

## **GUIDE TO THE USE OF SYNTHETIC TURF PITCHES FOR COMPETITION AND TRAINING**



### **INCORPORATING RFL PERFORMANCE AND CONSTRUCTION STANDARDS FOR SYNTHETIC TURF PITCHES**

2020 edition

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There are many ways of constructing a synthetic turf pitch. These guidelines do not constitute any form of approval from the Rugby Football League Limited on any particular form of surfacing or construction but are intended to provide information to potential consumers to allow them to make informed choices when designing and selecting surfaces, contractors, etc.

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## **Part 1**

# **A guide to the use of synthetic turf pitches for Rugby League**

## 1. INTRODUCTION

The last 25 years has seen major innovations in the development of synthetic turf surfaces meaning there are now artificial surfaces that replicate the playing qualities of good quality natural grass pitches, whilst being able to sustain significantly higher levels of usage. The quality of these surfaces is such that they are now being used in major competitions for association football, Rugby Union and Rugby League.

To assist potential developers of synthetic turf Rugby League pitches the Rugby Football League (RFL) first published guidance on these new forms of playing surface in 2012. Since then the guidance has been updated as s technology advances. This is the third edition and it describes many of the factors that need to be considered during the design, specification and construction of a synthetic turf sports pitch. It also includes advice on maintenance, life cycle costs, and post-installation monitoring and testing.

To ensure synthetic turf surfaces provide a satisfactory playing environment that will not increase the risk of injury to players and are of sufficient durability to perform adequately for a period of time that makes the economic investment viable, the RFL has developed performance and construction standards for synthetic turf Rugby League pitches. The latest edition of the Standard forms Part 2 of this guide.

## 2. WHAT IS A SYNTHETIC TURF PITCH?

A synthetic turf pitch used for Rugby League comprises two components, the synthetic turf surface, which comprises the synthetic turf carpet, infill material and a shockpad, and the base on which it is laid. Figure 1 show a typical cross-section of a pitch.

The synthetic turf surface is a carefully selected combination of materials that are designed to work together to provide the playing characteristics, player welfare properties and durability required to provide a high-quality playing surface, that (subject to acceptable use and maintenance) closely replicates the playing properties of natural turf, and is able to do so for eight to ten years. Figure 2 shows the typical cross section of a synthetic turf surface designed for Rugby League.

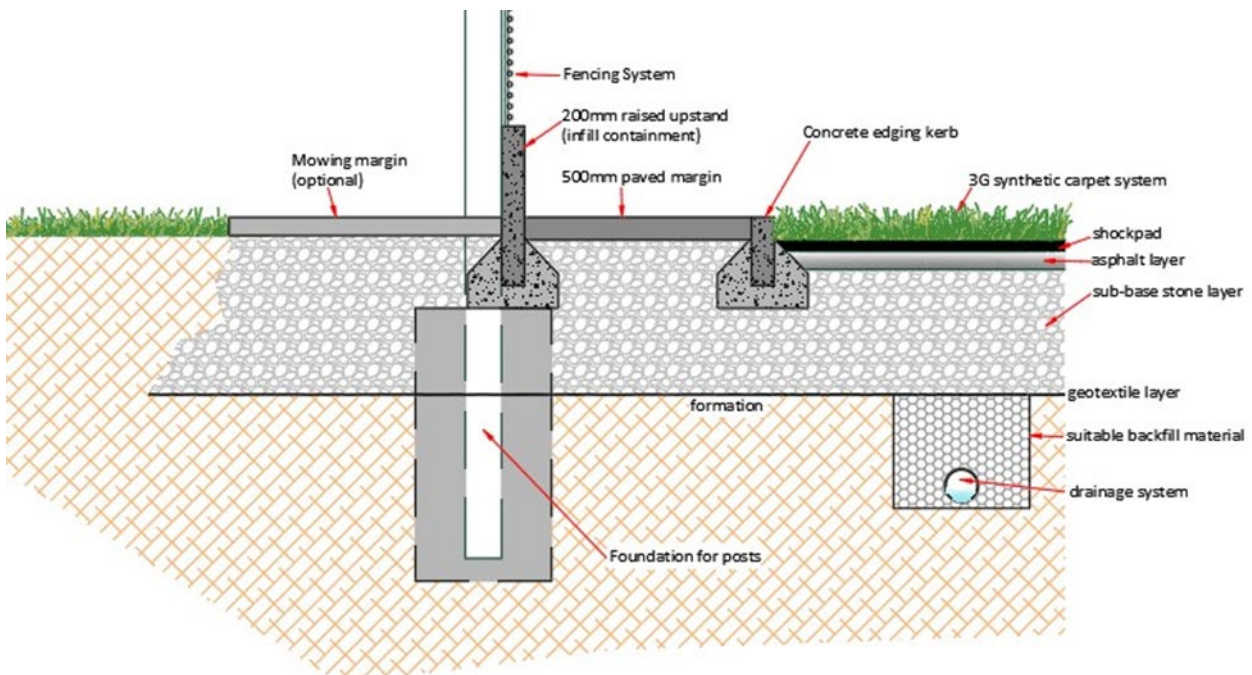


Figure 1 - The basic components of a synthetic turf pitch



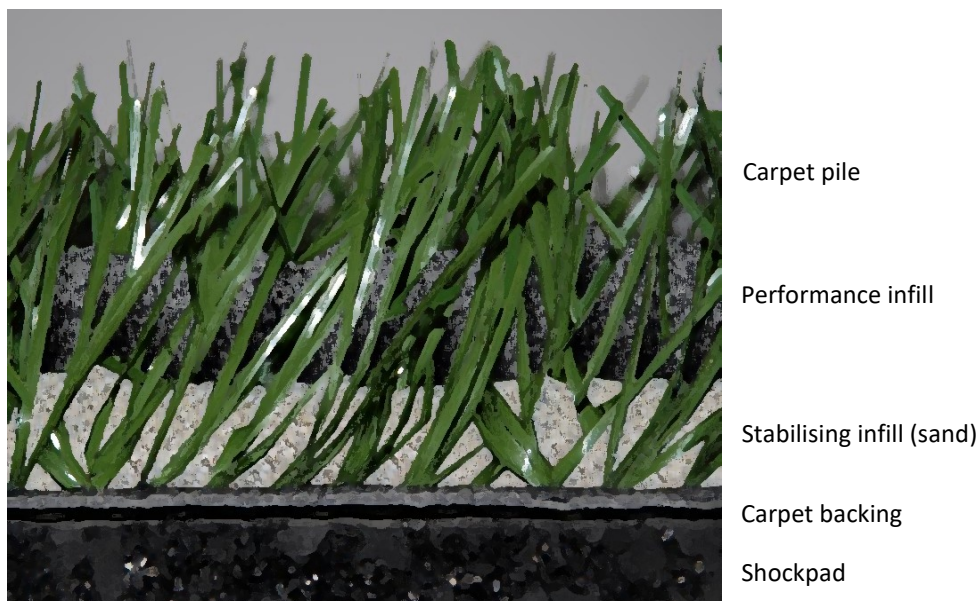


Figure 2 - principal elements of a synthetic turf surface

## 2.1 Synthetic turf carpet

The synthetic turf carpet influences the playing characteristics, durability and visual appearance of the pitch. Most attention is normally made to this aspect of the surface when a new pitch is being considered. The majority of synthetic turf surfaces are manufactured using a tufting process. This is where the pile is lopped through a backing cloth and anchored in place with some form of coating (normally a latex or polyurethane screed). Nowadays the pile is normally manufactured from polyethylene mono-filament yarn due to their enhanced durability, softness/comfort and resilience. In this process the pile yarns are produced as individual strands that are plied together to form tuft bundles. The number of yarns in a bundle can vary and is normally specified as the number of ends per tuft.

Occasionally surfaces are produced using fibrillated yarns; these are manufactured from thin sheets of plastic that are slit and twisted to form thicker filaments that form the carpet pile. Experience has shown, however, that the effects of play can cause these yarns to split into increasingly thin strands making it increasingly difficult for the surface to provide the desired playing characteristics. Fibrillated yarns provide good stabilisation of the infill, preventing excessive splash and dispersion. Therefore, several manufacturers combine monofilament and fibrillated yarns into one tuft bundle: ensuring the surface benefits from the positive attributes of both. Some surfaces may also include secondary curly yarns that lie near the base of the carpet, these are designed to help stabilise the infill.

The height or length of the pile above the backing of the carpet varies between surfaces but is typically in the range of 40mm to 65mm. For surfaces intended for Rugby League use, there are no restrictions providing the surface satisfies the requirements of the *RFL Performance and Construction Standards for Synthetic Turf Competition and Training Pitches*. If a field is also to be used for Rugby Union, the pile height must be at least 60mm to comply with World Rugby regulations.

The synthetic turf carpet is produced in rolls that are normally between 3.5m and 4.0m wide; these are normally laid across the pitch in full width runs. The rolls of carpet are joined together by either stitching or using adhesive joints. Both methods are acceptable providing the joints are well made.

Play lines can either be painted onto the playing surface or be tufted or inlaid. Tufted lines are incorporated into the carpet during production and are commonly used to form the outer boundary field markings; inlaid lines are cut into the carpet during installation and are used for most in-field markings. Inlaid and tufted lines provide permanent markings that reduce on-going maintenance costs, whereas painted lines give greater flexibility to the use of the area.

When deciding on the type of line markings required, it is important to remember that any pitch that is to be used in Super League or Championship competitions should only have markings for Rugby League present, meaning all other lines should be applied in paint to allow their removal prior to competition matches.

## 2.2 Infill

Most synthetic turf surfaces are partly filled with particulate materials that are used to:

- support the pile of the carpet to help it remain standing upright
- contribute to the playing and impact absorption properties of the surface
- provide weight to the carpet

Two layers of infill are normally used. The lower layer, known as the stabilising infill, is normally a rounded sand. This layer acts as a ballast to help ensure the synthetic turf carpet is held in place and cannot move or develop creases or wrinkles during use. The upper layer, known as the performance infill, is normally either rubber granules or some form of organic material. The grading, composition and depth of the infill materials are carefully selected by the manufacturer to ensure the combination of the carpet pile, infill materials and shockpad give the type and level of performance required from the surface.

### 2.2.1 Infill materials

The most common performance infill is produced from recycled end of life car and truck tyres (often referred to as rubber crumb ELT granulate or SBR infill). This material provides good performance and has excellent durability. Manufacturers are also offering a range of infill materials including polyurethane coated ELT, thermoplastic polymers (TPE) and EPDM (Ethylene Propylene Terpolymer) granules. As these are specifically manufactured to infill materials, they can be produced with enhanced shapes, sizes and colours. They can also incorporate flame retardant additives, which is an important consideration when surfaces are being laid indoors.

Manufacturers are also offering organic infills, based on cork, coconut fibre, timber, etc., which are designed to provide a more natural playing surface. Some, however, require moisture to keep them in their optimum condition and all are likely to require replacement periodically through the life of the synthetic turf carpet. Some are also known to float in heavy rain, which can increase maintenance and replacement costs.



Rubber crumb infill



EPDM rubber infill



Organic (cork) infill

*Figure 2 – infill types*

In some countries, there has been concerns about the use of rubber crumb infills made from ELT tyres and their possible

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effects on human health. Globally this has led to a number of governmental agencies, including the European Chemical Agency (ECHA) to investigate if there were any scientific justification for the concerns. They published their report in February 2017<sup>1</sup> and it stated that in the various research studies they evaluated the concentrations of potentially harmful chemicals found were well below the threshold limits set to protect human health, meaning there were no reasons to ban the use of rubber crumb infills.

They did, however, recommend that a new a new regulation be introduced to ensure the chemical content of infill material used in 3G surfaces does not rise to levels that could be of concern. Based on this recommendation, a restriction is being prepared for inclusion in the European Unions' Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) Regulations. These regulations aim to improve the protection of human health and the environment and apply to substances manufactured or imported into Europe in quantities of 1 tonne or more per year.

The new regulation for infill materials is likely to be introduced in late 2020 or early 2021, and although the UK has now left the European Union, the REACH regulations will continue to apply during the transition period, with their future status within the UK, forming part of the government's negotiations with the European Union.

As the protection of health and the environment is a primary concern to all using, operating and funding synthetic turf pitches, it is very important that only infills that comply with the draft REACH regulations are used in the construction or ongoing maintenance of 3G pitches. To assist identifying compliant products the Sport and Play Construction Association ([www.sapca.org.uk](http://www.sapca.org.uk))<sup>2</sup> has developed an list of infill materials that are known to comply and are produced under audited quality control conditions. This has enabled UK sport's governing bodies (including the RFL) and UK government agencies to recommend, and specify within their funding conditions, that only infill materials appearing on the SAPCA list should be used for constructing or maintaining 3G pitches.

The health questions asked about ELT rubber infill has highlighted the need to remember that when taking part in any sports activity, whether as a player, coach, spectator, employee or volunteer, or when maintaining or working a pitch, it is important to take sensible measures to maintain good personal hygiene. Public Health England have published guidance<sup>3</sup> to help organisations implement good hygiene practises across their establishments, simply and effectively, no matter the activity, sport or venue. The RFL recommends this guidance is implemented at all sports grounds, irrespective of the type of playing surface.

### 2.2.2 Minimising infill dispersion into the environment

Increasing public concern about the impact of microplastics on the environment is focusing attention on the need to minimise the risks posed by such materials. Microplastics have been defined as any solid particle made of non-biodegradable plastic or rubber that is 5 mm or less in size. They can be unintentionally formed through wear and tear or deliberately manufactured and intentionally added to products for a specific purpose.

As many infill materials used in synthetic turf surfaces meet the definition of a microplastic it is important that the infill is contained within the confines of a pitch and is not allowed to migrate into the environment. To aid and promote good design and maintenance procedures for sports fields containing infill materials the European Standards Committee (CEN) responsible for establishing pan-European standards for sports facilities has prepared a technical report<sup>4,5</sup> entitled *Synthetic Turf Sports Surfaces – Guidance on how to Minimize Infill Dispersion into the Environment*. To help ensure the infill used in a 3G synthetic turf pitch does not become a source of enviromental contamination it is recommended that

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<sup>1</sup> An evaluation of the possible health risks of recycled rubber granules used as infill in synthetic turf sports pitches; ECHA, 28 February 2017

<sup>2</sup> <https://sapca.org.uk/guide/performance-infills-for-3g-surfaces>

<sup>3</sup> <http://www.groundsmanship.co.uk/sportshygiene>

<sup>4</sup> CEN Technical Report CEN/TR 17519

<sup>5</sup> Available from <https://shop.bsigroup.com> following publication during spring / summer 2020

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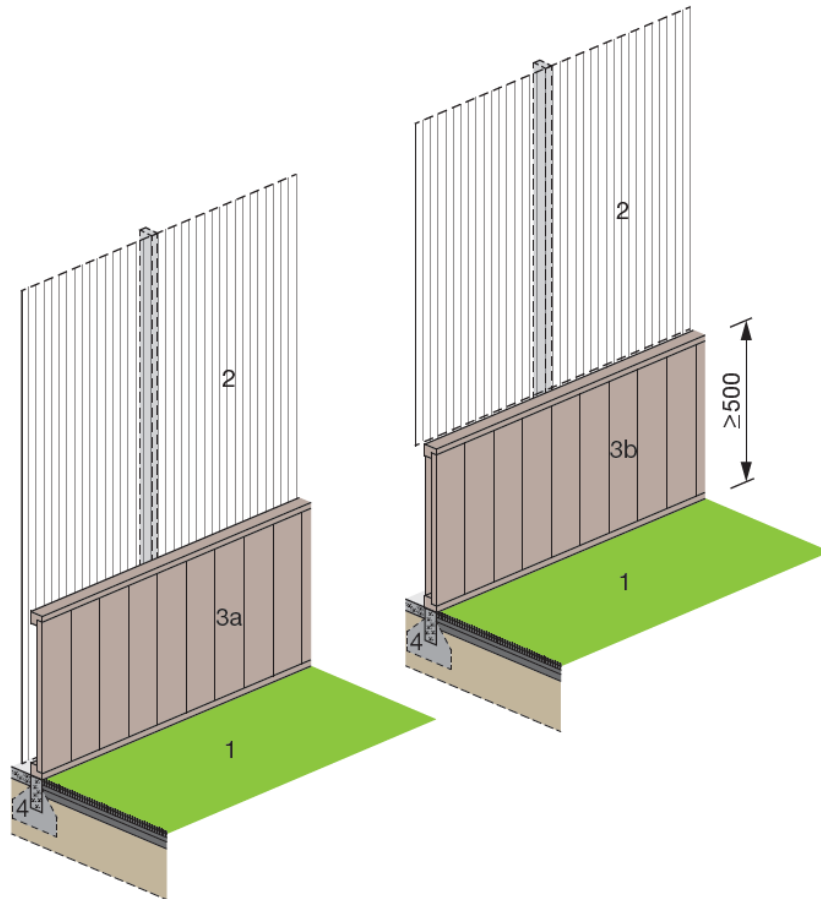
the guidance detailed in the CEN report is incorporated into design, operation and maintenance procedure used on the pitch. In summary this means:

- the pitch margins should incorporate some form of physical barrier to prevent infill leaving the playing surface and migrating into the surrounding environment. A number of different edge barriers have proven successful including:
  - 0.5 m or higher panels; that may be formed from brickwork, timber, rigid plastic extrusions, metal panels or other sheet materials
  - a combination of a paved margin (at least 0.5m wide) and timber or plastic boards (200 mm or higher), mounted on the fencing so they sit flush with the ground and do not allow infill to migrate under them
  - raised precast concrete edgings or kerbs (minimum 200 mm high) located inside and adjacent to the fence line
  - cast concrete plinth/kerbs (minimum 200 high) on which the perimeter fencing is flush mounted
- Boot cleaning brushes should be positioned at the main entrances to the pitch, and players should be encouraged to use them
- Decontamination grates are positioned at all entrances to a pitch to ensure any infill being carried out on players' boots or on maintenance machinery is dislodged and captured
- All surface drains around or near a pitch include silt traps to capture any infill being washed into them. These typically comprise a filter bucket offering primary filtration (removing the heavier silts) and a secondary fine micro-filter that captures any remaining small particles Both the filter bucket and secondary fine micro-filter should be easily removable for cleaning/replacement

Examples of typical infill containment design solutions, prepared by Sport England, are shown on the following pages.

### Infill Containment Methods

Fencing panels, used when the synthetic turf surface is laid up to fence



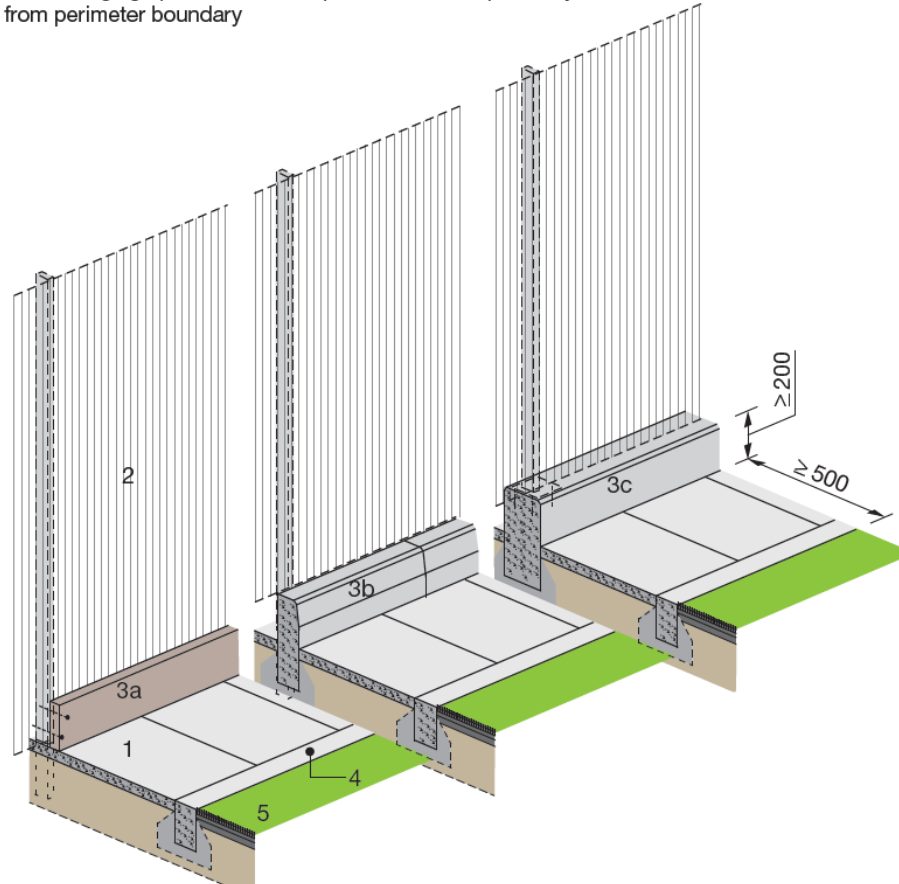
#### Key

- 1 Synthetic turf surfacing
- 2 Perimeter fencing
- 3a Fencing boards mounted in front of fence. May be used on new build fields or be fitted to existing fields
- 3b Fencing mounted above boards - most suited to new fields and fencing systems
- 4 Field edge detail/ kerb

Dimensions in millimetres

### Infill Containment Methods

Raised edging options used with paved zone to separate synthetic turf surface from perimeter boundary



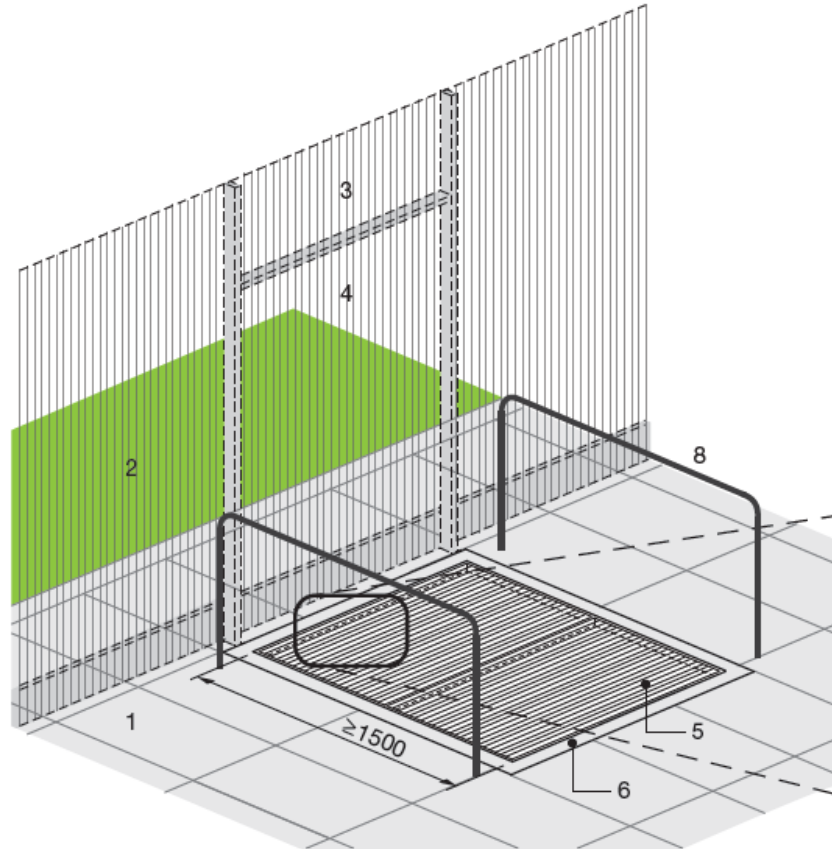
#### Key:

- 1 Hard paved zone between synthetic turf and fence
- 2 Perimeter fencing
- 3a Timber or plastic board
- 3b Pre-cast concrete kerb with fence mounted behind
- 3c Cast concrete edging with fence mounted above
- 4 Edge detail of synthetic turf field
- 5 Synthetic turf surfacing

Dimensions in millimetres

**Infill Containment Methods**

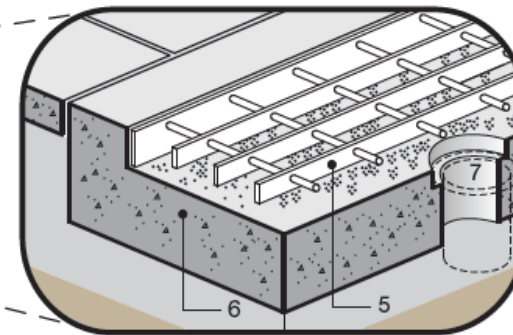
Decontamination / boot cleaning grate (located outside all entrances)



**Key**

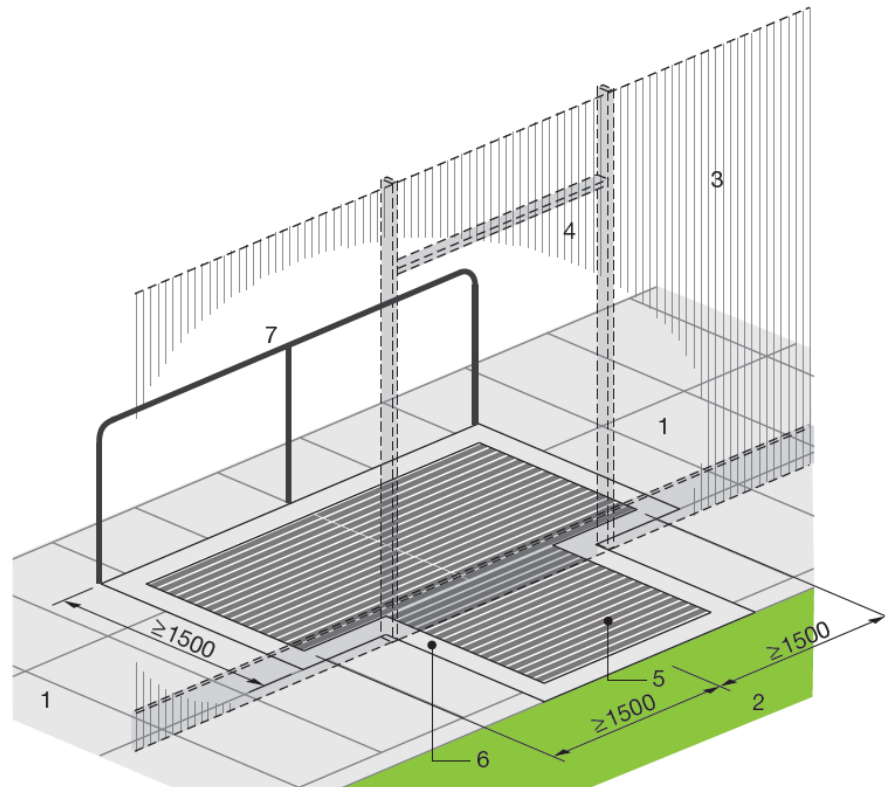
- 1 Area outside field
- 2 Synthetic turf surfacing
- 3 Perimeter fencing
- 4 Gate
- 5 Removable recessed grating panels with space below for rainwater discharge
- 6 Concrete base and edging surrounds
- 7 Drain with filter bucket and secondary fine micro-filter
- 8 Access barrier / fence

Dimensions in millimetres



**Infill Containment Methods**

Decontamination grate / boot cleaning – alternative configuration



**Key**

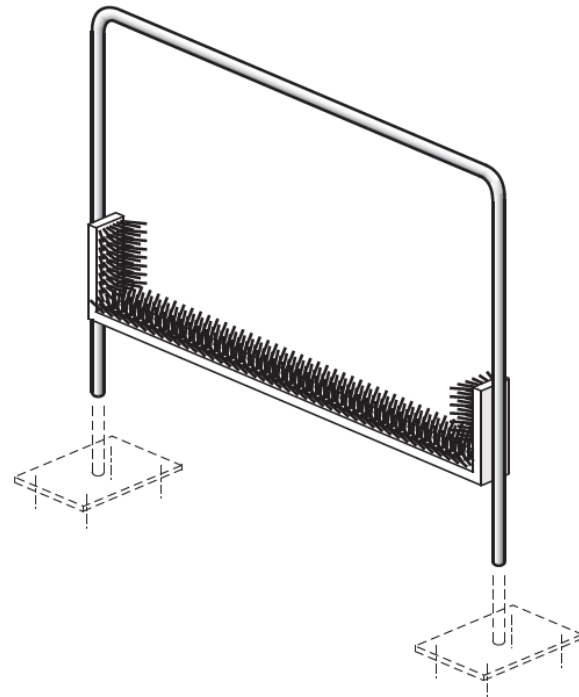
- 1 Area outside field
- 2 Synthetic turf field
- 3 Perimeter fencing
- 4 Gate
- 5 Heavy duty rubber scraper mats, honey-comb profile mats or smooth bar industrial decontamination grates
- 6 Concrete base with drain and silt trap
- 7 Control barrier / fence

Dimensions in millimetres



### Infill Containment Methods

Boot cleaning station



### 2.3 Shockpads

To ensure a synthetic turf pitch is able to provide the levels of protection considered necessary for the sport, it is likely to include a shockpad or elastic layer. These are laid beneath the synthetic turf carpet and act as a thick carpet underlay, providing isolating the hard sub-base and providing enhanced cushioning. Shockpads take many forms including polyurethane bound rubber mixes that are laid with a paving machine (often described as insitu laid shockpads) and factory produced panels or rolls that are manufactured from a range of materials including rubber granules, polyurethane foam, expanded polyethylene beads and recycled polyethylene foam.

### 2.4 Base constructions

The base on which the synthetic turf surface is laid is required to provide a stable and free draining platform on which the synthetic turf surface is laid; it should be capable of supporting and transmitting the loads placed on the surface during normal use and maintenance and provide adequate protection to the sub-grade from penetrating frosts.

Most commonly, bases for long pile synthetic turf pitches are now constructed from unbound graded, free draining aggregates (coarser gradings in the lower sections, finer gradings at the top) typically installed to a depth of 300mm – 450mm depending on ground conditions.

The pitch should have a drainage system that is designed to remove surface water from the playing surface at a sufficient rate to prevent flooding and to ensure that excess water is not allowed to build-up within the sub-base causing a reduction in its structural integrity. The drainage system will typically consist of a series of lateral drains laid beneath the pitch at between 8m and 15m centres, depending on site conditions. The lateral drains will connect into collector drains located on the outside of the perimeter edgings that will discharge into a suitable outlet. This will need to be identified (often before planning approval is granted) during the design of the pitch. Outlets can include storm water sewers, soak-aways and nearby watercourses. Whichever form is chosen permission is normally required from the relevant statutory body.

If a base or drainage system is poorly designed or constructed it can suffer from inadequate performance, which may result in localised movement and in undulations, surfacing flooding, etc. The Sport and Play Construction Association ([www.SAPCA.org.uk](http://www.SAPCA.org.uk)), in conjunction with a number of national sports governing bodies and government agencies, has developed a *Code of Practice for the Design, Specification and Testing of Bases for Outdoor Synthetic Sport Areas*. The RFL recommend that this is document be used as the basis for the design of a base for a synthetic turf rugby league pitch.

## 3. IS A SYNTHETIC TURF PITCH RIGHT FOR YOUR FACILITY?

When considering the installation of a synthetic turf pitch the first step is to undertake a feasibility study to identify what you really want to achieve from your pitch; this decision process is a fundamental element in the success of the future pitch. You should challenge yourself to think about the future of your organisation and ensure that you, and your colleagues, share a common vision.

Ask yourself:

- What are the priorities from your Rugby League development plan? Will training be the main use, or will you be looking to stage matches on the pitch too?
  - Is there commercial demand for a synthetic turf pitch in your area?
  - What will your hiring fee structure be across the various times the facility will be open and can the proposed hiring fees be afforded by the local community?
  - Will the income generated by the pitch be able to provide sufficient funds for an adequate sinking fund?
  - How will your development affect the key policies of RFL development strategies, e.g. have you taken advice from Rugby Football League?
-

- Are you able to commit to the maintenance requirements of the surface? The maintenance of the surface is of vital importance if the pitch is to retain acceptable performance and be long lasting. It is therefore essential that this vital aspect of the pitch’s management is not overlooked.

Dependent on the type of use, you must make your own informed judgement on the suitability of a synthetic turf pitch for your venue. This judgement can often be reached by visiting similar facilities in your area to seek information on best practice and to learn from their mistakes. This guide also aims to provide you with independent information on the many aspects of a synthetic turf pitch that you will need to consider.

When a synthetic turf pitch is to be used in RFL or other competitions a club should make their own risk assessment of whether long term compliance with the RFL competition rules is realistic given their individual circumstances. In particular, the need to retain a specified level of performance verses the risk of deterioration through the higher levels of use and or inadequate maintenance often associated with community use need to be seriously considered.

#### 4. RFL PERFORMANCE AND CONSTRUCTION STANDARDS FOR SYNTHETIC TURF PITCHES

To ensure only synthetic turf surfaces of acceptable quality are used for Rugby League the RFL has developed its *RFL Performance and Construction Standards for Synthetic Turf Pitches*; this forms Part 2 of this guide. The objectives of the Standard are to ensure pitches are constructed with synthetic turf surfaces that have the required performance and quality levels and that fields are constructed properly to provide satisfactory playing environments throughout their service lives. This is achieved by a three-stage process:

Stage 1 - a synthetic turf surface is subjected to a comprehensive series of laboratory tests that assesses its performance, durability and material qualities.

**To ensure new pitches (or existing fields that are resurfaced) the RFL recommend the synthetic turf surface should have been tested and shown to comply with the product test requirements detailed in Table 1 of the *RFL Performance and Construction Standards for Synthetic Turf Pitches***

Stage 2 – initial facility testing and certification - Following construction, a pitch is tested to verify the synthetic turf surface has been installed correctly and is providing the anticipated levels of performance – even the best quality surfaces will not perform acceptably if they are poorly or incorrectly installed.

Stage 3 – pitch recertification - The pitch is re-tested throughout its life to ensure it is still providing a satisfactory and safe playing environment.

**To ensure pitches are providing a satisfactory and safe playing environment the RFL require ALL synthetic turf pitches to be tested and registered with the RFL throughout their service life, as detailed in section 5 of this guide.**

#### 5. USE OF SYNTHETIC TURF PITCHES IN RUGBY LEAGUE COMPETITIONS

The Rugby Football League has amended their rules to allow the use of synthetic turf pitches in all of their competitions providing the pitch holds a valid Field Test Certificate showing it fully complies with the relevant field test requirements of the *RFL Performance and Construction Standards for Pitches*, as follows:

Level of competition		Category of field certification
Club Tiers 1 and 2 (Super League and Championship)		Stadium
Club Tiers 3 and 4 (Community) and training	New fields	Community
	Existing fields	Community or World Rugby’s Rugby Turf Standard

### 5.1 Super League and Championship category pitches

New or resurfaced pitches that are to be used for Super League and Championship matches must be tested prior to any competitive matches taking place. Thereafter pitches must be re-tested annually, the date of test being within two months of the start of the playing season. Following the field test a copy of the field test certificate must be submitted to the RFL Operations Department ([Operations@rfl.co.uk](mailto:Operations@rfl.co.uk)) prior to a season commencing.

If a field is found to fail the Stadium category field test requirements it must not be used without the written agreement of the RFL or until all necessary remedial works (including resurfacing if required) have been undertaken and the pitch has been fully retested and shown to satisfy the 'Stadium' category field test requirements.

#### 5.1.1 Pre-match maintenance checks

As the performance of a pitch can deteriorate over time it is important that it routinely maintained (see section 13 for more details). To help ensure consistency in the performance of fields used for Tier 1 and 2 competitions the RFL require the Ground Staff responsible for maintaining a pitch to check the vertical free-pile height and infill depths of the synthetic turf surface are in accordance with the manufacturer's instructions. Tests should be made on a grid across the pitch and in-goal areas and the results recorded on an official RFL maintenance record sheet (see Appendix B). If the vertical free-pile height is found to be less than 75% of the height specified by the surface manufacturer or the infill depth is found to be less than 90% or greater than 110% of the depth specified by the surface manufacturer the Ground Staff must undertake additional maintenance to rectify the defects and a further check made.

#### 5.1.2 Logos

RFL competition rules for Super League and Championship pitches require them to be marked with sponsors logos, etc. If synthetic turf logos are used, they should be manufactured from the same quality of synthetic turf carpet and be infilled in a similar way to the main playing area of the pitch. If painted logos are to be used, they shall not result in any aspect of the performance of the synthetic turf surface falling outside the 'Stadium' category of performance.

### 5.2 Community and amateur category competition pitches

Pitches to be used for community category matches shall initially be tested prior to any competitive match taking place. Thereafter pitches shall be retested every two years, the date of test being within two months of the start of the playing season. A copy of the field test certificate shall be submitted to the RFL Operations Department ([Operations@rfl.co.uk](mailto:Operations@rfl.co.uk)) prior to a season commencing.

If a field is found to fail the Community category field test requirements it must not be used without the written agreement of the RFL or until all necessary remedial works (including resurfacing if required) have been undertaken and the pitch has been fully retested and shown to satisfy the 'Community' category field test requirements.

### 5.3 Training fields

Pitches that will only be used for training activities shall be initially tested following installation. Thereafter the pitch shall be retested every three years. Following testing a copy of the field test certificate shall be submitted to the RFL Operations Department ([Operations@rfl.co.uk](mailto:Operations@rfl.co.uk)) so the field may be registered as being suitable for Rugby League activities.

### 5.4 Use of Rugby Union pitches

Club Tier 3 and 4 matches and Rugby League training may also be undertaken on synthetic turf Rugby Union fields that have been tested and certified as complying with World Rugby's *Rugby Turf Performance Standards*. A copy of the field test certificate shall be submitted to the RFL Operations Department ([Operations@rfl.co.uk](mailto:Operations@rfl.co.uk)) so the field may be

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registered as being suitable for Rugby League community activities.

*As a condition of allowing games and training activities to take place on a synthetic turf pitch the Rugby Football League reserves the right to test a pitch at any time. Any pitch found to be non-compliant may have its registration removed until areas of non-compliant performance are rectified.*

5.5 Multi-sports applications

Many synthetic turf pitches are used for more than one sport and this inevitably results in compromises in performance. In making such compromises it is important that the playing characteristics of the sports, or the protection provided to players, is not reduced to a point at which the surface fails to provide a satisfactory playing environment. Football and Rugby Union can both be successfully played on certain forms of synthetic turf that can also be used for Rugby League without a major impact on the playing characteristics of any of the three sports. The following table shows how the requirements of the various sports fit together.

Natural turf performance			
← Firmer pitches		Softer pitches →	
RFL Tier 1 & 2 competitions		RFL Tier 3 & 4 competitions	
RFL Stadium	RFL Stadium Football – FIFA Quality	RFL Community Football – FIFA Quality Pro Rugby Union	RFL Community Rugby Union

A number of international sports federations have developed the One Turf Concept. This is intended to give guidance on the performance requirements for pitches that will be used by football, rugby, hockey and other regional sports. One Turf compliant pitches are considered suitable for community level Rugby League.

6. PITCH DIMENSIONS

A pitch comprises the area within the field markings in-goal areas and side run-offs (the side areas beyond the markings which are provided to ensure players do not injure themselves by running into fencing, hoardings and other obstacles). The RFL has established recommended pitch sizes to ensure facilities are suitable for all potential levels of use, categories of competition, etc. These, along with the recommended run-offs, may be found at in the RFL document *Rugby League Pitch Dimensions*, available on the RFL website.

Where is the best location for a community synthetic turf pitch?

The design and cost of a new synthetic turf pitch will be greatly influenced by the site on which it is to be built and it should be recognised that some sites are probably not cost effective to develop. Factors that will influence the construction costs include topography, access, drainage, availability of an adequate power supply (for lighting) and most importantly ground conditions.

Before commencing the design of the pitch, the design team will require as much information as possible about the site and its surroundings. It is therefore essential that adequate resources are budgeted at an early stage of a project as this greatly reduces the risk of unforeseen problems (and increased costs), during, construction or even later. Of greatest importance is an understanding of the ground conditions, as the largest risk of unforeseen problems and additional cost normally occurs here. A specialist geo-technical survey should be undertaken where boreholes or trial pits are excavated to allow a detailed examination of the substrata across the proposed site.

Ideally a pitch should be located:

- close to changing accommodation and other support facilities;

- on relatively flat ground - to reduce construction complexity and costs and to prevent contamination of the playing surface from run-off from adjacent banking, etc;
- so the main playing direction is approximately north (between 285° and 20°) / south, to minimise the effect of a setting sun on the players, although the inability to achieve this orientation need not preclude the construction of a pitch;
- in a sheltered location, away from exposed terrain;
- where the installation of services (electricity and drainage) will not be prohibitively expensive;
- where easy access for maintenance and emergency vehicles is available;
- where players, spectators and maintenance equipment do not have to cross natural turf areas, as mud, debris and other contaminants will contribute to the deterioration of the playing surface;
- away from trees as roots and leaf litter can cause on-going structural and maintenance issues.

## 7. FENCING

Perimeter fencing is normally erected around community pitches to protect the playing surface from contamination and to help prevent unauthorised use and vandalism. Fencing heights vary, 3m is often used but this can increase to 5m where the site requires as many balls as possible to be retained within the pitch. Where site security and ball retention is not a serious issue or where an internal spectator compound is provided 1.2m high fencing with a top rail is often used to enable good spectator viewing.

The fencing is normally constructed from weld mesh panels or rolls that are suspended from box section posts. Weld-mesh is better suited to the repeated impacts of balls hitting the fence than cheaper chain-link mesh. Steelwork should be galvanised to minimise premature corrosion and may be plastic coated to improve its appearance.

Access gates should open outwards to ensure the safety of players. At least one pair of double gates should be provided to allow maintenance and emergency vehicle access.

## 8. FLOODLIGHTING

In order to maximise the use of the pitch most are floodlit. Lighting of full size pitches is normally achieved by a number of lamps mounted on columns positioned along the sides of the pitch. Typically, eight columns, fifteen or sixteen metres high, are used. Lighting levels for pitches that are not intended for televised matches should comply with the requirements of BS EN 12193 Table A.21 Class II with the option of switching down to Class I for training. The main requirements of are detailed below.

	Class II	Class I
$(E_m)$	200	75
$E_{min}/E_m$	0.6	0.5
Glare rating	$\leq 50$	$< 55$
Colour rendering	$> 60$	$> 20$

Televised league and cup competitions may specify the minimum level of lighting they require so it may be necessary to determine the competitions that teams using the pitch will compete in and design accordingly. If in doubt, lighting designers should consult with the RFL Professional Game Competition Manager.

When designing a floodlighting system is important that an assessment of the available power supply is made to determine if adequate capacity is on hand, as bringing a new supply to site can increase costs dramatically. The total installed power requirements for a full-size pitch is likely to be in the order of 35 to 40 kilowatts.

## 9. SYNTHETIC TURF SURROUNDS TO NATURAL TURF PITCHES

Increasingly synthetic turf surfacing is being installed around the perimeters of natural turf pitches located in stadia. Whilst visually improving the appearance of a stadium, the surface, depending on the type and how it is maintained, can



potentially be a hazard to Rugby League players falling or sliding onto it. This is particularly the case if the synthetic turf carpet is laid directly onto a hard base, the infill is allowed to compact, or the pile of the carpet is allowed to lie flat. Therefore, the RFL recommends the following:

- Ideally the inner run-off (for at least 2m) outside the touch lines and dead ball lines should be natural turf.
- If the inner run-off is a synthetic turf surface it should be a product that has been shown to comply with the *RFL Performance and Construction Standards for Synthetic Turf Pitches*. Where this is not possible, for whatever reason, the stadium operator should undertake a risk assessment to determine the implications of allowing Rugby League players to run or fall onto the surface and a copy of the risk assessment should be submitted to the RFL Operations Department ([Operations@rfl.co.uk](mailto:Operations@rfl.co.uk)).
- The synthetic turf surround should be maintained in accordance with the manufacturer's instructions, with particular attention being paid to ensuring the infill within the surface remains un-compacted and the pile of the synthetic turf remains standing upright.

## 10. PROJECT DESIGN TEAM

Having decided a synthetic turf pitch is right for your organisation you are committing to a large capital investment that should be supported by thorough design and planning if it is to be successfully built and operated. Experience shows the design, specification and project/construction management of the pitch is best undertaken by people with specialist expertise. A typical project team is likely to include:

- Design consultant
- Geo-technical engineer
- Project manager / quantity surveyor

Project team members should be appropriately qualified in their respective disciplines, be independent of suppliers and manufacturers and have adequate professional indemnity insurance cover. Each specialist should be carefully selected and should provide references from previous relevant engagements.

## 11. PROCUREMENT

There are various forms of specification that can be used when inviting contractors to bid for the construction of a synthetic turf pitch. Most synthetic turf pitches are, however, designed and procured using the design and build approach where a number of contractors are invited to submit their proposals for the design and construction of the facility. In this type of contract, the customer needs to prepare a design brief (or Employer's Requirements document) that adequately describes what is required. The use of a specialist architect or consultant to prepare such a document is strongly recommended.

The Football Foundation, in conjunction with Sport England and a number of sports governing bodies, runs a framework programme for the design and construction of synthetic turf pitches. The framework is available to any organisation planning to build a synthetic turf pitch and it is suggested consideration be given to using it.

## 12. CONTRACTORS

As a result of the expansion in the market for synthetic turf pitches there has been a corresponding increase in the number of contractors offering their services as constructors of such facilities. Not surprisingly, the large number of contractors operating includes companies of a wide range of size, structure and ability, from which a choice must be made for any project. Selecting the correct company is crucial if your pitch is to meet your expectations.

The Sports and Play Construction Association (SAPCA) is the UK trade association for the sports facility construction industry. SAPCA represents most specialist constructors, professionals, manufacturers and suppliers of sports surfaces and related products. Details of SAPCA and its members may be obtained from their website <http://www.sapca.org.uk>.

### 13. MAINTENANCE OF SYNTHETIC TURF SURFACES

When a new synthetic turf pitch is built it is very important that the maintenance recommendations of the surface manufacturer are provided as part of the handover documentation, and that these are fully complied with. As a general rule every 10 hours of use requires one hour's routine maintenance (brushing, infill redistribution, etc)

It is very important that a pitch owner appreciates that synthetic turf surfaces are **NOT MAINTENANCE FREE** or even low maintenance. Play and the frequency and intensity of usage will detrimentally affect the pitch's performance and quality. What is important, is minimising the rate of deterioration, through appropriate maintenance.

It is very important to spread the pitch use to various locations on the pitch to prevent uneven or accelerated wear in certain areas.

It is also important to remember that as the usage of the pitch increases the frequency of maintenance also needs to increase. You should adjust the maintenance and sinking fund schedules to reflect the actual usage patterns.

#### Routine maintenance

It is important that the pitch is inspected regularly to ensure that any debris is removed, that there are no hazards, and any unknown issues are identified and assessed/repared as appropriate.

Checks should ideally be made daily and at least weekly. When conducting a routine inspection emphasis should be on:

- checking for any displaced infill and redistributing or replacing infill to ensure the depths are at the recommended levels;
- identifying any damage to the playing surface
- Identifying any foreign debris on the pitch or surrounds that may injure players
- Checking carpet and line joints; open joints can quickly become a trip hazard and failure to repair small failures can quickly resulted in much larger and more complex/expensive repairs being needed.



#### Brushing

The pile of the synthetic turf will flatten through use; the rate at which this occurs will depend on the levels of use and types of footwear being worn by players. Lifting the pile is essential to retain optimum playing conditions.

Brushing has a number of purposes:

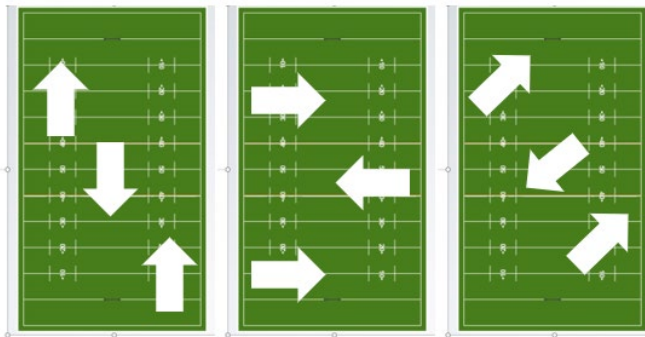
- It lifts the pile yarns to prevent pile flattening, which if allowed to occur will adversely affect performance, increases the risk of carpet burns and lead to premature wear of the synthetic turf carpet;
- It maintains and helps redistribute infill to ensure uniform distribution;
- It collects larger pieces of debris/rubbish



A number of brush designs are used with different degrees of effectiveness, including, static triangular and straight drag brushes and powered oscillating and rotating brushes. Some are integrated with cleaning machine; others are pulled behind small tractors.

Whilst there are many different types of brushes on the market, research has shown that oscillating brushes and rotating brushes are the most effective. Brushing is most effective when undertaken on a dry surface.

Always brush the pitch in different directions, use large turning circles at the end of each pass



### Infill levels

The correct depth of infill is vital to the safety of players and performance of the pitch; too low and turf pile will be damaged and wear more quickly; too high and players will find the surface unstable with inadequate grip which can result in injuries. The infill also helps keep the pile standing upright which gives the desired ball pace and reduces the risk of carpet burns occurring.

Drag mats or brushes are used to redistribute infill evenly. Drag mats have the advantage of not placing significant stress on the turf's pile, minimising the risk of the pile tufts being pulled out.

Periodically top dressing to compensate for infill compaction will be required. Replacement infill should meet the manufacturer's specifications and all chemical and environmental regulations.

The infill will compact through normal use. This will result in less protection and comfort being provided to players as they run and fall on the surface and may eventually result in a slow draining surface.

Periodically, typically twice yearly, a deep groom using metal tines to loosen and decompact the infill will be required. This is a skilled operation and is often outsourced to specialist maintenance contractors that have the specialist equipment required.

### Carpet joints

Open joints can create a tripping hazard and should be immediately repaired - discuss with your pitch builder in advance of any self-repair techniques to see if they are recommended or may invalidate your warranty.



### Debris removal

You should remove any foreign matter including twigs, leaves, rubbish, tape, gum etc. as soon possible. If debris is allowed to remain on the surface for any length of time, it will migrate into the infill and eventually impede drainage and can cause infill compaction. Any organic matter, such as faeces, soil/mud and food should be removed by hand where possible and then washed away with warm/hot soap and water.

### Stain removal

Most stains can be removed easily with hot water and soap (e.g. household detergent). Blood/human tissue should be removed using a weak disinfectant.

Chewing gum can be removed by making the gum brittle with proprietary aerosol freezing the material and carefully remove, ensuring the yarn fibres are not also broken at the same time. If the gum has spread across numerous fibres, peanut butter may soften and breakdown the gum so that it can be wiped off.

### Use of chemicals

The carpet manufacturer should be consulted to determine what chemicals, if any, can be used on the surface. Generally, any product that has an acid compound (i.e. pH less than 3) or contains Halogens (e.g. chlorine, bromine etc.) sulphur or nitrogen is likely to adversely affect the synthetic turf pile yarns and could shorten the life of the synthetic turf surface

### Frequency of maintenance

It is important to recognise that synthetic turf pitches are not maintenance free, and the more use they receive the more frequently they will need to be maintained. The following table show a typical maintenance plan.

Minimum frequency	Recommended	Operation	Typical time allowance
As required	Daily	Litter removal	0.5 hour
Weekly	2 / 3 times per week	Infill redistribution	1 hours per operation
Weekly	Every 10 hours use	Brushing / grooming to lift carpet pile	2 hours per operation
Weekly	Daily	Inspection of seams and joints	0.5 hour per inspection
Every six months	Quarterly	Infill de-compaction	1 day
Yearly – as required	As required	Moss treatment and weed treatment	

## 14. REPLACEMENT FUNDS

Project co-ordinators should be aware of, and plan for, the full life costs of the pitch and supporting infrastructure from an early stage. Information should be sought regarding the on-going costs of routine maintenance of the chosen playing surface, together with the life expectancy and cost of replacement at the end of the surface’s useful life. The manufacturer of the surface will be able to provide guidance on the likely life of the surface - provided it is properly maintained – and its replacement cost. Similar information should also be obtained in respect of the floodlighting and fencing.

A sinking fund should be established as soon as the new pitch is brought into use to ensure that sufficient funds are available to replace the surface when it reaches the end of its life. As the cost of replacement is in the future, it will be

necessary to save the amount of money required at that future date, not today's cost. This means that it is not possible to take the today's cost and divide it by the number of years until replacement is due. A more complex calculation that takes into account compound interest to the replacement date needs to be used.

Current estimates for the resurfacing of a full-size pitch (including removal of the existing surface and disposal of the surface and fill) suggests a budget of between £150,000 and £180,000 plus VAT is realistic. Based on 2% inflation a sum of £180,000 will equate to £220,000 in 10 years' time. To achieve this figure, and assuming a compound interest rate of 3%, a monthly contribution of approximately £1,650 (£19,800 per annum) is required every month from the first month of the pitch's life.

## 15. SOURCES OF USEFUL INFORMATION

### Synthetic turf surfacing options

Selecting the Right Artificial Surface for Hockey, Football, Rugby League, Rugby Union - [www.sportengland.org.uk](http://www.sportengland.org.uk)

FIFA Quality Programme for Football Turf - <http://football-technology.fifa.com>

World Rugby Regulation 22 – Standard relating to the use of Artificial Rugby (Union) Turf - [playerwelfare.worldrugby.org/rugbyturf](http://playerwelfare.worldrugby.org/rugbyturf)

Guide to the Construction and Maintenance of Synthetic Turf Sports Pitches - [www.sapca.org.uk](http://www.sapca.org.uk)

Performance infills for 3G pitches – frequently asked questions - [www.groundsmanship.co.uk/3Gpitches](http://www.groundsmanship.co.uk/3Gpitches)

### Pitch fencing

Guide to the Construction and Maintenance of Fencing Systems for Sports Facilities - [www.sapca.org.uk](http://www.sapca.org.uk)

### Floodlighting

[www.sportengland.org.uk](http://www.sportengland.org.uk)

[www.sapca.org.uk](http://www.sapca.org.uk)

Maintenance of artificial grass surfaces

[www.sapca.org.uk](http://www.sapca.org.uk)

Trade associations

European Synthetic Turf Council (ESTC) ([www.theesto.com](http://www.theesto.com))

Institute of Groundsmanship [www.iog.org](http://www.iog.org)

Sport and Play Construction Association [www.sapca.or.uk](http://www.sapca.or.uk)



## Part 2

### RFL Performance and Construction Standards for Synthetic Turf Pitches

## 1. INTRODUCTION

The development of synthetic turf surfaces that replicate the playing qualities of natural turf but sustain much higher levels of use has led to their increasing use for the game of Rugby League. To ensure these surfaces provide a satisfactory playing environment that will not increase the risk of injury to players and are of adequate durability to perform adequately for a period of time that makes the economic investment viable, the Rugby Football League Limited has developed performance and construction standards for synthetic turf Rugby League pitches. The Standard was first published in 2012. This edition reflects improvements made in a number of the test methods used to assess the performance and characteristics of synthetic turf surfaces and the experiences gained by the Rugby Football League over the last eight years as synthetic turf surfaces have been used at the professional and amateur levels of the game.

As it is likely that many synthetic turf Rugby League pitches will also be used for Football or Rugby Union the Standard has been aligned with the requirements of FIFA <sup>(1)</sup> (as adopted by The FA) and World Rugby Regulation 22 <sup>(2)</sup> (as adopted by the RFU), wherever possible.

## 2. GENERAL

This Standard details the requirements for synthetic turf surfaces used for Rugby League (training and competition). It comprises two parts,

Part 1 comprises a series of laboratory tests that are designed to assess the ability of a synthetic turf surface to provide the required levels of player/surface and ball/surface interaction, together with tests that assess the durability and quality of materials used to form the surface. Ideally a pitch intended for Rugby League will be surfaced with a synthetic turf surface that complies with Part 1 of the Standard.

Part 2 details the performance requirements for an installed field. RFL competition and training regulations require all fields to be periodically tested to verify they are providing the appropriate levels of player protection and performance. A new synthetic turf field should be tested following its construction, ideally before it is brought into use, and then periodically through the life of the playing surface to ensure it is retaining acceptable playing characteristics.

## 3. IMPLEMENTATION

The Standard becomes effective from 1<sup>st</sup> March 2020 and any synthetic turf surface submitted for product approval testing from that date onwards shall be tested in accordance with this edition of the RFL Standard.

Any new fields built in 2020 may be surfaced with products that have been tested to the 2017 or 2020 editions of this Standard. Any fields constructed after 31<sup>st</sup> December 2020 should be surfaced with a synthetic turf that has been tested and type approved in accordance with this edition of the Standard.

Existing fields requiring certification for the first time or fields requiring re-certification shall be tested in accordance with the edition of the Standard that was approved at the time the field was built.

## 4. NORMATIVE REFERENCES

This Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Standard only when incorporated into it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

## 5. TEST LABORATORIES

Laboratory and pitch tests shall only be undertaken by laboratories operating a quality system accredited to ISO 17025 for the principal sports performance tests. A list of suitable laboratories may be obtained from the RFL. The laboratory appointed to undertake a pitch test shall not have been involved in the design, specification or procurement of the pitch.

## 6. DEFINITIONS

A synthetic turf surface comprises the synthetic turf carpet and infill plus shockpad and any supporting layers that are designed to influence the sports performance or biomechanical response of the surface. Tests shall be made on all elements of the construction that influence the sports performance or biomechanical response of the surface.

The designation EN used to reference test procedures in this Standard, refers to documents published by the European Standards Committee (CEN). British editions of these Standards are published by the British Standards Institution ([www.bsigroup.com](http://www.bsigroup.com)).

The designation ISO used to reference test procedures in this Standard, refers to documents published by the International Standards Organisation (ISO). British editions of these Standards are published by the British Standards Institution ([www.bsigroup.com](http://www.bsigroup.com)).

The designation FIFA TM used to reference test procedures in this Standard refers to a test method detailed in the FIFA Quality Programme for Football Turf - Handbook of Test Methods.

## 7. LABORATORY TEST SPECIMENS

Test specimens shall be prepared strictly in accordance with the manufacturer's instructions and BSEN 12229. If required, this may include additional consolidation of the infill by means of a conditioning roller or other means (up to a maximum of 250 passes by the roller). The same conditioning procedure shall be used on all test specimens being prepared for player/ surface and ball/surfaces tests.

## 8. LABORATORY TEST BASES

Unless a synthetic turf surface is laid on a base that is designed to contribute to the dynamic performance of the surface, laboratory tests shall be carried out on test specimens laid on a rigid flat floor.

If a synthetic turf surface is laid on a base that is designed to contribute to the dynamic performance of the surface the measurements of shock absorption, vertical deformation, energy restitution, HIC and ball rebound shall be made on a test specimen comprising the synthetic turf surface and the base, laid to the depth specified by the manufacturer or supplier.

## 9. LABORATORY TEST CONDITIONS

Laboratory tests shall be made at an ambient laboratory temperature of  $23 \pm 2^\circ \text{C}$ .

Test specimens shall be conditioned for a minimum of 3 hours at the laboratory temperature prior to test.

## 10. LABORATORY TEST SPECIMEN CONDITIONING

Laboratory tests shall be made on dry and wet test specimens, as specified in the appropriate test method.

### 10.1 Wet test specimens

Wet specimens shall be prepared by evenly applying to the test piece a volume of water that thoroughly soaks the specimen (if in doubt this should be equal to the volume of the test specimen). Care shall be taken when applying the water to ensure it does not disturb the infill within the carpet; the use of a fine hose spray or fine rose on a watering can is recommended. Following wetting the test specimen shall be allowed to drain for 15 minutes and the tests carried out immediately thereafter.

### 10.2 Resistance to simulated use

Test specimens shall be conditioned to simulate use using a Lisport XL in accordance with FIFA Test Method 15 (as specified in the *FIFA Quality Programme for Football Turf Handbook of Test Methods* October 2015 Edition incorporating

all subsequent amendments. The number of conditioning cycles shall be **6,010 cycles** and dispersed infill shall be reapplied to the test specimen in accordance with the test method.

#### 10.3 Water ageing

Test specimens shall be conditioned in accordance with EN 13744.

#### 10.4 Air ageing

Test specimens shall be conditioned in accordance with EN 13817.

#### 10.5 Resistance to artificial weathering

Test specimens shall be conditioned in accordance with EN 14836 for and exposure of  $9600 \pm 125 \text{ kJ/m}^2/340\text{nm}$ .

Tests shall be undertaken on each colour of synthetic turf being offered, including field of play, perimeter run-offs and line markings. Results obtained previously on a family of yarns may be carried forward providing the tests were undertaken by an ISO 17025 accredited test institute and the following conditions are met:

- a. The Differential Scanning Calorimetry trace of the yarn, when tested in accordance with FIFA TM 22 shows the same profile. The main points of reference when comparing yarns shall be obtained from the second heating of the polymer sample and comprise the peak temperature, peak area and overall curve shape, all of which should be similar (peak temperature  $\pm 3^\circ$ ).
- b. The thickness of the yarn shall be at least 90% of the previously tested yarn, when tested in accordance with FIFA TM 25.
- c. The shape of the yarn is the same.

### 11. HEAD INJURY CRITERION (H.I.C.) TESTS

H.I.C tests shall be made in accordance with BS EN 17435 (currently in draft format).

Tests undertaken in the laboratory to assess the performance of a synthetic turf surface shall be undertaken in accordance with Method A.

Tests undertaken to assess the performance of a synthetic turf field shall be undertaken in accordance with Method B.

### 12. BALL REBOUND

Ball rebound shall be measured in accordance with EN 12335. As the shape of a Rugby League ball prevents reproducible results, tests shall be made with a football.

### 13. SHOCK ABSORPTION AND VERTICAL DEFORMATION

Shock absorption and vertical deformation shall be measured in accordance CEN TS 16717.

### 14. ENVIRONMENTAL AND TOXICOLOGY PROPERTIES

#### 14.1 Synthetic turf carpet

The synthetic turf carpet shall comply with the requirements of the Registration, Evaluation, Authorisation & Restriction of Chemicals (REACH) regulations Annex XV11 Entry 50.

#### 14.2 Performance infill

Performance infill placed within the synthetic turf carpet should comply with the draft REACH restriction requirements of the European Chemical Agency (20mg/kg of the REACH 8-PAHs)

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Notes

- 1 Infills listed in the SAPCA *Quality Control Protocol for Sports Performance Infills* published by the UK Sports and Play Construction Association (SAPCA) are considered to satisfy the draft REACH requirements.
- 2 Reference to the draft REACH restriction requirements shall always refer to the latest edition applicable at the time a product is tested.

15. REQUIREMENTS

15.1 Categories of performance

Two categories of performance are specified. The category designated *Stadium* is intended to replicate the playing qualities of top level natural turf playing surfaces used for Rugby League and is intended for pitches used for professional matches and training.

The category designated *Community* has wider ranges of acceptability that are intended to replicate the playing qualities found on good quality community natural turf fields.

15.2 Product tests

For a synthetic turf product to comply with the *RFL Quality Recommendations for Synthetic Turf Surfaces* it shall satisfy the requirements of Table 1 and product identification tests, as detailed in Table 3 shall be undertaken. The results of the product identification tests shall be within the tolerances specified in Table 3 when compared to the manufacturer’s declared values for each property. The manufacturer’s declared values shall be reported in the laboratory test report.

15.3 Pitch tests

For a pitch to comply with the *RFL Performance and Construction Requirements for Synthetic Turf Pitches* it shall satisfy the requirements of Table 2. All the tests detailed shall be undertaken in positions 1 – 9 as shown on Figure 1. HIC and Rotational Resistance tests shall also be measured in positions A to J. Tests may also be made in additional positions if the performance is of concern.

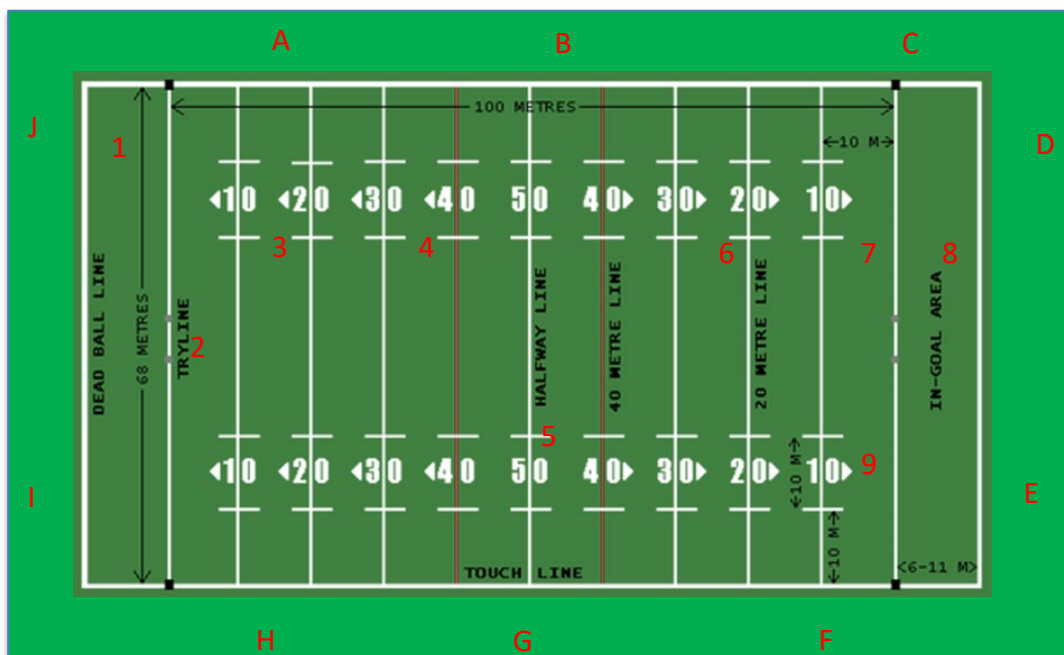


Figure 3- test positions

Infill depths and free pile heights shall be measured on a 10m grid across the pitch and end zones.

All tests shall be made under the prevailing site conditions. The surface and ambient temperatures and the ambient relative humidity at the time of test shall be recorded and reported.

The results of all pitch tests shall be detailed on an RFL Synthetic Turf Pitch Test Report (see Appendix A), a copy of which shall be submitted within three weeks of a pitch test to the RFL Operations Department at [Operations@rfl.co.uk](mailto:Operations@rfl.co.uk)

*Note: in order to ensure the components of the synthetic turf surface installed on a pitch are the same as those previously tested in the laboratory the RFL recommends the initial pitch test also include the identification tests detailed in Table 3. The maximum variation between the installed materials and the manufacturer’s declared values shall be as specified in Table 3.*

## 16. LOGOS

If a pitch is to incorporate permanent logos within the playing area or end zones the logos shall be manufactured from the same quality of synthetic turf carpet and infill as the main playing area.

**Table 1 – Laboratory test requirements**

Property	Test Method	Test Condition	Requirement	
			Stadium	Community
<b>Complete synthetic turf surfacing system</b>				
Head Injury Criterion	EN 17435	Dry	≥ 1.3m	
		Wet		
		After simulated use		
Shock Absorption	EN TS 16717	Dry	50% - 65%.	50% - 70%
		Wet		
		After simulated use	≥ 50%	
		-5°C	50% - 65%.	50% - 70%
Vertical Deformation	EN TS 16717	Dry	3.0 – 8.5mm	≤11.0mm
		Wet		
		After simulated use		
Rotational Resistance – traction	FIFA TM 06 or 06a	Dry	35 – 50Nm	25 – 55Nm
		Wet		
		After simulated use		
Skin Friction	FIFA TM 08	Dry	≤ 0.75μ	
		After simulated use		
Skin Abrasion	FIFA TM 08	Dry	≤ 30%	
		After simulated use		
Ball Rebound	EN 12335	Dry	0.70 – 1.10m	0.60 – 1.10m
		Wet		
		After simulated use		
Water permeability	EN 126161	After simulated use	≥ 300mm/h	
Infill splash	FIFA TM 16	Unaged – Dry	≤ 10%	-

Synthetic turf carpet						
Property	Test Method	Test Condition	Requirement			
Joint strength	EN 12228 Method A	Unaged	≥ 2500N/100mm			
		After water ageing				
	EN 12228 Method B	Unaged	50N/100mm			
		After water ageing				
Resistance to tuft withdrawal	ISO 4919	Unaged	≥ 40 N			
Tensile strength of carpet	ISO 13934-1	Unaged	Mean: ≥ 25 N Minimum in any direction: 15N			
		After water ageing				
Pile yarn(s)						
Tensile strength	EN 13864	Unaged & after artificial weathering	Mono-filament yarns	≥ 8 N per strand		
			Fibrillated yarns	≥ 30N		
Change in tensile strength after artificial weathering		After artificial weathering	≤ 25%			
Colour change	EN ISO 20105-A02	After artificial weathering	> Grey scale 3			
Polymeric infills						
Colour change after artificial weathering	EN ISO 20105-A02	After artificial weathering	≥ Grey scale 3			
Composition after artificial weathering	Visual assessment	After artificial weathering	No change			
Shockpads and elastic layers						
Tensile strength	Shockpads and elastic layers less than 25mm thick	EN 12230	Unaged	≥ 0.15 MPa		
			% loss in strength compared to unaged result	≤ 25%		
	Shockpads and elastic layers 25mm or thicker	FIH Hockey Turf & Field Standards Part 3 Clause 8.17.1.2	Unaged	≥ 0.10 MPA		
			After air ageing	% loss in strength compared to unaged result	≤ 25%	
	Shockpad with channels and slots	FIH Hockey Turf & Field Standards Part 3 Clause 8.17.1.3	Unaged	≥ 0.10 MPA		
			After air ageing	% loss in strength compared to unaged result	≤ 25%	



Resistance to Dynamic Fatigue	<i>ESTO Performance Guide for Shockpads – Annex D</i>	Change in shock absorption	± 5% FR
		Loss of thickness	≤ 15% of initial thickness
		Physical damage	There shall be no tearing, splitting or delamination of the shockpad
Resistance to bowing and curling	<i>ESTO Performance Guide for Shockpads – Annex C</i>	Maximum degree of bowing or curling	5 mm

**Table 2 – Field test requirements**

Property	Test Method	Stadium category fields	Community category fields
Head Injury Criterion	EN 17435	≥ 1.3m	≥ 1.3m
Shock Absorption	EN TS 16717	50% - 65%	50% - 70%
Vertical Deformation	EN TS 16717	3.0mm – 8.5mm	≤11.0mm
Rotational Resistance – traction	FIFA 06 or 06a	35Nm – 50Nm	25Nm – 55Nm
Ball Rebound	EN 12335	0.70m – 1.10m	0.60m – 1.10m
Vertical free pile height above infill	FIFA TM 18	Within ± 5mm of manufacturer’s declared value	Within ± 5mm manufacturer’s declared value
Infill depth	EN 1969	Within ± 5mm of manufacturer’s declared value	Within ± 5mm of manufacturer’s declared value

Notes:

- 1 Vertical free pile height is the height of the pile standing upright above the infill. It is important because pile lying flat increases the potential for carpet or skin burns. The manufacturer’s declared value is normally in the range 15 – 20mm. If they specify 20mm this means all measurements need to be in the range 15 - 25mm.
- 2 Skin friction is an important property for players. Pitches should be maintained in accordance with the surface manufacturer’s instructions to ensure satisfactory performance of this property. If concerns or complaints about excessive friction or skin abrasion are received the pitch shall be tested under dry conditions in accordance with the specified test methods and the field shall comply with the requirements detailed in Table 1 for these properties.

Table 3 – Product identification tests

Component	Property	Test Method	Maximum variation field sample / Laboratory sample / Manufacturer’s declaration
Synthetic turf	Mass per unit area	ISO 8543	≤ 10%
	Tufts per unit area	ISO 1763	≤ 10%
	Tuft withdrawal force	ISO 4919	≥ 90% of lab sample result
	Pile length	ISO 2549	≤ 5%
	Pile weight	ISO 8543	≤ 10%
	Pile dtex	FIFA TM 23	≤ 10%
	Pile yarn characterisation	ISO 11357-3 & FIFA TM 22	Same polymer
Shockpad or e-layer	Shock Absorption	EN TS 16717	± 5% (FR) of lab sample
	Thickness	EN 1969	≥ 90% of lab sample result
Performance infill	Particle grading	EN 933 - Part 1 & FIFA TM 20	60% within d and D
	Particle shape	EN 14955	Similar shape
	Bulk density	ISO 1097-3	≤ 15%
	Thermo-gravimetric analysis	% organic / % inorganic	±5%
Stabilising infill	Particle grading	EN 933 - Part 1 & FIFA TM 20	60% within d and D
	Particle shape	EN 14955	Similar shape
	Bulk density	ISO 1097-3	≤ 15%

## 17. PITCH CONSTRUCTION REQUIREMENTS AND TOLERANCES

Pitches should be designed and built to the following requirements.

### Construction standards

Pitches shall be constructed in accordance with the Code of Practice for the Construction and Maintenance of Synthetic Turf Pitches, published by SAPCA.

### Surface regularity

The field shall be constructed and maintained so that when it is assessed with a 3m straightedge and graduated wedge, in accordance with EN 13036-7, the maximum undulation is 10mm.

Noting that infill dispersion can result in localised undulations occurring, up to 15 deviations (for full size pitches pro-rata for smaller areas) are considered permissible providing no deviation is greater than 15mm and does not form a potential hazard to players or detract from the playing experience.

Any undulations greater than 1m in length shall be considered multiple deviations of 1m intervals.

### Gradients

The gradient of a pitch shall be no more than 1.0% in any direction.

## 18. REFERENCES

- 1 *FIFA Quality Programme for Football Turf*
- 2 *World Rugby Rugby Turf Performance Specification*

## Appendix A - RFL Synthetic Turf Pitch Test Report

**Synthetic Turf Pitch Test Report**

Type of test	Initial	o	Retest	o
Club (if applicable)				
Pitch location				
Site contact				
Tel.				
Email				
Synthetic turf surface name				
Surface manufacturer				
Installation contractor				
Date of pitch construction				
Test laboratory				
Test laboratory project reference				
Laboratory email address				
Date of test				
Surface condition (dry or wet)				
Surface temperature (°C)	Min.		Max.	
Humidity (%RH)	Min.		Max.	
Stadium category pitch	Pitch passed	o	Pitch failed	o
Community category pitch		o		o
Criteria that failed (if any)				
Signed by Laboratory Director				
Date				

**Section 3: Detailed results**

Property	Specified range		Test Position																			Pass / fail	
	Stadium category	Community category	A	B	C	D	E	F	G	H	I	J	1	2	3	4	5	6	7	8	9		
Head Injury Criterion	≥ 1.3m	≥ 1.3m																					
Shock Absorption	50% - 65%.	50% - 70%.																					
Vertical Deformation	3.0 – 8.5mm	≤11.0mm																					
Rotational Resistance – studded sole	35 – 50Nm	25 – 55Nm																					
Ball Rebound	0.70 – 1.10m	0.60 – 1.10m																					

**Infill depths (mm) measured on pitch**

Position	Manufacturer's declaration						Permitted range						End zone
	End zone	0	10	20	30	40	50	60	70	80	90	100	
0m													
Variation*													
10m													
Variation													
20m													
Variation													
30m													
Variation													
40m													
Variation													
50m													
Variation													
60m													
Variation													
68m													
Variation													
	Field passes						Field fails						

\* variation from manufacturer's specification



Vertical Free Pile (mm) measured on pitch

Position	Manufacturer's declaration						Permitted range						End zone
	End zone	0	10	20	30	40	50	60	70	80	90	100	
0m													
Variation*													
10m													
Variation													
20m													
Variation													
30m													
Variation													
40m													
Variation													
50m													
Variation													
60m													
Variation													
68m													
Variation													
	Field passes						Field fails						

\* variation from manufacturer's specification

Product identification (initial pitch tests only – recommended but optional)

Component	Property	Site sample	Manufacturer's declaration	Variation	Tolerance	Pass / Fail
Synthetic turf	Mass per unit area				$\leq \pm 10\%$	
	Tufts per unit area				$\leq \pm 10\%$	
	Tuft withdrawal				$\geq 90\%$ of reference	
	Pile length above backing				$\leq \pm 5\%$	
	Total Pile weight				$\leq \pm 10\%$	
	Pile dtex				$\leq \pm 10\%$	
	Yarn characterisation				Same polymer	
Performance infill	Particle size				$\leq \pm 20\%$	
	Particle shape				Similar shape	
	Bulk density				$\leq \pm 15\%$	
Stabilising infill	Particle size				$\leq \pm 20\%$	
	Particle shape				Similar shape	
	Bulk density				$\leq \pm 15\%$	

Plan showing surface undulations exceeding 10mm	Plan showing principal gradients
	

## Appendix B - Synthetic turf pitch pre-match maintenance checks

Experience has shown that poorly maintained synthetic turf fields can be detrimental to player welfare and not perform as the game desires. It is therefore very important that a synthetic turf field is maintained in accordance with the manufacturer's instructions and a log of the maintenance undertaken.

Whilst the RFL expects all synthetic turf pitches used for Rugby League at any level of play to be adequately maintained it is not practical for them to monitor this is happening on a regular basis. At the professional level of the game such monitoring is possible and ground staff are required to test a field after maintenance and prior to a game to demonstrate the maintenance undertaken has been adequate and the infill depths and vertical free pile height are in accordance with the surface manufacturer's specifications.

The following pages allow a record of the checks to be reported and copies should be retained by the Club. Copies should also be submitted to the RFL or their Match Officials as requested.

Review of inspection data and appropriate actions to ensure the playing surface complies with the turf manufacturer's recommendations and RFL competition regulations always remains the sole responsibility of the Club.

Synthetic Turf Pitch Pre-Match Maintenance Checks							
Club Name / pitch location							
Date and time of game							
Date and time of pitch inspection							
Measurements made by				Name			
				Position			
Measured infill depth (mm)							
Manufacturer's declaration							
Tolerance			± 5mm of manufacturer's specification				
Grid position							
	Run-off	Touch line	20	40	60	Touch line	Run-off
Run-off							
In-goal							
0							
20							
40							
60							
80							
100							
In-goal							
Run-off							

*Note - ideally vertical free pile heights will be within +/- 2mm of the manufacturer's specification. If values are found outside this range additional maintenance is advised.*

Measured vertical free pile height (mm)

Manufacturer's declaration		
Tolerance	± 5mm of manufacturer's specification	

Grid position							
	Run-off	Touch line	20	40	60	Touch line	Run-off
Run-off							
In-goal							
0							
20							
40							
60							
80							
100							
In-goal							
Run-off							

*Note: ideally vertical free pile heights will be within +/- 2mm of the manufacturer's specification. If values are found outside this range additional maintenance is advised.*

**Statement of compliance**

The data recorded above is a true record of the condition of the synthetic turf pitch at the time of test.

Signed	Grounds staff	Name	
		Signature	

Copies of this completed form shall be retained by the Club. Copies shall be submitted to the RFL or their Match Officials as requested. Review of inspection data and appropriate actions to ensure the playing surface complies with the turf manufacturer's recommendations and RFL competition regulations remains at all times the sole responsibility of the Club.