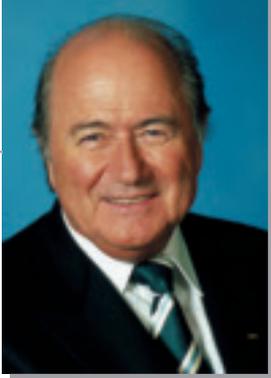


FIFA Quality Concept for Football Turf





Joseph S. Blatter

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 idea of high-level competition matches on artificial surfaces. The breakthrough came 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 realised 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 will not necessarily benefit from the predominance of natural grass turf. With the deployment of football turf, 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 football turf pitches and in 2001 introduced, the FIFA Quality Concept for Football 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 now feels it is appropriate to use "Football Turf" as the designation for products installed as part of the FIFA Quality Concept. The main reasons for this are because it emphasizes the high-quality pitches that are certified as part of the programme and because the playing characteristics on "Football Turf" mirror the quality of natural grass pitches, which is required to play the game on a very high level.

A handwritten signature in black ink, which appears to be 'Blatter'.

Joseph S. Blatter (FIFA President)

FOOTBALL TURF

Many different products exist on the market.
An example of a football turf system may be built up as follows.

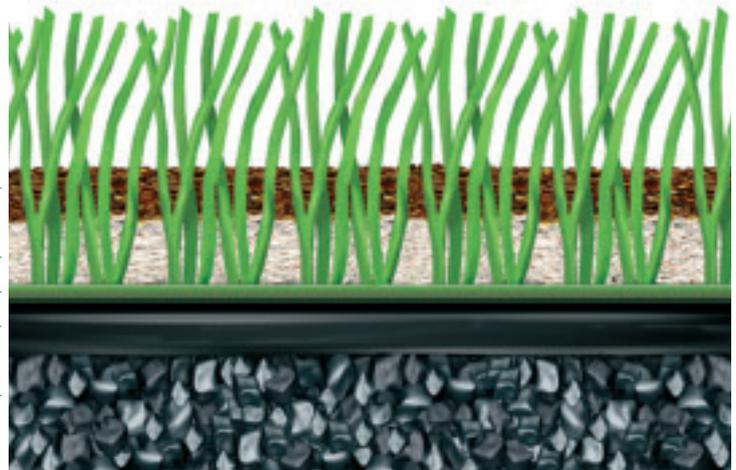
Rubber particle infill

River sand infill

Artificial turf

Asphalt layer (optional)

Aggregate (under-base)



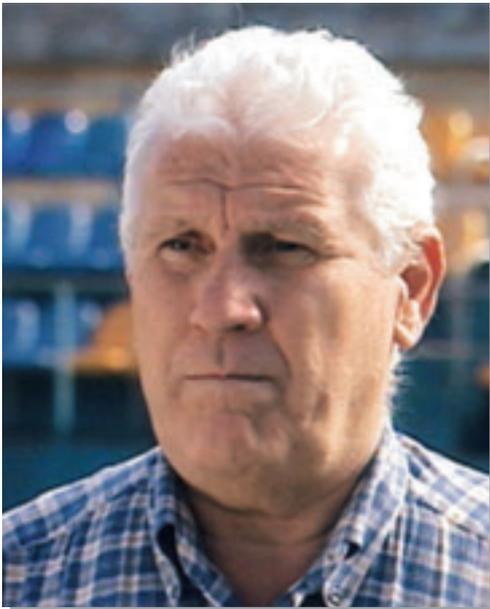
Football turf enables millions of footballers around the world to indulge in their favourite sport all year round, and, more importantly, to do so in the best possible conditions. No more unplayable pitches. No more abandoned matches.

1. ➔ ADVANTAGES OF MODERN FOOTBALL TURF
2. ➔ FIFA QUALITY CONCEPT FOR FOOTBALL TURF
3. ➔ FIFA CERTIFICATION
4. ➔ BENEFITS OF A FIFA RECOMMENDED FOOTBALL PITCH
5. ➔ THE TESTS
6. ➔ MAINTENANCE OF A FOOTBALL TURF FIELD
7. ➔ FIFA QUALITY CONCEPT LICENSING PROGRAMME
8. ➔ ADVISORY NOTE WHEN TENDERING
FOR A FIFA RECOMMENDED FIELD
9. ➔ COMPETITION REGULATIONS
10. ➔ FUTURE STEPS
11. ➔ COMMUNICATION
12. ➔ CONTACT

RESISTANCE TO DIFFICULT CLIMATIC CONDITIONS



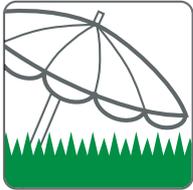
Many regions of the world suffer from extreme climatic conditions and as a result are often without adequate natural grass pitches. Either the climate makes the growth and maintenance of such fields a burden or the financial resources are limited. Furthermore, the demand on these pitches is quite high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



Francisco "Paquito" García
Coach Villarreal CF, Season 2003/2004

"... but I think this is amazing for both climates, south or north, sunny or rainy, so it's a save bet."

IDEAL FOR COVERED OR STEEP-SIDED STADIA



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 grow and thrive. However, the trend towards building steep-sided stadia with roofs and terraces for additional spectator comfort creates an environment better suited to football turf.

The newest generation of artificial surfaces combines the advantages of playing characteristics similar to natural turf, including player comfort and safety, with independence from sunlight, wind and rain.



Jarmo Koskinen
Stadium Manager, Finnair Stadium

"... it's also an architectural question. In this stadium we have a big roof for the main stand and therefore the shadow comes to the pitch area at around 11 a.m. ... and then half of the pitch is lacking the sunshine ..."

LOW MAINTENANCE COSTS



The new generation of artificial surfaces is easier to maintain than natural grass fields. Artificial it may be, but it cannot just be installed and left to its own devices. The groundsman, whose day-to-day job will change and who will have to learn a whole new set of maintenance techniques, is one of the main beneficiaries of an artificial surface. The time for maintenance is much lower and thus costs for a football turf field can be significantly reduced.



Marko Priitsku
Groundsman, Finnair Stadium

"... If I had only this pitch, it'd take me 1-2 hours a day. The other pitches with natural turf take the rest of the day."

LONGER PLAYING HOURS



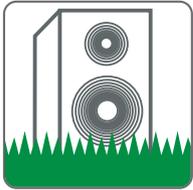
Most of the football turf fields are owned by municipalities and football clubs who recognise that an artificial pitch can be used almost 24 hours a day and seven days a week since it does not need time to recover. Due to the increased longevity, fewer playing fields are required.



Juan Carlos Garrido
Director of Football Academy, Villarreal CF

"... So it's a surface you can use the whole day, a major advantage ... having an artificial turf, especially one like this, is one of the most important advantages you can think of for development and training. It's essential ..."

MULTI-USAGE



Today, the financial situation has become one of the most important components of any football club. In order to cover the increasing costs, additional revenue streams are necessary. The newest generation of artificial surfaces with playing characteristics similar to natural turf, low maintenance, longer playing hours and the multi-usage possibilities meets the demands of a modern football field. It can be used almost 24 hours a day and seven days a week. In addition to training sessions and matches of various teams, it can be hired out to companies and municipalities for all kind of events.



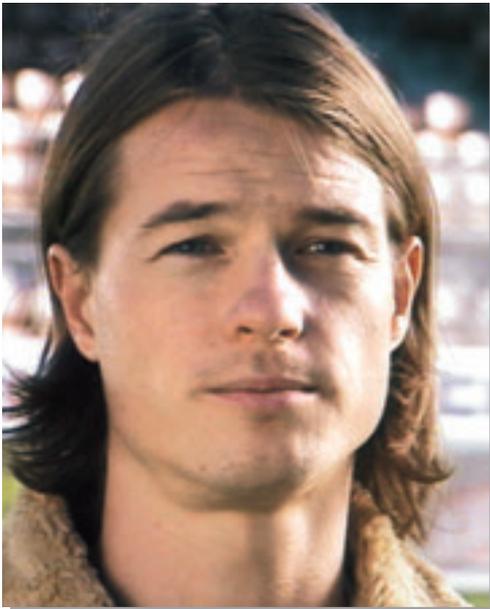
Mario Jiménez
Commercial Manager, Saprissa Stadium

"... Besides hosting FIFA World Cup qualification matches, we have successfully held concerts and trade-shows on this field. We have almost recouped the investment within a year ..."

IMPROVED AND CONSISTENT PLAYING CONDITIONS



As the game's global popularity increases, the climate plays a greater part in limiting its development. In adverse weather conditions, the use of natural grass pitches is limited and the performance suffers. Manufacturers have now developed football turf products that mirror the playing characteristics of real grass and are resistant to difficult climates. FIFA has recognised that all year round and improved and consistent playing conditions worldwide bring enormous benefits to the global development of football.



Mika Lehtkoski
Youth Coach, HJK Helsinki

"... this kind of football turf gives us the opportunity here in Finland to develop players almost all year round ..."

The FIFA Quality Concept for Football Turf was developed to standardise the quality and safety of artificial turf for football players, and to encourage further developments in artificial turf technology.

There are a number of manufacturers and installers of artificial turf worldwide, and because many of them use different systems, synthetic turf exists in a variety of different technical versions. As a result, the performance of artificial turf products can be extremely variable and not all are advantageous to a player's health, or the quality of the game.

This project 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. Only artificial turf of the best quality with the highest technical standards will be able to gain a FIFA RECOMMENDED endorsement. Football pitches that meet the quality criteria for a FIFA RECOMMENDED mark combine the advantages of the playing characteristics of natural turf with the highest level of comfort and safety for the players, while at the same time allowing for low maintenance and extended usage of the pitch.

Projects offered through FIFA's Development programmes, notably the *GOAL* Programme, aim to boost the worldwide development of football and its ideas through tailor-made education, financial assistance and infrastructure programmes for the benefit of the 205 member associations of FIFA.

The national team of Korea DPR, for example, is playing most of its official matches on the FIFA RECOMMENDED field in the Kim Sung stadium, which was installed in 2002 as a result of the FIFA *GOAL* Programme.

Football turf has become an important component of FIFA's development programmes. FIFA's associations and the confederations can rest assured that only the surfaces specifically suited to top-flight football will qualify for the FIFA RECOMMENDED marks.

We believe the technological developments in the field of football turf and the superior quality of the new designs make 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 Football Turf.



Mary Harvey
Director Development, FIFA

QUALITY LEVELS

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

The International Football Association Board (IFAB) has also recognised the advances in artificial surface technology and decided to introduce artificial surfaces into the Laws of the Game in July 2004. Following the IFAB mandate to FIFA to create universal guidelines for football 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 football turf products even closer to the perfect natural grass pitch model and provide the world of football with the best football turf surfaces for the professional game.

The FIFA Quality Concept for Football Turf consisting of the FIFA RECOMMENDED 2 STAR and the FIFA RECOMMENDED 1 STAR quality levels reflects the segmented market situation.



National Training &
Matchplay, Municipality

FIFA RECOMMENDED 1 STAR



Top Clubs, Stadia,
International Matchplay

FIFA RECOMMENDED 2 STAR

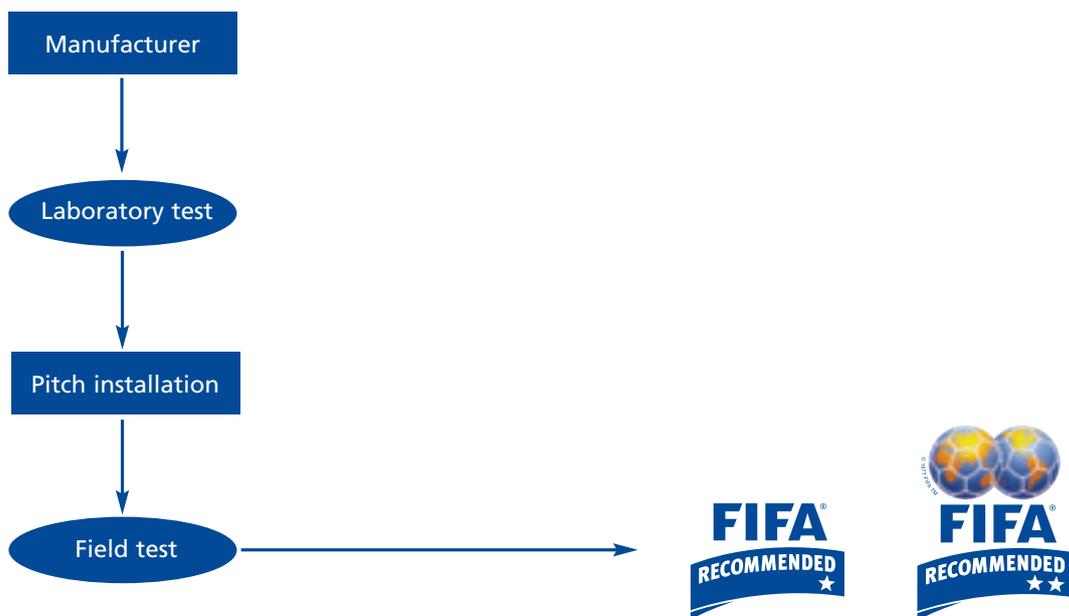
TEST PROCEDURES

The FIFA RECOMMENDED marks are only awarded to those football turf pitches that have passed a series of stringent laboratory and field tests. Natural grass in ideal condition is the benchmark for these FIFA test criteria in order to ensure highest playing comfort and to constantly improve the quality of football turf pitches.

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

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.

If the football turf pitch passes all the laboratory and field tests, it will qualify for one of the two FIFA RECOMMENDED marks. 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.



BENEFITS OF A FIFA RECOMMENDED FOOTBALL PITCH

With a FIFA RECOMMENDED football turf pitch, everybody benefits: manufacturers benefit from the reliability and credibility afforded by the FIFA quality seal. Players and managers reap the benefits of the outstanding playing conditions of a FIFA RECOMMENDED football turf.

Club officials, football associations and confederations have the assurance that FIFA RECOMMENDED football turf pitches have been tested to the stringent FIFA criteria and so meet the highest quality standards. Therefore, only those surfaces specifically suited to top-flight football will qualify for the FIFA endorsement.

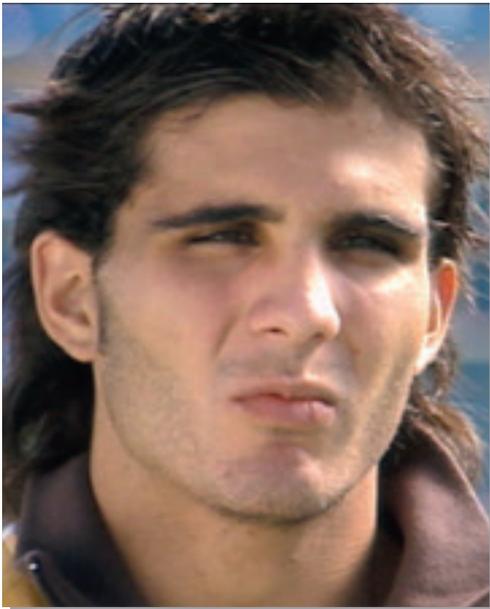
Football turf pitches that satisfy the FIFA quality standards combine the benefits of natural turf with optimum playing comfort and maximum safety for players. In addition, maintenance costs are low and artificial turf has greater longevity.



Photo by Action Images

SAME PLAYING CHARACTERISTICS AS NATURAL TURF

The FIFA test criteria are based on the readings of good natural turf fields. Therefore, football turf pitches have similar playing characteristics to real grass. The way the ball behaves on football turf and the player-to-surface interaction mirror the game on natural grass.



José Antonio "Verza" García Rabasco
Player, Villarreal CF

*"... The ball and your body move very well,
the movements you make are just like on
a real pitch ..."*

SURFACE TESTED BY FIFA

The FIFA RECOMMENDED mark is only awarded to those football turf pitches that have passed a series of stringent laboratory and field tests. Therefore, FIFA RECOMMENDED football turf pitches are a guarantee for football surfaces of the highest quality.

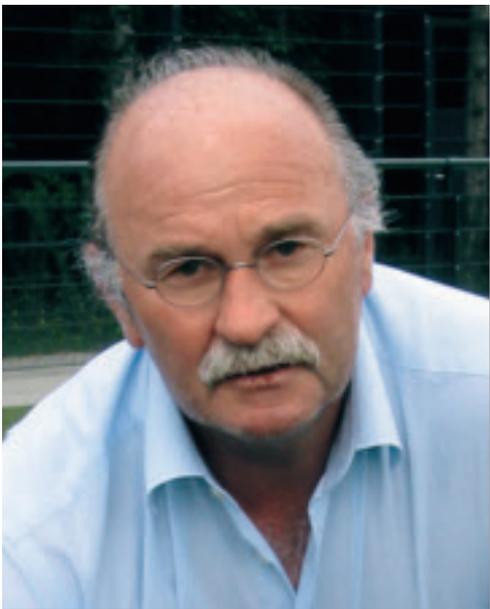


Eric Harrison
Artificial Turf Consultant

"... Football turf fields that have been tested by FIFA guarantee highest quality for three years ..."

FIFA CERTIFICATION

Only recognised test institutes that are ISO 17025 certified and comply with the stringent accreditation procedures can be accredited and carry out testing for the FIFA Quality Concept. This guarantees the reliability of the FIFA RECOMMENDED quality marks.



Horst Köppel
Head Coach, Borussia Mönchengladbach

"... We have taken the successful FIFA certification as evidence of the high quality of this pitch. This is the optimum criteria for professional training conditions ..."

LONGER PLAYING LIFE

The durability and climatic resistance of football turf products are tested in the laboratory. Therefore, a FIFA-certified pitch guarantees a long playing life and thus increases the return on investment.



Juan Carlos Garrido
Director of Football Academy, Villarreal CF

"... So at the economic level, it's worth it because you're using it all the time ..."

SIMPLIFIED EVALUATION

The FIFA RECOMMENDED endorsements are a guarantee of quality and safety. This simplifies the decision-making process since football associations, confederations, football clubs and municipalities can rest assured that only those surfaces specifically suited to top flight football will qualify for the FIFA RECOMMENDED marks.



Jarmo Koskinen
Stadium Manager, Finnair Stadium

"... choosing a pitch is like science – we didn't want to go into depth and therefore relied on the FIFA endorsement ..."

REGISTRATION AND IDENTIFICATION ON FIFA.COM

The FIFA certificate and registration on FIFA.com ensure that FIFA RECOMMENDED football turf pitches can be easily and clearly identified. Players and coaches can be confident that registered FIFA RECOMMENDED fields are of the highest quality.



Walter Gagg
Director Stadiums & Security, FIFA

"... the registration on FIFA.com ensures that FIFA RECOMMENDED football turf pitches are easily and clearly identified ..."

ACCEPTANCE OF FIFA ENDORSEMENT

The FIFA RECOMMENDED endorsement is recognised and accepted by footballers around the world. Players can be assured that FIFA RECOMMENDED football turf surfaces allow them highest performance and safe conditions.



Ville "Nulli" Nylund
Player, HJK Helsinki

"... we players need to know that we are playing on a certified field – it's important – just like the endorsement of FIFA for balls and referees ..."

QUALIFYING FOR INTERNATIONAL MATCHES

Under the Laws of the Game, FIFA RECOMMENDED football turf pitches qualify as venues for international football matches. The FIFA RECOMMENDED quality marks provide a starting point and quality guarantee for those confederations, associations and leagues that wish to open their competitions to football turf.



Jim Brown
Director Competitions, FIFA

"... As of 1 July of 2004, FIFA RECOMMENDED fields are authorised for international match play according to the Laws of the Game. Therefore, all future FIFA tournaments including qualification matches for the 2006 FIFA World Cup Germany™ can be played on FIFA RECOMMENDED football turf fields ..."

THE TESTS

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 resistance of the surface to wear and tear (durability)
- The reaction of a football on the surface (ball/surface interaction)
- The reaction of a football player to the surface (player/surface interaction)

The series of tests includes laboratory tests as well as field tests.

The field tests are conducted after the installation of the pitch. The ball/surface interaction and the player/surface interaction tests are conducted not only in the laboratory but on the field as well.

All football turf pitches wishing to host international matches have to comply with the official Laws of the Game, which may require that certain additional technical criteria be met (see www.FIFA.com/refs/laws_E.html for further information).

IDENTIFICATION OF THE PRODUCT

First of all, the product needs to be identified and classified according to the following criteria.

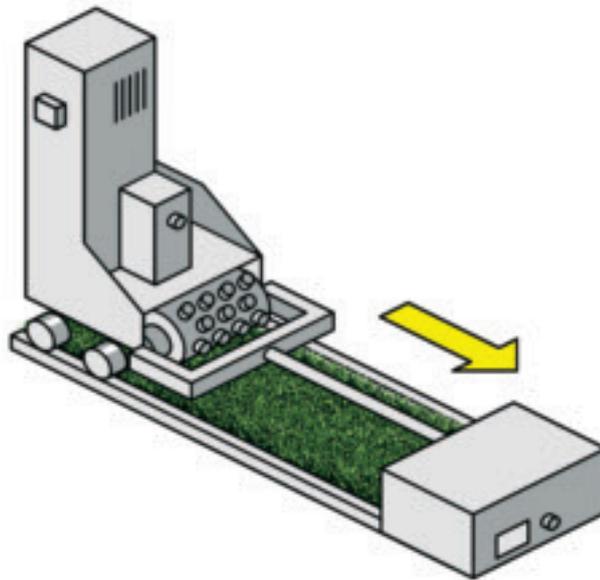
- Mass per unit area and tufts per unit area
 - Tuft withdrawal force
Measures how strongly the fibres are anchored into the backing of the carpet.
 - Pile weight
Measured to ensure that not only the numbers of tufts are correct but also that the correct dTex of yarn has been used.
 - Fibre identification
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).

LABORATORY TESTS – PRODUCT IDENTIFICATION TESTS & QUALITY MONITORING REQUIREMENTS				
Component	Characteristic	Test Method	Variation between laboratory tested system and materials taken from site	
			FIFA RECOMMENDED **	FIFA RECOMMENDED *
Football turf and pile yarn(s)	Mass per unit area	ISO 8543	< ± 10%	< ± 10%
	Tufts per unit area	ISO 1763	< ± 10%	< ± 10%
	Tuft withdrawal force	ISO 4919	< - 10%	< - 10%
	Pile length	ISO 2549	< ± 5%	< ± 5%
	Pile weight	ISO 8543	< ± 10%	< ± 10%
	Pile yarn characterisation	DSC	-	-
Infill	Layer depth(s)	EN 1969	< ± 15%	< ± 15%
Individual elements of infill materials (e.g. rubber, sand, etc)	Particle size	EN 933 – Part 1	< ± 20%	< ± 20%
	Particle shape	prEN 14955	< ± 20%	< ± 20%
	Bulk density	EN 13041	< ± 15%	< ± 15%
Rubber granular infill	% organic	Thermo-gravimetric analysis	-	-
	% inorganic		-	-
	Residual compression & change in appearance	FIFA 12/05-01	-	-
Shockpads and e-layers (if supplied as part of system)	Mass per unit area	EN 430	< ± 100gm ²	< ± 100gm ²
	Compressive modulus	EN 604	< ± 10%	< ± 10%
	Tensile strength	EN 12230	< ± 10%	< ± 10%
	Thickness	EN 1969	< ± 15%	< ± 15%
Unbound sub-bases (when tested as part of system)	Particle size	EN 933 – Part 1	< ± 20%	< ± 20%
	Particle shape	prEN 14955	< ± 20%	< ± 20%

DURABILITY

- Simulated Wear (Abrasion Resistance)

The surface is artificially abraded (simulation of five year period of wear) and tested for the following: Shock Absorption, Vertical Deformation, Vertical Ball Rebound, Rotational Resistance.



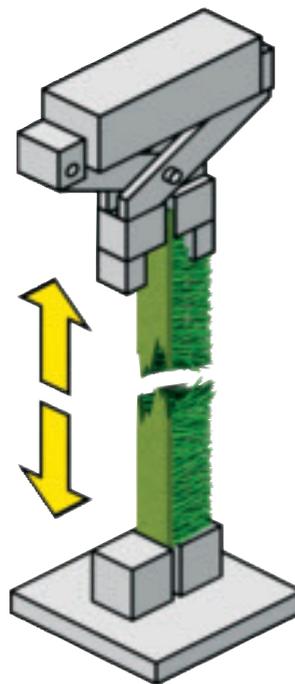
LABORATORY TESTS – MISCELLANEOUS PROPERTIES

Characteristics	Test Method	Requirements
Simulated Wear/Abrasion Resistance	EN 13672	Remains within the limits: <ul style="list-style-type: none"> • Shock Absorption • Vertical Deformation • Vertical Ball Rebound • Rotational Resistance

DURABILITY

- Joint Strength

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



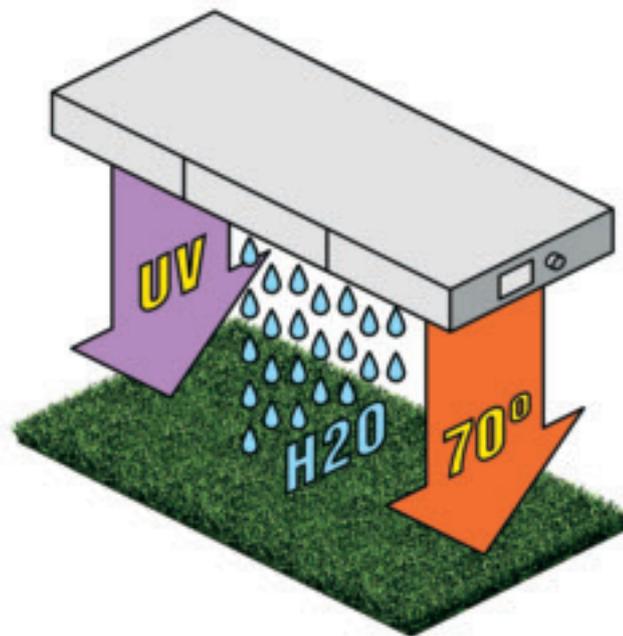
LABORATORY TESTS – MISCELLANEOUS PROPERTIES

Property	Test Method	Condition	Requirement	
			FIFA RECOMMENDED **	FIFA RECOMMENDED *
Joint strength Stitched seams	EN 12228 & EN 13744	Unaged	1000 N/100 mm	1000 N/100 mm
		Immersion in hot water		
Joint strength Bonded seams	EN 12228 & EN 13744	Unaged	25 N/100 mm	25 N/100 mm

CLIMATIC RESISTANCE

UV / Water / Heat

Measures the colour change, abrasion resistance and joint strength.



LABORATORY TESTS – ARTIFICIAL WEATHERING (FIFA 11/05-01)

Component	Property	Test Method	Requirement	
			FIFA RECOMMENDED **	FIFA RECOMMENDED *
Football turf	Colour change	EN ISO 20105-A02	> Grey scale 3	> Grey scale 3
	Effects of simulated wear after artificial weathering	Visual description and photographic record	–	–
Pile yarn (s)	Tensile strength	EN 13864	Percentage change from unaged to be no more than 50%	Percentage change from unaged to be no more than 50%
Polymeric infill	Colour change	EN ISO 20105-A02	> Grey scale 3	> Grey scale 3

PLAYER / SURFACE INTERACTION

Different categories and criteria define the characteristics of the surface that influence the ability of a football player to play the game:

- Shock Absorption
Is the ability of a surface to absorb the impact of a player running on the surface.
- Vertical Deformation
Is the stability of a surface measured by the amount that the surface gives in to impact.
- Rotational Resistance
Measures another interaction between the shoe sole and the surface relating to the ability of a player to change direction.
- Slip Resistance
Measures the grip of a shoe sole on the surface.

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.

LABORATORY TESTS – PLAYER / SURFACE INTERACTION

Property	Test Method	Test Method	Test Conditions			Requirement	
			Preparation	Temperature	Condition	FIFA RECOMMENDED **	FIFA RECOMMENDED *
Shock Absorption	FIFA 04/05-01 & FIFA 10/05-01	Flat foot mean 2 nd / 3 rd impact	Pre-conditioning	23°C	Dry	60 % – 70 %	55 % – 70 %
					Wet		–
			Simulated wear	23°C	Dry		55 % – 70 %
			40°C	Dry	–		
		Flat foot 1st impact	–	-5°C	Frozen	60 % – 70 % ⁽¹⁾	–
Vertical Deformation	FIFA 05/05-01 & FIFA 10/05-01	Flat foot mean 2 nd / 3 rd impact	Pre-conditioning	23°C	Dry	4 mm – 8 mm	4 mm – 9 mm
					Wet		–
			Simulated wear	23°C	Dry		4 mm – 9 mm
Rotational Resistance	FIFA 06/05-01 & FIFA 10/05-01		Pre-conditioning	23°C	Dry	30 Nm – 45 Nm	25 Nm – 50 Nm
					Wet		–
			Simulated wear	23°C	Dry		25 Nm – 50 Nm
Linear Friction – Stud Deceleration Value	FIFA 07/05-01		Pre-conditioning	23°C	Dry	3.0 g – 5.5 g	3.0 g – 6.0 g
					Wet		–
Linear Friction – Stud Slide Value			Pre-conditioning	23°C	Dry	130 – 210	120 – 220
					Wet		–
Skin / Surface Friction	FIFA 08/05-01		Pre-conditioning	23°C	Dry	0.35 – 0.75	–
Skin Abrasion	FIFA 09/05-01		Pre-conditioning	23°C	Dry	± 30 %	–

SHOCK ABSORPTION

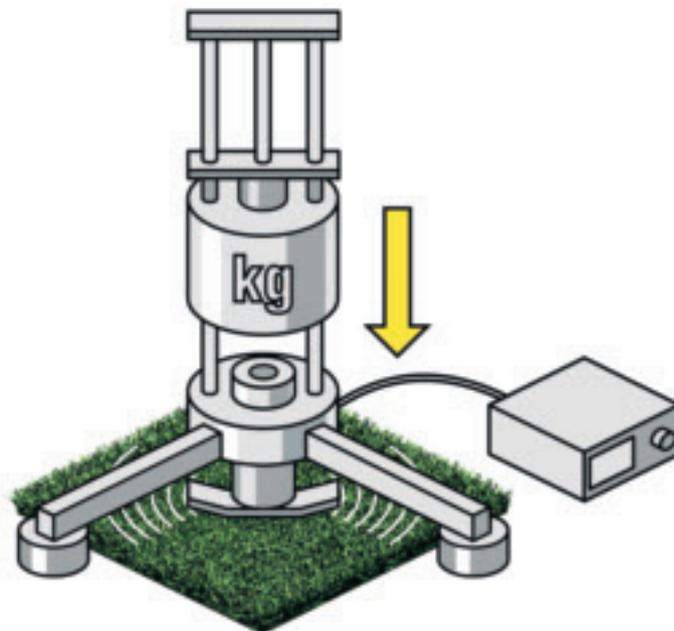
The surface can feel “hard” or “soft”. A hard surface can lead to injuries to the body by causing the joints (particularly ankles, knees, hips and spinal column) to compress, which results in damage to the cartilage. Furthermore, falling on a hard surface can cause bruising to soft tissue like muscles and, in extreme cases, can cause fractures to bones. A soft surface can cause fatigue to the player running on the surface.

The human body behaves like a spring when it makes contact with the surface. A spring when compressed absorbs a certain amount of energy.

The ability of a surface to absorb the impact of a player running on the surface is called its Shock Absorption. The Shock Absorption is measured using a device called the Berlin Athlete that incorporates the elements of the human spring and an impacting force.

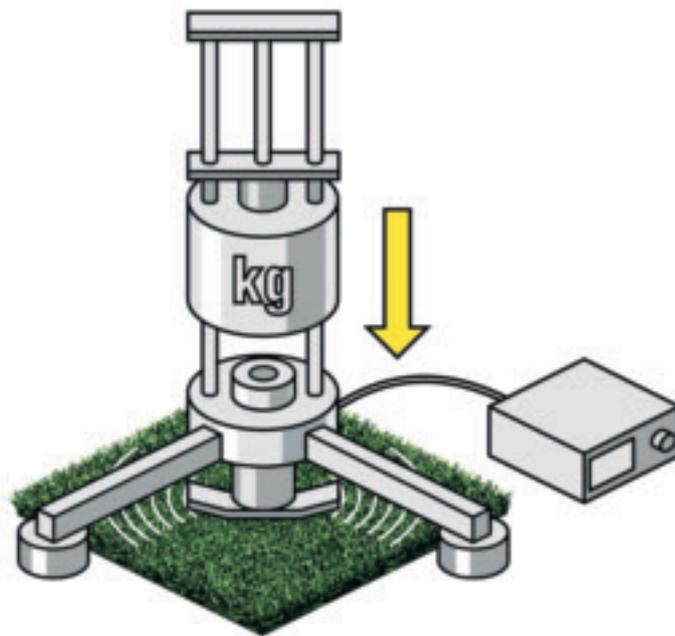
The force received by the anvil is a function of the combination of the spring and the shock absorbing nature of the surface. The measure is called “Force Reduction” and is expressed as a percentage.

The higher the percentage the softer the surface i.e. the more shock absorbing the surface is. Natural turf in ideal conditions produces values of between 60 – 70 %.



VERTICAL 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.



ROTATIONAL RESISTANCE

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 grip 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 lose footing, too much and muscle, ligaments and joints will be placed under too much stress and damage will ensue. This property of the surface is measured using a Traction Apparatus.

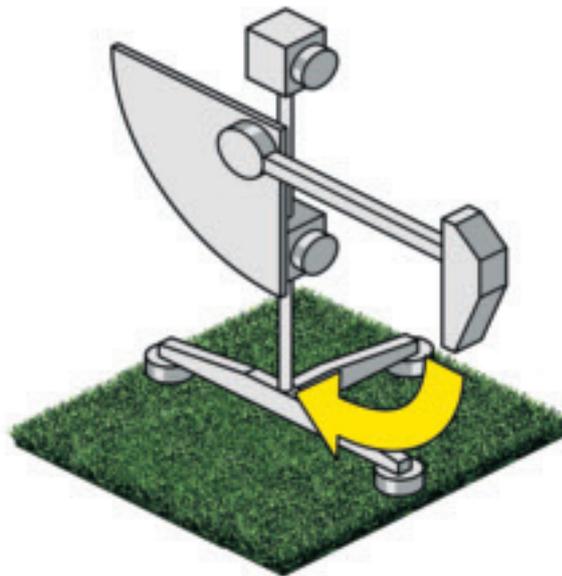
Values for natural turf of between 25–50 N.M., for good turf and between 35–45 N.M. for an “ideal” natural turf have been measured. The apparatus uses a Torque Wrench and measures the amount of Torque necessary to start the motion of a studded sole. The units of Torque are Newton metres abbreviated by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



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.

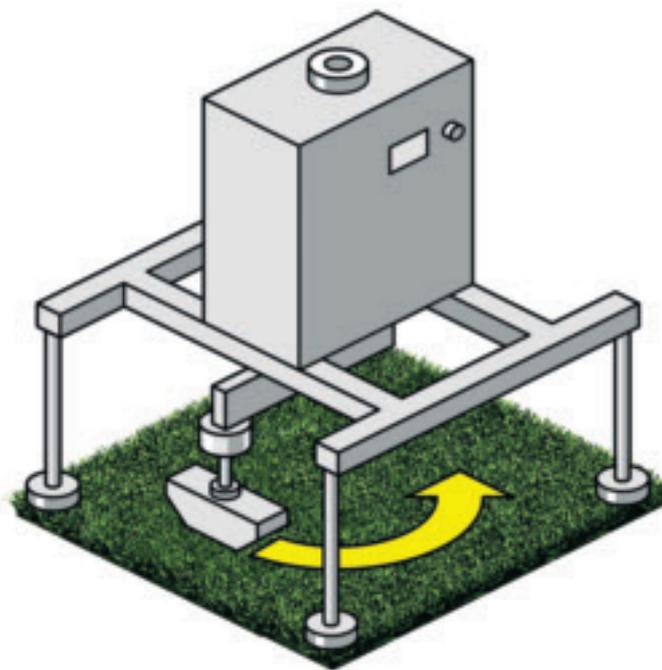
The method used to assess this characteristic is referred to as Slip Resistance and on synthetic grass surfaces it is measured using a Slip Resistance Tester. The Slip Resistance Tester allows us to assess the surface in two ways. Firstly how much horizontal movement the player will feel in the surface 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.



SKIN ABRASION / SKIN FRICTION

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, made 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 as well as to slow the ball down. Hence the need for both a lower and an upper limit for the coefficient of friction.



BALL / SURFACE INTERACTION

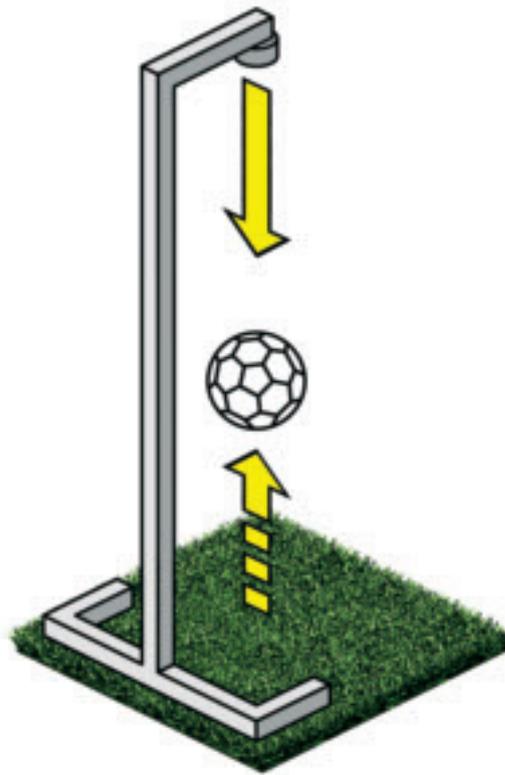
There are three categories that define the performance of a ball on the surface. These are Ball Bounce, Ball Roll and Angled Ball Behaviour. The behaviour of a ball on the surface is correlated to the anticipation of the player. A player expecting to receive a ball makes certain mental assumptions regarding 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.

LABORATORY TESTS – BALL / SURFACE INTERACTION

Property	Test Method	Test Condition			Requirement	
		Preparation	Temperature	Condition	FIFA RECOMMENDED **	FIFA RECOMMENDED *
Vertical Ball Rebound	FIFA 01/05-01 & FIFA 09/05-01	Pre-conditioning	23°C	Dry	0.60 m – 0.85 m	0.60 m – 1.0 m
				Wet		–
		Simulated wear	23°C	Dry	0.60 m – 1.0 m	
Angled Ball Behaviour	FIFA 02/05-01	Pre-conditioning	23°C	Dry	45 % – 60 %	45 % – 70 %
				Wet	45 % – 80 %	45 % – 80 %
Ball Roll	FIFA 03/05-01	Pre-conditioning	23°C	Dry	4 m – 8 m	4 m – 10 m
				Wet		–

VERTICAL BALL REBOUND

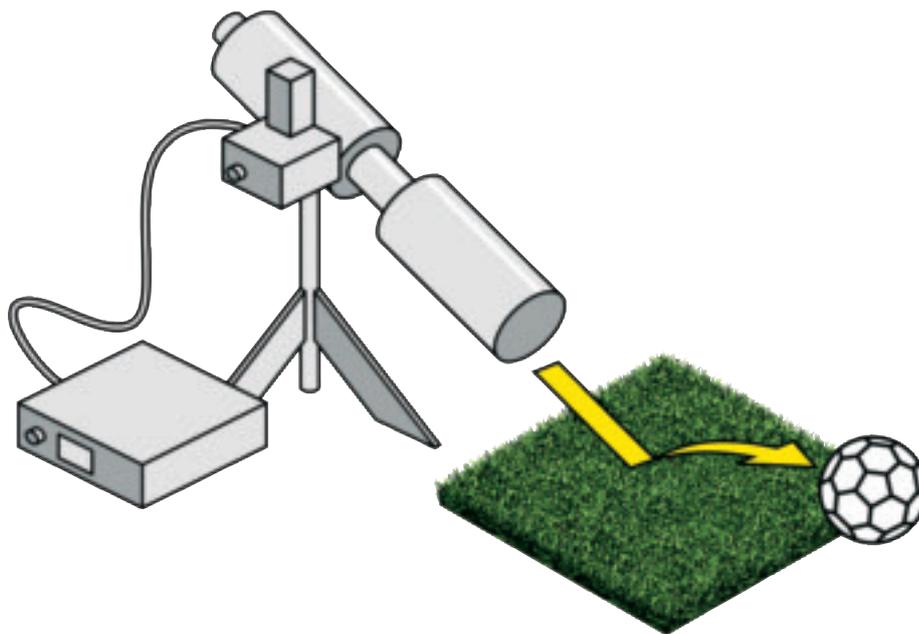
Clearly, if a ball bounces higher than expected the player may fail to control the ball or it may bounce over his head or bounce too low and pass under a raised foot. It is therefore necessary to measure the height to which a ball bounces when dropped onto the surface from a certain specified height. The Vertical Ball Rebound is measured by dropping a ball from 2 metres and measuring its rebound height. Natural turf will give values of between 50 and 100 cm, but an "ideal" natural turf will give values of between 60 and 85 cm.



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 launched 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 to measure the combined effects of Angled Ball Behaviour.



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 slow down over the surface and will therefore kick it with a certain force anticipating the ball to be slowed down accordingly. The test 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 and the distance that the ball rolls over the surface is measured. This allows the surface to be classified in terms of the speed of the surface or the deceleration of the ball over the surface. The ball roll values for natural turf would vary between 4 m and 10 m, natural turf in ideal conditions will give values from 4 m to 8 m. The lower the value, the slower the pitch.



LABORATORY TEST FORM

Laboratory Test Form – FIFA RECOMMENDED 2 STAR

The surface manufacturer should complete the first and third sections of this form and send it to the test laboratory together with the following samples:

- 11m x 1m of artificial turf and adequate infill materials (this surface should have no joints or inlaid lines)
- 2m x 1m of any shockpad or e-layer
- 5m length of pile yarn – if more than one yarn is used to form the pile please send one length of each
- 1m by 1m sample of artificial turf split down the middle and rejoined using the proposed jointing / seaming method

Section 1: Product and applicant details - this section to be filled in by the manufacturer

Product name			
Product code (mandatory)			
Applicant			
Address			
Tel.		Fax.	
E-mail		Web	
Signature			
Laboratory Test for:		FIFA RECOMMENDED 2 STAR	
Base on which test are to be made	Concrete		Unbound aggregate
<p>If base is to be constructed from unbound aggregate supply adequate material and frame to construct a test bed measuring a minimum of 1m by 1m by the depth required to provide the dynamic response of the artificial turf system. If test bed is to be constructed by test laboratory also provide full installation instructions including details of compaction levels, etc.</p>			

LABORATORY TEST FORM

Laboratory Test Form – FIFA RECOMMENDED 1 STAR

The surface manufacturer should complete the first and third sections of this form and send it to the test laboratory together with the following samples:

- 11m x 1m of artificial turf and adequate infill materials (this surface should have no joints or inlaid lines)
- 2m x 1m of any shockpad or e-layer
- 5m length of pile yarn – if more than one yarn is used to form the pile please send one length of each
- 1m by 1m sample of artificial turf split down the middle and rejoined using the proposed jointing / seaming method

Section 1: Product and applicant details - this section to be filled in by the manufacturer

Product name			
Product code (mandatory)			
Applicant			
Address			
Tel.		Fax.	
E-mail		Web	
Date / Signature			
Laboratory Test for:		FIFA RECOMMENDED 1 STAR	
Base on which test are to be made	Concrete	Unbound aggregate	
<p>If base is to be constructed from unbound aggregate supply adequate material and frame to construct a test bed measuring a minimum of 1m by 1m by the depth required to provide the dynamic response of the artificial turf system. If test bed is to be constructed by test laboratory also provide full installation instructions including details of compaction levels, etc.</p>			

QUALITY MONITORING

FIELD TESTS – PRODUCT IDENTIFICATION TESTS & QUALITY MONITORING REQUIREMENTS				
Component	Characteristic	Test Method	Variation between laboratory tested system and materials taken from site	
			FIFA RECOMMENDED **	FIFA RECOMMENDED *
Football turf and pile yarn(s)	Mass per unit area	ISO 8543	< ± 10%	< ± 10%
	Tufts per unit area	ISO 1763	< ± 10%	< ± 10%
	Tuft withdrawal force	ISO 4919	< - 10%	< - 10%
	Pile length	ISO 2549	< ± 5%	< ± 5%
	Pile weight	ISO 8543	< ± 10%	< ± 10%
	Pile yarn characterisation	DSC	-	-
Infill	Layer depth(s)	EN 1969	< ± 15%	< ± 15%
Individual elements of infill materials (e.g. rubber, sand, etc)	Particle size	EN 933 – Part 1	< ± 20%	< ± 20%
	Particle shape	prEN 14955	< ± 20%	< ± 20%
	Bulk density	EN 13041	< ± 15%	< ± 15%
Rubber granular infill	% organic	Thermo-gravimetric analysis	-	-
	% inorganic		-	-
	Residual compression & change in appearance	FIFA 12/05-01	-	-
Shockpads and e-layers (if supplied as part of system)	Mass per unit area	EN 430	< ± 100gm ²	< ± 100gm ²
	Compressive modulus	EN 604	< ± 10%	< ± 10%
	Tensile strength	EN 12230	< ± 10%	< ± 10%
	Thickness	EN 1969	< ± 15%	< ± 15%
Unbound sub-bases (when tested as part of system)	Particle size	EN 933 – Part 1	< ± 20%	< ± 20%
	Particle shape	prEN 14955	< ± 20%	< ± 20%

CONSTRUCTION TEST

Slope Test:

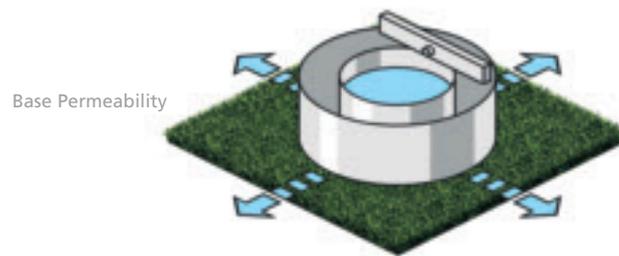
Measures the slope of the field.

Evenness Test:

Measures the degree of evenness of the field.

Base Permeability:

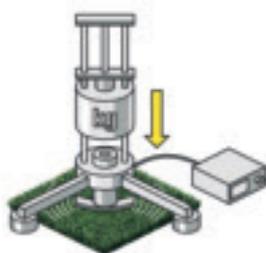
Measures the base permeability which allows water to freely drain through the carpet.



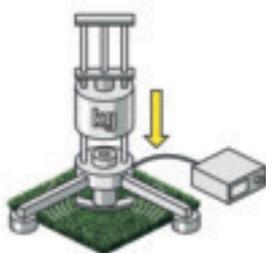
Characteristics	Test Method	Test Conditions	Requirements
Surface regularity of playing surface	EN 13036	3 m straight edge	< 10 mm
Slope	Surveyors' level	–	< 1 % (< 0.5 % recommended)
Water permeability of sub-base	EN 12616	–	> 180 mm/h
Surface regularity of sub-base	EN 13036	3 m straight edge	< 10 mm
		300 mm straight edge	< 2 mm

PLAYER / SURFACE INTERACTION

Please refer to the detailed explanation in the “Laboratory Tests” section.



Shock Absorption



Vertical Deformation



Rotational Resistance



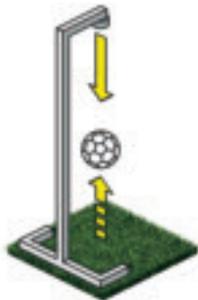
Slip Resistance

FIELD TESTS – TEST SCHEDULE AND REQUIREMENTS

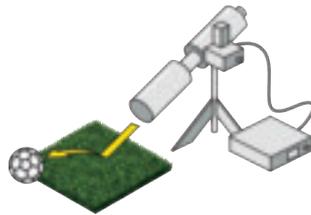
Characteristics	Test Method	Test Conditions	FIFA RECOMMENDED **	FIFA RECOMMENDED *
Shock Absorption	FIFA 04/05-01	Flat foot – mean 2 nd / 3 rd impact	60 % – 70 %	55 % – 70 %
Vertical Deformation	FIFA 05/05-01	Flat foot – mean 2 nd / 3 rd impact	4 mm – 8 mm	4 mm – 9 mm
Rotational Resistance	FIFA 06/05-01	–	30 Nm – 45 Nm	25 Nm – 50 Nm
Linear Friction – Stud Deceleration Value	FIFA 07/05-01	–	3.0 g – 5.5 g	3.0 g – 6.0 g
Linear Friction – Stud Slide Value	FIFA 08/05-01	–	130 – 210	120 – 220

BALL / SURFACE INTERACTION

Please refer to the detailed explanation in the “Laboratory Tests” section.



Vertical Ball Rebound



Angled Ball Behaviour



Ball Roll

Characteristics	Test Method	Test Conditions	FIFA RECOMMENDED **	FIFA RECOMMENDED *
Vertical Ball Rebound	FIFA 01/05-01	–	60 cm – 85 cm	60 cm – 100 cm
Angled Ball Behaviour	FIFA 02/05-01	Dry	45 % – 60 %	45 % – 70 %
		Wet	45 % – 80 %	45 % – 80 %
Ball Roll	FIFA 03/05-01	Initial assessment	4 m – 8 m	4 m – 10 m
		After 12 months	4 m – 10 m	

ADDITIONAL REQUIREMENTS FOR FIELD TEST

Field dimensions for a FIFA RECOMMENDED installation:

The field of play must be rectangular. The length of the touch line must be greater than the length of the goal line.

Length: Minimum 90 m
Maximum 120 m

Width: Minimum 45 m
Maximum 90 m

For all additional requirements regarding field markings, goal area, penalty area and corner arc, "LAW 1 – The Field of Play" and the Decisions of the International F.A. Board become relevant.

Field Markings

The field of play is marked with lines. These lines belong to the areas of which they are boundaries. All lines are not more than 12 cm (5ins) wide.

The field of play is divided into two halves by a halfway line.

The centre mark is indicated at the midpoint of the halfway line. A circle with a radius of 9.15 m (10yds) is marked around it.

The Goal Area

A goal area is defined at each end of the field as follows. Two lines are drawn at right angles to the goal line, 5.5 m (6yds) from the inside of each goalpost. These lines extend into the field of play for a distance of 5.5 m (6yds) and are joined by a line drawn parallel with the goal line. The area bounded by these lines and the goal line is the goal area.

The Penalty Area

A penalty area is defined at each end of the field as follows:

Two lines are drawn at right angles to the goal line, 16.5 m (18 yds) from the inside of each goalpost. These lines extend to the field of play for a distance of 16.5 m (18 yds) and are joined by a line drawn parallel with the goal line. The area bounded by these lines and the goal line is the penalty area.

Within each penalty area, a penalty mark is made 11 m (12yds) from the midpoint between the goalpost and equidistant to them. An arc of a circle with a radius of 9.15 m (10yds) is drawn outside the penalty area.

See following page →

Flagposts

A flagpost, not less than 1.5m (5ft) high, with a non-pointed top and a flag is placed at each corner. A flagpost may also be placed at each end of the halfway line, not less than 1 m (1 yd) outside the touch line.

The Corner Arc

A quarter circle with a radius of 1 m (1yd) from each corner flagpost is drawn inside the field of play.

Decisions of the International F.A. Board:

Decision 3

No kind of commercial advertising, whether real or virtual, is permitted on the field of play and field equipment from the time the teams enter the field of play until they have left it at half time and from the time the teams re-enter the field of play until the end of the match. In particular, no advertising material of any kind may be displayed on goals, nets, flagposts or their flags.

Decision 5

The reproduction, whether real or virtual, of representative logos or emblems of FIFA, confederations, member associations, leagues, clubs or other bodies is forbidden on the field of play and field equipment (including goal nets and areas they enclose) during playing time, as described in Decision 3.

FIELD TEST FORM

FIELD TEST FORM – FIFA RECOMMENDED 2 STAR

The applicant should complete this section of the form before sending copies to their appointed test laboratory and FIFA Marketing AG.

Pitch location			
Surface (Product)			
Product code			
Date pitch installed			
Applicant			
Address			
Tel.		Fax.	
E-mail		Web	
Signature		Date	
Field test for:	FIFA RECOMMENDED 2 STAR		
Type of test	Initial	Retest	
For initial tests please attach the <i>Laboratory Test Report for Artificial Turf</i> for the specific surface that has been installed.			

Test result - This section to be filled in by the testing laboratory			
Test laboratory			
PASSED		FAILED	
Criteria that failed (if any):			
Ball / Surface interaction	Vertical ball rebound	Ball roll	
	Angle ball rebound		
Player / Surface interaction	Shock absorbency	Deformation	
	Rotational resistance	Stud slide value	
	Stud deceleration value		
Construction Requirements	Slope	Regularity	
	Base permeability		
Signature	Date		

FIELD TEST FORM

FIELD TEST FORM – FIFA RECOMMENDED 1 STAR

The applicant should complete this section of the form before sending copies to their appointed test laboratory and FIFA Marketing AG.

Pitch location			
Surface (Product)			
Product code			
Date pitch installed			
Applicant			
Address			
Tel.		Fax.	
E-mail		Web	
Signature		Date	
Field test for:	FIFA RECOMMENDED 1 STAR		
Type of test	Initial	Retest	
For initial tests please attach the <i>Laboratory Test Report for Artificial Turf</i> for the specific surface that has been installed.			

Test result - This section to be filled in by the testing laboratory

PASSED		FAILED	
Criteria that failed (if any):			
Ball / Surface interaction	Vertical ball rebound	Ball roll	
	Angle ball rebound		
Player / Surface interaction	Shock absorbency	Deformation	
	Rotational resistance	Stud slide value	
	Stud deceleration value		
Construction Requirements	Slope	Regularity	
	Base permeability		
Signature	Date		

IDENTIFICATION OF THE PRODUCT

LABORATORY TESTS – PRODUCT IDENTIFICATION TESTS & QUALITY MONITORING REQUIREMENTS				
Component	Characteristic	Test Method	Variation between laboratory tested system and materials taken from site	
			FIFA RECOMMENDED **	FIFA RECOMMENDED *
Football turf and pile yarn(s)	Mass per unit area	ISO 8543	< ± 10%	< ± 10%
	Tufts per unit area	ISO 1763	< ± 10%	< ± 10%
	Tuft withdrawal force	ISO 4919	< - 10%	< - 10%
	Pile length	ISO 2549	< ± 5%	< ± 5%
	Pile weight	ISO 8543	< ± 10%	< ± 10%
	Pile yarn characterisation	DSC	-	-
Infill	Layer depth(s)	EN 1969	< ± 15%	< ± 15%
Individual elements of infill materials (e.g. rubber, sand, etc)	Particle size	EN 933 – Part 1	< ± 20%	< ± 20%
	Particle shape	prEN 14955	< ± 20%	< ± 20%
	Bulk density	EN 13041	< ± 15%	< ± 15%
Rubber granular infill	% organic	Thermo-gravimetric analysis	-	-
	% inorganic		-	-
	Residual compression & change in appearance	FIFA 12/05-01	-	-
Shockpads and e-layers (if supplied as part of system)	Mass per unit area	EN 430	< ± 100gm ²	< ± 100gm ²
	Compressive modulus	EN 604	< ± 10%	< ± 10%
	Tensile strength	EN 12230	< ± 10%	< ± 10%
	Thickness	EN 1969	< ± 15%	< ± 15%
Unbound sub-bases (when tested as part of system)	Particle size	EN 933 – Part 1	< ± 20%	< ± 20%
	Particle shape	prEN 14955	< ± 20%	< ± 20%

DURABILITY

Characteristics	Test Method	Requirements
Simulated Wear/Abrasion Resistance	EN 13672	Remains within the limits: <ul style="list-style-type: none"> • Shock Absorption • Vertical Deformation • Vertical Ball Rebound • Rotational Resistance

LABORATORY TESTS – MISCELLANEOUS PROPERTIES

Property	Test Method	Condition	Requirement	
			FIFA RECOMMENDED **	FIFA RECOMMENDED *
Joint strength	EN 12228 & EN 13744	Unaged	1000 N/100 mm	1000 N/100 mm
Stitched seams		Immersion in hot water		
Joint strength	EN 12228 & EN 13744	Unaged	25 N/100 mm	25 N/100 mm
Bonded seams				

CLIMATIC RESISTANCE

LABORATORY TESTS – ARTIFICIAL WEATHERING (FIFA 11/05-01)

Component	Property	Test Method	Requirement	
			FIFA RECOMMENDED **	FIFA RECOMMENDED *
Football turf	Colour change	EN ISO 20105-A02	> Grey scale 3	> Grey scale 3
	Effects of simulated wear after artificial weathering	Visual description and photographic record	–	–
Pile yarn(s)	Tensile strength	EN 13864	Percentage change from unaged to be no more than 50 %	Percentage change from unaged to be no more than 50 %
Polymeric infill	Colour change	EN ISO 20105-A02	> Grey scale 3	> Grey scale 3

PLAYER / SURFACE INTERACTION

LABORATORY TESTS – PLAYER / SURFACE INTERACTION							
Property	Test Method	Test Method	Test Conditions			Requirement	
			Preparation	Temperature	Condition	FIFA RECOMMENDED **	FIFA RECOMMENDED *
Shock Absorption	FIFA 04/05-01 & FIFA 10/05-01	Flat foot mean 2 nd / 3 rd impact	Pre-conditioning	23°C	Dry	60 % – 70 %	55 % – 70 %
					Wet		–
			Simulated wear	23°C	Dry		55 % – 70 %
			40°C	Dry	–		
		Flat foot 1st impact	–	-5°C	Frozen	60 % – 70 % ⁽¹⁾	–
Vertical Deformation	FIFA 05/05-01 & FIFA 10/05-01	Flat foot mean 2 nd / 3 rd impact	Pre-conditioning	23°C	Dry	4 mm – 8 mm	4 mm – 9 mm
					Wet		–
			Simulated wear	23°C	Dry		4 mm – 9 mm
Rotational Resistance	FIFA 06/05-01 & FIFA 10/05-01		Pre-conditioning	23°C	Dry	30 Nm – 45 Nm	25 Nm – 50 Nm
					Wet		–
			Simulated wear	23°C	Dry		25 Nm – 50 Nm
Linear Friction – Stud Deceleration Value	FIFA 07/05-01		Pre-conditioning	23°C	Dry	3.0 g – 5.5 g	3.0 g – 6.0 g
					Wet		–
Linear Friction – Stud Slide Value			Pre-conditioning	23°C	Dry	130 – 210	120 – 220
					Wet		–
Skin / Surface Friction	FIFA 08/05-01		Pre-conditioning	23°C	Dry	0.35 – 0.75	–
Skin Abrasion	FIFA 09/05-01		Pre-conditioning	23°C	Dry	± 30 %	–

BALL / SURFACE INTERACTION

LABORATORY TESTS – BALL / SURFACE INTERACTION						
Property	Test Method	Test Conditions			Requirement	
		Preparation	Temperature	Condition	FIFA RECOMMENDED **	FIFA RECOMMENDED *
Vertical Ball Rebound	FIFA 01/05-01 & FIFA 09/05-01	Pre-conditioning	23°C	Dry	0.60 m – 0.85 m	0.60 m – 1.0 m
				Wet		–
		Simulated wear	23°C	Dry	0.60 m – 1.0 m	
Angled Ball Behaviour	FIFA 02/05-01	Pre-conditioning	23°C	Dry	45 % – 60 %	45 % – 70 %
				Wet	45 % – 80 %	45 % – 80 %
Ball Roll	FIFA 03/05-01	Pre-conditioning	23°C	Dry	4 m – 8 m	4 m – 10 m
				Wet		–

PRODUCT IDENTIFICATION TESTS & QUALITY MONITORING REQUIREMENTS

FIELD TESTS – PRODUCT IDENTIFICATION TESTS & QUALITY MONITORING REQUIREMENTS				
Component	Characteristic	Test Method	Variation between laboratory tested system and materials taken from site	
			FIFA RECOMMENDED **	FIFA RECOMMENDED *
Football turf and pile yarn(s)	Mass per unit area	ISO 8543	< ± 10%	< ± 10%
	Tufts per unit area	ISO 1763	< ± 10%	< ± 10%
	Tuft withdrawal force	ISO 4919	< - 10%	< - 10%
	Pile length	ISO 2549	< ± 5%	< ± 5%
	Pile weight	ISO 8543	< ± 10%	< ± 10%
	Pile yarn characterisation	DSC	-	-
Infill	Layer depth(s)	EN 1969	< ± 15%	< ± 15%
Individual elements of infill materials (e.g. rubber, sand, etc)	Particle size	EN 933 – Part 1	< ± 20%	< ± 20%
	Particle shape	prEN 14955	< ± 20%	< ± 20%
	Bulk density	EN 13041	< ± 15%	< ± 15%
Rubber granular infill	% organic	Thermo-gravimetric analysis	-	-
	% inorganic		-	-
	Residual compression & change in appearance	FIFA 12/05-01	-	-
Shockpads and e-layers (if supplied as part of system)	Mass per unit area	EN 430	< ± 100gm ²	< ± 100gm ²
	Compressive modulus	EN 604	< ± 10%	< ± 10%
	Tensile strength	EN 12230	< ± 10%	< ± 10%
	Thickness	EN 1969	< ± 15%	< ± 15%
Unbound sub-bases (when tested as part of system)	Particle size	EN 933 – Part 1	< ± 20%	< ± 20%
	Particle shape	prEN 14955	< ± 20%	< ± 20%

CONSTRUCTION TEST

Characteristics	Test Method	Test Conditions	Requirements
Surface regularity of playing surface	EN 13036	3 m straight edge	< 10 mm
Slope	Surveyors' level	–	< 1 % (< 0.5 % recommended)
Water permeability of sub-base	EN 12616	–	> 180 mm/h
Surface regularity of sub-base	EN 13036	3 m straight edge	< 10 mm
		300 mm straight edge	< 2 mm

PLAYER / SURFACE INTERACTION

FIELD TESTS – TEST SCHEDULE AND REQUIREMENTS

Characteristics	Test Method	Test Conditions	FIFA RECOMMENDED **	FIFA RECOMMENDED *
Shock Absorption	FIFA 04/05-01	Flat foot – mean 2 nd / 3 rd impact	60 % – 70 %	55 % – 70 %
Vertical Deformation	FIFA 05/05-01	Flat foot – mean 2 nd / 3 rd impact	4 mm – 8 mm	4 mm – 9 mm
Rotational Resistance	FIFA 06/05-01	–	30 Nm – 45 Nm	25 Nm – 50 Nm
Linear Friction – Stud Deceleration Value	FIFA 07/05-01	–	3.0 g – 5.5 g	3.0 g – 6.0 g
Linear Friction – Stud Slide Value	FIFA 08/05-01	–	130 – 210	120 – 220

BALL / SURFACE INTERACTION

Characteristics	Test Method	Test Conditions	FIFA RECOMMENDED **	FIFA RECOMMENDED *
Vertical Ball Rebound	FIFA 01/05-01	–	60 cm – 85 cm	60 cm – 100 cm
Angled Ball Behaviour	FIFA 02/05-01	Dry	45 % – 60 %	45 % – 70 %
		Wet	45 % – 80 %	45 % – 80 %
Ball Roll	FIFA 03/05-01	Initial assessment	4 m – 8 m	4 m – 10 m
		After 12 months	4 m – 10 m	

FIFA RECOMMENDED 1 STAR CERTIFICATE

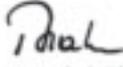

Licensing Certificate

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 2004 to 30 June 2007.

Licence No. XX-00.00


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

Zurich, 1 July 2004

FIFA RECOMMENDED 2 STAR CERTIFICATE



SPECIMEN

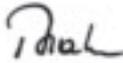
Licensing Certificate

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 2004 to 30 June 2005.

Licence No. XX-00.00



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

Zurich, 1 July 2004

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
Sports Labs Ltd	Scotland		X
Norges byggforskingsinstitutt	Norway		X
IST Consulting GMBH	Switzerland		X

Other test institutes will be appointed by FIFA as the programme develops.

Laboratory and Field Testing Institutes

Labosport

Technoparc du circuit des 24 heures
Chemin aux Boeufs
72100 Le Mans
FRANCE
Telephone: +33-2 43 47 0840
Fax: +33-2 43 47 0828
Contact: Ing. Dominique Boisnard
E-Mail: bureau.labosport@wanadoo.fr
Web: www.labosport.com

ISA-Sport

Papendallaan 31
P.O. Box 302
6800 AH Arnhem
NETHERLANDS
Telephone: +31-26 483 4625
Fax: +31-26 483 4651
Contact: M.Sc. Franklin Versteeg
E-Mail: info@isa-sport.com
Web: www.isa-sport.com

Field Testing Institutes

INSTITUTO DE BIOMECAÁNICA DE VALENCIA

Universidad Politécnica de Valencia
Edificio 9C
Camino de Vera s/n
E-46022 Valencia
SPAIN
Telephone: +34-96 387 9160
Fax: +34-96 387 9169
Contact: Juan Vicente Durá Gil
E-Mail: jvdura@ibv.upv.es
Web: www.ibv.org

ACOUSTO-SCAN PTY Ltd

2-4 Bedford St, Surry Hills
Sydney
Australia 2010
Telephone: +61-(0)2 9699 4092
Fax: +61-(0)2 9699 4091
Contact: Dr. John Dunlop
E-Mail: jdunlop@acoustoscan.com.au
Web: www.acoustoscan.com.au

See following pages →

Field Testing Institutes

Sports Labs Ltd

Unit 12b
Nasmyth Court
Houstoun
Livingston EH54 5EG
SCOTLAND
Telephone: +44-(0)845 602 6354
Fax: +44-(0)845 602 6356
Contact: Eric O'Donnell
E-Mail: info@sportslabs.co.uk
Web: www.sportslabs.co.uk

IST Consulting GMBH

Hauptstr. 34 / Geschäftshaus Krone
8264 Eschenz
SWITZERLAND
Telephone: +41-52-740 3005
Fax: +41-52-740 3009
Contact: Hans J. Kolitzus
E-Mail: hjkolitzus@bluewin.ch
Web: www.iss.de/ist-ch

Norges byggforskningsinstitutt

Forskningsveien 3 b
P.O. Box 123 Blindern
No-0314 Oslo
NORWAY
Telephone: +47-22 96 55 55
Fax: +47-22 69 94 38
Contact: Morten Gabrielsen
E-Mail: morten.gabrielsen@byggforsk.no
Web: www.byggforsk.no

See following pages →

FIFA QUALITY CONCEPT FOR FOOTBALL TURF: LABORATORY ACCREDITATION	
Terms & conditions for laboratory accreditation for testing of football turf according to FIFA	Compliance/ Comments
1. The laboratory must have a calibration, traceability and staff training system in accordance with ISO 17025. For laboratories that do not have third party certification of conformity to ISO 17025 at the time of their application, FIFA will assess the application on a case-by-case basis. In such cases, any laboratory whose application is successful will be required to achieve ISO third party accreditation within a timescale agreed with FIFA. If accreditation to ISO 17025 is not possible due to national policies, FIFA will assess the application from the laboratory on a case-by-case basis. The full FIFA test description and all the required test apparatus have to be included in the ISO scheme.	
2. The laboratory must be devoted to the research and development of sports surface science and shall have achieved a position of influence and responsibility in the field of sports surfaces. Their work may include the testing and evaluation of sports surfaces and related materials, in the laboratory and in the field, with well-documented records.	
3. The laboratory must be independent of any company manufacturing, supplying or installing sports surfaces, or manufacturing or supplying sports equipment.	
4. The laboratory must show that they are in possession of the necessary test equipment.	
5. The laboratory must participate regularly in Round Robin laboratory and field testing, presentation of papers and publications, and other scientific and technical matters, which may be requested by FIFA.	
6. The laboratory must nominate a senior member of staff to act as its official contact with FIFA. The named person shall be responsible for issuing all FIFA test reports, organising Round Robin testing and other duties as required by FIFA. The laboratory may only change the designated member of staff with FIFA's approval.	
7. The laboratory applying for FIFA accreditation must provide the following information in full: <ol style="list-style-type: none"> a) Indicate if it intends to carry out laboratory controls, field tests or both. b) A list of test equipment (with photos) relevant to the testing of football turf. c) A diagram of its organisational structure, together with the curriculum vitae of its nominated representative(s) and brief details of the qualifications and experience of other relevant staff in the organisational structure. d) A list of the personnel and their assistants in charge of testing football turf with all persons named individually. 	
8. Independent calibration of test equipment shall be carried out with a Round Robin test or in the laboratory of the applicant to demonstrate the accuracy and validity of their test equipment and procedures. The accreditation can be carried out in two ways: <ul style="list-style-type: none"> - accreditation by performing the tests during the Round Robin testing at the annual test institute meeting, ensuring peer assessment of the applicant laboratory. - accreditation by performing the tests at the applicant's laboratory, for which an already accredited laboratory (appointed by FIFA) and a representative of FIFA need to be invited to the applicant's laboratory in order to carry out the assessment. The applicant laboratory must meet all expenses (including fees and travel costs, etc.) involved in both procedures.	
9. A yearly test institute meeting including a Round Robin test, organised by FIFA, shall be carried out in the laboratory or in the field to demonstrate the accuracy and validity of their test equipment and procedures. FIFA shall review the performance of the laboratory at the yearly Round Robin tests and, if satisfied that it has fulfilled its obligations as an accredited laboratory, shall confirm its accreditation. The Round Robin tests shall be done in the presence of a representative of FIFA and all other FIFA accredited laboratories. The applicant laboratory must meet all expenses (including fees and travel costs, etc.) involved in this procedure. The location of this test institute meeting can alternate between the confederations.	
10. Approval as an accredited laboratory is dependent on the laboratory signing a "Testing Service Agreement" with FIFA.	

See following pages →

FIFA QUALITY CONCEPT FOR FOOTBALL TURF: LABORATORY ACCREDITATION

Test equipment requirement	Manufacturer	Serial number or photograph	ISO reference number
Laboratory #			
Climatically controlled environment			ISO 17025
Angled Ball Behaviour #*			
Canon			
Radar			
Ball Rebound #*			
Acoustic method			EN 12235
Ball Roll #*			
Ramp			EN 12234
Rotational Resistance #*			
Torque meter			
Studded disc and weights			
Shock Absorbency #*			
Berlin athlete			EN 14808
Sample tray for sub-ambient tests			
Vertical Deformation #*			
Stuttgart athlete			EN 14809
Energy Restitution #			
Artificial athlete			
Turf Conditioning #			
Lisport with traversal movements			
Studded roller for turf conditioning			
Turf Testing			
Pile height ruler #*			ISO 2549
Particle size sieving machine #*			EN 933-1, 933-2
Bulk density calibrated vessel & weighing balance #*			EN 1097-3
Particle shape microscope #*			EN 933-4
Tuft withdrawal force tensometer with attachments #*			ISO 4919
Mass per unit area (artificial grass) weighing balance #*			ISO 8543
Tufts per unit area ruler #*			ISO 1763
Mass per unit area (shockpad) weighing balance #*			EN 430
Tensile strength (shockpad) tensometer #*			
Tensile strength (seams) tensometer #*			EN 12228
Fibre testing, DSC #*			
Climatic Resistance #			
UV resistance machine			EN 13864
Water bath			
Temperature controlled oven			
Low temperature chamber			
* Field Testing			
# Laboratory Testing			

See following page →

FIFA QUALITY CONCEPT FOR FOOTBALL TURF: LABORATORY ACCREDITATION

Test equipment requirement	Manufacturer	Serial number or photograph	ISO reference number
Slip Resistance #*			
Scale			
Deceleration			
Construction *			
Straight edges			EN 22768
Slip gauges			EN 22768-1
Level and staff			EN 12616
Base Permeability			
Double ring infiltrometer*			
Securi Sport #			
Skin abrasion			
Skin friction			
* Field Testing # Laboratory Testing			

QUALITY ASSURANCE

FACTORY QUALITY CONTROL PROCEDURES

(normative)

1 Introduction

This specifies a factory production control system for constituent components to ensure that they conform to the relevant requirements of this standard.

The performance of the factory production control system shall be assessed according to the principles used in this document.

Note: the overall quality of the surface remains the responsibility of the licensee.

2 Organisation

2.1 Responsibility and authority

It will be necessary to produce a quality assurance line management diagram outlining the individuals responsible for quality. One individual shall be highlighted as the contact person in cases of quality disputes. These individuals should have the capability to:

- Initiate action to prevent the occurrence of product non-conformity;
- Identify, record and deal with any product quality deviations.

2.2 Management representative for factory production control

For every manufacturing plant, the licensee must ensure that an appropriately qualified person with appropriate authority will see that the requirements stipulated in this document are implemented and maintained.

2.3 Management review

The factory production control system adopted to satisfy the requirements of this document shall be audited and reviewed at appropriate intervals to ensure its continuing suitability and effectiveness. Records of such reviews shall be maintained. It is assumed that for most manufacturers, this would be covered within an ISO 9000 scheme.

See following pages →

3 Control procedures

The licensee shall establish and maintain a factory production control manual, setting out the procedures by which the requirements for factory production control are satisfied for those products it directly produces. Furthermore, the licensee should establish similar procedures for all suppliers of products that are part of its systems.

4 Document and data control

Document and data control shall include those documents and data that are relevant to the requirements of this standard, covering purchasing, processing, inspection of materials and the factory production control system documents.

A procedure concerning the management of documents and data shall be documented in the production control manual covering procedures and responsibilities for approval, issue, distribution and administration of internal and external documentation and data; as well as the preparation, issue and recording of changes to documentation.

5 Sub-contract services

If any part of the operation is sub-contracted by the producer, a means of control shall be established. The producer shall retain overall responsibility for all components sub-contracted.

6 Knowledge of raw material

There shall be documentation detailing the nature of the constituent parts as specified in the licensee's technical data sheets.

It is the licensee's responsibility to ensure that if any dangerous substances are identified, their content does not exceed the limits in force.

Note: See EU Council Directive 76/769/EEC.

See following pages →

7 Management of production

The factory production control system shall fulfil the following requirements:

- There shall be procedures to identify and control the materials.

Note: these can include procedures for maintaining and adjusting processing equipment, inspection or testing material sampled during processing, etc.

- There shall be procedures to identify and control any hazardous materials identified above to ensure that they do not exceed the limits.
- There shall be procedures to ensure that material is put into stock in a controlled manner and the storage conditions are appropriate for the materials being stored.
- Certain materials are known to deteriorate in storage. There shall be procedures to ensure that material taken from stock has not deteriorated in such a way that its conformity is compromised.
- The product shall be identifiable up to the point of sale with regard to source and type.

8 Inspection and test

8.1 General

The licensee shall ensure that it has all the necessary facilities, equipment and trained personnel to carry out the required inspections and tests.

8.2 Equipment

The licensee shall be responsible for the control, calibration and maintenance of inspection, measuring and test equipment.
Accuracy and frequency of calibration shall be in accordance with the appropriate standards.

Equipment shall be used in accordance with documented procedures.

Equipment shall be uniquely identified.

Calibration records shall be retained.

See following pages →

8.3 Frequency and location of inspection, sampling and tests
The production control document shall describe the frequency and nature of inspections.

8.4 Records
The results of factory production controls shall be recorded, including sampling locations, dates and times and product tested along with any other relevant information.

Where the product inspected or tested does not satisfy the requirement laid down in the specification, or if there is an indication that it would not do so, a note shall be made in the records of the steps taken to deal with the situation (e.g. carrying out of a new test and/or measures to correct the production process).

The records required by all the clauses of this standard shall be included.

The records shall be kept for the statutory period at least.

Note: "Statutory period" is the period of time that records are required to be kept in accordance with the regulations applying at the place of production.

9 Control of non-conforming products
Following an inspection or test that indicates that a product does not conform, the affected material shall be:

- Reprocessed; or
- Diverted to another application for which it is suitable; or
- Rejected and marked as non-conforming.

All cases of non-conformity shall be recorded by the producer, investigated, and if necessary, corrective action shall be taken.

See following pages →

Note: Corrective action can include:

- Investigation of the cause of non-conformity including an examination of the testing procedure and making any necessary adjustments;
- Analysis of processes, operations, quality records, service reports and customer complaints to detect and eliminate potential causes of non-conformity;
- Initiating preventive actions to deal with problems to a level corresponding to the risks encountered;
- Applying controls to ensure that effective corrective actions are taken;
- Implementing and recording changes in procedures resulting from corrective action.

10 Handling, storage and conditioning in production areas
The manufacturer shall make the necessary arrangements to maintain the quality of the product during handling and storage. This is of particular importance to those materials that may deteriorate in storage.

11 Transport and packaging
The producer's factory production control system shall identify the extent of its responsibility in relation to storage and delivery.

Products should be packaged appropriately to prevent any damage of the materials in transit. Any precautions necessary to achieve this during handling and storage of the packaged goods shall be marked on the packaging or on accompanying documents.

12 Training of personnel
The producer shall establish and maintain procedures for the training of all personnel involved in the factory production system. Appropriate records of training shall be maintained.

13 Minimum test frequencies for general properties
The manufacturer shall be asked to give details of the frequency with which the products are tested for compliance with the product data sheet. If it is felt that these are inadequate, extra testing and/or third party attestation may be requested.

See following page →

14

Communication

Before any goods leave the factory for site installation, the product quality assurance sheets should be signed and dispatched to a third party for attestation. These documents should unequivocally state the testing that has taken place as well as the frequency of testing.

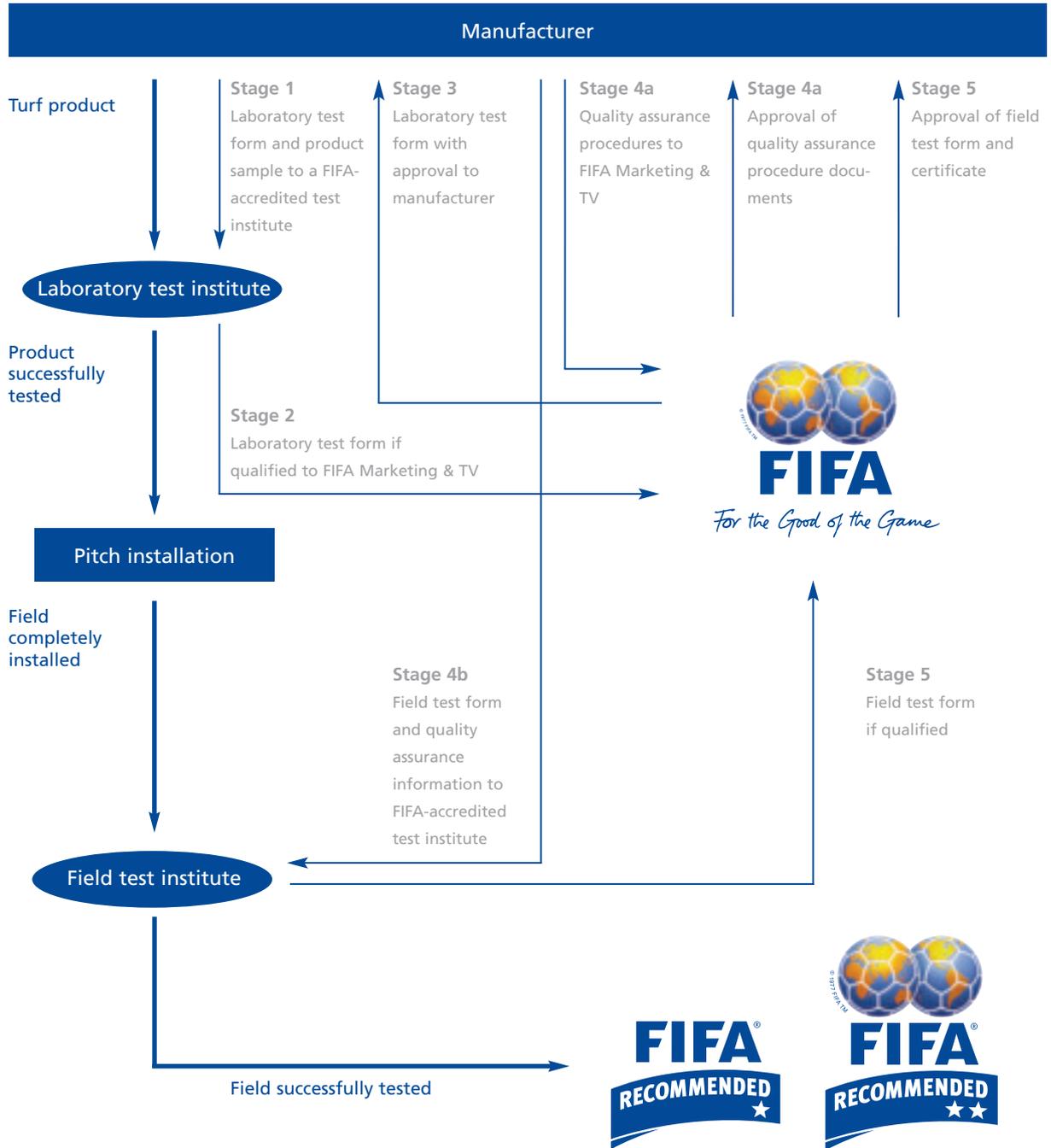
The minimum testing that is acceptable is full compliance with the technical data sheet for that product. If the data sheet is deemed to be inadequate, more testing may be requested to show compliance with the data sheet.

Only upon approval from the third party attestation should the goods be dispatched. This does not, however, pass the responsibility of quality assurance onto the third party. The quality assurance of the product (including its constituent parts) and the installation is at all times the sole responsibility of the licensee.

Third party attestation would usually be provided by the test laboratory undertaking the field test.

Site samples will be taken by third parties (FIFA accredited test laboratory or FIFA's appointed representatives) in accordance with the requirements of the FIFA Quality Concept for Football Turf. The above quality assurance measures are additional to the provisions outlined in the FIFA Quality Concept for Football Turf Manual.

TESTING PROCESS



See following page →

- Stage 1 A potential licensee (manufacturer) or existing licensee will submit the appropriate samples and the laboratory test form for type approval to a FIFA-accredited laboratory.
- Stage 2 The FIFA-accredited laboratory will undertake all the statutory tests laid out in the FQC Handbook. If the sample submitted fulfils all the requirements a test report will be submitted to FIFA Marketing & TV confirming that the potential licensee's product has met the requirements of the FQC laboratory test procedure.
- Stage 3 The potential licensee will be informed by FIFA Marketing & TV by means of a laboratory test report that the licensee's product has met the requirements of the FQC laboratory test procedure and the licensee can proceed with the installation of a field and the contract between FIFA and the licensee.
- Stage 4 The potential licensee will identify a project and install a field using the same product that was submitted and approved in the FQC laboratory test procedure. To ensure the product installed is the same as the product that was tested the following quality checks will take place:
- a) The potential licensee must nominate a suitably qualified individual to be responsible for all liaisons regarding quality assurance issues between the manufacturer and FIFA Marketing & TV. The licensee will submit to FIFA Marketing & TV its quality assurance procedures. If these are satisfactory, FIFA Marketing & TV will inform the licensee and he can continue with b) onwards. If they are not satisfactory, FIFA Marketing & TV will inform the potential licensee of which specific additional measures it will need to adopt to become a licensee.
 - b) Before any goods are dispatched to the field for installation, the documentation (ie. quality assurance information) and the field test form must be signed and sent to the third party responsible for attestation that the product leaving the factory is the same as that approved by the laboratory testing procedures. It is assumed that in most instances the third party will be the laboratory responsible for field testing. If the field was installed prior to the application for the field to be granted a licence, the appropriate quality assurance information from the factory must still be supplied. The quality assurance information applies to all the constituent components of the field installed.
 - c) The laboratory responsible for field testing will undertake all the field tests including product identification tests on the completed installation.
- Stage 5 The identified project is then tested by a FIFA-accredited laboratory. If it passes all the FQC field tests, the FIFA test institute will submit the appropriate test report, including quality assurance information, to FIFA Marketing & TV, which will grant the appropriate FQC star rating to the licensee by means of the field test report.

RE-TESTING A FIFA RECOMMENDED 2 STAR FIELD

- 1 In order to retain the FIFA RECOMMENDED 2 STAR certification an annual field test must be undertaken to ensure it still meets the criteria of the original test.
- 2 If the field is retested and does not meet the FIFA RECOMMENDED 2 STAR criteria but meets the FIFA RECOMMENDED 1 STAR test, the field becomes a FIFA RECOMMENDED 1 STAR for 3 years.
- 3 If the field is retested and does not meet either the FIFA RECOMMENDED 2 STAR or 1 STAR requirements, the certificate for the field is revoked.
- 4 If the field is not retested it automatically becomes a FIFA RECOMMENDED 1 STAR installation for the next two years.

MAINTENANCE OF A FOOTBALL TURF FIELD

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 mark for football turf 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 receives FIFA RECOMMENDED endorsement. The certificate is valid for a defined period 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 may become faster over the surface, roll unevenly or bounce may 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.

Football turf certainly demands less investment in time and costs for maintenance and can be used for many more playing hours than natural turf but you cannot just lay it and leave it untouched. The maintenance of a football turf pitch is different but just as important as that of a grass pitch.

The correct maintenance of a synthetic turf field ensures that players get the best out of the facility for the longest possible period of time and that the client is able to maximise his investment by lengthening the usable lifetime of his investment.

Therefore licensees who have installed a new FIFA RECOMMENDED football turf field must organise a maintenance training session for the customer for whom the field has been installed, given by appropriately qualified staff. The training must be sufficient to enable the customer to carry out regular maintenance and repair work on the football turf unaided.

WHY MAINTENANCE?

The need to maintain a football turf field is fundamental for several reasons. These include the following:

- Longevity
- Playing performance
- Safety
- Aesthetics

The lifetime of the football field will be significantly reduced by a lack of maintenance, and the investment in the field will thus be undermined.

The playing characteristics of the field will be severely impaired by a lack of maintenance. The ball may become faster over the surface, roll unevenly or bounce may 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.

A neglected field will often be a dangerous field. Put simply, a 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 leave the owners open to the threat of litigation.

Purely for the overall appearance of the surface, it is necessary to maintain a football turf field. A dirty unclean field is not an attractive place to play any sport and will in the long term deter participants from playing there.

GENERAL PRINCIPLES

Do not undertake any action that 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 for that particular surface, namely the supplier.

Do not apply any chemicals to 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 from tractor units. Always re-fuel off the playing surface.

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

MAINTENANCE TIME SCHEDULE

What	Frequency
Inspection of fixtures and fittings	daily
Brushing to remove debris	weekly
Brushing to redistribute in-fill	weekly
Moss-kill / algaecide	annually
Weed-kill	as necessary
Snow / Ice	as necessary
Decompaction (regulate infill)	annually

MAINTENANCE EQUIPMENT

- Drag brushes and drag mats and nets
- Hand-held equipment such as hard road-sweeping brushes 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 1,000m² or a sweeping and suction machine, self-propelled, with an hourly capacity of up to 3,000m²

These guidelines are not intended to replace the recommendations given by the manufacturer but to compliment the manufacturer's recommendations in order to underline the importance of correct maintenance of football turf fields on ensuring the optimum performance of the facility for the longest possible period of time.

The rule is the same for a football field as for any other object in need of maintenance. Prevention is the best care.

WEEKLY MAINTENANCE

The surface should normally be brushed at least once a week. The amount of brushing required will be related to the intensity of use, the more often it is used the more often it will need to be brushed.

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 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. Both directions 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 RAINFALL

On the face of it, it seems a ridiculous proposition to water a synthetic field. After all, it does not grow. However, on certain occasions it can improve the performance of the field.

Artificial fields will become hot during periods of warm weather. The surface can become so warm as to be noticeable to the players. Furthermore, a hot surface can contribute to friction burns. 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 skin burns almost inevitable.

Water has several effects:

- It lubricates the surface
- It cools the surface
- It stabilises the infill and consequently reduces migration

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



LEVELLING THE IN-FILL

The penalty spots and corners are prone to disruption of the in-fill. The ground staff should be aware of this and be prepared to top up on a more regular basis than is necessary for 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, the debris should be removed and the accumulated material brushed back into the centre of the field.

Settling-in period

Systems that utilise in-fill 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 increased frequency of this 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. However, this can be easily 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, such as leaves, soil and seeds will result in algal, moss or weed growth if left. Therefore 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 are damaged 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, check it periodically. Also periodically check the drainage system to see that it is still functioning well.

Snow removal

Snow can be removed using a snowplough. If your area is subject to regular heavy snowfall, ensure you have sufficient space around the field to deposit the snow removed from the field. Seek advice from the manufacturer of the system as to the suitable equipment. 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 5–10 cm 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 5–10 cm can be removed with a brush. A rotating brush is particularly useful for this.

Snow blowers can also help to remove snow.

Moss, algae and 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, the bigger the problem will become.

See following page ➔

Pitch surround

The most important issue here is avoiding 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 this, ensure the pathway is clean.

If other vegetation surrounds the field, this will inevitably be deposited on the field. For example, when cut, grass areas around the field will result in 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 provide the nutrients 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 in-fill level
- Keeping the fibres upright
- Reporting minor defects before they become major problems

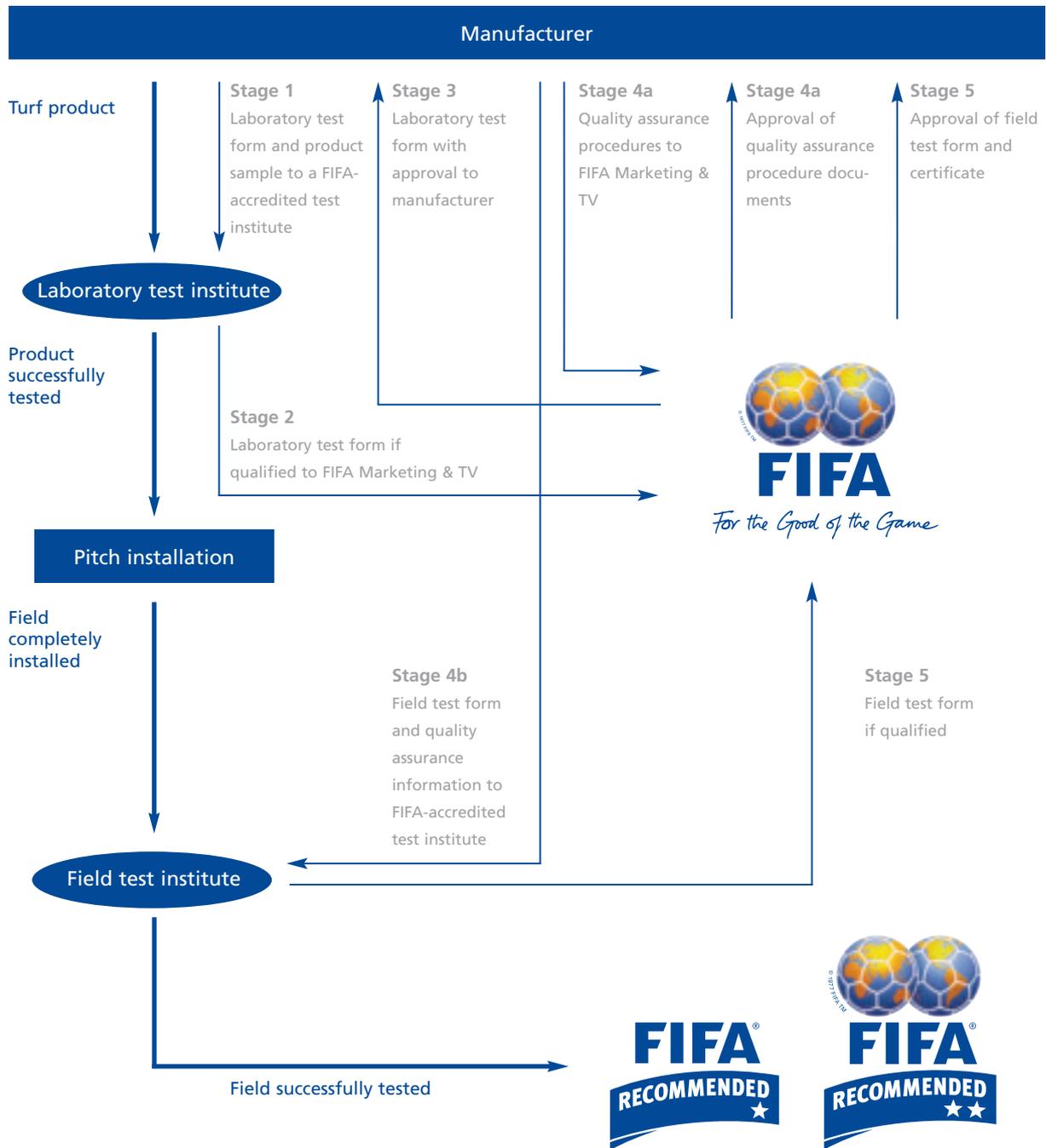


THE LICENSING PROGRAMME

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



TESTING PROCESS



See following page →

- Stage 1 A potential licensee (manufacturer) or existing licensee will submit the appropriate samples and the laboratory test form for type approval to a FIFA-accredited laboratory.
- Stage 2 The FIFA-accredited laboratory will undertake all the statutory tests laid out in the FQC Handbook. If the sample submitted fulfils all the requirements a test report will be submitted to FIFA Marketing & TV confirming that the potential licensee's product has met the requirements of the FQC laboratory test procedure.
- Stage 3 The potential licensee will be informed by FIFA Marketing & TV by means of a laboratory test report that the licensee's product has met the requirements of the FQC laboratory test procedure and the licensee can proceed with the installation of a field and the contract between FIFA and the licensee.
- Stage 4 The potential licensee will identify a project and install a field using the same product that was submitted and approved in the FQC laboratory test procedure. To ensure the product installed is the same as the product that was tested the following quality checks will take place:
- a) The potential licensee must nominate a suitably qualified individual to be responsible for all liaisons regarding quality assurance issues between the manufacturer and FIFA Marketing & TV. The licensee will submit to FIFA Marketing & TV its quality assurance procedures. If these are satisfactory, FIFA Marketing & TV will inform the licensee and he can continue with b) onwards. If they are not satisfactory, FIFA Marketing & TV will inform the potential licensee of which specific additional measures it will need to adopt to become a licensee.
 - b) Before any goods are dispatched to the field for installation, the documentation (ie. quality assurance information) and the field test form must be signed and sent to the third party responsible for attestation that the product leaving the factory is the same as that approved by the laboratory testing procedures. It is assumed that in most instances the third party will be the laboratory responsible for field testing. If the field was installed prior to the application for the field to be granted a licence, the appropriate quality assurance information from the factory must still be supplied. The quality assurance information applies to all the constituent components of the field installed.
 - c) The laboratory responsible for field testing will undertake all the field tests including product identification tests on the completed installation.
- Stage 5 The identified project is then tested by a FIFA-accredited laboratory. If it passes all the FQC field tests, the FIFA test institute will submit the appropriate test report, including quality assurance information, to FIFA Marketing & TV, which will grant the appropriate FQC star rating to the licensee by means of the field test report.

RE-TESTING A FIFA RECOMMENDED 2 STAR FIELD

- 1 In order to retain the FIFA RECOMMENDED 2 STAR certification an annual field test must be undertaken to ensure it still meets the criteria of the original test.
- 2 If the field is retested and does not meet the FIFA RECOMMENDED 2 STAR criteria but meets the FIFA RECOMMENDED 1 STAR test, the field becomes a FIFA RECOMMENDED 1 STAR for 3 years.
- 3 If the field is retested and does not meet either the FIFA RECOMMENDED 2 STAR or 1 STAR requirements, the certificate for the field is revoked.
- 4 If the field is not retested it automatically becomes a FIFA RECOMMENDED 1 STAR installation for the next two years.

LICENSING RIGHTS

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

- Three years' validity
- The right to use the FIFA RECOMMENDED marks
 - in advertising and promotions relating to licensed products
 - on boards around licensed pitches
- Access to a full marketing services package (see **MARKETING SERVICES**)

ROYALTY FEE

Licensees are required to submit royalty statements on an annual basis with subsequent payment of the royalties due.

MINIMUM GUARANTEE

The licence agreement provides for a minimum guarantee, payable annually and to be set off against royalty payments.

MARKETING SERVICES

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

- Well-focused advertising and PR campaigns on behalf of FIFA, aimed at member associations, football clubs, leagues, communities, media organisations and the football world in general
- Promotion of the FIFA Quality Marks
- 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
- Legal advice and supervision from FIFA's international network to enforce and protect licensee's rights and prevent infringements of the FIFA Quality Marks
- Access to promotional material which is developed by 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 also undergo field tests.

FIFA Marketing & TV AG have developed a set of information material in form of a brochure and a DVD. Both items explain the FIFA Quality Concept for Football Turf and are made available to licensees free of charge.

The laboratory tests assess the quality of the turf product – and if successful – field tests must be conducted after completion of pitch installation to ensure quality performance.

Laboratory tests

For each football turf product to be tested, manufacturers must submit the test material specified below to one of the selected laboratory test institutes.

- 11 m x 1 m of football turf and adequate in-fill materials (this surface should have no joints or inlaid lines)
- 2 m x 1 m of any shockpad or e-layer
- 5 m of pile yarn – if more than one yarn is used to form the pile, one length of each
- 1 m x 1 m sample of football turf, split down the middle and rejoined using the proposed jointing/seaming method

In addition, the FIFA Laboratory Test Form for Football Turf must be completed for every turf model and the original copy sent together with the turf samples 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 a laboratory but will undergo field-testing as well. After having successfully passed the laboratory test, the FIFA Field Test Form for Football Turf must be completed and sent to the respective test institute together with the Laboratory Test Report filled out by the laboratory test institute and FIFA Marketing & TV AG.

Upon completion of laboratory and field testing, the results will be sent from the test institute to FIFA Marketing & TV AG, which 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 may take up to six months.

ADVISORY NOTE WHEN TENDERING FOR A FIFA RECOMMENDED FIELD

The process of preparing a tender for sports surfacing contractors requires additional considerations. The following guidance notes are meant to assist in the pre-tender submissions.

It should be noted that this information is of an informative nature and recognises that procedures will vary from geographical location to geographical location. It should not be assumed that the following information is in anyway exclusive nor does it indemnify the purchaser of the football turf surface from their own legal obligations when deciding upon a contractor to undertake a project.

The following, non-exclusive information should be requested from the prospective tenderers prior to the tender submission:

- The turf manufacturer must be able to supply a number of references of similar sized projects to the satisfaction of the client, some or all of which may be contacted. Telephone numbers, site addresses and contact names should be provided.
- The turf manufacturer must be ISO 9001 accredited, as should the suppliers of the additional materials that are included in the system, e.g. seaming adhesives, in-fill materials, sub-base aggregates. It is however recognised that, due to geographical or other complications, certain materials cannot always fall within this restriction. Where such restrictions cannot be enforced, the manufacturer should demonstrate to the client how he intends to maintain quality assurance for those suppliers.
- The turf manufacturer must be able to demonstrate that the product approved is the product installed. This will require ISO 9001 certification of all materials that are to be used in the system to be sent to the client or the client's agents prior to the materials being shipped to site. This does not in itself exonerate the manufacturer from its obligations or bestow any seal of approval on the finished product.

To ensure that the finished installation is of the highest achievable quality, it is not only the quality of the manufactured product that has to be controlled, the quality assurance of the synthetic turf-installing team is of equal importance. The turf manufacturer must be able to demonstrate that the installing team is experienced with the product. It is therefore necessary to submit evidence of the installing team's experience in handling the specified product. It is advisable to obtain references for similar projects and ascertain from their site agents who was the installing team involved in the construction of the field.

See following page ➔

One of the most crucial aspects when producing a successful sports surface is to ensure the consistency and stability of the sub-base. It is recognised that on a global scale the quality and experience of operatives and equipment responsible for preparing the sub-base will inevitably vary. Therefore, wherever sub-contractors are employed, for example in sub-base preparations, they shall be obliged to demonstrate that they have the machinery and skilled operatives necessary to fulfil the requirements of the base specification submitted. The turf manufacturer should be able to supply a qualified engineer capable of overseeing any sub-contractors to ensure that the sub-base is constructed to the required standard.

Close supervision of sub-contractors is fundamental to ensure a quality finish. The sub-base is a fundamental part of the overall system and demands the same level of quality assurance as the other aspects of the completed synthetic turf. It is advisable that the client satisfies himself as to the financial stability of the turf manufacturer.

The turf manufacturer should have an appropriately qualified representative on site to certify the work undertaken.

The turf manufacturer must be able to supply adequate public indemnity insurance.

Furthermore, the turf manufacturer must obtain adequate insurance cover to protect the client against any losses should the turf manufacturer become insolvent during both the contract period and the warranty period.

The following tender document can be downloaded from www.FIFA.com

SAMPLE TENDER DOCUMENT

Example for a Tender Document

DESCRIPTION OF PROJECT

Bill of Quantities

Project :

DESCRIPTION OF WORK

Dimensions 111m x 74m=8214m²

Playing area	105m x 68m	
Safety area	3m touchlines	
	3m goal lines	

Chapter 1 Preliminary work USD

1.1	Working drawing			
1.2	Site installation - equipment / storage			
1.3	Site preparation - Geotechnical survey			
1.4	Demolition work			

1 Total Preliminary work

Chapter 2 Earthworks and Sub-base

2.1	Excavation and removal of soil			
2.2	Subgrade with slope max 1.0%			
2.3	Compaction of the subgrade			
2.4	Filter - layer *cm thickness			
2.5	Geotextile, product*			
2.6	Unbound base course, *cm thickness.			
	Gradation of aggregate *			
	Alternative: additional layer (s)			
2.7	Bound base course, permeable			
2.7.1	Lower bituminous base layer			
	*cm thickness, aggregate			

See following pages →

2.7.2	Upper bituminous base layer *cm thickness, aggregate			
2.8	Ground sockets for sports equipment			
2.9	Curbstones, d *mm, profile			
2	Total	Earthwork and sub-base		
Chapter 3		Drainage network		
3.1	Drainage pipes, d * mm			
3.2	Perimeter drainage, d *mm			
3.3	Water sewerage network			
3.4	Water drainage channels, product *			
3	Total	Drainage network		
Chapter 4		Elastic layer (if included)		
N°	Description	Quantity	Price	Amount
4.1	Elastic layer in situ, *mm			
4.2	Pre-fabricated shock pad, *mm			
4	Total	Elastic layer		
Chapter 5		Artificial turf		
N°	Description	Quantity	Price	Amount
5.1				
	File component, PE UV Stabilised*			
	File height, *			
	Colour, Verde Green*			
	Marking, *			
	Thread			
	Infill weight, *kg / m2			
	Infill height, *mm			
	Rubber, quality* size*			
	Quartzsand, quality, *size, * including delivery			
	Turf installation Labour			
5.2	Maintenance equipment- including delivery-FOC			
5	Total	Artificial turf		

See following pages ➔

Chapter 6		Sports equipment football		
N°	Description	Quantity	Price	Amount
6.1	Goals			
6.2	Corner flags			
6.3	Substitutes benches			
6	Total	Sports equipment football		

Chapter 7		Fences		
N°	Description	Quantity	Price	Amount
7.1	Fencing system, h *m			
7.2	Fencing system, h *m (behind goal area)			
7.2	Door, *m x * m			
7.3	Gate, *m x *m			
7	Total	Fences		

Chapter 8		Pathways, surrounding		
N°	Description	Quantity	Price	Amount
8.1	Pathway to the pitch, *m			
8.2	Pathway surround the pitch, *m			
8.3	Kerbstones, d * mm, profile *			
8	Total	Pathways and surrounding		

Chapter 9		Artificial lighting		
N°	Description	Quantity	Price	Amount
9.1	Masts, height *m,			
9.2	Floodlights, *Lamps, *lux			
9.3	Trenches for cables			
9.4	Foundation masts			
9	Total	Artificial lighting		

See following page ➔

Chapter 10		Maintenance / Training		
N°	Description	Quantity	Price	Amount
10.1	Maintenance training for local crew			
10	Total			
Chapter 11		Fieldtests (FQC)		
N°	Description	Quantity	Price	Amount
11.1	Fieldtests on site (as required)			
11	Total			
Sub-Contractor Contingency				
Freight for carpet and rubber				
Time schedule				Weeks
Warranty				Years
Summary 1 - 11				
Total				

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 that are fully acceptable at all levels of the game. Therefore for the very first time a reference to the field surface was 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 Football 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,” comments 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 that would make it impossible on natural turf pitches.”

The release of the FIFA Quality Concept for Football Turf provided the necessary assurances to open up the possibility for international competitions to be held on football turf. This approval scheme is aimed at offering those associations and confederations that aspire to host matches on artificial turf the quality assurances that come with the FIFA marks. There is no longer a reason to prevent matches on football turf products carrying the FIFA marks, 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. This means that, from now on, FIFA tournaments and qualifiers for the 2006 FIFA World Cup™ in Germany can be staged on FIFA RECOMMENDED football turf.

The FIFA RECOMMENDED 2 STAR standard will be the relevant quality standard for the use of football turf in UEFA’s top competitions as the European Championship, the UEFA Champions League and the UEFA Cup.

See following page →

In order to ensure familiarity with the newest football turf products, FIFA suggests that provisions specifying a minimum number of training sessions for the visiting team be included in any applicable regulations. FIFA recommends at least two one-hour training sessions in the stadium prior to the match.

Depending on the reaction of the international community to the FIFA Quality Concept, FIFA may eventually decide to allow final competitions to be placed on artificial surfaces. This will be of particular importance to associations that wish to host a FIFA competition at a later date.

Competitions	FIFA RECOMMENDED	Authorisation
FIFA Final Competitions	2 STAR	FIFA Competition Regulations
FIFA Preliminary Competitions	1 STAR / 2 STAR	FIFA Competition Regulations
UEFA Champions League / UEFA Cup	2 STAR	UEFA Competition Regulations
European Championship qualifiers	2 STAR	UEFA Competition Regulations
Other UEFA Competitions	1 STAR / 2 STAR	UEFA Competition Regulations

FUTURE STEPS

We believe the development of new technology in the field of football 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 stadium microclimates) where natural grass is not an economic or environmental option. Of course, we will always prefer a perfectly manicured grass pitch to an artificial surface. However, the option should be available for those associations with good reason to play on football turf that has proven to be the best alternative to natural grass.

More and more football clubs and associations are installing FIFA RECOMMENDED football turf 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 Football Turf and to improve the quality of these surfaces in general.

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



Photo by Action Images

ADVERTISEMENT

As world football's governing body, FIFA has taken the lead to ensure that there is a recognised international standard for artificial turf pitches. To make sure this is widely known by people involved in decision-making, full page advertisements have been developed showing the main advantages and benefits of a certified FIFA RECOMMENDED football turf pitch. This advertisement appears regularly in the key specialist international magazines.

Bilstein, Bremen	Friday, 14.15 after U-17 training	Friday, 17.05 after a snowstorm	Friday, 18.50 after U-20 fitness training	Friday, 22.00 after a U-17 league game
	Friday, 01.45 after championship celebrations	Saturday, 08.00 after a night below zero	Saturday, 13.05 after first team training	Saturday, 22.34 after 'The Reasons' concert
	Sunday, 11.30 after a U-18 friendly	Sunday, 18.30 after a first team league match	Tuesday, 10.30 after first team training	Wednesday 16.30, after a youth cup tie
	Wednesday, 22.00 after a U-20 league match	Thursday, 11.00 after reserve team training	Thursday, 14.30 after a youth tournament	Friday, 21.45 after a U-17 league game
	Sunday, 16.25 after three days' rain	Tuesday, 23.00 after the 'Hotel Berlin' concert	Wednesday, 21.50 after a U-20 league match	Tuesday, 08.00 after a three-week drought

Plays the same, time after time.

Football turf pitches that have been awarded either of the "FIFA RECOMMENDED" quality marks last longer. That is a simple fact. Boasting the same playing qualities as natural turf without cutting any corners on comfort or safety, the new generation of artificial turf surfaces takes advantage of all the latest advances made in development and testing. That means a whole range of direct benefits for you, including longer playing life, time and cost savings in terms of maintenance, and increased resistance to extremes in weather and climate. GREAT TO PLAY ON. www.FIFA.com FIFA Quality Concept, FIFA Marketing & TV AG, Grafenauweg 2, P.O. Box 4250, 6304 Zug, Switzerland e-mail: artificial.turf@fifa.org




EDITORIAL COVERAGE

Our targeted media efforts ensure that football turf is covered regularly in all the leading specialist publications. We provide editors with detailed reports explaining the advantages of artificial turf in clear and convincing terms, which are then published in magazines such as Stadia, Panstadia, Football Business International, ...



See following page →

INFORMATION MATERIAL



CONTACT

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

FIFA Marketing & TV AG
FIFA Quality Concept
Grafenauweg 2
P.O. Box 4250
CH-6304 Zug
SWITZERLAND

Tel. +41-(0)41-727 0000
Fax +41-(0)41-727 0035
E-Mail: football.turf@fifa.org
<http://www.FIFA.com/en/development/quality/index.html>