Belmont Middle and High School
Synthetic Turf - Summary of Approved Products
5/18/2021

Description	Manufacturer	Product	Brief Description
Turf Product (Carpet)	Astroturf	Rhino Blend	2" Monofilament Fibers, Multilayer wover primary Backing
Shock Pad	Brock USA	Shockpad/17	17 mm Polypropylene composite (30% Recycled)
Fill	Brock USA	BrockFILL	Engineered Wood Particle Fill

AstroTurf | PRODUCT FACT SHEET

RHINO BLEND

AstroTurf's Rhino Series synthetic sports turf is a good choice for clients who want to increase the playing time and performance of their sports fields. The Rhino Series systems benefit from AstroTurf's legendary quality control protocols, industry-leading R&D efforts and start to finish control over manufacturing, civil construction and installation.

Rhino Series Blend products combine high quality Trionic monofilament fibers and slit film fibers for resistance to wear and aesthetics for your field.

Rhino Series fields play and look so natural, yet provide the easy maintenance and exceptional durability we've become famous for over the past 50+ years.

- Exclusive, precise in-house fiber masterbatch formulations with cutting edge ultraviolet and heat stabilizers
- Trionic monofilament fibers that refract light naturally for a grass-like appearance
- Trionic monofilament fibers are 330 microns thick for enhanced durability
- Exceptionally durable slit film fibers for resistance to wear
- Entanglement technology, wherein we entangle molecular side chains to reinforce the fiber and prevent splitting
- Multi-layer woven primary backing
- The latest polyurethane technology to enhance tuft lock, dimensional stability and fiber adhesion, with polymer formulations engineered in Germany and applied in our own American factory

RHINO BLEND

Rhino Series Blend products combine high quality Trionic monofilament fibers and slit film fibers for resistance to wear and aesthetics for your field.

"We're extremely pleased with our new AstroTurf athletic fields. They represent an important part of a world-class multi-sport venue."

Kerry Martin, President of SOZO Sports (WA)


Allegheny Co. Sports & Athletic Complex – Montour Junction, PA


Lake Howell High School – Winter Park, FL


Mendota High School – Mendota, CA


University of Michigan – Ann Arbor, MI

FINISH FABRIC	VALUE	ASTM TEST METHOD
Face Yarn Type	Trionic PE/PA Co-Polymer Monofilament and Polyethylene Slit Film	N/A
Yarn Denier	10,400 (6 ends, 1,800 denier per end for Mono, 10,000 denier per end for Slit Film)	D-1577
Yarn Thickness	330 microns for Mono, 115 microns for Slit Film	D-3218
Pile Weight	55 oz per SY	D- 5848
Finished Pile Height	2.0"	D-5823
Standard Field Color	Field/Lime Green, Field Green	None
Construction	Tufted	None
Turf Density	990 oz/yd^3	HUD 44d
Gauge:	3/8"	D-5793
Primary Backing	7 oz per SY Multilayer Polypropylene/Polyester	D- 5848
Secondary Backing	20 oz per SY Polyurethane	D- 5848
Total Carpet Weight	82 oz per SY (+/- 5%)	D-5848
Turf Roll Dimensions	15' wide by custom lengths up to 220'	N/A
Perforations	3/16" holes on staggered 4" (approximate) centers	N/A
Turf Permeability	> 30" +/- per hour	F-1551
Tuft Bind	> 8 lbs	D-1335
Grab Tear Strength (Average)	> 200 lbs	D-5034
Lead Content	< 50 ppm	F-2765
Elongation to Break	> 50%	D-2256
Yarn Breaking Strength	> 20 lbs	D-2256
Yarn Melting Point	248° F	D-789
Flammability	TEST PASSED	D-2859

THIS IS A NON STANDARD PRODUCT

WARNER LARSON, INC.
130 West Broadway
Boston, MA 02127

Approved as Submitted	X
Approved as Noted	
Revise and Resubmit	
Not Approved	

This review is only for conformance with the design concept of the project and does not relieve the Contractor from meeting the provisions of the contract, drawings and specifications. The Contractor is responsible for verifying all dimensions, schedules, quantities and field conditions and for all means, methods, techniques, sequences and procedures of construction.

Date: 03/30/2021 | By: ehunt

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Date: 02/26/2021 | By: ehunt

AstroTurf Corpo
help@a
(800) 723-TURF
TurfUSA

Submitted by:

BROCK USA
3090 W. Sterling Circle, #102
Boulder, CO 80301
~
Tel (303) 544-5800
sales@brockusa.com

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SHOCKPAD 17
BY BROCK

Project Information

Dear Brock Customer:

This package is provided to assist you during planning and to introduce you to the capabilities of Brock USA's products and services.

Throughout the project, we will be available to answer questions and to work with you in developing a final result that meets your requirements and budget.

We appreciate your time and look forward to working with you as this project progresses.

Best Regards,

Customer Support Team
Brock USA
303-544-5800
sales@brockusa.com

SHOCKPAD 17
BY BROCK

Table of Contents

Safety First.

SHOCKPAD SERIES
BY BROCK

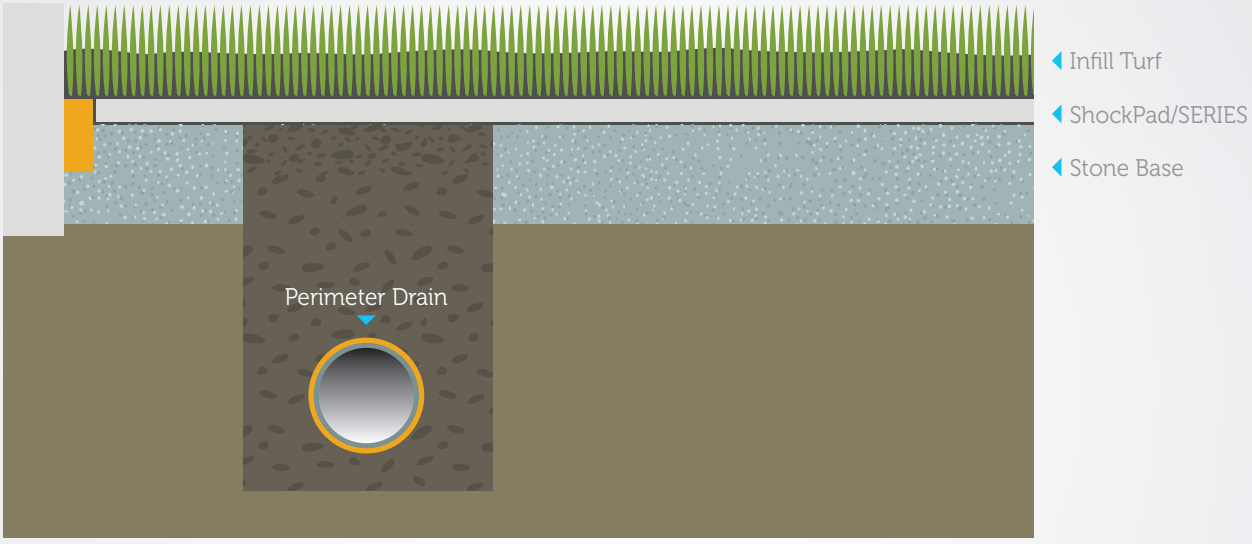
Benchmarking natural turf.

3 There are three measurements used to characterize safety and performance of a surface:

The Test	The Testing Device	The Goal
HIC (Head Impacts) **ASTM F355 E Missile** HIC is the internationally recognized test standard for head injuries. It drops a 10 lb hemispherical impacter from increasing heights to determine Critical Fall Height. It's the same test used in playgrounds, automotive crashes, wall padding, pole vault, and the WR Reg22 standard for artificial turf. The higher the Critical Fall Height, the more protective the surface is for head injuries.	1 	**1.7-2.3 m** **(5'7"-7'6" ft)** CRITICAL FALL HEIGHT
GMAX (Body Impacts) **ASTM F355 A Missile** This test method covers the measurement of certain shock-absorbing characteristics, like during body impacts. It's applicable to natural and artificial playing surface systems. It does not correlate to head injury. It drops a 20 lb flat missile from 24". GMax is a good measurement when used in conjunction with HIC above, but as a stand alone test is not a total measure of field safety.	2 	**71-115 G's** GMAX
VERTICAL DEFORMATION (Firmness Under Foot) **EN14809 Vertical Deformation** This test simulates the heel strike of an adult running athlete in stride. This is the softness or hardness under foot during play. A great natural grass field hits the "sweet spot" of being firm under foot while producing very low gmax and high Critical Fall Height. Which is why quality natural turf is the benchmark for quality artificial turf.	3 	**6-11 mm** VERTICAL DEFORMATION

The goal of any artificial turf surface is to mimic a high-quality, natural grass playing field. Achieving this requires a more sophisticated approach than laying "rug over rock". Think of Brock ShockPad/SERIES as the "intel inside" of your field.

The ShockPad/SERIES comes in several thicknesses, from 14mm to 20mm, depending on the turf you select, always keeping the performance of the overall system in mind. Fields that utilize a SP shock pad demonstrate the safety, speed and impact performance that replicates a quality natural turf surface; plus they drain fast and last longer.



SHOCKPAD/SERIES, SYNTHETIC TURF AND STONE BASE FOR STABLE SOILS – *Cross Section*

A shock pad for every turf.

SHOCKPAD/14

14 mm - great for new construction & turf replacements. Outperforms ProPlay 23D.

SHOCKPAD/17

17 mm - great for new construction & turf replacements with all infills. SP System for BrockFILL.

SHOCKPAD/20

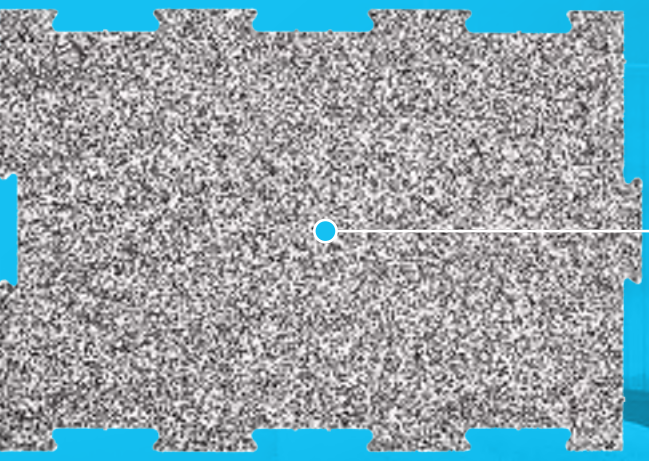
20 mm - highest performance. Used on all athletic fields with all infills and on playgrounds.

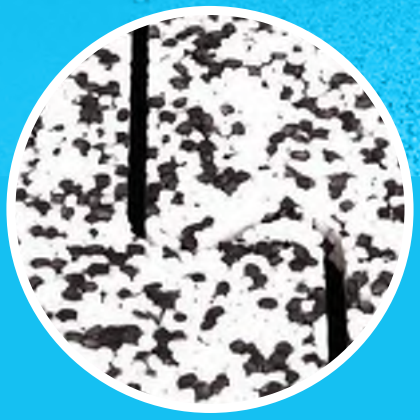
14 mm

17 mm

20 mm

The most proven Shock Pad on the market.





STABLE

Large robust dovetail interlock makes installation fast and easy.

POROUS

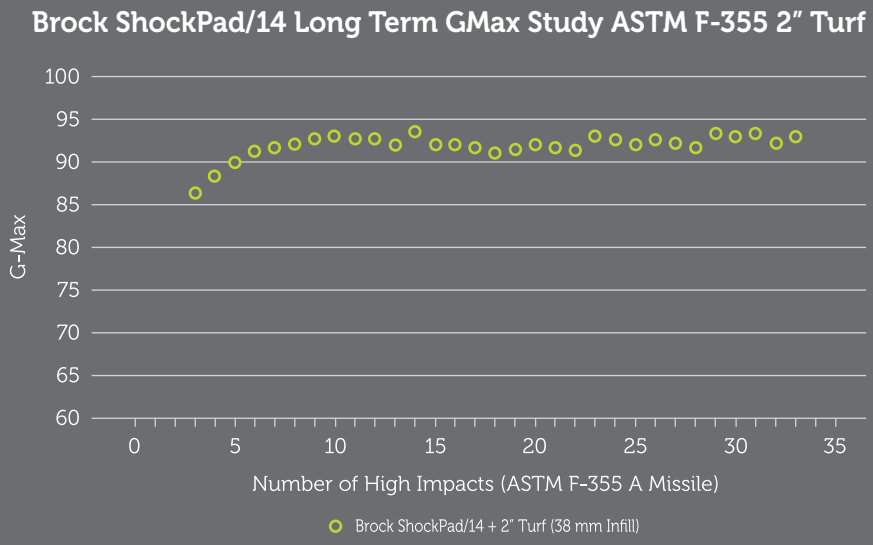
Open pore structure allows water to pass vertically through material.

DYNAMIC

Interaction of particles keeps field stiff for running, soft for impacts.

Low GMax for the life of your field.

Our goal was simple: A great natural grass field will produce a GMax of around 90-100 Gs and be firm and fast to play on. A synthetic turf over ShockPad/SERIES will do the same thing, and maintain it for the life of the field. Testing shows how even after years of high impacts *in the same location* the GMax is low and consistent.



16 YEAR WARRANTY

When you replace your turf, the Shock Pad is reused for the next turf life.

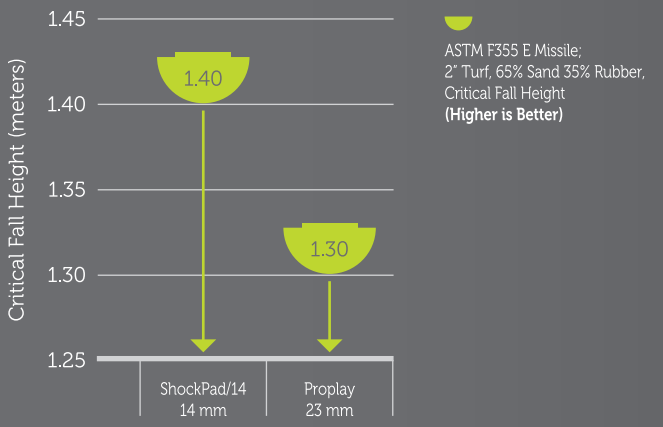
Use Brock SP Series when:

1. Replacing an old, hard synthetic turf field. Using a shorter turf and SP results in better play and greater safety, doesn't change the field profile, and offsets some of the cost of the pad.

2. New synthetic fields designed with a draining stone base, where long term safety is required. Again, we recommend a slightly shorter turf over SP. The thickness of the SP is determined by the turf you select. The shorter pile turf, the thicker the SP should be in order to attain the highest safety levels possible.

It's a work horse.

Brock's ShockPad series will outperform other "shock pads" nearly twice as thick. That's because it's engineered for artificial turf and the impact it will experience during play. A patented material using polypropylene with a microcoating binder produces a material with an open pore structure for fast drainage and a unique impact profile ideal for artificial turf.



Fast drainage.

Vertical permeability of ShockPad/17 is far greater than the turf itself, so as long as the stone base below and the turf above allows water to pass, Brock SP will only enhance drainage.

>700 in/hr
ShockPad/17 Pad

<50 in/hr
Synthetic Turf Only

BROCK®
FIRMER. FASTER. SAFER.

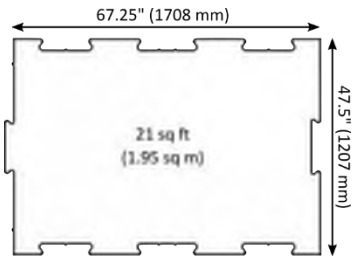
www.brockusa.com / 877-276-2587

US Patents: 8,236,392, 8,353,640 and D637318 and other patents pending.

SHOCKPAD 17
BY BROCK

Typical Properties & Specification

Product Number	SP17XL
Material Type	Expanded polypropylene composite containing approximately 30% by volume reprocessed pre-consumer and/or post-consumer recycled material
Part Format	Interlocking panel
Part Size, nominal net coverage	21.0 sq. ft per panel (1.95 sq. m)
Part Thickness, nominal	0.67 in (17 mm)
Part Length, nominal	67.25 in (1708 mm)
Part Width, nominal	47.5 in (1207 mm)
Part Weight, nominal	4.3 lb per panel



Property (Shock Pad Only)	Typical Value	Specification	Test Method
Tensile Strength	70 psi	> 45 psi	ASTM D3574 Test E
Tensile Elongation	19%	> 10%	ASTM D3574 Test E
Compression Strength @ 25% strain @ 50% strain	 33 psi 51 psi	 > 25 psi > 40 psi	ASTM D3575 Test D
Compression Set 35 psi for 30 minutes – % set after 24 hr	5%	< 7%	Brock Test Method
Coefficient of Linear Thermal Expansion per 1 °C change	0.06 mm/m	< 0.10 mm/m	ASTM D696
Water Absorption After 24 hr immersion	~1%	≤ 1%	DIN 53428
Water Permeability (Vertical Drainage)	> 700 in/hr	> 500 in/hr	ASTM F1551: DIN 18-035, Part 6
Critical Fall Height (HIC = 1000)	0.66 m	> 0.6 m	ASTM F3146, Procedure A
Gmax	107 g	< 120 g	ASTM F355 (Missile A)
Shock Absorption	60% 63%	>55% >55%	ASTM F3189 (Adv. Artificial Athlete) EN 14808 (Artificial Athlete)
Vertical Deformation	7.1 mm 3.5 mm	< 8.0 mm < 4 mm	ASTM F3189 (Adv. Artificial Athlete) EN 14809 (Artificial Athlete)
Resistance to Chemicals	1 / 2	≤ 2	JSP Method based on ASTM F925
Microbiological Analysis bacteria resistance fungi resistance	 No growth No growth	 No growth No growth	 ASTM G22 ASTM G21
Environmental Standards Testing Heavy Metals VOCs SVOCs California Title 22 California Proposition 65	 Compliant with EPA human health standards, surface water and groundwater quality Compliant Certified (no listed mat'ls)	 Compliant with EPA human health standards, surface water and groundwater quality Compliant Certified (no listed mat'ls)	 EPA 6010B, 7470A, 7471A EPA 8260B EPA 8270C CA Code of Regulations, Title 22, Division 4.5, Chapter 11 California Proposition 65

DATA ARE TYPICAL PROPERTIES ONLY. THIS DOCUMENT DOES NOT CREATE ANY WARRANTY, EXPRESS OR IMPLIED.

Patented and Patents Pending

Brock USA LLC
www.brockusa.com
May 2019

BROCK

Why shock pads are the safest bet for your field

Informed buyers are getting out of the Stone Age and into the Technology Age. Laying carpet over stone outside was OK ten years ago, but today, systems have evolved to provide better drainage, greater safety, greater longevity, and more environmental solutions to a project. There are many reasons why placing a "pad" under the turf is now the growing trend in the industry for the best quality synthetic turf sports fields:

Concussions are Front Page News

The growing media attention about concussions in sports means that every measure must be taken to ensure the optimum safety of a surface. Using shock pads helps protect the players from injuries that result from hard impacts with the surface, and the owner from liability. Preventing concussions from occurring is far better than treating them after the fact.

Same Safety as Pristine Natural Turf

An optimal *natural* turf field will produce a G-Max of 90-110. A proper synthetic turf field, with at least a 2 1/4" turf built over a stone base, will produce an opening g-max of around 120. But over the life of the turf, the g-max will typically climb to a g-max of 165 or higher. The higher the g-max, the lower the safety. But a synthetic turf field over a quality shock pad will produce 90-100 G's just like natural grass. The reduction in the likelihood of severe head injury between a 100 G field and a 165 G field is 50%. Using a shock pad under the turf means you don't have to sacrifice safety for performance.

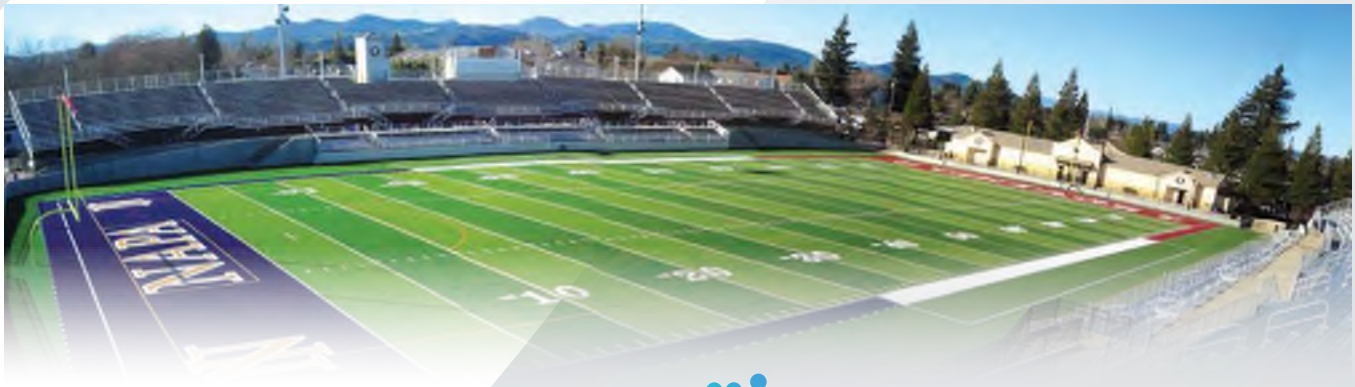
Injury / Symptom	AIS Degree	1 Minor	2 Moderate	3 Major	4 Severe	5 Critical	6 Survival Uncertain
Headache, Dizziness							
Loss of Consciousness							
Skull Fracture							
Neurological Damage							
Hemorrhage							
Brainstem Damage							
Brain Tissue Disruption							

FIFA Performance Measures

Concussions are not the only safety concern with synthetic turf fields. Cartilage, ligaments, tendons and muscles are also susceptible to injury if the performance of a synthetic surface is not properly calibrated. Much of the FIFA testing for fields is related to surface performance, and is designed to measure the properties of a synthetic turf surface as compared to the typical values achieved on stadium quality *natural* turf field. In fact, a recent research study showed no difference in injury rates on a FIFA 2-Star quality *synthetic* field vs. a perfect *natural* turf field. So achieving the proper force reduction and vertical deformation levels (two proven measures for bone and spine impacts, foot stability and soft tissue injury) is essential for a well performing field. Using a shock pad as a component to the turf system has been proven to achieve, and *maintain*, those levels, whereas turf over a stone base may start that way, but degrades outside the desired levels after only a few years.

Better Footing, Better Game

Sand content in the infill is essential for footing and ballast for turf stability, but it reduces the impact absorption qualities and force reduction of the surface. A shock pad allows sand to be used in the infill without sacrificing safety. The pad lets the turf backing flex, helping prevent over compaction of the sand layer that occurs when the turf system is installed over a hard surface. So you get a far better playing surface plus even greater safety.



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brockusa.com

More about why shock pads are the safest bet for your field.

Lack of Maintenance Resources

If properly maintained, a synthetic field can perform and last mostly as desired. The problem is, fields are not properly maintained due to budget cuts and lack of training. Infill migration and compaction are inevitable and are primary causes of field hardening. A shock layer helps prevent compaction, maintains significantly better safety levels, and offers a critical "safety layer" when infill is displaced.

It Saves Money

Using a shock pad under synthetic turf allows you to use a shorter turf system since the safety of the field is not solely dependent on the turf infill alone. The benefits to a shorter turf include: less expensive product, better stability and footing, less disposal costs, and faster installation. Some Brock systems even replace the drainage (and its cost) under the turf. The money saved on the turf helps pay for some of the pad cost at the outset, and then more each time the turf is replaced. You may pay a little more today, but you will spend far less over time – A proper pad system can be reused, therefore amortized, over several turf cycles. *(Analysis available)*

More Durable Fibers

Fiber technology has vastly improved over the last 10 years so many companies are touting longer fiber life. The advent of the monofilament also means that the fiber does not have a built in "degradation period" as with slit films. So using a shorter turf in combination with a shock pad does not result in shorter turf life. In fact, many believe turf lasts longer over a pad, just as indoor carpet does. And a study published by FieldTurf showed traction and footing on a 2" turf mimicked the highest quality natural turf. *(Study available)*

Less Expensive Field Replacement Costs

Using a shorter turf means less disposal costs. Plus having a "pad" system over the base protects it, and eliminates the expense of repairing it during replacement, a cost sometimes as high as $50,000.

All of these facts are backed by independent research, available on request.

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SHOCKPAD SERIES
BY BROCK

Brock Shock Pad Series
Limited Product and Performance Warranty

BROCK

BROCKFILL
THE ENGINEERED INFILL FOR ATHLETES

Project Information

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BROCKFILL
THE ENGINEERED INFILL FOR ATHLETES

Submitted by:

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3090 W. Sterling Circle, #102
Boulder, CO 80301
~
Tel (303) 544-5800
sales@brockusa.com

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Date: 02/26/2021	By: ehunt

BROCKFILL

THE ENGINEERED INFILL FOR ATHLETES

Table of Contents

The Natural

Next Step.

BROCKFILL™

THE ENGINEERED INFILL FOR ATHLETES

It's Sourced from Softwood Tree Farming:
An Abundant, Renewable U.S. Resource.

1

A prolific species of trees are planted in high density on farmland across the southeastern US.

2

After 7-9 years, trees are thinned to allow the remaining trees to grow taller for higher end uses like lumber, furniture and telephone poles.

3

Thinned trees are then converted for the paper, animal bedding, and biofuels industries...and BrockFILL.

4

BrockFILL is manufactured through a proprietary process that removes splinters, buffs and rounds the particles, and sifts out dust. The process involves 12 different steps to achieve the ideal particle shape, size, and smooth surface.

5

BrockFILL is used as infill for the life of the turf. Providing a safe, high performing surface for all athletes.

6

BrockFILL returns to earth as soil amendment for natural turf fields, lawns, gardens, golf fairways, or landscape mulch without leachates that are harmful to water quality or human health.

BROCKFILL RECIPE: 1 lb BrockFILL, 4 lbs Sand, in a 2" Slit Film or Blended Turf over Brock ShockPad

Finally, a true replacement for crumb rubber infill.

Since 2004, Brock has led the industry in research about athlete safety and the environmental impacts of artificial turf.

We were the first ones to achieve Cradle to Cradle environmental certification for our base systems, the first to offer a 25-year warranty, the first to hold national educational forums for designers and scientists, and the first (and still only) to achieve the higher head protection safety levels of pristine natural turf.

It has been proven in many player studies that athletes prefer natural turf to artificial. Those same studies show that artificial turf fields that use shock pads are universally preferred over those that do not – *so the least preferred system by athletes is artificial turf directly over stone.* Additionally, 1-in-5 concussions happen when the head hits the surface and lower leg injuries are higher on conventional artificial turf than on natural grass. All this has led to a paradigm shift in thinking about artificial turf safety and why it is essential that it mimics well-groomed natural turf. It's what athletes want!

The challenge is to create a system that feels like natural turf and that means changing the one component athletes hate most: crumb rubber infill. It's too hot, it smells, it's too abrasive, it's unstable under foot and its end of life is an environmental tragedy. As global warming continues, climate change will make these surfaces literally too hot to play on.

Starting in 2015, the Brock team worked with a specialized group of universities, sports testing labs, PhD scientists, engineers, horticulturists, and several sports science experts to develop a solution to these problems. True to Brock form, we left no research question unanswered.

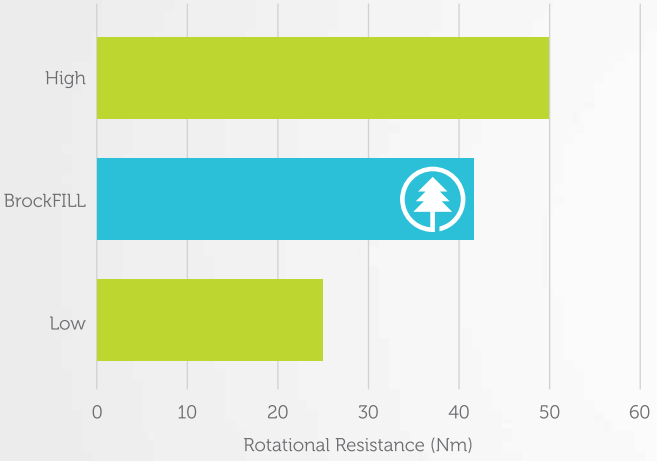
Now another first: A durable, cool, *affordable*, best-performance infill engineered for athletes. And it's organic. In a world that is getting too hot, it's time to cool off.

"It is a wonderful example of Man and Nature working together."

Tested for... everything.

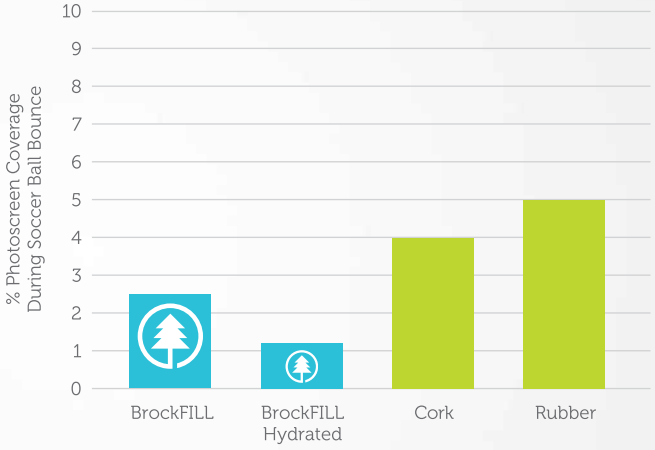
Traction

Humans evolved running on natural surfaces, not a rubberized bouncy turf that changes consistency across the field. BrockFILL feels like natural turf under foot and falls within the optimal traction range (FIFA 2-STAR) without the variability in energy restitution ("bounce") of crumb rubber.



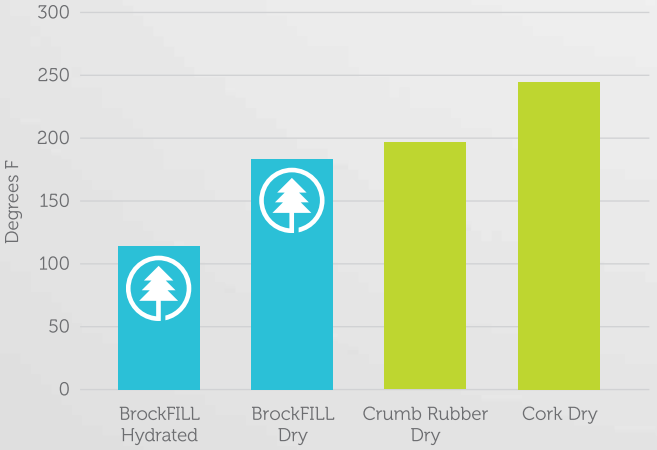
Splash

Keeping infill in the turf is key, so the lower the splash the better. BrockFILL achieves the lowest splash when dry compared to other infills and is even better when damp.



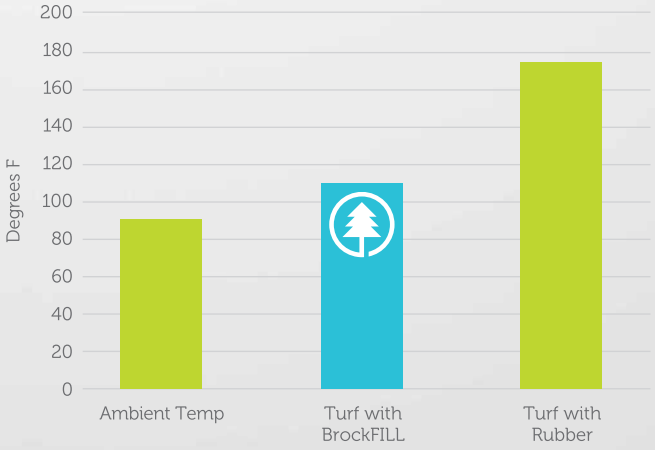
Abrasion

Besides field temperature, abrasion is the most common complaint from athletes about artificial turf. Independent testing from Labosport measures heat generated as a device slides across the turf sample using a mass and speed representative of a sliding athlete. BrockFILL generated the lowest heat score, therefore the lowest abrasion, of any infill, even crumb rubber. Better yet, abrasion is even lower when BrockFILL is damp.



Cooling

BrockFILL is a significantly cooler infill than crumb rubber and does not require watering. Each BrockFILL particle is naturally hydrophilic, so they absorb natural rainwater and condensation into their core, not just on the surface. Moisture is then released slowly for extended cooling. Plus BrockFILL gains weight when wet, so it doesn't float or migrate like cork.



Durability

BrockFILL is an extremely durable organic material. After 20,000 Lisport cycles, the particle dimensions remain virtually unchanged. Additionally, the particles improve over time! They get smoother, further lowering skin abrasion without breaking down.

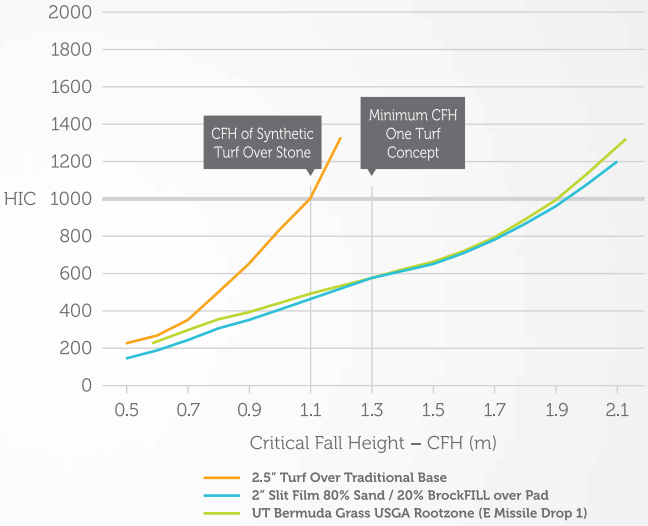
BrockFILL before Lisport test.

BrockFILL after 20,000 Lisport cycles.

* BrockFILL at 120x magnification.

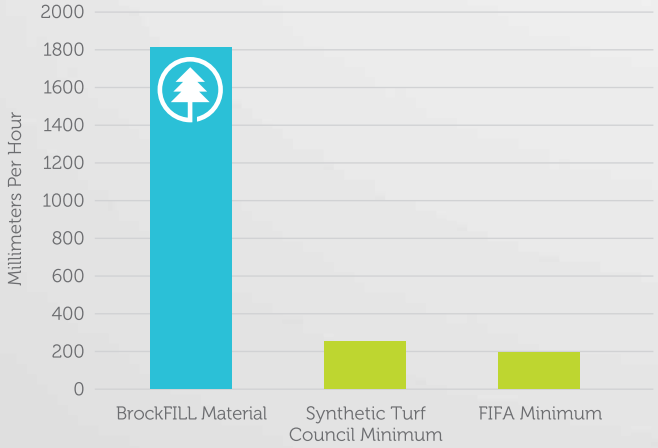
Player Safety

The BrockFILL system utilizes Brock shock pads to provide the optimal energy absorption and head injury protection, while remaining firm for running: something a rubber and sand field over stone cannot achieve.



Drainage

Like all Brock products, BrockFILL has higher permeability than the turf itself. When tested in turf, the system drains over 50" per hour. Even after 8 years of simulated use with zero maintenance, the field still meets the requirements of International drainage standard. (But you should still maintain your field!)



... and we mean everything.

- Head Impact Criteria
- Gmax Test
- Permeability in the System
- Shock Absorption
- Energy Restitution
- Rotational Resistance
- Vertical Deformation
- Ball Rebound / Angled Ball Rebound
- Ball Roll
- Flammability
- Ball Splash
- Temperature Testing
- Durability
- Density at Different Moisture Content Levels
- Permeability (material only)
- Total Pesticides
- Total Herbicides
- Leachable Pesticides
- Leachable Metals
- Total Metals
- Hexavalent Chromium
- Mold Growth
- Bacteria Growth
- Freeze-Thaw Cycle
- Insect Resistance
- UV Exposure
- Flotation
- Abrasion

* All test reports available.

The science is undeniable.

When infilled sand and crumb rubber systems were first introduced in the late 1990s they were a significant leap forward for artificial turf sports systems when compared to the original nylon turf. These systems have been used prolifically, but the shortcomings in the design, performance, environmental impact, and safety cannot be overlooked any longer. These systems, long touted as shock-pad free, do not provide the safe surface athletes deserve. They create foul smelling and dangerously hot environments leading to burns, blisters and heat exhaustion, and rubber can create an unnatural, "bouncy" feel which results in the instability that contributes to fatigue, joint stress and lower extremity injuries. The waste and disposal of crumb rubber has reached alarming levels. A typical athletic field is equivalent in size to a 500 car parking lot, and can reach temperatures of 175+ degrees. With the effects of global warming, **this has to stop**.

Years of research, testing, and studies have led to a superior playing surface. Twenty five years from its introduction, It's time for the crumb-rubber, turf-over-stone system to take its place in history and clear a path for the next generation system for athletes. One that is cooler, firmer, safer, and leaves no scars on the athlete, or the environment.

A typical athletic field is equivalent in size to a 500-car parking lot, and can reach temperatures of 175+ degrees.

The US Consumer Products Safety Commission suggests the use of WOOD and other materials rather than crumb rubber to create a shock-absorbing surface under public play areas.

There are plenty of better uses for waste tires, including road asphalt, Speed bumps, railway vibration absorption and more.

BROCK®
FIRMER. FASTER. SAFER.

www.brockusa.com / 877-276-2587

US and International patents pending.

BROCKFILL

THE PERFORMANCE INFILL FOR ATHLETES

Limited Product & Performance Warranty

1. Limited Warranties. Subject to the terms and conditions of this Limited Warranty, Brock USA LLC ("Brock") warrants to the owner of the playing field(s) ("Owner") at which BrockFill® ("Infill") has been installed that, for a period of ten (10) years from date of purchase (the "Warranty Period"), the BrockFill® material shall: (1) be comprised of virgin natural pine wood grown and manufactured in the USA; (2) Be free of pesticides and heavy metals, and processed in a way that destroys all mold, mildew, bacteria, insects and fungus and naturally inhibits the growth of new mold, mildew, bacteria, insects and fungus on the surface. (3) maintain a vertical drainage rate that exceeds that of the artificial turf when tested alone according to test method ASTM 1551. (4) Not materially degrade as an infill such that a maximum of 20% of the material will pass through a .5mm screen when tested according to BS EN 933-1:2012; (5) if used over PowerBase YSR be part of a turf system that will meet the critical fall heights and G-Max guarantee defined in the PowerBase YSR warranty. (collectively, the "Limited Warranties").(6) if used over Series SP17 or SP20 be part of a turf system that will meet the G-Max guarantee defined in the Series SP warranty. (collectively, the "Limited Warranties").

If the Brock System including BrockFill® and a Brock Shock pad (PowerBase YSR or Shock pad series SP17 or SP20) is installed under artificial turf with a minimum pile height of 40mm (1.5") and complies with BrockFILL infill guidelines, Brock USA guarantees the field will meet One Turf Concept field average performance parameters for existing fields for Shock Absorption, Vertical Deformation, Head Injury Criteria, and Rotational Resistance (collectively the "Standard") at the time of installation. If the test measurements fall outside the Standard within 60 days of field completion, Brock hereby guarantees to bring the field into compliance including materials and labor required to do so.

2. Warranty Claim Process. In the event the Infill fails to comply with these Limited Warranties during the Warranty Period, Owner shall: (1) provide Brock written notice within thirty (30) days after it first discovery of the non-compliance; and (2) afford Brock an opportunity to inspect the Infill (in place as originally installed) prior to modifying or altering the Infill in any manner.

3. Exclusions. Notwithstanding any provision herein to the contrary, Brock does not warrant and shall not be responsible for, the Limited Warranties shall not cover, and Owner shall not be entitled to recover, (for breach of contract, tort, strict liability, or otherwise), any loss, liability, claim, damage, cost, expense, or defect (collectively, a "Claim") caused by, in whole or in part, or arising from any of the following: (1) any party's failure to install, use, and maintain the BrockFill® strictly in accordance with Brock's Installation Standards and Manufacturer's Standards. (2) improper handling, use or protection of BrockFill®, including, but not limited to, exposure to open flame or imposition of hazardous chemicals, (3) improper or inadequate site preparation, including, without limitation, improper base material, grading, compaction, or material usage in perimeter drain collectors and other drain collectors; (4) improper or inadequate site drainage, including without limitation, lack of adequate drainage systems, gutters, channels, and water diversion mechanisms; (5) any size degradation such that less than 20% of the original average particle size passes a .5mm screen, determined by sieve analysis according to BS EN 933-1:2012, (6) any cause or event that is not reasonably foreseeable by Brock, including acts of God, extreme weather events, fires, floods, lightning, earthquakes, landslides, explosions, riots, wars, hurricane, sabotage, terrorism, vandalism, accident, restraint of government, governmental acts, and injunctions; (7) any condition related to the soil, base, earth, or subsurface upon which the BrockFill® is installed, including without limitation, soil expansion, shifting, contraction, subsidence, compression, or erosion; (8) improper or inadequate selection, use, installation, maintenance, repair, or replacement of the field's artificial turf system. (9) contamination of the BrockFill® with, dirt, or other substances; (10) failure to install the BrockFill® according to Brock guidelines and maintain your field according to turf manufacturers instructions; (collectively, the "Exclusions").

4. Remedy. As Owner's sole and exclusive remedy for any Claim relating to or arising from the Limited Warranties for BrockFill®, and provided the Claim was not caused by or arising from any Exclusion, Brock shall deliver to the Owner new BrockFill® to replace the non- conforming BrockFill® at no charge and pay costs directly incurred for new BrockFill® installation. If Owner decides to replace the entire surface for reasons other than a breach of Brock Warranty, Owner shall give Brock reasonable advance notice of replacement of the surface so that a Brock representative has the option to be present as the time of the turf replacement to inspect BrockFill®.

5. Limitation of Liability. OWNER'S SOLE AND EXCLUSIVE REMEDY FOR ANY AND ALL CLAIMS ARISING OUT OF OR RELATING TO THE PURCHASE, USE, OR CONDITION OF ANY INFILL OR LIMITED WARRANTY UNDER ANY LEGAL THEORY, INCLUDING

WITHOUT LIMITATION, BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE (INCLUDING NEGLIGENT MISREPRESENTATION), OR STRICT LIABILITY, SHALL BE LIMITED TO THE REMEDIES PROVIDED IN SECTION 4 (REMEDY) OF THIS LIMITED WARRANTY. IN NO EVENT SHALL BROCK BE LIABLE FOR, AND OWNER HEREBY WAIVES ANY RIGHT TO RECOVER, ANY PUNITIVE, SPECIAL, CONSEQUENTIAL, OR INDIRECT LOSSES OR DAMAGES, ALL OF WHICH OWNER EXPRESSLY DISCLAIMS. BROCK'S TOTAL AGGREGATE LIABILTY TO OWNER FOR ANY AND ALL CLAIMS UNDER ANY LEGAL THEORY ARISING FROM OR RELATING TO THE BROCKFILL®, ANY ACTION OR INACTION OF BROCK, OR THIS LIMITED WARRANTY, SHALL NOT EXCEED THE TOTAL CONSIDERATION OWNER PAID FOR THE NON-CONFORMING BROCKFILL®.

The foregoing Limitation of Liability shall not apply to any Claim caused by the grossly negligent or intentional acts or omissions of Brock. Owner and Brock (the "Parties") agree that: (1) this Limitation of Liability was the product of commercial negotiation, formed part of the basis of the sale contract for BrockFill®., factored into the pricing of the BrockFill®., and that Owner had an opportunity to review the same with its legal counsel; (2) in the event the Sole and Exclusive Remedy Fails of its essential purpose, they intend for the above disclaimer of punitive, special, consequential, and indirect losses or damages (the "Disclaimer") to survive and remain binding upon the Parties; and (3) the Disclaimer is independent of any other limitation of liability in this Limited Warranty and reflects a separate allocation of risk.

6. Disclaimer of Warranties. THIS LIMITED WARRANTY AND ITS REMEDIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL, WRITTEN, STATUTORY, EXPRESS OR IMPLIED. BROCK DISCLAIMS ALL STATUTORY AND IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND WARRANTIES AGAINST HIDDEN OR LATENT DEFECTS.

7. General Terms. This Limited Warranty: (1) shall be governed, interpreted, and enforced solely under laws of the State of Colorado, irrespective of conflict of laws principles; (2) shall not be waived, altered, or modified except in writing signed by the Parties; (3) supersedes and replaces entirely any previous representations, warranties, or promises made in relation to the BrockFill®.; and(4) may only be assigned by Brock in its sole discretion. Failure to enforce any provision of this Limited Warranty shall not constitute a waiver of any other provision.

BROCKFILL
THE ENGINEERED INFILL FOR ATHLETES

Typical Properties & Specification

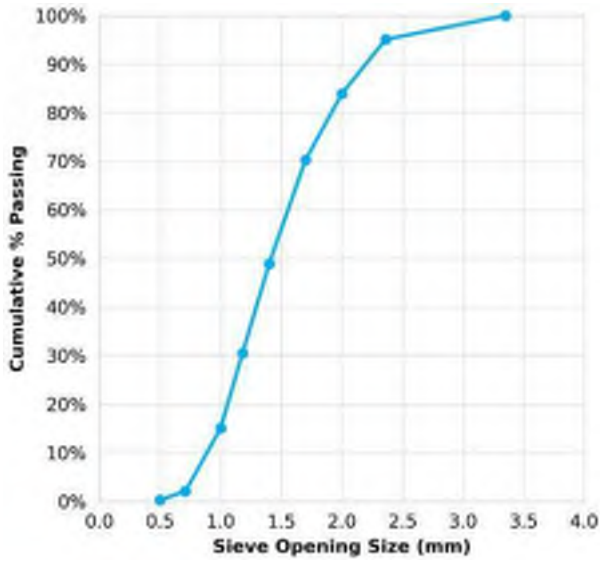
Product Name	BrockFILL™
Product Description	Artificial turf infill made from engineered wood particles produced in the USA
Bulk Density	17 lb / cu. ft.
Packaging	45 cu. ft. supersacks (approx. 750 lb each) – 2 supersacks per pallet
Moisture Content	8 – 15% (at time of production)
Color	Natural to Medium Brown

Sieve Analysis (Typical Results)

ASTM C136, modified (Ro-Tap RX-29, 5 min shaking)

Sieve Size (mm)	Cumulative % Passing		
	Typical Value	Typical Range	Specification
3.35	100	99 – 100	> 99
2.36	95	90 – 100	> 90
2.00	84	75 – 98	-
1.70	70	60 – 90	-
1.40	49	35 – 70	-
1.18	31	20 – 50	-
1.00	15	5 – 35	-
0.71	2.1	0 – 6	< 6
0.5	0.3	0 – 2	< 2

Typical Particle Size Distribution Curve



Environmental Compatibility Testing

Test	Method	Result
Pesticide Testing	AOAC Method 2007.01	PASS
Chlorinated Acidic Herbicides	FDA PAM II Method 180.292	PASS
Total CAM 17 Metals and Hexavalent Chromium	EPA Methods 3050B / 6020 EPA Methods 3060A / 7199	PASS
Leachable CAM 17 Metals and Hexavalent Chromium	EPA Methods 1312 / 6020 EPA Methods 1312 / 7199	PASS
Leachable Semi-Volatile Organic Compounds including Phenols	EPA Methods 1312 / 8270C	PASS

DATA ARE TYPICAL PROPERTIES ONLY. THIS DOCUMENT DOES NOT CREATE ANY WARRANTY, EXPRESS OR IMPLIED.

Test reports available upon request

Patents Pending

BROCKFILL
THE ENGINEERED INFILL FOR ATHLETES

Statement of Compliance

To whom it may concern:

This statement confirms that BrockFill meets or exceeds all design and performance criteria for this project.

Please feel free to contact us if you have questions. We look forward to working with you as this project progresses.

Best Regards,

Technical Support Team
Brock USA
303-544-5800
sales@brockusa.com