AirDrain – What drains better than Air?

For Synthetic Turf No Rubber Infill Solution

The consistent Gmax and Shock Attenuation properties of the AirDrain system are major contributors to the safety of players and the reduction of concussions. Unlike traditional shock pads or e-layers, AirDrain is 1” high, has 92% air void and 100% vertical drainage. AirDrain’s performance cannot be matched by any other product in the industry.

A No Rubber Infill Solution provided for Sports Fields, Play Areas and general purpose use reduces maintenance, upkeep and cleaning the surrounding area of rubber pieces that tend to find their way off the field.

Some of the Benefits of an AirField Synthetic Turf Drainage System include:

- AirDrain creates and helps maintain a constant Gmax for Synthetic Turf
- ASTM testing proves AirDrain’s shock absorption properties reduces Gmax
- AirDrain creates a 1” air void allowing for 100% vertical drainage over the whole installation
- Patented expansion and contraction built into every part which keeps the grid from buckling
- AirDrain is only limited by the drainage capacities of the profile above and the exit drains below
- AirDrain can be reused when the synthetic turf must be replaced

*This drawing, specifications and the information contained herein is for general presentation purposes only. All final drawings and layouts should be determined by a licensed engineer(s). HIC & Gmax testing are measured in a lab setting and are not site specific.
Synthetic Turf No Rubber Infill Detail

Synthetic Grass Surface
1.125" 69oz turf w/ 2.0lbs/ft² non rubber infill installed

Geotextile Filter Fabric (4oz Non Woven)
Geotextile Filter Fabric (10oz Non Woven)

AirDrain™

Perimeter nailer board attached to base with typical screws or nails

Compacted Aggregate Base Per Engineer

AirDrain™ Unit Panel Specifications:
Size: 32" x 32" x 1"
Weight: 3.1 lb
Strength: 233 psi (unfilled)
Resin: 100% Recycled (PIR) Copolymer with Impact Modifier "No Break" Polymer Material
Color: Black (3% carbon black added for UV Protection)

Airfield Systems
8028 N. May Ave., Suite 201
Oklahoma City, OK 73120
(405) 359-3775
www.airfieldsystems.com

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## TEST REPORT

### CLIENT:

**Company:** Airfield Systems  
**Address:** 8028 North May Avenue, Suite 201, Oklahoma City, OK 73120  
**Requested By:** Michael Bean  
**Report Number:** 66090  
**Lab Test Number:** 2781-6357  
**Test Completion Date:** 1/15/2016  
**Report Date:** 1/15/2016

### TEST MATERIAL:

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Date Received</th>
<th>Material Condition</th>
<th>Turf and Infill ID</th>
<th>Fabric ID</th>
<th>Grid ID</th>
<th>Fabric ID</th>
<th>Base ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthetic Turf over Pad System</td>
<td>1/4/2016</td>
<td>EXCELLENT</td>
<td>MSP 69 with 2.0 lbs/ft² Envirofill installed (TOP)</td>
<td>4 oz Non-Woven Filter Fabric</td>
<td>AirDrain</td>
<td>10 oz Non-Woven Filter Fabric</td>
<td>2” #7 &amp; #81 Rock (bottom) + 1” Compacted Fines Layer (top) (GROUND)</td>
</tr>
</tbody>
</table>

### TESTING METHODS REQUESTED:

- Testing Services Inc. was instructed by the client to test for the following:
  - Standard: ASTM F355a

### SAMPLING PLAN:

- Sampling Date: 1/14/2016
- Specimen sampling is performed in the sampling department at TSI.
- The sampling size of specimens is determined by the test method requirements.
- In the event a specific sampling size is not called for, a determination will be made based on previous testing experience, and approved for use by an authorized manager.
- All samples are subjected to the outside environmental conditions of temperature and relative humidity.
- Sample requiring predetermined exposure to specified environmental conditions based on a specific test method, take place in the departments in which they are tested.

### TEST SUMMARY:

<table>
<thead>
<tr>
<th>TEST METHOD</th>
<th>TEST DESCRIPTION</th>
<th>TEST RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F355-10a</td>
<td>Impact Attenuation (Gmax)</td>
<td>126</td>
</tr>
</tbody>
</table>

- Test Conditions: 63°F, 29% RH  
- Drop 1: 107 Drop 2: 128 Drop 3: 123  
- Drop Height: 24"  
- Missile Weight: 9.1 kg (20 lbs)  
- Missile Velocity: 3.4 meters/second  
- Pile Hit: 28 mm

### Uncertainty:

We undertake all assignments for our clients on a best effort basis. Our findings and judgments are based on the information to us using the latest test methods available. TSI can only ensure the test results for the specific items tested. Unless otherwise noted in the deviations sections of this report, all tests performed are in compliance with stated test method.

Test Report Approval:

Erle Miles, Jr. VP, Testing Services Inc

TSi Accreditation: Our laboratory is accredited by the US Dept of Commerce, National Institute of Standards and Technology: ISO/IEC 17025:2005. Our code # is: NVLAP 100108-0. TSi is a certified independent testing laboratory by the Synthetic Turf Council

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817 Showalter Avenue * PO Box 2041  
Dalton, GA 30722-2041  
(706) 226-1400  
tsioffice@optilink.us

OUR LETTERS AND REPORTS APPLY ONLY TO THE SAMPLE TESTED AND ARE NOT NECESSARILY INDICATIVE OF THE QUALITIES OF APPARENTLY IDENTICAL OR SIMILAR PRODUCTS. THESE LETTERS AND REPORTS ARE FOR THE USE ONLY OF THE CLIENT TO WHOM THEY ARE ADDRESSED AND THEIR COMMUNICATION TO ANY OTHERS OR THE USE OF THE NAME TESTING SERVICES, INC. MUST RECEIVE OUR PRIOR WRITTEN APPROVAL. THE REPORTS AND LETTERS, AND OUR NAME, OUR SEALS, OR OUR INSISSA ARE NOT UNDER ANY CIRCUMSTANCES TO BE USED IN ADVERTISING TO THE GENERAL PUBLIC.
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- AirDrain is only limited by the drainage capacities of the profile above and the exit drains below
- AirDrain can be reused when the synthetic turf must be replaced

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Synthetic Turf No Rubber Infill Detail

- Synthetic Grass Surface
  2" 54oz turf w/ 2.7lbs/ft² non rubber infill installed

- Geotextile Filter Fabric (4oz Non Woven)
- Geotextile Filter Fabric (10oz Non Woven)
- AirDrain™
- Compacted Aggregate Base Per Engineer
- Perimeter nailer board attached to base with typical screws or nails

AirDrain™ Unit Panel Specifications:

- Size: 32" x 32" x 1"
- Weight: 3.1 lb
- Strength: 233 psi (unfilled)
- Resin: 100% Recycled (PIR) Copolymer with Impact Modifier "No Break" Polymer Material
- Color: Black (3% carbon black added for UV Protection)
### CLIENT:
- **Company:** Airfield Systems
- **Address:** 8028 North May Avenue, Suite 201
  Oklahoma City, OK  73120
- **Report Number:** 66141
- **Lab Test Number:** 2782-6398R
- **Test Completion Date:** 1/20/2016
- **Report Date:** 1/21/2016
- **Requested By:** Michael Bean
- **Page:** 1 of 1

### TEST MATERIAL:
- **Material Type:** Synthetic Turf over Pad System
- **Date Received:** 1/19/2016
- **Material Condition:**
  - EXCELLENT:
  - GOOD:
  - POOR:
  - REJECTED:
- **Turf and Infill ID:** Sport Pro Plus 54MF with 2.75 lbs/ft² Envirolfill installed
  (TOP)
- **Fabric ID:** 4 oz Non-Woven Filter Fabric
- **Grid ID:** AirDrain
- **Fabric ID:** 10 oz Non-Woven Filter Fabric
- **Base ID:** 2” #7 & #81 Rock (bottom) + 1” Compacted Fines Layer (top)

### TESTING METHODS REQUESTED:
**Testing Services Inc. was instructed by the client to test for the following...**
- **Standard:** ASTM F355
- **Test Method:** Standard Test Method for Impact Attenuation of Playing Surface Systems and Materials

### SAMPLING PLAN:
- **Sampling Date:** 1/19/2016
- **Specimen sampling is performed in the sampling department at TSI.**
- **The sampling size of specimens is determined by the test method requirements.**
- **In the event a specific sampling size is not called for, a determination will be made based on previous testing experience, and approved for use by an authorized manager.**
- **All samples are subjected to the outside environmental conditions of temperature and relative humidity.**
- **Sample requiring predetermined exposure to specified environmental conditions based on a specific test method, take place in the departments in which they are tested.**

### DEVIATION FROM TEST METHOD:
State reason for any Deviation from, Additions to, or Exclusions From Test Method.
- **None**

### TEST SUMMARY:
<table>
<thead>
<tr>
<th>TEST METHOD</th>
<th>TEST DESCRIPTION</th>
<th>TEST RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F355-10a</td>
<td>Impact Attenuation (Gmax)</td>
<td>128</td>
</tr>
</tbody>
</table>

**Test Conditions:** 61°F, 12% RH  
**Drop 1:** 98 Drop 2: 128 Drop 3: 128  
**Drop Height:** 24"  
**Missile Weight:** 9.1 kg (20 lbs)  
**Missile Velocity:** 3.4 meters/second

**Uncertainty:**
We undertake all assignments for our clients on a best effort basis. Our findings and judgments are based on the information to us using the latest test methods available. TSI can only ensure the test results for the specific items tested.

Unless otherwise noted in the deviations sections of this report, all tests performed are in compliance with stated test method.

**Test Report Approval:** Erle Miles, Jr. VP, Testing Services Inc

**TSI Accreditation:** Our laboratory is accredited by the US Dept of Commerce, National Institute of Standards and Technology: ISO/IEC 17025:2005. Our code # is: NVLAP 100108-0. TSI is a certified independent testing laboratory by the Synthetic Turf Council

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**Form:**  
**Rev.:**  
**Revision Date:**  
**Release Date:** Control Type: Electronic – Expires 24 hours after this date: Jan. 21, 16

**Printed copies are uncontrolled**

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Airfield Systems, LLC
8028 N May Ave, Suite 201
Oklahoma City, OK 73120
(405) 359-3375
www.airfieldsystems.com

Unit Panel Specifications:
Size: 32" x 32" x 1"
Weight: 3.1 lb
Volume: 8% material, 92% air void
Strength: 233 psi (unfilled)
Resin: 100% Recycled (PIR)
Copolymer with Impact Modifier
"No Break" Polymer Material
Color: Black (3% carbon black added for UV Protection)

AirDrain Cross Section
Scale 0.12:1
Typical
For AirDrain Grass Systems
Proper Sequencing and Orientation of AirDrain GeoCell Panels for Rapid Installation

Pallet Staging: AirDrain pallets cover approximately 798sqft. per pallet and should be staged accordingly within the installation area so that you minimize the amount of time to stage the AirDrain grid along the install lines across the project. Typically placing the AirDrain every 65 feet across and 15-20 feet back from each other. (Call AirField with questions that you might have about proper staging and installation.)

All Installations must start in the Top Left Corner of the Field and work Left to Right to be installed properly.

1. Orientate the AirDrain GeoCell materials with the integral indicator tab to the panel's bottom left corner (painted yellow). Install the AirDrain units by placing units with the connectors and platforms up creating a flat surface for the profile above. If the male connectors do not fall or drop into the female connectors then the orientation is incorrect, please call AirField Systems Immediately at 405-359-3775.
2. Install the AirDrain panels across the field in a rowed pattern. Staggering of rows will allow for multiple row completion by a multi-manned crew.

3. Once the first row has progressed across the project, start with a second row. Have a person staging the panels in groups of three snapped together along the row. The crew can then install the left side of the panel while elevating slightly the top portion (so the male and female connectors don’t touch each other). Once the left side has been snapped with a pull along the row direction, the top portion should fall into place and with a bottom vertical pull holding the inside of parts 1 & 3 snap all three parts in place.

4. AirDrain panels can be shaped to individual field areas as needed with appropriate cutting device. If a typical field is installed correctly there should only be two sides that would need to be trimmed.

   A. If only a few parts need to be trimmed, use tin snips.

   B. If many parts require trimming, set up a table and use a circular saw with a no melt, plastic cutting saw blade.

Visit [AirField Systems Flickr page](http://example.com) to watch a video of a 74,000 sq ft project for Chesapeake Energy illustrating a 3 man crew installation.

**DISCLAIMER:** The preceding and following drawings and/or general installation guidelines are provided only to show a concept design for installation and are not instructions for any particular installation. These drawings and general instructions are not complete and are provided only to assist a licensed Geo-Technical Engineer, a Landscape Architect and/or Civil Engineer in preparing actual construction and installation plans. These drawings and instructions must be reviewed by a licensed Geo-Technical Engineer, a Landscape Architect and/or Civil Engineer and adapted to the condition of a particular installation site and to comply with all state and local requirements for each installation site. **THESE DRAWINGS AND/OR GENERAL INSTRUCTIONS DO NOT MODIFY OR SUPPLEMENT ANY EXPRESS OR IMPLIED WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IF APPLICABLE RELATING TO THE PRODUCT.**
### General Information

<table>
<thead>
<tr>
<th>Construction</th>
<th>Injection Molded Copolymer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>Copolymer Polypropylene Using an Impact Modifier</td>
</tr>
<tr>
<td>Dimensions</td>
<td>31.784” x 31.880” x 1.000” (7.03 sq ft.)</td>
</tr>
<tr>
<td>Unit Weight</td>
<td>3.1 lbs.</td>
</tr>
<tr>
<td>Material</td>
<td>Resin Pellets</td>
</tr>
</tbody>
</table>

### Shipping

<table>
<thead>
<tr>
<th>Parts Per Pallet</th>
<th>114</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallet Dimensions</td>
<td>33” x 33” x 48”</td>
</tr>
<tr>
<td>Pallet Weight</td>
<td>390 lbs.</td>
</tr>
<tr>
<td>Area Coverage Per Pallet</td>
<td>798 sq. ft.</td>
</tr>
<tr>
<td>Pallets Per Trailer</td>
<td>114 (3 wide x 2 tall x 19 deep)</td>
</tr>
<tr>
<td>Area Covered Per Trailer</td>
<td>90,972 sq. ft.</td>
</tr>
</tbody>
</table>

### ASTM and ISO Properties

<table>
<thead>
<tr>
<th>Physical</th>
<th>Nominal Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity</td>
<td>0.940</td>
<td>ASTM D792</td>
</tr>
<tr>
<td>Melt Mass-Flow Rate (230°C/2.16 kg)</td>
<td>20 g/10 min</td>
<td>ASTM D1238</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Nominal Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>57.490 lb/ft³</td>
<td>ASTM D1505</td>
</tr>
<tr>
<td>Tensile Strength (Yield, 73°F)</td>
<td>2,145 psi</td>
<td>ASTM D638</td>
</tr>
<tr>
<td>Tensile Elongation (Yield, 73°F)</td>
<td>16%</td>
<td>ASTM D638</td>
</tr>
<tr>
<td>Flexural Modulus (73°F)</td>
<td>100,175 psi</td>
<td>ASTM D790</td>
</tr>
<tr>
<td>Compression Strength (73°F)</td>
<td>233 psi unfilled</td>
<td>ASTM D6254</td>
</tr>
</tbody>
</table>

### Impact

<table>
<thead>
<tr>
<th>Nominal Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notched Izod Impact (73°F, 0.125 in)</td>
<td>ASTM D256</td>
</tr>
</tbody>
</table>

### Thermal

<table>
<thead>
<tr>
<th>Nominal Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deflection Temperature Under Load 264 psi, Unannealed</td>
<td>160°F ASTM D648</td>
</tr>
</tbody>
</table>

### Expansion/Contraction Index

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Humidity</th>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°F</td>
<td>98%</td>
<td>31.881”</td>
<td>31.817”</td>
</tr>
<tr>
<td>-5°F</td>
<td>0%</td>
<td>31.765”</td>
<td>31.713”</td>
</tr>
<tr>
<td>Change</td>
<td>.116”</td>
<td>.104”</td>
<td></td>
</tr>
<tr>
<td>Joint Expansion/Contraction Capacity</td>
<td>.420”</td>
<td>.572”</td>
<td></td>
</tr>
<tr>
<td>Safety Factor</td>
<td>362%</td>
<td>550%</td>
<td></td>
</tr>
</tbody>
</table>

### Examples of Usage

<table>
<thead>
<tr>
<th>Application</th>
<th>Required Strength</th>
<th>Safety Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>40 psi</td>
<td>x 168</td>
</tr>
<tr>
<td>Truck</td>
<td>110 psi</td>
<td>x 61</td>
</tr>
</tbody>
</table>

1 Independent laboratory testing conducted by TRI/Environmental, Inc., TSI/Testing Services, Inc. and Wassenaar.
100% Post Manufactured Content

Recycled

The AirDrain GeoGrid is made of 100% post-manufactured material, you can feel good about helping the planet while adding valuable LEED Points to your project! We also add an impact modifier for incredible strength and superior performance in extreme heat and cold - on top of the already durable AirDrain design.

AirDrain Co-Polymer with an Impact Modifier Performance and Temperature Durability

Attached you will find the specification of the resin used to produce both the 32 x 32 and the 32 x 18 Geo cells. This material is a co-polymer polypropylene that is 100% recycled resin. In order to be able to produce a consistent recycled resin a PIR (post industrial resin) is used for the base resin. This is the only way to produce a consistent material as opposed to a PCR (post consumer resin) which is dependent on the consumer to supply a consistent material. Using the PIR as a base resin 3% carbon black is added to insure good UV stabilization and metallocene (an ethylene base material) is used as an impact modifier.

Impact Modifier

The impact modifier is added in an amount to achieve a 10.0 Notched Izod Impact which comfortably qualifies this material as a NO BREAK material (4.0 and greater are normally considered no break material). The AirDrain resin offers an advantage over many ethylene and HDPE products since the AirDrain resin is often superior when it comes to pliability, warping and internal stress related issues. Referring to the attached specification sheet you will notice that all testing is done to specific ASTM Standards.

Resin Blends

AirDrain’s blend of resins gives it the ability to perform in extreme temperatures. AirDrain does not need a temperature above 50 degrees Fahrenheit to be installed or warmed in the sun to be pliable on site for install. In addition, AirDrain’s unique resin blend also helps prevent breakage and cracking in extreme temperatures, thus giving it the ability to withstand repeated freeze thaw cycles.

Airfield posts its resin content and performance values with ASTM test methods and guide lines to measure the properties of our grid.