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CHOOSING ARTIFICIAL FIELD HOCKEY TURF

INTRODUCTION

Artificial turf is a well-known phenomenon that has been valued throughout the field hockey world for many years.

Every field hockey club in the Netherlands now owns at least one artificial turf field. A number of these fields are now in need of replacing. This white paper gives an overview of the artificial turf currently available as well as which turf is best suited to which hockey level. It explains how a modern semi-water or water field is constructed and what has to happen in order to convert or renovate an existing field. It also covers all the latest in field maintenance as well as the choice and necessity of facilities surrounding the field. And finally, a brief explanation on current innovations has been included.



C1 TYPES OF ARTIFICIAL FIELD HOCKEY TURF

There are currently 3 options for artificial field hockey turf in 2016:

Sand-filled hockey fields

These fields are made of durable fibers that are held upright by the sand (infill) inside the mat. These are the most popular fields to date as well as the most flexible: they can be used for a number of different purposes.

This type of field satisfies all of the requirements for conventional field hockey. Generally speaking, installing this type of field offers the most economic advantages. The average lifespan of this type of field is approximately 13-15 years (when well maintained).



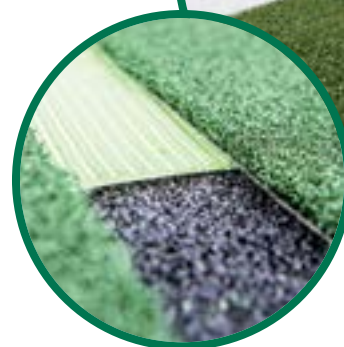
Semi-water fields

These fields have a denser fiber structure (.7-.8 in high), meaning that less sand is needed. Most semi-water fields are (briefly) sprayed with water prior to matches and training sessions. This gives the ball more speed and improves the overall quality of the game. The average lifespan of this type of field is approximately 11-12 years (when well maintained).



Water fields

These fields are made up of low-pile fibers. No sand is needed to strengthen the fibers. To ensure optimal playing conditions, the field should be sprayed with water prior to matches and training sessions. This type of field offers the best playing properties of the three types of artificial turf presented in this chapter. It is also the most expensive option. Clubs playing - or aspiring to play - at a mid to high level usually choose water fields. The average lifespan for this type of field is approximately 10-11 years (when well maintained).



C2 THE RIGHT TURF FOR ANY LEVEL OF FIELD HOCKEY

Artificial turf has become an essential part of field hockey. It provides a durable, quick and responsive surface, creating an excellent field for any level of field hockey. The crucial factors here are the type of material and fibers used as well as the technical properties and quality required of the field.

TYPE OF MATERIAL

Artificial hockey fields can be made of different materials.

The most commonly used materials are:

- polyethylene (PE): soft, kind to the skin and durable
- polypropylene (PP): stiffer and durable
- nylon: harder and extremely durable.

The extent to which materials are used has an impact on the price/quality ratio. A material's color fastness is determined by its level of UV resistance. Polypropylene is the most UV resistant, followed by polyethylene and nylon, respectively.



TYPE OF FIBER

There is also a distinction made between the types of fibers used:

monofilament, fibrillated and textured artificial turf fibers. The last fiber type mentioned has more volume and a permanent crimp.



TECHNICAL PROPERTIES

A field's technical properties are crucial in determining the level of hockey that can be achieved on the surface. We distinguish between the following properties:

Height of grass blades

Heights can vary from .5 inches in water fields to a maximum of 1 inch in sand fields. Clubs playing at a high level should choose a field with shorter blades of grass.

Thickness of grass blades

Thicknesses vary from 0.1cm to 0.15 cm. The higher the level of play, the greater the preference for thinner blades of grass. This helps to optimize stick placement under the ball.

Weight of the grass yarn (Denier)

This number indicates the number of grams per 9,000 meters of yarn. The higher the value, the thicker and/or heavier the yarn and the stronger the fiber. This helps make it less susceptible to wear.

Density of the mat (Division)

This refers to the number of stitches per 3 cm. The more stitches, the denser the mat and the heavier the pile weight. This in turn creates a more level field where the ball can roll more smoothly and bounce more consistently, allowing for optimal ball control.

Pile weight

Pile weight is measured by the square yard and indicates how much material has been incorporated into the artificial turf. A higher pile weight will have better technical playing properties.

Number of filaments

The number of grass blades or filaments is determined by the distance between the rows, the number of stitches per inch and the number of filaments per stitch. This determines how natural the artificial turf will appear.

Friction coefficient

A low friction coefficient ensures excellent grip/torque in both wet and dry weather conditions.

Shock absorption

The greater the shock absorption of the surface, the lower the chance of injuries. There is less pressure put onto the back, ankles, knees and other joints.


Rebound damping

The level of rebound damping indicates how low the ball will remain and allows for perfect ball control.

Backing stability

The backing of the artificial grass mat determines the strength, dimensional stability and bonding of the system's fibers. A good, stable backing is especially crucial for water fields.

QUALITY AND FIH QUALITY CERTIFICATION

The quality of the artificial field hockey turf is determined by properties such as safety, drainage and playing properties like ball behavior. These standards are described in detail in the  [FIH](#) (International Hockey Federation) publication.

International classification

In order to play matches at an international and Olympic level, the field is required to meet the FIH criteria for the "global" level.



C3 TYPE OF BASE

The quality of artificial field hockey turf is largely dependent on the base. Nowadays, it is quite common to have to deal with existing artificial turf when laying hockey fields. In this case, the options include field conversion or field renovation. These options are further explored in the second half of this chapter. When laying a completely new field - a full construction - a distinction must be made between the following bases:

Sub-surface

The sub-surface of the artificial turf is composed of the drainage and foundation. In the case of rising groundwater levels, drainage system pipes divert excess water to prevent the artificial turf from flooding. For example, in the Netherlands, this base will have a total depth of about 15-20 inches and contain several different layers. The lowest layer is composed of sand and cork and has the drainage built into it. The next layer up contains asphalt, lava, granulate or coarse stones, and is followed by a layer of pervious or porous concrete. A good, stable base is important for the overall quality and lifespan of the field. A quality sub-surface does not require adjusting every time the turf needs to be replaced.

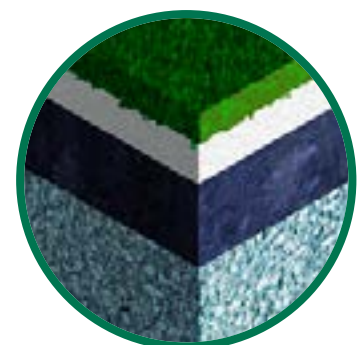


Technical sports layer

The technical sports layer, located between the sub-surface and the turf, influences ball behavior and the movement of players on the field. To a large degree, it establishes the overall stability of the field. To increase the safety of hockey fields, a shock-absorbing layer (a 'shock pad' or an 'e-layer') is added, which is .5 to 1.5 inches thick and reduces the strain placed on the players' muscles and joints. The e-layer also has a significant impact on ball behavior, such as the ball roll and ball bounce. A shock pad is made of foam and is softer than an e-layer, but also affects the muscles more as it has a higher energy restitution level.

Backing

A backing is installed underneath the turf. This ensures that the artificial grass piles remain securely in place and that the turf is well-placed on the e-layer, correcting any irregularities. The backing provides extra strength and stability to the field and keeps it flat.



'Thinner' construction

Ongoing developments are striving to produce 'thinner' sports fields, in other words, constructing fields with thinner foundations. Examples include Accorder and SuperSub. These sub-surfaces are not yet permitted for entire sports fields as a result of the current building standards for sports surfaces. At the moment, they are being used for fields of unconventional sizes, such as half-sized practice fields. Pilot fields can be requested.

RENOVATION OF AN EXISTING FIELD

For existing artificial field hockey turf, there is the possibility of field conversion, where only the turf has to be replaced. Alternatively, there is field renovation, where the field is upgraded from a sand or semi-water field to a water field.

Adjusting the sub-surface

If the same type of field is chosen for renovation and the sub-surface is still in good condition, a lot can be saved on costs. However in most existing sand and semi-water fields, the lava layer is composed of a combination of rock and rubber. Shock pads were not used in the past, as rubber already contains a form of damping. This 'rock-rubber layer' has to be replaced with a new layer that provides a firm sub-surface. A technical sports layer is then placed on top of that (see Figure 2 and 3 on page 7). In view of the regulations that apply in this case, solid advice is imperative. Please note: For sand to sand renovations, the lava/rubber layer does not have to be adjusted!

Sub-surface approval

After removing the old field during renovation or conversion, the sub-surface always has to be re-approved by KIWA/ISA Sport, the certification body that approves the technical aspects of the sub-surface in accordance with KNHB standards. After placing the technical sports layer and the turf, KIWA/ISA Sport must also approve the entire system, allowing the turf field to be declared suitable for competitions.

Choice and planning for field replacement

When choosing a conversion, renovation or full construction, the first point to consider is to what extent the club is dependent on the municipality. It is important to be well-informed of any relevant laws and regulations. See the [FIH site](#).

Next, the club needs to make a good plan for laying the field.

First of all, it is not possible to lay a field during the winter, as cold weather can naturally cause shrinkage. If shrinkage occurs, the installation could react differently after winter has passed. In addition, the e-layer cannot be constructed in temperatures below 53 degrees Fahrenheit.

Actual conversion of the field requires a period of approximately 2 weeks. Renovation requires 3 to 4 weeks and for a full construction, the period is 6 to 8 weeks. In the busy summer months, a period of 6 to 8 weeks is to be expected. Provided that planning appointments have been made with supplier in a timely manner.

C4 MAINTENANCE AND UPKEEP OF THE FIELD

Maintenance, watering and use of the artificial turf is important for the upkeep of the field and also strongly influences its lifespan.

MAINTENANCE

Maintenance costs for artificial turf is only about 25% of the maintenance costs for a field with natural grass. The type of maintenance depends on the type of artificial turf. Daily maintenance includes activities such as preserving the beauty of the field by removing litter, leaves and branches. Periodic maintenance involves replenishing the infill material, brushing and weeding as well as inspecting the turf, watering system and drainage system. This is important to ensure a long life for the field. Professional maintenance should be conducted annually. Many artificial turf suppliers have developed maintenance programs that can either be carried out by them or by in-house maintenance personnel, once they have received comprehensive training. This ensures maximum comfort and safety for the players on the field and compliance with the sporting authorities guidelines or local standards. A pro-active and speedy approach at managing repairs and extra maintenance helps keep permanent damage to the artificial turf to a minimum.

GAUGING PERFORMANCE

The performance of the artificial turf can be measured using instruments developed specifically for that purpose. For example, measuring the thickness of the infill, the ball roll, ball bounce and any uneven areas. These measurements are directly related to the field's shock absorption and torque resistance, important performance indicators for artificial turf systems.

WATERING

Before using an artificial water field or semi-water field, water needs to be applied to the field with sprinklers or water cannons. Spraying is an absolute must to ensure good - and most importantly safe - playing conditions. Failing to spray increases the risk of injuries. In addition, playing on an unsprayed field negatively affects the turf. Irrigating water fields with a layer of water contributes to speed. It also ensures low slide resistance and absorbs shock. The surface remains soft even at low temperatures. This promotes safety and helps prevent injuries.

WATER COLLECTION

Some artificial turf systems allow for unevaporated water to be collected from the field, filtered, purified and stored in basins found under or around the field. The collected and purified water can be (re)used for spraying the field or for other purposes such as in the showers, for cleaning the plumbing, for the toilets or other areas. (See also Customized water purification and reuse, page 36 [Expand Horizons in Hockey](#)).

USE OF THE FIELD

In principle, both artificial turf and the sand, plastic, cork or rubber infill can be used in temperatures as low as 10 degrees below zero. In frosty conditions, however, the field may experience some hardening as the materials become stiffer. If the temperatures fall below minus 10 degrees, then the fibers become more susceptible to damage. It is not advisable to use the field in (extremely) severe frosty conditions. Relieving the circles directly after laying sand-filled and semi-water fields can prevent the rubber filling level from decreasing and needing to be replenished and brushed. After filling, environmental influences and use of the field naturally stabilize the sand/rubber filling.



C5 FACILITIES SURROUNDING THE FIELD

Various facilities surrounding the field influence its playability. We distinguish between the following facilities:

GOALS, FLAGS AND DUGOUTS

The goals must be centered on every goal line and comply with the guidelines and requirements established by the KNHB for installing hockey fields (see the [FIH site](#)).

Field flags should be between 47 inches and 59 inches high. Flag poles are not to pose any danger of any kind whatsoever. Choosing poles with a rounded top with a thickness of 1 inch is recommended. Flags may not be attached with hooks and the flag should preferably be 12x12 inches.

Stationary or movable dugouts are to be placed on the same side of the field at a distance of at least 6.5 inches from the sidelines and a maximum of 32 feet from either side of the center line. It is recommended to position the dugouts so that the ceiling height is a minimum of 6.5 feet.

PAVING, CLEANING AREAS AND BRUSH MATS

Shoes can bring mud, grass and other impurities onto the field, adversely affecting the turf. For that reason, it is important for the pathways surrounding the field to be paved and to be kept very clean, preventing shoes from collecting dirt. In addition, it is a good idea to create a cleaning area equipped with grates at the entrance to the field. Separating the field with fencing makes sure that players can only enter the field via the cleaning area.

By tiling the edging along the fence with so-called brush mats, you can trap cigarette butts, food, cups and other waste and prevent them from entering into the field. It is easier to clean this edging than the field.

FENCING, RAILINGS AND SIDE-BOARDS

The enclosed field area is to be constructed so as to avoid the risk of injury to competitors and the public as much as possible. Fencing must be at least 3 feet high, but 3.6 feet is recommended. This prevents spectators from easily stepping over the fencing. It can also act as a ball catcher. Various options are available that comply with the KNHB regulations for installing hockey fields (see the [FIH site](#)).

The other fences can differ significantly in height, from 13 feet to 32 feet high behind the goals. The fences behind the goals need to be a minimum of 13 feet away from the goal line. The height depends on the type of artificial turf field, the playing level and the kind of environment that is directly around the field.

In addition to the standard hard wood side-boards, there are also side-boards currently available that include an e-layer inlay or a synthetic inlay, helping to reduce noise pollution.

FLOODLIGHTS

Artificial lighting helps maximize the playability of an artificial turf field. The guidelines and regulatory requirements (relating to competitions), for lighting hockey fields are established by the Board of the KNHB (see the [FIH site](#)). This depends on the purpose of the floodlight installation. Is the lighting used for training sessions in the evening, for practice matches in artificial light or for league matches in artificial light?

The performance of the floodlight installation will decline the older the installation gets. The level of lighting can decrease to such a degree that it is in fact impossible to practice or play responsibly (safely) or that the lighting no longer complies with the regulatory requirements for competitions. This could lead to the installation no longer being allowed to be used in competitions. Thus, proper maintenance of the installation is crucial.

Building permits for floodlights often requires a light nuisance calculation. This will determine if the strength of the lighting on the facades of the surrounding buildings is within the permitted limits. Clubs can save up to 85% on energy costs by using LED lighting. In addition, many communities are now providing significant subsidies for switching to LED lighting. (See also C6)



C6 INNOVATION

There are several ongoing innovations for artificial field hockey turf. The following innovations will be described briefly here.

Top level fields

Innovations are now making it possible to purchase artificial field hockey turf that meets any requirement and any preference, creating the ultimate podium for elite field hockey. Individual club ambitions are the most important factors for the type of field chosen, however.


Case studies in sustainability and cost-effectiveness

Currently available innovations offer clubs significant advantages in the areas of water and energy. Advantages include saving costs by switching to LED lighting (see also C5), collecting water under the field, purifying and reusing water (see also C4) and generating electricity with solar collectors on top of the club house and solar panel film on unused fields. There are many subsidies available for these investments in sustainability.

Community centers

Fields and clubhouses that are either mostly unused or are not used at all can also offer opportunities. They can be used to provide assistance not only to children but also to the older members of our aging communities.

H7 AND LASTLY

A great deal of relevant information in this white paper can also be found in
 [“Expand Horizons in hockey”](#).

FOR MORE INFORMATION OR ADVICE, PLEASE CONTACT:

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