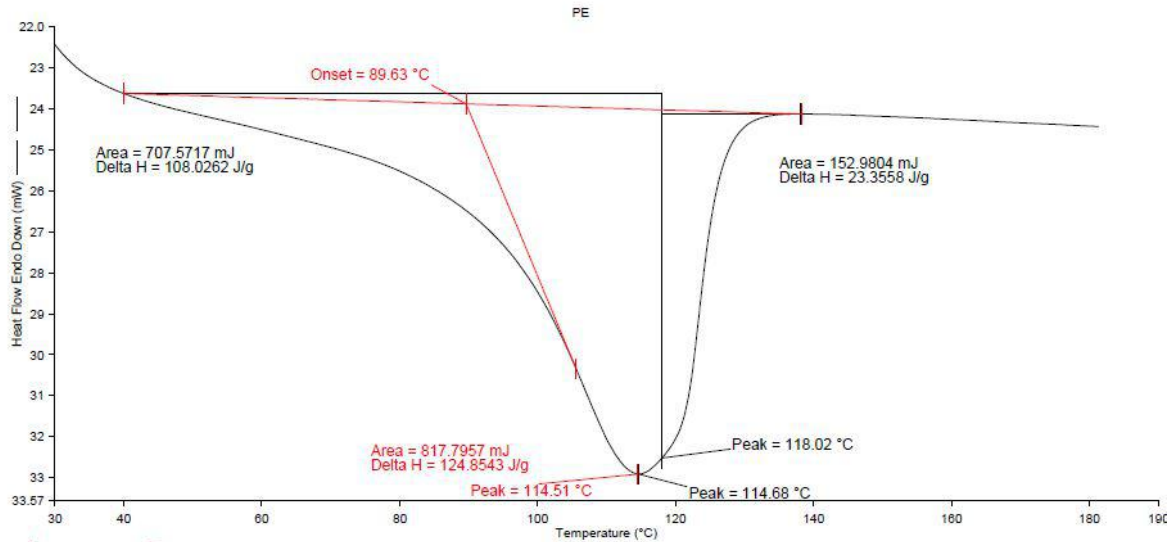




Yarn Characteristics DSC

Data Collected: 05/02/2021 11:08:13
 Operator ID: AKI
 Sample ID: OI210074
 Sample Weight: 6.550 mg
 Initial Purge Gas: Argon
 Comment: NF EN ISO 11357-3; Perkin Elmer Thermal Analysis DSC 4000 Serial Number : 520B19120202

OI210074: 21-0030 IT Light green (0490-02).d8d
 Unsubtracted Heat Flow Endo Down (mW) : Step: 5



12/02/2021 16:17:47

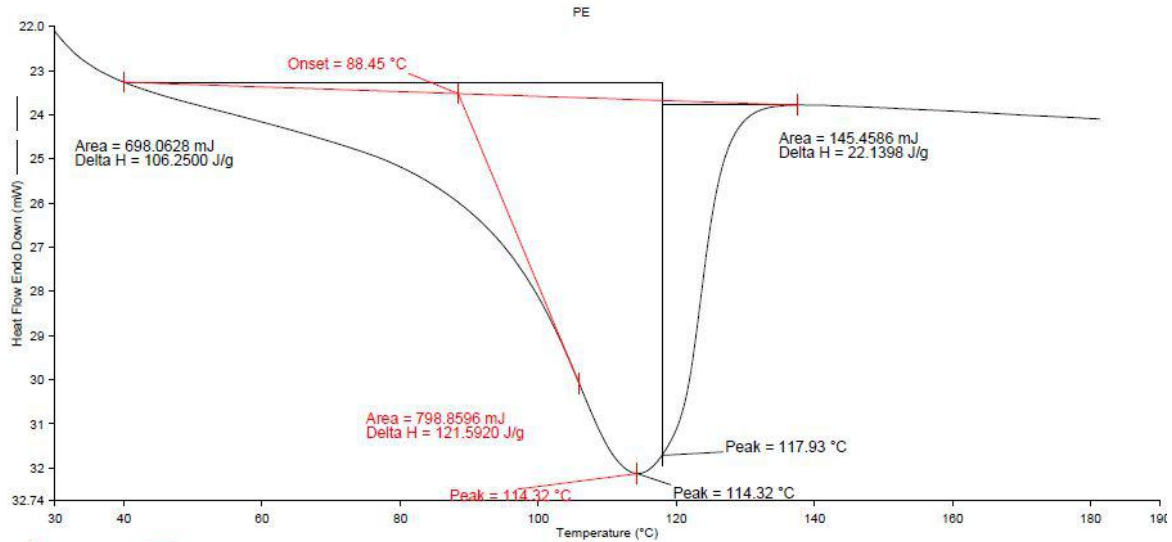
1) Heat from 20.00°C to 190.00°C at 20.00°C/min
 2) Hold for 5.0 min at 190.00°C
 3) Cool from 190.00°C to 20.00°C at 20.00°C/min
 4) Hold for 5.0 min at 20.00°C
 5) Heat from 20.00°C to 190.00°C at 20.00°C/min



Yarn Characteristics DSC - 2

Data Collected: 05/02/2021 10:16:58
 Operator ID: AKI
 Sample ID: OI210074
 Sample Weight: 6.570 mg
 Initial Purge Gas: Argon
 Comment: NF EN ISO 11357-3: Perkin Elmer Thermal Analysis DSC 4000 Serial Number : 520B19120202

OI210074: 21-0030 IT Dark green (0460-01).d6d
 Unsubtracted Heat Flow Endo Down (mW) : Step: 5



12/02/2021 16:21:28

1) Heat from 20.00°C to 190.00°C at 20.00°C/min
 2) Hold for 5.0 min at 190.00°C
 3) Cool from 190.00°C to 20.00°C at 20.00°C/min
 4) Hold for 5.0 min at 20.00°C
 5) Heat from 20.00°C to 190.00°C at 20.00°C/min

Stabilising Infill - picture

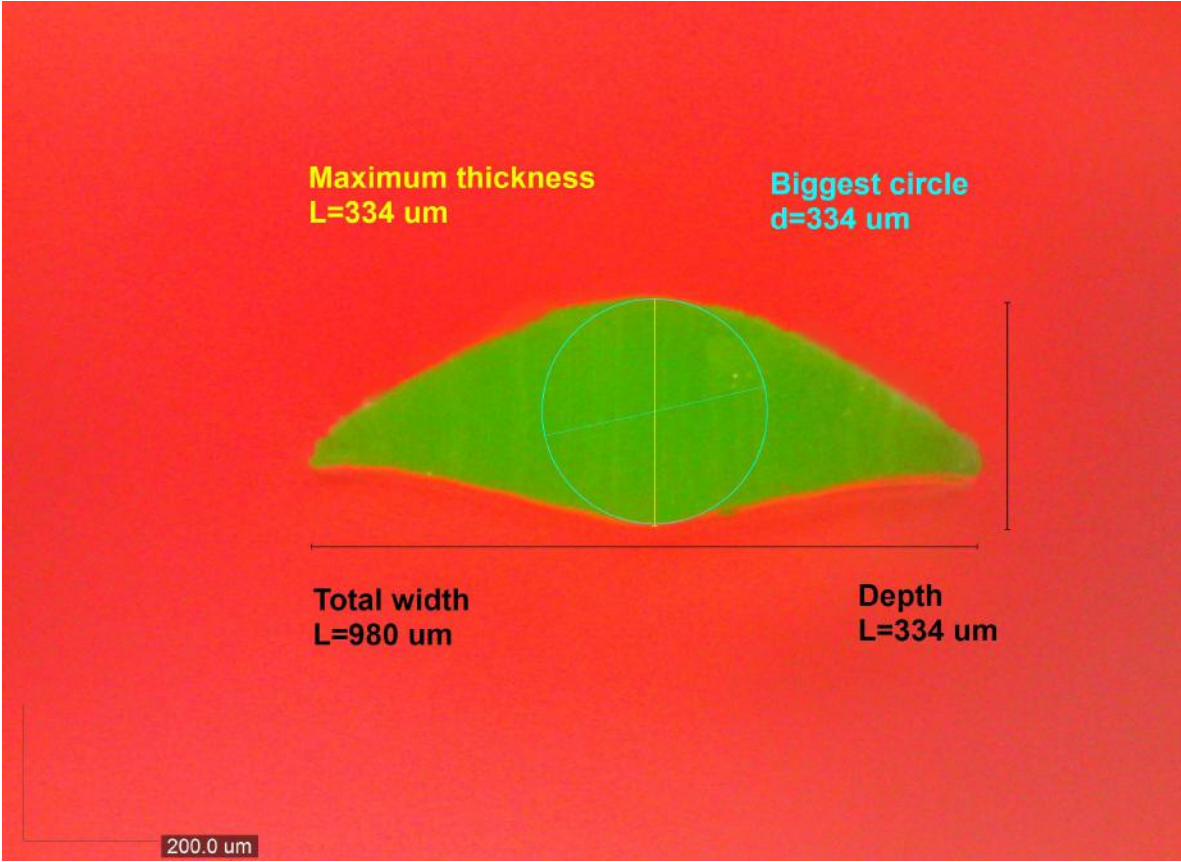


Performance Infill - picture





Cross-section Yarn 1





Cross-section Yarn 2

