

# FIFA QUALITY CONCEPT FOR ARTIFICIAL TURF GUIDE



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## Introduction

Artificial turf has been around now for several decades. It can be argued that artificial turf was originally developed to address the limitations of natural grass. However, the earliest versions were not designed for football and changed the game dramatically. Therefore, football never thoroughly embraced the thought of high level competition matches on artificial surfaces.

The breakthrough came about when manufacturers started to develop surfaces specifically designed for football. Manufacturers have now developed a turf that mirrors real grass. In order to get away from the short, tightly packed matting of the earlier generation, nowadays, the concept is to produce longer and more thinly spaced tufts and most of the systems are infilled with sand for support and rubber granules to give bounce. This newest generation of artificial turf, has proven to be the most favourable for football to date.

FIFA realized that, as the game's global popularity increases, so the climate plays a greater part in limiting its development. Players in countries at the extreme ends of the temperature range won't necessarily benefit from the predominance of natural-grass turf. With the deployment of third-generation artificial turf pitches, FIFA has recognised the enormous benefits artificial pitches would bring to the global development of football, not only because artificial turf can be used in more extreme climates, but because, where a pitch is used intensively it can be used almost 24 hours a day and seven days a week.

Due to the numerous manufacturers and installers involved worldwide, all using slightly different systems, the performance of artificial pitches could be extremely variable. Therefore FIFA as the world governing body of football wants to ensure that there is a recognised international standard for artificial turf pitches and has introduced, in 2001, the FIFA Quality Concept for artificial turf. This quality testing scheme uses real turf as its benchmark and awards the FIFA Recommended Marks to those pitches that meet the very stringent quality criteria.



## FIFA Quality Concept for Artificial Turf

The pitch is a crucial element of the game and in an ideal world and an ideal climate there is no better football playing surface than grass. These include among other things the best playing characteristics and acceptance at all levels of football. However, in adverse weather conditions the use of these pitches is limited and the performance suffers. The answer is being found in the form of artificial turf. Manufacturers have developed a new generation of artificial turf that mirrors real grass.

“As the game’s worldwide governing body, we have the responsibility to support any move to improve football equipment,” says Joseph S. Blatter, President of FIFA. In line with this commitment and in response to the growing trend to play football on artificial surfaces, the FIFA Quality Concept has been expanded to artificial turf in 2001.

### Artificial Turf

The following two cases demonstrate the need for a change in thinking about artificial surfaces:

- **Climatic Conditions**

Many regions of the world suffer from extreme climatic conditions and as a result are often without adequate natural grass pitches. Either the climate makes the growth and care for such fields a burden or the financial resources are limited. Furthermore, the demand on these pitches is quite high and the resulting mix often leaves the pitches in poor condition. The advantage of artificial turf in these regions is more than evident.

- **Stadia Microclimate**

Stadium construction is often influenced by the need to adjust designs for the installation of natural grass for international football. Natural grass needs sufficient sunlight, wind and rain to adequately grow and thrive. However, the trend to build stadia with roofs and terraces for additional spectator comfort creates an environment better suited to artificial turf.

The newest generation of artificial surfaces combines the advantages of similar playing characteristics as natural turf, including increased player comfort and safety, with low maintenance and extended usage.



This project reflects FIFA's goal to standardize and control football equipment and to ensure the safety of footballers together with developments in the sporting goods industry.

The FIFA Quality Concept is a rigorous test programme for artificial surfaces whereby successful manufacturers will be able to enter into a licensing programme for the use of the prestigious FIFA Recommended Marks. Synthetic turf for football pitches exist in various technical versions and not all of them are advantageous to the quality of the game or to a player's health. Therefore, only artificial turf of the best quality with the highest technical standards would be able to gain a FIFA Recommended endorsement.

The scheme is in operation since more than three years and over 80 FIFA Recommended pitches are installed worldwide. Many of these pitches are owned by municipalities, which recognise that an artificial pitch can be hired out almost 24 hours a day and seven days a week. Equally, major clubs, like Ajax Amsterdam, Glasgow Rangers, Boca Juniors, Deportivo La Coruña and FC Porto, have installed FIFA Recommended artificial pitches as a central component in their training facilities.

Bigger and bigger stadia are taking the major step of laying an artificial turf pitch, including the Finnair (Töölö) Stadium in Helsinki that was hosting ten matches, including the final, of the first major tournament, the FIFA U-17 World Championship, played on an artificial surface in 2003.

FIFA is responding to this development by introducing a segmented FIFA Recommended system with two quality levels as of 1 July 2004 which reflects the market situation. The creation of a second, more stringent standard, based on the results of an extensive research program, including player's feedback and medical research, will further improve playability and safety.

## Scoring Chances for all

Manufacturers profit from the reliability and credibility of the FIFA Quality Mark.

Players, coaches and club officials benefit from the playability of the newest generation of artificial turf; criteria based on the performance characteristics of natural grass. The transition from natural grass to artificial turf should be as smooth as possible. Sliding tackles can be carried out without hesitation on the newest generation of artificial turf. The risk of friction burns is minimal. Also, according to claims from the manufacturers players may use the same footwear on both surfaces. No special shoes or studs are needed for football on artificial surfaces of the newest generation.

National associations and confederations can rest assured that only those surfaces specifically suited to top-flight football will qualify for the FIFA Recommended Mark. This quality control provides a starting point for those parties who wish to open their competitions to artificial turf of the newest generation. We believe the technological developments in the field of artificial turf and the superior quality of the new designs makes it necessary to, if not promote, at least encourage the use of artificial surfaces in climates where natural grass is not an economic or environmental option.

This document outlines the key elements of the FIFA Quality Concept for Artificial Turf.

# Testing for FIFA Certification

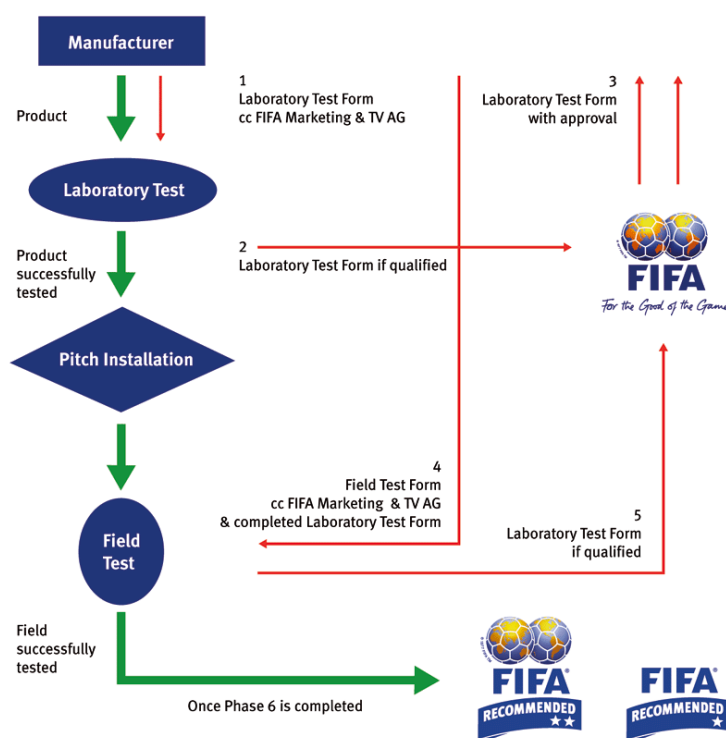
## Test Procedures

The FIFA Recommended Marks are only awarded to those artificial turf pitches which have passed a series of stringent laboratory and field tests. The marks will only be given to an installed pitch and not simply to the turf carpet. This is because the underlying base surface is just as important to the playability of the pitch as the turf itself.

Therefore every turf product must first pass laboratory tests to determine its composition and then must be tested for durability, climatic resistance, player-to-surface interaction and ball-to-surface interaction. If it passes all these tests, then this completes the first stage of the process towards the award of the marks.

In the second stage every installed pitch must be tested on site. Firstly, specialised field-testing equipment measures how the ball reacts on the surface in terms of roll, vertical rebound and how the ball behaves when it strikes the surface at an angle. Then it must similarly be tested to see how it reacts to the actions of players –including shock absorbency, surface deformation, slip resistance and traction. In addition, the reaction of the turf to the skin of the players, when sliding on the surface, will be measured in form of skin abrasion and friction for the higher FIFA Recommended level.

If the artificial turf pitch passes all the laboratory tests and all the field tests then it will qualify for one of the two FIFA Recommended Marks.



## Quality Levels

Since the implementation of the FIFA Quality Concept for Artificial Turf in 2001 many top league clubs worldwide have already installed, and thus discovered the advantages of, FIFA Recommended artificial turf training pitches. Many lower division and amateur leagues are already accepting artificial turf pitches for competitive matches. The positive feedback from players induces more and more top football clubs to consider artificial turf pitches in their stadia and football association to open their competitions for these surfaces.

The International Football Association Board has also recognized the advances in artificial surface technology and decided to introduce artificial surfaces into the Laws of The Game in July 2004. Following the International FA Board mandate to FIFA to create universal guidelines for artificial turf, the FIFA Quality Concept has been further developed by introducing a FIFA Recommended 2 Star rating system. Based on player's feedback, medical research, test results and information from the industry since the implementation in 2001, a second, more stringent standard has been developed in addition to the existing level.

The creation of a top-of-the-range FIFA standard will further improve playability and safety. This new benchmark will lead the industry to develop artificial turf products even closer to the perfect natural grass pitch model and provide the world of football with the best artificial turf surfaces for the professional game.

The FIFA Quality Concept for artificial turf consisting of the FIFA Recommended 2 Star and the FIFA Recommended 1 Star quality levels is reflecting the segmented market situation.



# Test Requirements

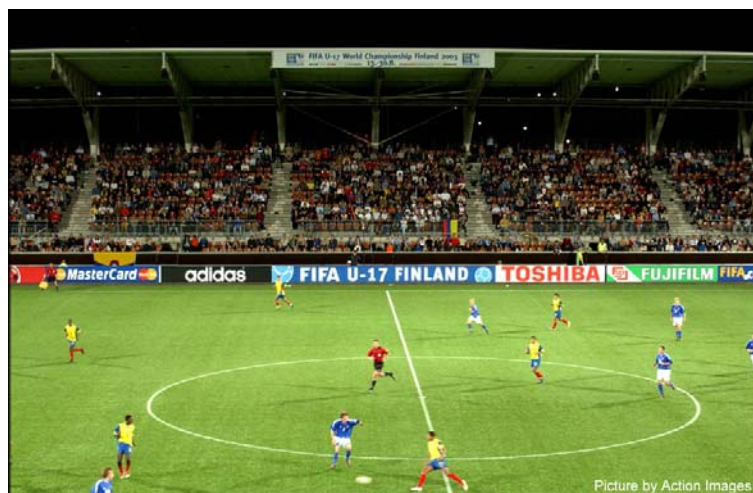
## Quality Criteria

There are three basic categories that define the overall performance of a synthetic surface suitable for the game of football. These may be broadly defined as:

- the reaction of a football on the surface (Ball/Surface Interaction)
- the reaction of a football player to the surface (Player/Surface interaction)
- the resistance of the surface to wear and tear (Durability)

The series of tests would include:

- Laboratory Tests
  - Identification Tests
  - Durability
  - Climatic Resistance
  - Player/Surface Interaction
  - Ball/Surface Interaction
- Field Tests
  - Construction Test (Slope, Evenness, Base Permeability)
  - Player/Surface Interaction
  - Ball/Surface Interaction



## Test Methods

### DURABILITY

#### Abrasion Resistance

The surface is artificially abraded (equivalent to five years of wear) and tested on the following: shock absorbency, vertical deformation, ball rebound, traction, angled ball behaviour.



#### Joint Strength

Measures the maximum force recorded to destroy the joints where they are sewn or joined with adhesive.



### CLIMATIC RESISTANCE

#### UV / Water / Heat

Measures the colour fastness, abrasion resistance and joint strength.



## PLAYER/SURFACE INTERACTION

The characteristics of a surface that a football player needs to play the game fall into several categories:

### Shock Absorbency

The surface can feel “hard” or “soft”. A hard surface can lead to injuries to the body by causing the joints (particularly ankles, knees, hips and spinal column) to compress which results in damage to the cartilage between the bones in the joints. Furthermore falling on a hard surface can cause bruising to soft tissue like muscles and extreme cases can cause fractures to bones. A soft surface can cause fatigue to the player running on the surface. The ability of a surface to absorb the impact of a player running on the surface is called its *Shock Absorbency* and is measured using a device called the *Berlin Athlete*. The human body behaves like a spring when it makes contact with the surface. A spring when compressed absorbs a certain amount of energy.

This energy is released when the pressure on the spring is released. Similarly a human being walking on a surface absorbs some of the impact when his foot makes contact with the ground. However, once our human spring has been completely compressed any additional impacting force will feel like a physical shock. Walking on a surface our human spring can absorb most if not all of the shock. If we then jump on the surface it is likely that we completely compress our spring and the extra force we apply by jumping rather than walking gives a physical shock to the body. If we jump from a sufficient height the shock can be so great as to do physical damage to our bodies.

The apparatus we use to measure *Shock Absorbency* incorporates these elements of the human spring and an impacting force. An anvil is placed on the surface to be tested, on top of the anvil is a spring that has the same spring coefficient as an “idealised” sports person and a weight is allowed to fall on the spring. The force received by the anvil is a function of the combination of the spring and the shock absorbing nature of the surface. The apparatus is first placed on a concrete slab and a value is obtained. The apparatus is then placed on the surface to be tested and the new value is obtained. The two values are compared and the reduction in the force received by the anvil due to the surface is recorded. Hence the values are expressed as a percentage of the force received when compared to concrete or *Force Reduction*.

The property we are measuring is called *Shock Absorbency*; the apparatus we use to measure *Shock Absorbency* is called the *Berlin Athlete*. The measure of *Shock Absorbency* using the *Berlin Athlete* is called *Force Reduction* and is expressed as a percentage. The higher the percentage the “softer” the surface i.e. the more shock absorbing is the surface. Natural turf in good conditions gives values of between 55-70%. Natural turf in “ideal” conditions produces values of between 60-70%.

## Deformation

The stability of a surface as a player runs across it has a significant effect on his stride pattern (often referred to as gait). A surface that deforms excessively gives the impression of being unstable. Consequently the player will shorten his stride and his speed will reduce accordingly. A surface that does not deform is hard and unforgiving and causes discomfort. We measure the stability of a surface by the amount of give in the surface, or Deformation. A weight is dropped onto a spring sitting on an anvil, as per the *Berlin Athlete*, but the weight and spring are different. Instead of measuring the force we measure the amount the surface deforms in millimetres.

## Slip Resistance

If a football player is to run on a surface he needs to have sufficient foot holding for him to be able to accelerate and decelerate as necessary. A football player needs to both accelerate from a standing start and be able to stop quickly equally as well. This characteristic requires an interaction between the sole of the soccer shoe and the surface. The shoe has to gain sufficient grip on the surface to allow the propulsive forces of the take-off to be transmitted to the surface to allow the player to accelerate from standing. Similarly the player must gain sufficient grip from the surface to enable him to stop quickly. If there is insufficient grip the player will slip which could result in a loss of balance with the danger of physical damage to muscle ligaments, soft tissue or even bones. Conversely too much grip is also dangerous. When a player attempts to stop forces are transmitted to joints and ligaments to decelerate the body's forward momentum. If the forces are transmitted too quickly then there is a danger that too high a strain will be imparted to the joints and ligaments resulting in damage.

The method used to assess this characteristic is referred to as *Slip Resistance* and on synthetic grass surfaces it is measured using a *Slip Resistance Tester*. The *Slip Resistance Tester* allows us to assess the surface in two ways. Firstly how much horizontal movement the player will feel in the surface upon acceleration/deceleration. A studded test foot strikes the surface and comes to rest on a numbered scale. A low value indicates a slippery surface and a high value a surface that doesn't allow sufficient movement and is dangerous to the player. Values of between 120-220 for horizontal movement have been found to give sufficient grip. A second measurement is also taken with this apparatus. The deceleration of the foot as it stops is measured. High decelerations will cause soft tissue damage to the joints. Values between 3.0-6.0 g for this deceleration have been measured on good natural turf. Lower values indicate a surface with low grip and higher values with high grip.



## Traction

Another aspect of the interaction between the shoe sole and the surface is the ability to change direction at will when running at speed. Football is not a unidirectional sport but is one involving repeated changes of direction. The player therefore needs to change direction on a regular basis as the game moves around the field. The surface must allow sufficient Traction to allow the player to repeatedly change direction. Similarly as for *Slip Resistance* there is a need for an upper and lower limit-insufficient and the player will loose footing, too much and muscle, ligaments and joints will be placed under too much stress and damage will accrue. This property of the surface is measured using a *Traction Apparatus*.

Values for natural turf of between 25-50 N.M. (Traction Coefficient 1.2-1.8) for good turf and between 35-45 N.M. for an “ideal” natural turf have been measured. The apparatus uses a *Torque Wrench* and measures the amount of *Torque* necessary to start the motion of a studded sole. The units of *Torque* are *Newton metres* abbreviated by N.M.



## Skin Abrasion

A common complaint of first and second generation synthetic turf was the abrasiveness of the surface together with its tendency to produce friction burns when a player for example undertook a sliding tackle on the surface. To help us assess the new generation of surfaces ability to reduce the effects of skin burning and skin abrasion a new device has been developed to replicate the action of skin rubbing on the artificial grass. A special silicone elastomer that simulates natural skin is rubbed over the surface at speed. Afterwards the damage to the silicone is assessed and the friction between the silicone elastomer and the synthetic grass is recorded. If the surface is abrasive it damages the silicone elastomer which can be assessed by measuring the friction change in the silicone before and after the test procedure. A large change indicates an abrasive surface. A surface that produces a high coefficient of friction is one that will lead to friction burns. A certain amount of friction is however necessary to slow the player down as he slides and also to slow the ball down. Hence, the need for both a lower and an upper limit for the coefficient of friction.



## BALL/SURFACE INTERACTION

There are three categories that define the performance of a ball on the surface. These are *Ball Bounce*, *Ball Roll* and *Angled Ball Behaviour*. The behaviour of a ball on the surface is correlated to the anticipation of the player. A player expecting to receive a ball makes certain mental assumptions regarding the rebound of the ball, the pace of the ball across the surface and the speed at which an angled ball comes off the surface.

### Vertical Ball Rebound

Clearly if a ball bounces higher than expected the player may fail to control the ball or it may bounce over his head or bounce too low and pass under a raised foot. It is necessary therefore to measure the height to which a ball bounces when dropped from a certain specified height onto the surface. The *Vertical Ball Rebound* is measured by dropping a ball from a specified height and measuring its rebound height. Natural turf will give values of between 50-90%, but an “ideal” natural turf will give values of between 60-84%.



## Ball Roll

A ball moving over the ground towards a player more quickly or slowly than anticipated will result in the player failing to control the ball correctly. The player passing the ball will also assume the ball will be slowed over the surface and will therefore kick it with a certain force anticipating the ball to be slowed down accordingly. The test used to predict the slowing down of the ball over the surface is called *Ball Roll*. A ball is allowed to roll down a ramp onto the surface through sets of timing gates and the speed of the ball over the surface is assessed. This allows the surface to be classified in terms of the speed of the surface or the deceleration of the ball over the surface. A calculation can be done by measuring the decreasing velocity of the ball over a defined distance. The velocity change calculated for natural turf would vary between 0.5 m/s-0.8m/s. The higher the velocity change the slower the pitch.



## Angled Ball Behaviour

Vertical Ball Rebound measures the resiliency of the surface experienced by the ball. *Ball Roll* (expressed as the speed of the surface) measures the pace of the ball over the surface and is related to the friction between the ball and the surface. There is also a further combined effect when a ball is struck into the air and strikes the surface at an angle, referred to as *Angled Ball Behaviour*. The *Angled Ball Behaviour* is a complex interaction between the ball and the surface involving the friction between the ball and the surface on impact, the horizontal velocity and the *Vertical Ball Rebound*. In practical terms a ball hit at an angle and speed, particularly a long ball, will bounce off the surface at a certain angle and speed. If the ball comes off the surface at a different trajectory and speed than anticipated it makes it difficult to control the ball. Hence the need, if possible, to measure the combined effects of *Angled Ball Behaviour*.



## Laboratory Tests

### IDENTIFICATION OF THE PRODUCT

- **mass per unit area and tufts per unit area**
- **tuft withdrawal force**  
Measures how strongly the fibres are anchored into the backing of the carpet.
- **pile weight**  
Is measured to ensure that not only the numbers of tufts are correct but also that the correct dTex of yarn has been used.
- **fibre identification**  
Can be identified by its melting point and so called glass transition temperature (type of polymer).
- **in-fill materials**  
Defines the various types of in-fill available for incorporation into the gaps between the fibres of the synthetic turf (particle size / particle shape / bulk density).

Optional:

- **compressive modulus**  
Optional shock pad under turf (a shock pad is an impact-absorbing layer, which influences player comfort and ball response).

### DURABILITY

- **Abrasion Resistance**  
The surface is artificially abraded (five year period of wear) and tested on the following: Shock Absorbency, Vertical Deformation, Ball Rebound, Traction, Angled Ball Behaviour.
- **Joint Strength**  
Measures the maximum force recorded to destroy the joints where they are sewn or adhered with adhesive.

### CLIMATIC RESISTANCE

- **UV / Water / Heat**  
Measures the colour fastness, abrasion resistance and Joint Strength.

### PLAYER/SURFACE INTERACTION

- **Shock Absorbency**  
Is the ability of a surface to absorb the impact of a player running on the surface.
- **Deformation**  
Is the stability of a surface measured by the amount that the surface gives in to impact.
- **Slip Resistance**  
Measures the grip of a shoe sole on the surface.

- **Traction**

Measures another interaction between the shoe sole and the surface relating to the ability of a player to change direction.

**FIFA RECOMMENDED 2 STAR:**

- **Skin Abrasion**

Measures the abrasiveness of the surface on the skin of the player when sliding.

- **Skin Friction**

Measures the friction of the surface on the skin of the player when sliding.

**BALL/SURFACE INTERACTION**

- **Vertical Ball Rebound**

Measures the resiliency of the surface against the ball.

- **Ball Roll**

Measures the pace of the ball over the surface in relation to the friction between the ball and the surface.

- **Angled Ball Behaviour**

Measures the complex interaction between the ball and the surface (involving the friction between the football and the surface) on impact, horizontal velocity and Vertical Ball Rebound.



## OVERVIEW OF QUALITY CRITERIA AND TEST METHODS OF LABORATORY TESTS

Characteristics	Surface or Component	Test Method
Mass per Unit Area	Synthetic Turf	ISO 18543
Tufts per Unit Area	Synthetic Turf	ISO 1763
Pile Weight	Synthetic Turf	ISO 2549
Tuft Withdrawal Force	Synthetic Turf	ISO 4919
Mass per Unit Area	Shockpad (if present)	EN 430
Compressive Modulus	Shockpad (if present)	ISO 604
Particle Size	sand or rubber	EN 933-1 and 933-2
Particle Shape	sand or rubber	EN 933-1 and 933-2
Bulk Density	sand or rubber	EN 13043
Fibre Identification	Synthetic Turf	DSC

### Durability

Characteristics	Test Method	Requirements
Abrasion Resistance	EN 13672	Remains within the limits: – Shock Absorbency – Vertical Deformation – Ball Rebound – Traction – Angled Ball Behaviour
Joint Strength	EN 12228	> 15N/m

### Climatic Resistance

Characteristics	Test Method	Requirements
UV / Water / Heat	EN 13864	– Colour Fastness – Abrasion Resistance – Joint Strength

### Player/Surface Interaction

Characteristics	Test Method	FIFA Recommended ★★	FIFA Recommended ★
Shock Absorbency	EN 14808	60 – 70%	55 – 70%
Vertical Deformation	EN – Low Impact ("Artificial Athlete") EN 14809	4mm – 8mm	4mm – 9mm
Traction	number to be allocated	30 – 45 N.M.	25 – 50 N.M.
Slip Resistance	Slip Resistance Tester: – Scale – Deceleration	130 – 210 3 – 5.5 g	120 – 220 3 – 6 g
Skin Abrasion	Securisport: – Friction Change	+/- 15%	–
Skin Friction	– Coefficient of Friction	0.35 – 0.75	–

### Ball/Surface Interaction

Characteristics	Test Method	FIFA Recommended ★★	FIFA Recommended ★
Vertical Ball Rebound	EN 12235	60 – 90 cm	60 – 100 cm
Ball Roll	EN 12234	0.45 – 0.8 m/s	0.35 – 0.95 m/s
Angled Ball Behaviour	developed specifically for the FIFA Quality Concept (15°; 50km/h)	45 – 65 % dry 45 – 80 % wet	45 – 70 %

## LABORATORY TEST FORM

### LABORATORY TEST FORM FOR ARTIFICIAL TURF

Please complete the information below, sign and enclose the required test material of 3 m x 3 m of each product to be tested – one form per product – and send a copy to FIFA Marketing & TV AG.

Company: \_\_\_\_\_  
 Contact Name: \_\_\_\_\_ Date submitted: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Tel: \_\_\_\_\_ Fax: \_\_\_\_\_  
 Signature: \_\_\_\_\_

Product Name / Specification: \_\_\_\_\_

Test Institute: \_\_\_\_\_

#### Product Identification

Mass per Unit Area: \_\_\_\_\_ Pile Weight: \_\_\_\_\_  
 Tuft Withdrawal Force: \_\_\_\_\_ Particle Size: \_\_\_\_\_  
 Fibre Identification: \_\_\_\_\_ Particle Shape: \_\_\_\_\_  
 Tufts per Unit Area: \_\_\_\_\_ Bulk Density: \_\_\_\_\_

#### OPTIONAL

Compressive Modulus (Shockpad):  yes  no  not applicable

Laboratory Test for:  FIFA Recommended 2 Star\*  FIFA Recommended 1 Star

(The part below will be filled in by the testing institute after the testing)

**Test Result**

Criteria failed (if any):  **QUALIFIED**  **FAILED**

**Durability**  Abrasion Resistance  
 Joint Strength

**Climatic Resistance**  UV/Water/Heat

**Player / Surface Interaction**  Shock absorbency  Deformation  
 Slip Resistance  Traction  
 Skin Abrasion\*  Skin Friction\*

**Ball / Surface Interaction**  Vertical ball rebound  Ball Roll  
 Angled ball behaviour

Description:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Field Tests

The field tests will be conducted after installation of the pitch. The *Player/Surface Interaction* and the *Ball/Surface Interaction* tests are not only conducted in the laboratory but additionally on the field. For clarification of those tests please refer to the explanation listed under the section “Laboratory Tests”.

### CONSTRUCTION TEST

- Slope Test  
Measures the slope of the field.
- Evenness Test  
Measures the degree of evenness of the field.
- Base Permeability  
Measures the base permeability which allows water to freely drain through the carpet.

### PLAYER/SURFACE INTERACTION

(please refer to the explanation mentioned under the section “Laboratory Tests”)

- Shock Absorbency
- Deformation
- Traction
- Slip Resistance

### BALL/SURFACE INTERACTION

(please refer to the explanation mentioned under the section “Laboratory Tests”.)

- Vertical Ball Rebound
- Ball Roll
- Angled Ball Behaviour



## OVERVIEW OF QUALITY CRITERIA AND TEST METHODS OF FIELD TESTS

### Construction Requirements

Characteristics	Test Method	Requirements
Slope	EN 22768-1	< 1.0%
Evenness	EN 22768 EN 22768	< 10mm under 3m < 2mm under 300mm
Base Permeability	EN 12616	> 180mm/hr

### Quality Monitoring

Characteristics	Test Method	Requirements
Mass per Unit Area	ISO 18543	+/- 5%
Tufts per Unit Area	ISO 1763	+/- 10%
Pile Weight	ISO 2549	+/- 10%
Particle Size	EN 933-1/933-2	+/- 10%
Pile Height	ISO 2549	+/- 5% (according to the product description)

### Player/Surface Interaction

Characteristics	Test Method	FIFA Recommended ★★	FIFA Recommended ★
Shock Absorbency	EN 14808	60 – 70%	55 – 70%
Vertical Deformation	EN – Low Impact ("Artificial Athlete") EN 14809	4mm – 8mm	4mm – 9mm
Traction	number to be allocated	30 – 45 N.M.	25 – 50 N.M.
Slip Resistance	Slip Resistance Tester: – Scale – Deceleration	130 – 210 3 – 5.5 g	120 – 220 3 – 6 g

## Ball/Surface Interaction

Characteristics	Test Method	FIFA Recommended ★★	FIFA Recommended ★
Vertical Ball Rebound	EN 12235	60 – 90 cm	60 – 100 cm
Ball Roll	EN 12234	0.45 – 0.8 m/s	0.35 – 0.95 m/s
Angled Ball Behaviour	developed specifically for the FIFA Quality Concept (15°; 50km/h)	45 – 65 % dry 45 – 80 % wet	45 – 70 %

### Additional Requirements

All pitches to be granted the FIFA Recommended hallmark will have to comply with the following dimensions:

- Length: minimum 90 m (100 yds)  
maximum 120 m (130 yds)
- Width: minimum 45 m (50 yds)  
maximum 90 m (100 yds)

All artificial turf pitches willing to host international matches have to comply with the official Laws of the Game (please go to [http://www.fifa.com/refs/laws\\_E.html](http://www.fifa.com/refs/laws_E.html) for further information) which may require that certain additional technical criteria be met.



## FIELD TEST FORM

### FIELD TEST FORM FOR ARTIFICIAL TURF

Please complete the information below and hand it in to the test institute and send a copy to FIFA Marketing & TV AG.

Company: \_\_\_\_\_

Pitch Name: \_\_\_\_\_ Date submitted: \_\_\_\_\_

Address: \_\_\_\_\_

Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

E-mail / Website : \_\_\_\_\_

Signature: \_\_\_\_\_

Product Name/Specification: \_\_\_\_\_

Test Institute: \_\_\_\_\_

*Please enclose the Laboratory Test Form for Artificial Turf for the specific product that has been installed.*

Field for:  FIFA Recommended 2 Star  FIFA Recommended 1 Star

(The part below will be filled in by the testing institute.)

#### Test Result

Criteria failed (if any):  **QUALIFIED**  **FAILED**

#### Construction Requirements

- Slope  Base Permeability  
 Evenness

#### Player / Surface Interaction

- Shock absorbency  Traction  
 Deformation  Slip Resistance

#### Ball / Surface Interaction

- Vertical ball rebound  Ball Roll  
 Angled ball behaviour

Description:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Test Institutes appointed by FIFA

Company	Country	Laboratory Testing	Field Testing
Labosport	France	X	X
ISA Sport	The Netherlands	X	X
IBV	Spain		X
Acousto-Scan	Australia		X

Other test institutes (Field Testing) will be appointed by FIFA as the programme develops.



## Quality Assurance

It will be the responsibility of the testing institutes to satisfy themselves that the product installed is the same as the product submitted for type testing. This will be achieved by undertaking the following steps:

- All products manufactured must submit a certificate of compliance to the effect that the product dispatched is the same as the product submitted for type testing in accordance with procedures to be run under their ISO 9002 or similar scheme. These certificates must be dispatched and have been received by the institute before any product leaves the place of manufacture for the installation site.
- If the testing institute has any reasonable cause for concern, it may request samples of the manufactured products for product identification.
- Any minor change in the product profile must be proven to satisfy the requirements of the scheme. Any significant change will require a complete re-evaluation of the product.
- The client must demonstrate the ability to undertake the necessary maintenance requirements as stipulated in a separate document and the manufacturer's recommendations. This will entail a minimum of purchasing the necessary equipment and demonstrating that the appropriately qualified personnel are employed to utilise the machinery.
- The fields will be regularly inspected over the lifetime of the facility to ensure the continuing suitability for the intended use of football. This will involve re-testing of the facility after a number of years of use to ensure the product remains within the requirements as defined above.

The products may require a period of establishment before they have fully achieved their optimum playing characteristics. Field-testing will therefore take place within one year after pitch installation where climatic conditions allow.



## CERTIFICATE FIFA RECOMMENDED 2 STAR



### LICENSING CERTIFICATE

FIFA is pleased to confirm herewith that the artificial turf

Brand Name	Model Name	Authorisation No.
xxx	xxx	xx-00.00

installed at the **PITCH NAME (LOCATION)**  
of the company **XYZ**  
has successfully passed the tests and  
qualified for the "**FIFA RECOMMENDED 2 STAR**" mark  
for the period of 1 July 2000 to 30 June 2003.

**Licence No. xx-00.00**



Mr. Joseph S. Blatter  
President Fédération Internationale de Football Association

Zurich, 1 July 2004

## CERTIFICATE FIFA RECOMMENDED 1 STAR



### LICENSING CERTIFICATE

FIFA is pleased to confirm herewith that the artificial turf

Brand Name	Model Name	Authorisation No.
xxx	xxx	xx-00.00

installed at the **PITCH NAME (LOCATION)**  
of the company **XYZ**  
has successfully passed the tests and  
qualified for the “**FIFA RECOMMENDED 1 STAR**” mark  
for the period of 1 July 2000 to 30 June 2003.

Licence No. **xx-00.00**



Mr. Joseph S. Blatter  
President Fédération Internationale de Football Association

Zurich, 1 July 2004

## FIFA Quality Concept Licensing Programme

### The Licensing Programme

Artificial surfaces will undergo tough quality tests in order to qualify for the FIFA standard and to be eligible for the use of the prestigious FIFA hallmarks.



### The Concept

The FIFA Quality Concept consists of the following procedures:

- Laboratory Tests
- Field Tests

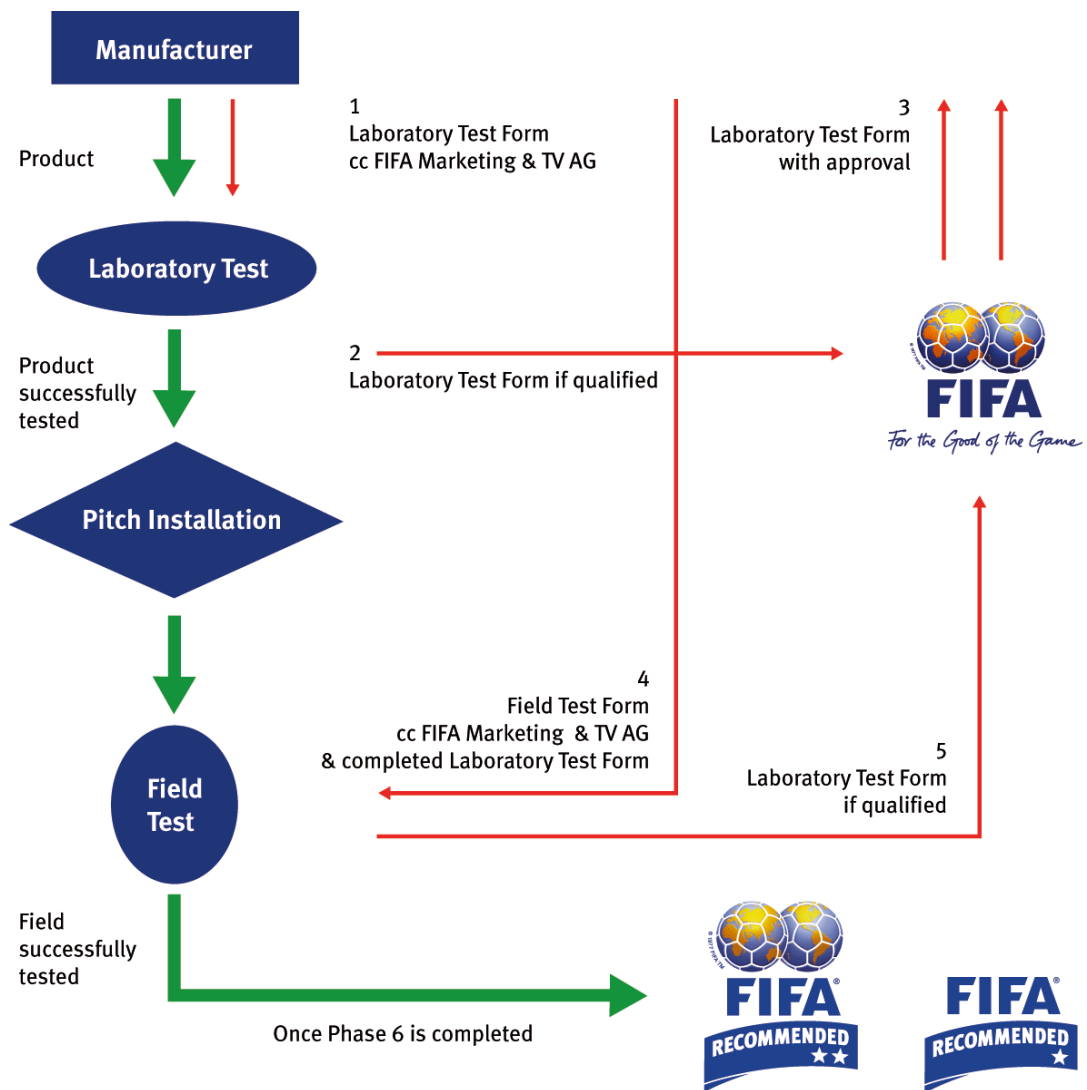
Please refer to the section “Test Procedures” for detailed information about the FIFA quality testing standard.

It is primarily the responsibility of the manufacturer to ensure the quality of the finished installation.

### Worldwide Protection

The FIFA Recommended Marks are protected through extensive trademark and copyright registration.

## Testig Process



## Licensing Rights

The licensing agreement between artificial turf manufacturers and FIFA will include the following features:

- three years' validity
- the right to use the FIFA Recommended Marks
  - in advertising and promotions in conjunction with licensed products
  - on boards around licensed pitches
- access to a full marketing service package (see #6 below)

In compensation for the licensing rights granted by FIFA a royalty per licensed pitch installed is required.

## Marketing Services

One of the main objectives of this licensing programme is to provide comprehensive and targeted marketing services which licensees will benefit from free of charge. These include:

- well-focused advertising and PR campaigns on behalf of FIFA, aimed at associations, football clubs, communities, media as well as the football world in general
  - to inform about the unique licensing programme
  - to promote the FIFA Quality Marks
  - to prevent infringements of the FIFA name
- a FIFA certificate issued after successful testing, specifying the name of the licensee, the artificial turf model and licensed pitches, the authorisation number and the term of the validity of the licence
- the FIFA Digital Archive containing artwork and guidelines on
  - use of graphics
  - use of the FIFA Recommended Marks in promotions and advertising
- an authorisation number to identify the official licence and the licensed pitches
- legal advice and supervision by FIFA's international network to enforce and protect licensee's rights and prevent infringements
- access to various promotional activities which will be developed in cooperation with FIFA

## Test Procedures

In order to qualify for a FIFA licence, products must first go through a series of rigorous tests to be conducted under laboratory conditions. In addition to the laboratory tests, installed pitches will undergo field tests.

The testing in the laboratory will identify the quality of the turf product — and if successful — the field testing has to be conducted after completion of pitch installation to ensure quality performance.

- **LABORATORY TESTS**

For each artificial turf to be tested, manufacturers must submit a piece of test material (2 m x 2 m) to one of the selected laboratory test institutes.

To facilitate the laboratory test administration a special test form has been created. The “Laboratory Test Form for Artificial Turf” must be completed for every turf model and the original copy will have to be sent together with the turf sample to the respective test institute. A copy of the test form must be sent to FIFA Marketing & TV AG for reference.

- **FIELD TESTS**

The performance of the artificial turf also depends upon the preparation of the sub-base and composition of the existing sub-soil; therefore the installed turf will not only be tested in laboratory but will also undergo field-testing as well. After having successfully passed the laboratory test, the “Field Test Form for Artificial Turf” must be completed and sent to the respective test institute together with the “Laboratory Test Form” filled out by FIFA Marketing & TV AG.

Under the terms of the FIFA Quality Concept the test fees must be paid to the test institute directly by the manufacturer prior to testing.

Upon completion of the laboratory and the field testing, the results will be sent from the test institute to FIFA Marketing & TV AG who will inform the manufacturer accordingly. Taking into consideration that the artificial weathering test takes several weeks, and that the field tests can only be performed after the installed pitch has settled, the final approval of a surface can take up to six months.

## Royalty Fee

Licenses are required to submit royalty statements on an annual basis with subsequent payment of the royalties due. The licence fee per field installed will be Swiss Francs 15,000.

## Minimum Guarantee

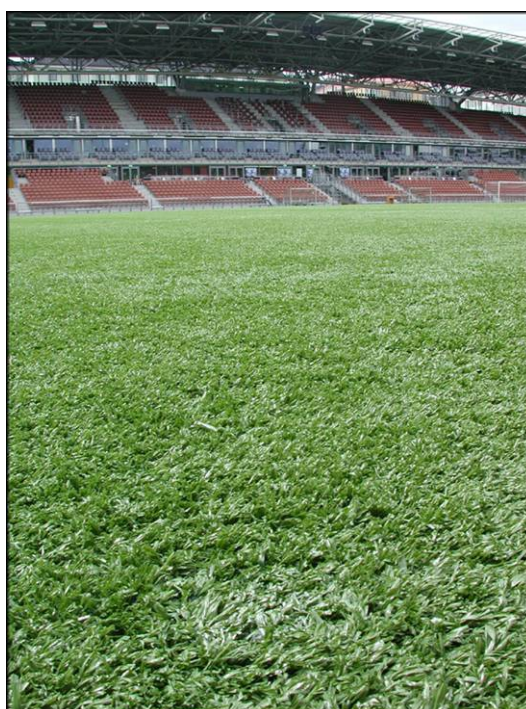
The licence agreement provides for the minimum guarantee of Swiss Francs 450,000, payable annually in 3 equal instalments of CHF 150,000, and to be set off against royalty payments.

## Maintenance of an Artificial Turf Field

The FIFA Quality Concept is a rigorous test program for artificial surfaces whereby successful manufacturers will be able to enter into a licensing programme for the use of the prestigious FIFA Recommended Mark for artificial turf football fields that meet the FIFA laboratory- and field-test requirements. The testing scheme ensures that only artificial turf of the best quality with the highest technical standards would be able to gain a FIFA Recommended endorsement. The certificate is valid for a period of three years and can be renewed by retesting. FIFA is aware that the playability of the surface needs to remain as constant as possible throughout its life. Unless a pitch is maintained properly, it will lose some of its playing quality in the long term. The ball can become faster over the surface, it will roll unevenly and the ball bounce will vary from place to place. The players will feel uncomfortable running on an uneven surface and frustrated by the inability to control an unpredictable ball.

Artificial turf certainly demands less investment in time and costs for maintenance and can be used for many more playing hours than real turf but you can't just lay it and leave it to its own devices. Maintenance on an artificial turf pitch is different but just as important as it is on a natural grass pitch.

The correct maintenance of a synthetic turf field ensures that the optimum performance of the facility is achieved for the longest period of time and that the client is able to maximise his investment by lengthening the usable lifetime of his investment.



## Why Maintenance ?

The need to maintain an artificial turf field is fundamental for several reasons. These can be highlighted as follows:

- aesthetics
- safety
- playing performance
- longevity

Purely from the overall appearance of the surface it is necessary to maintain an artificial turf field. A dirty unclean field is not an attractive venue to play any sport on and will in the long term deter participants from playing on the field.

A neglected field will often be a dangerous field. Simply put, the field that is not maintained can present a number of hazards to the players, which can lead to a variety of injuries. This can further detract from the attraction of the facility and open the owners up to threat of litigation.

The playing characteristics of the field will be severely impaired by a lack of maintenance. The ball can become faster over the surface, it will roll unevenly and the ball bounce will vary from place to place. The players will feel uncomfortable running on an uneven surface and frustrated by the inability to control an unpredictable ball.

Finally the lifetime of the artificial field will be significantly reduced by a lack of maintenance. Thus the investment in the field will be undermined.

## General Principles

Do not undertake any action, which has not previously been authorised by the installing company. Warranties are normally linked to the maintenance of the surface. Lack of maintenance will invalidate the warranty as will incorrect maintenance. If in doubt ask the experts of that particular system namely the supplier.

Do not apply any chemicals onto the surface without prior consent. Many chemical substances can act to the detriment of the surface particularly petroleum-based products. Care must be taken to avoid all petroleum-based spillages including fuel for the tractor units. Always re-fuel off the playing surface.

Chemicals are used on synthetic surfaces. These can include algaecides, mossicides, weedkillers, de-icers, etc.

## Weekly Maintenance

The surface should normally be brushed at least once weekly. The brushing frequency will be related to the intensity of use, the more often it is used the more often will be the need for brushing.

The main effect of brushing is to level the in-fill (where present) to ensure the uniformity of the surface. A second important reason for brushing a synthetic field is to prevent pile lean and pile flattening. Many synthetic fibres have a tendency to lean in a particular direction or flatten with use. To help overcome this regular brushing in all directions will tend to keep the fibres upright and non-directional.

A variety of brush types exist on the market with a variety of effectiveness. The most commonly used are drag brushes. These are normally attached to the rear of tractor units either hydraulically or as a simple attachment. They are particularly effective at levelling the in-fill (where present) in the surface. Rotary brushes are also used. These are typically attached to the front of the tractor unit. Normally they can rotate forward or in reverse. Rotating forward is particularly effective at removing material from the surface. Either modes of rotation are good for raising the pile of the carpet.

Always brush in different directions, as brushing in one direction will tend to cause the fibres to lean in that direction. This will result in different ball roll characteristics in different directions.

The high wear areas will require additional attention as these zones will obviously have the most disrupted infill and pile flattening due to the intensity of play.

It is usually most effective to brush the surface when it is dry.

## Irrigation and Waterfall

On the face of it seems a ridiculous proposition to water a synthetic field. After all they don't grow. However, on certain occasions it can benefit the performance of the field.

Artificial fields will become hot during periods of warm or hot weather. The surfaces can become so warm as to be noticeable to the players. Furthermore the heated surface can contribute to a friction burn. This is simply due to the fact that it requires a skin temperature of approximately 60°C to produce a skin burn. On a hot day the combination of hot skin with a hot surface in addition to the friction (heat) generated when the player slides on the surface makes almost inevitable that a skin burn can occur.

Water has several effects:

- it will lubricate the surface
- it will cool the surface
- it will stabilise the infill and consequentially reduce migration

After heavy rainfall it is advisable to check the infill levels as they may have become disrupted. This can be particularly significant if the field has a slope and the infill has migrated with the slope.

## Levelling the In-Fill (where present)

The penalty spots and corners are prone to disruption of the infill. The ground staff should be aware of this and be prepared to top up on a more regular basis than is necessary for the general brushing. It may be necessary to top up these areas every day during intense usage.

When material begins to accumulate at the edges of the field, debris should be removed from it and the accumulated material brushed back into the main field.

### SETTLING IN PERIOD

Systems that utilise infill materials may require a period of settling in. This will necessitate a regime of regular brushing on a more frequent basis than is normally required. The installing company will give advice as to the necessity and added frequency of this extra brushing.



## **Additional Maintenance**

Wherever and whenever contaminants are present remove them as soon as possible.

It should be noted that no food or beverages should be allowed on the field. Equally problematic is chewing gum albeit this can be simply remedied by freezing the offending gum which can then be broken out of the field when it has become solid.

Smoking is strictly forbidden.

All organic matter leaves, soil, seeds et cetera, if left will result in algal, moss or weed growth. Remove as soon, as is practical.

If the infill shows signs of agglomerating break up the lumps into their individual components.

## **Less Frequent Maintenance**

Check for compaction of the infill (where present), particularly in the high usage areas. Contact the installing company if you observe this and they will advise accordingly. Some installing companies supply equipment for overcoming this problem; others will undertake the work themselves under a maintenance contract.

Check the seams for any failings. If the seams have failed in any place contact the installing company as soon as possible and insist on an immediate repair under the terms of the warranty. **DO NOT ATTEMPT TO UNDERTAKE THE REPAIRS YOURSELF.**

If you have an irrigation system periodically check it. Also periodically check the drainage system to see that it is still functioning well.

### **SNOW REMOVAL**

Snow can be removed by the use of a snowplough. If your area is subject to regular heavy snowfalls ensure you have sufficient area around the field to deposit the snow removed from the field.

Seek advice from the manufacturer of the system as to the equipment suitable. This should normally be a plough with a rubber blade on the lower edge to prevent damaging the surface. Remove the majority of snow with this plough but leave the final 5cm-10cm on the surface. Always turn the plough in large loops when coming to the edge of the field to prevent the plough from digging in to the surface. The final 5cm-10cm can be removed with a brush. A rotating brush is particularly useful for this.

Snow blowers can also be useful to remove snow.

## **MOSS ALGAE WEEDS**

Weeds are easily removed by hand if the infestation has not become too excessive.

Moss and algae require specialist treatment normally using specific chemicals and techniques to remove residues. The advice of the installing company should be sought at an early stage if the problem should occur. The longer you leave an infestation in general the bigger the problem will become.

## **PITCH SURROUNDS**

The most important design feature is to avoid contamination.

Contamination can come in several forms:

- player borne contamination
- surrounding vegetation
- wind borne contamination
- animal borne contamination

Players will inevitably take the shortest path between the changing facilities and the pitch. If that pathway is dirty they will carry that dirt on their boots onto the field. To avoid it ensure the pathway is clean.

If other vegetation surrounds the field this will inevitable be deposited on the field. For example grass areas around the field when cut will deposit cuttings on the field. Try to leave a barrier between the natural area and the artificial field. This can be a physical barrier or a zone that is vegetation free.

Contamination, particularly pollution and seeds, will be blown onto the field by the wind. Take this into consideration when deciding on the location of the field.

Animals particularly birds will leave deposits on the field. Clean them off as soon as possible as the deposits will become the nutrient for moss, algae and weed growth.

## **Conclusion**

An active maintenance programme will maximise the lifetime of the installation and ensure many satisfactory years of use.

The maintenance regime is based around simple principles:

- keeping the surface clean
- keeping the infill level
- keeping the fibre upright
- reporting minor defects before they become major problems

## MAINTENANCE EQUIPMENT

- drag brushes and drag mats and nets
- hand-held equipment such as a hard road-sweeping brush for brushing the infill material into the turf system
- high-pressure cleaner (wet cleaning with a pressure of approx. 200 bar)
- manually-operated sweeping machines with an hourly capacity of around 1.000m<sup>2</sup> or a sweeping and suction machine, self-propelled, with an hourly capacity of up to 3.000m<sup>2</sup>

These guidelines are not intended to replace the recommendations given by the manufacturer rather they are intended to compliment the manufacturers recommendations in order to underline the importance of correct maintenance of an artificial turf football field that ensures the optimum performance of the facility for the longest period of time.

The rule is the same for an artificial field as with any other object in need of maintenance prevention is the best care.



## Competition Regulations

The introduction of the newest generation of artificial turf sparked renewed interest in hosting official matches on this type of surface. The advances in artificial surface technology have created high quality surfaces which are fully acceptable at all levels of the game. Therefore for the very first time a reference to the field surface has been included in the Laws of the Game of football on 1 July 2004:

### Law 1 – The Field of Play

#### Field Surface:

Matches may be played on natural or artificial surfaces, according to the rules of the competition.

#### New International FA Board Decision:

Where artificial surfaces are used in either competition matches between representative teams of national associations affiliated to FIFA or international club competition matches, the surface must meet the requirements of the FIFA Quality Concept for Artificial Turf Standard or the International Artificial Turf Standard, unless special dispensation is given by FIFA.

“Integrating the artificial surface into the Laws of the Game for the first time is another milestone in the history of football”, says FIFA President Joseph S. Blatter. “Millions of players from all around the world will benefit from this decision as it will allow them to play their favourite sport on a more regular basis and, above all, in different climatic conditions, which would make it impossible on natural turf pitches.”

The release of the FIFA Quality Concept for Artificial Turf provided the necessary assurances to open up international competitions to artificial turf. This approval scheme is aimed at offering those national associations and confederations that aspire to host matches on artificial turf the quality assurances that come with the FIFA Mark. There is no longer a reason to prevent matches on artificial turf products carrying the FIFA Mark, if installed properly and professionally maintained.

The inspection clause included in FIFA Circular no. 707 no longer applies to FIFA Recommended pitches as the testing procedures already guarantee the quality and uniformity for international football. In other words, all qualification matches for either the FIFA World Cup™ or Olympic Football Tournaments may take place on FIFA Recommended artificial turf.

In order to ensure a familiarity with the newest artificial turf products we suggest a minimum number of training sessions for the opponent to be included in any applicable regulations. FIFA recommends at least two one-hour training sessions in the stadium prior to the match.

Depending upon the reaction of the international community to the FIFA Quality Concept, we may eventually decide to open our final round competitions to artificial surfaces. This will be of particular importance to a national association that wishes to host a FIFA competition at a later date.

## Future Steps

We believe the development of new technology in the field of artificial turf and the superior quality of the new designs makes it necessary if not to promote, then at least to encourage the use of artificial surfaces in climates (including stadia microclimates) where natural grass is not an economic or environmental option. Of course, we will always prefer a perfectly manicured natural grass field to an artificial surface. However, the option should be available for those national associations that have good reason to play on artificial turf that has proven to be the best alternative to natural grass.

More and more soccer clubs and sporting association are installing FIFA Recommended artificial soccer pitches. Further research including players' feedback, test result analysis and medical research will be carried out in order to continue the ongoing development of the FIFA Quality Concept for artificial turf and the quality of these surfaces in general.

It is impossible to predict what the future may hold. It can be assured however, that whatever development will take place will be so designed as to benefit the game of football.



## Contacts

The FIFA Quality Concept is being coordinated on behalf of FIFA by:

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