

INFILL

What infill type is right for you?

What does infill “do”?

The infill system is the single most important aspect of all synthetic turf fields. It is the basis for the safety of the turf system by providing the appropriate cushioning to absorb impact as well as being the foundation to a field's performance level by offering traction for players to cut, plant and release just like they would on natural grass. Whereby turf fibers are directly related to the aesthetics of the field, the infill – which is spread between the fibers – delivers what the athlete needs: A safe surface with proper performance attributes.

The infill market is becoming more complex with new products being introduced at a rapid rate. With so many choices, it is important to understand the difference between the various systems.



INFILL METHODS



SAND-AND-RUBBER (3-LAYERED) INFILL

The 3-layered infill system is the most intricate and most meticulous infill system available on the market. It can only be performed by experienced installers. This infill method has been proven to offer the best Gmax (shock absorption) and energy restitution results for both the safety and the performance of athletes playing on the field.

- The infill consists of sand at the base of turf carpet to stabilize the whole system.
- The middle layer contains a mix of sand and rubber granules to offer the ideal firmness.
- The top is entirely made up of crumb rubber for a soft landing on impact.

This layered process may require up to 14 passes of infill layers and is slightly more time consuming but offers the ultimate proven ground for the highest level of performance and safety.



SAND-AND-RUBBER (HETEROGENEOUS MIX) INFILL

The heterogeneous infill mix is a simpler method. Sand is deposited at the base of the turf carpet to stabilize the whole system and to offer a firmness which is required for athletic performance. Crumb rubber is laid over the sand to create a soft surface with safe shock absorption.



SAND-AND-RUBBER (HOMOGENEOUS MIX) INFILL

The homogeneous mix is an infill method where the sand and crumb rubber are mixed together before the particles are deposited between the turf fibers. Such a method will typically offer inconsistencies in the level of Gmax and energy restitution across the surface due to the varying levels of each component at different parts of the field.



ALL-RUBBER INFILL

An all-rubber infill field is exactly as it sounds. Crumb rubber is the only element used to fill up the entire turf system. All-rubber fields have been identified as being far too soft and subject to quick deterioration. The infill migrates easily and the lack of mass at the base of the turf makes the field vulnerable to other damages.

INFILL COMPONENTS

STANDARD INFILL MATERIALS

Since the introduction of long pile artificial turf, sand and SBR (Styrene-Butadiene-Rubber) crumb have been used in the installation of turf fields. Both environmental and practical, these components have safety, performance and cost advantages which have made them the preferred infill materials of artificial turf fields.

★★ CRYOGENIC (SBR) RUBBER

Cryogenic rubber is the cleanest and highest grade of recycled rubber granule. This rubber consists of ground-up recycled tires which have been cryogenically frozen to allow for a cleaner partition of the pieces and turning the rubber into small, smooth-edged particles.

IT IS THE ULTIMATE FORM OF AN ENVIRONMENTALLY-FRIENDLY PRODUCT.

Cryogenic rubber works to promote effective and consistent drainage by eliminating the potential for migration caused by water. The cryogenic rubber's smooth shape facilitates a consistent flow of water through the infill without raising and displacing any rubber. The shape also allows the granules of rubber and sand to remain in suspension in a layered system, creating the optimal mix for a safe and realistic playing surface.

★ AMBIENT (SBR) RUBBER

Ambient-processed rubber results in a looser rubber material. Also made from ground-up tires, ambient rubber differs from cryogenic rubber in its grinding phase, where it is processed through a high powered rubber cracker mill at ambient temperature. The result is a more jagged rubber granule creating air pockets which can increase its propensity to float and facilitate infill migration. Due to its more jagged shape, ambient rubber does not stay in suspension with silica sand, and therefore, ambient rubber should not be used in a layered system. Nonetheless, ambient rubber offers an environmental, cost-efficient solution for a sports field.

ALTERNATIVE INFILL MATERIALS

In recent years, an influx of new infill products has been introduced to the market, all with their own claimed benefits and some noteworthy drawbacks. Here is a description of the alternative infill materials that are currently available:

★ NIKE GRIND

Nike Grind infill is a solution for those who wish to have a recycled, environmentally-friendly infill other than SBR. Nike Grind consists of recycled athletic shoes and Nike manufacturing scrap which are ground up and turned into infill crumb. Nike Grind is also a non-marking rubber, leaving balls, shoes and uniforms clean from any markings obtained on a typical turf field. This product is also the most cost-efficient material other than SBR.

THERMOPLASTIC ELASTOMER (TPE)

TPE is an alternative rubber to the recycled tire rubber. It is produced by using prime raw materials which offer a stable shock absorption for synthetic turf fields. The infill pellets are harder than typical SBR granules but are also quite durable. TPE has an environmental aspect because the material can be recycled after its use as infill.

A high-grade of TPE is required in order for the infill material to be durable in a sports field. Only the best grades of TPE have characteristics which allow them to remain durable by rebounding back to their original shape after compression. Such material comes at a higher price, often three to five times higher than that of SBR.

Many forms of lower grade TPE can easily deform after athletic use and turn into an ineffective gummy piece with no safety or performance attributes.

ETHYLENE PROPYLENE DIENE MONOMER (EPDM)

Similarly sized to SBR rubber, EPDM consists of a virgin, non-recycled material which can be made into any color to make the artificial turf system look as closely as possible to natural grass. However, EPDM is known for breaking down over time. The material is soft yet does not withstand sports use quite as well as SBR. EPDM also comes at a significantly higher price tag due to its complex manufacturing process.



Cryogenic Rubber



Ambient Rubber



Nike Grind Rubber



TPE Granules



EPDM

Selecting the Proper Turf System

INFILL

ORGANIC

Natural infills are currently made available by some manufacturers in the market. These infills either consist of cork, coconut shell, or a combination of both. They are viewed as organic due to the materials they consist of, but the playing conditions of fields which have this infill are far from being "natural".



Organic



Coated Rubber



Coated Sand

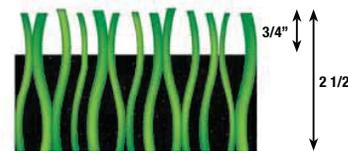
COATED (SBR) RUBBER

Polyurethane-coated (colored) rubber has been introduced to the market as an attempt to reduce the temperature of fields in warm areas. This effort has proven to be ineffective. The process simply involves coating standard crumb rubber with a light color, in hopes that less heat would be absorbed by the infill. However, studies have shown that the previous generation of fibers absorbed the heat and not the crumb rubber infill. Coated rubber is also more expensive than standard SBR and offers no added performance or safety benefit. It is not commonly used in sports fields.

COATED SAND

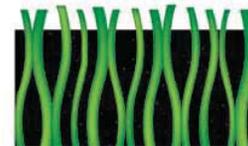
Coated sand has been presented as another alternative to SBR, with companies stating infill-splash is reduced. Although this may be the case - due to the low quantity of infill - the quality of the infill simply does not match that of SBR. Testing has proven that coated sand is not sufficiently robust to withstand outdoor use and the abuse of high traffic areas on sports fields. The infill material breaks down quickly and the fibers are subject to more degradation because they are not being protected by the infill. Furthermore, it may have a low cost compared to some other alternative infills, but a high quantity is required to fill a full field, driving the cost up. Overall, such infill material is not recommended.

Here is a look at the effects of varying infill depths:



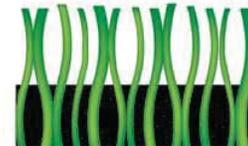
Infill Depth - Ideal

Infill at approximately 2/3 (two-thirds) depth of the fiber height will provide the necessary fiber support for a longer lasting field along with less maintenance and a very minimal amount of infill displacement.



Infill Depth - Too High

Too much infill depth in a turf system leads to rooster tails following ball roll and running, along with the potential for severe infill displacement.



Infill Depth - Too Low

An infill level that is too low interferes with the anchoring of the turf surface, causes wrinkling and/or buckling of the turf surface, fails to protect the turf fibers from premature wear and abrasion and compromises athlete safety.

* It is important to note that fiber manufacturers will not provide a warranty for these systems.

LEVELING THE PLAYING FIELD

THE IMPORTANCE OF PROPER INFILL DEPTH

There are three key aspects to constructing the ideal turf system – turf spacing (gauge), pile height, and infill depth. All three properties must be engineered to deliver maximum safety, performance, and durability.

Turf Spacing – The spacing of the system must be open enough for the athlete to cut, plant, and release in the infill system – proving for grass-like traction. The right spacing for a turf system is $\frac{3}{4}$ " as it has proven to provide ideal cleat interaction.

Pile Height – The height of a system's fiber is proportionate to the amount of infill required by a given system. For contact sports, a 2.5" pile height is desired because it allows ample infill for proper cushioning and impact resistance. For non-contact sports, a 2" fiber height is acceptable. Systems shorter than 2" should not be used for sports unless accompanied by an underpad.

Infill Depth – Infill depth is key to maintaining a grass-like appearance, while also ensuring proper playability and longevity of the fiber. The infill is the athlete's source for cutting, planting, shock absorption and energy restitution. Moreover, ensuring proper infill depth will contribute to the longevity of the turf fiber and lead to the natural progression of an artificial turf field. This aspect is the most important part of turf construction. It is important to note that the leading fiber manufacturers recommend free pile heights between $\frac{5}{8}$ " and $\frac{3}{4}$ ". The free pile height refers to the portion of the fiber that is left exposed after the infill is added to the artificial turf system.

The critical mistake of competitive turf systems, regardless of the type of infill, is the under filling or over filling of the turf system.