WHERE WE ALL BELONG

Synthetic turf surfaces for Gaelic games

Part 1 -
Guide to the design, construction and maintenance of synthetic turf fields and training areas

2022 Edition

Contents

Foreword

A chairde,

Táim breá sásta an deis seo a bheith agam chun fáilte a chur romhaibh.

I am delighted to welcome the publication of this new comprehensive guide on the construction and maintenance of synthetic turf pitches for Gaelic games.

One of the jewels in the crown of the GAA is the existence of so many fantastic facilities at club level.

These playing facilities are a credit to the volunteers who go to such extraordinary lengths to raise funds to bring them into existence for the benefit of our players and members.

Our clubs take enormous pride in their facilities and increasingly we are seeing the use of synthetic surfaces that allow clubs to have a useable field to accommodate our games whatever the weather. These synthetic facilities are a significant expense, and it is only right that they are to the appropriate standard.

It makes the availability of this advice and guidance invaluable, and I want to thank the input from Croke Park's Pitch Manager Stuart Wilson, as well as the input of Dr Ian McClements who is an expert in this area, and also acknowledge the assistance of Kieran McGann on behalf of our National Health and Safety Committee and National Pitch Maintenance Workgroup.

I look forward to seeing this advice and guidance reflected in the continued drive and ambition of our clubs and counties and provinces to have the best playing facilities possible.

Rath Dé ar an obair.

Labhrás MacCarthaigh
Uachtarán CLG

Disclaimers

There are many ways of constructing a synthetic turf facility. These guidelines do not constitute any form of approval from the GAA on a 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.

Whilst every effort has been made to ensure the accuracy of the information contained in this publication, any party who makes use of any part of this document in the development of a synthetic turf facility should indemnify the Gaelic Athletic Association, its servants, consultants or agents against all claims, proceedings, actions, damages, costs, expenses and any other liabilities for loss or damage to any property, or injury or death to any person that may be made against or incurred by the Gaelic Athletic Association arising out of or in connection with such use.

1 Introduction

The development of long pile synthetic turf sports surfaces that replicate the playing qualities of natural turf, but sustain much higher levels of use, has led to their increasing use for Gaelic games. To ensure these surfaces provide a satisfactory playing environment that will not increase the risk of injury to players and are of adequate durability, the GAA originally published guidance on the construction and performance of synthetic turf fields in 2009. Since then the use of synthetic turf surfaces for a variety of different sports, has grown significantly, with over 4000 fields now being installed throughout Europe each year. This has resulted in significant improvements in the quality and performance of synthetic turf sports surfaces and the technology used to assess them. Recognising these developments, the GAA has updated its guidance and recommendations for synthetic turf fields used for Gaelic games.
The principal changes are:

- Incorporation of improved testing protocols, developed by organisations such as the European Standards Committee (CEN), FIFA, World Rugby and the European Synthetic Turf Council. These specifically relate to:
  - Head Injury Criteria
  - Effects of simulated wear
  - Measurements of the dynamic properties of the playing surface
- Incorporation of guidance and best practice, relating to:
  - Quality of materials
  - Environmental considerations

The new guide comprises three parts. Each is published as a separate document for ease of reference.
The three parts are:

- Part 1 - Guide to the design, construction and maintenance of synthetic turf fields and training areas.
- Part 2 - Performance and quality standards for synthetic turf products
- Part 3 - Performance and construction standards for synthetic turf fields and training areas

Part 1 provides general guidance and information on the many aspects that any organisation considering a synthetic turf facility for Gaelic games should consider.
It includes information on:

- Synthetic turf sports surfaces
- Field layouts and design considerations
- Sports lighting
- Procurement of synthetic turf facilities
- Synthetic turf maintenance

Part 2 describes how a synthetic turf surface should be tested to verify that it is able to provide the necessary playing, safety and durability characteristics required to enable Gaelic games to be played satisfactorily for typically eight to ten years, subject to acceptable use and maintenance. This document is primarily intended for the manufacturers of synthetic turf surfaces and the test institutes that assess them.

It is recommended that any organisation considering a synthetic turf surface that will be used for Gaelic games, ensures it has been independently tested and shown to fully comply with the recommendations described in Part 2.

Part 3 describes the performance and construction requirements the GAA recommend for synthetic turf fields and training areas intended for Gaelic games. This document is primarily intended for those designing and building synthetic turf fields and training areas and the test institutes that assess them.

The GAA require all full-size fields that are used for Gaelic games to be listed on their Register of Synthetic Turf Fields, and also recommend all training areas are periodically tested to verify acceptable performance.
For a field to be listed on the GAA Register it needs to be periodically tested and shown to satisfy the requirements of Part 3.

2 GAA Register of synthetic turf fields used for Gaelic games

Experience has shown that the quality of even the best quality synthetic turf fields can deteriorate and result in a poorly performing or even unsafe playing environment that exposes athletes to unacceptable risks. To ensure that such fields are not used for GAA competitions or training the GAA has introduced a Register of Synthetic Turf Fields and only fields that appear on the Register should be used for any form of GAA sanctioned event.

For a field to appear on the Register it must be tested and shown to satisfy the requirements of the GAA Performance and construction standards for synthetic turf fields and training areas, applicable at the time the field was built.
An initial field test should be undertaken following construction of a new field, ideally before it is brought into use. Thereafter the field should be retested every three years throughout its life to verify it is still providing acceptable levels of performance and adequate protection to players.

Following the testing of a field a copy of the test report prepared by the test institute should be sent to:
GAA Insurance Department
Croke Park
Jones Road
Dublin 3

Email: syntheticregister@gaa.ie

Should a field fail a test, the GAA should be notified immediately; failure to do so may compromise the public liability insurance cover provided by the GAA for the field. Depending on the severity of the failure the GAA will either:

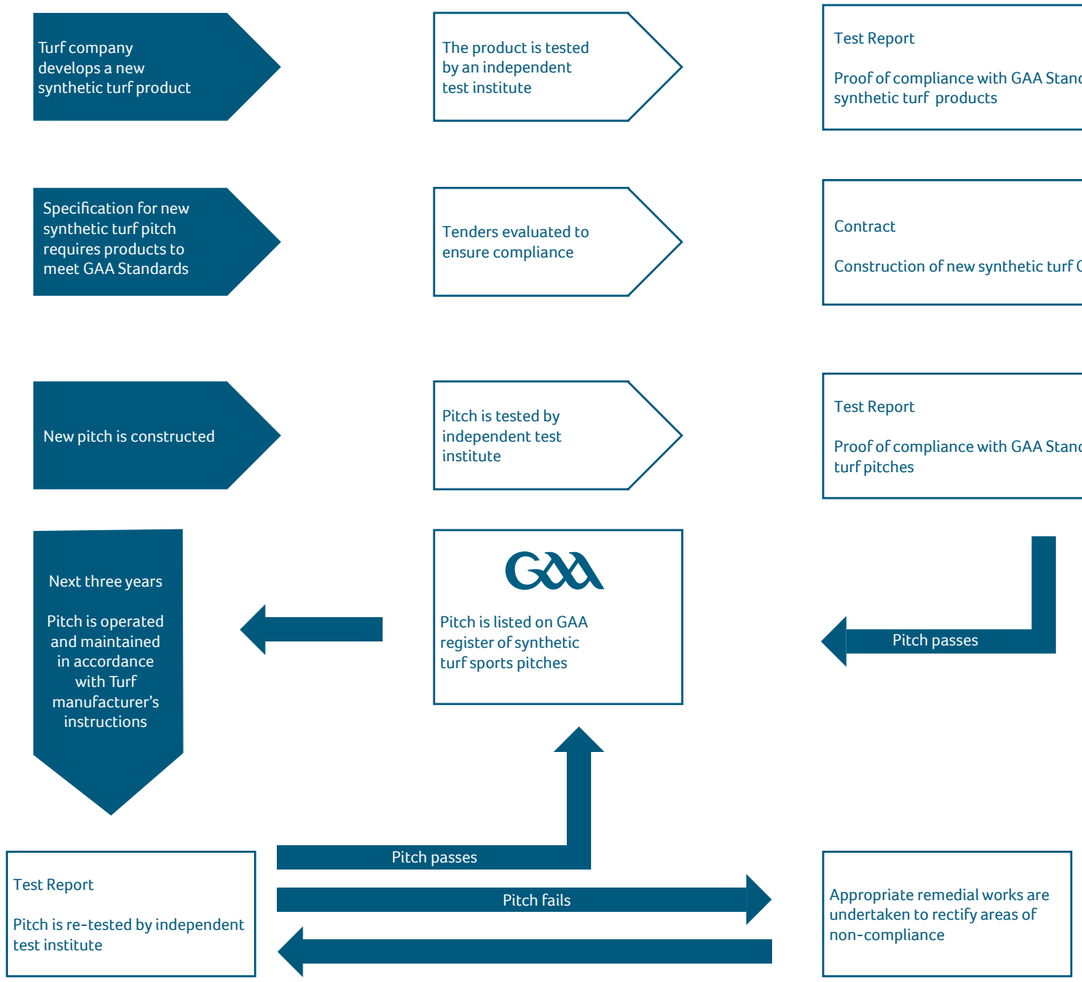
- agree to a programme of rectification works being undertaken, in an agreed timescale (normally no more than three months), allowing the field to remain in use, and once proof the defects have been rectified, registering the field for a further three years.
- or in the unusual situation where a failure is considered an immediate serious risk to players' wellbeing, notify the field owner that the field should be withdrawn from use until the defects are rectified.

The testing of synthetic turf fields, to demonstrate compliance with the GAA Standard, should be undertaken by an independent test institute authorised to test synthetic turf products by the One Turf Initiative[1].
At the time of preparing this Standard the following test institutes are known to meet this criterion and also undertake field tests in Ireland:

- Labosport Limited: www.labosport.co.uk
- Sports Labs Limited: www.sportslabs.co.uk
- Surface Performance Limited: www.surfaceperformance.com

The flowchart on the next page shows the GAA recommended procurement route for a synthetic turf intended for Gaelic games and its inclusion on the GAA register.

[1] An initiative lead by World Rugby to set common guidelines for long pile synthetic community fields, that the GAA support



3 Use of synthetic turf surfacing within natural turf surfaces

This guide has been produced to specifically describe the use of fully synthetic fields. It is acknowledged, however, that synthetic turf surfaces can also be used in conjunction with natural turf playing surfaces.

Synthetic turf run-offs

Generally, it is desirable that the inner run-off should be the same playing surface as the field of play. In some circumstances this may not be practical, and a full synthetic turf run-off may be installed. In such instances it is recommended that this complies with the GAA standards for synthetic turf.

Synthetic turf goal mouths

After careful consideration of the pros and cons of incorporating synthetic turf areas into the high wear areas (such as goal mouths) of natural turf surfaces, the GAA have concluded that the differences in performance and the possibility of a poorly maintained or installed synthetic turf areas creating safety risks to players is such that synthetic turf areas within the body of a natural turf surface are not recommended.

4 What is a synthetic turf field?

A synthetic turf field can be split into two primary elements, the synthetic turf surface (which normally comprises a synthetic turf carpet, that is partly filled with infill, and a shockpad) and the foundations or base on which the synthetic turf surface is laid.

The overall construction is a carefully selected combination of materials that are designed to work together to provide the playing, safety and load-bearing properties required to provide a high quality long lasting facility. They typically comprise:

- ***the formation*** - the prepared natural ground on which the field is built, after profiling and compacting this is normally covered by a geotextile membrane to separate the field construction from the native ground.
- ***a sub-surface drainage system*** – designed to take rainwater from the playing surface and prevent it building up and weakening the base.
- ***the base*** – a layer of graded aggregates, designed to provide a load bearing and structurally stable platform on which the playing surface is laid.
- ***asphalt (macadam) base*** – an optional upper layer to the base that provides enhanced structural stability, ensuring longer term surface flatness and ease of future resurfacing
- ***shockpad*** – a cushioning layer laid beneath the synthetic turf carpet, that, in conjunction with the infill materials, is designed to ensure adequate protection is provided against concussion and other high impact energy injuries.
- ***synthetic turf surface*** - made up of the synthetic turf carpet and infill materials, which are carefully selected to provide the appropriate levels of performance and durability.

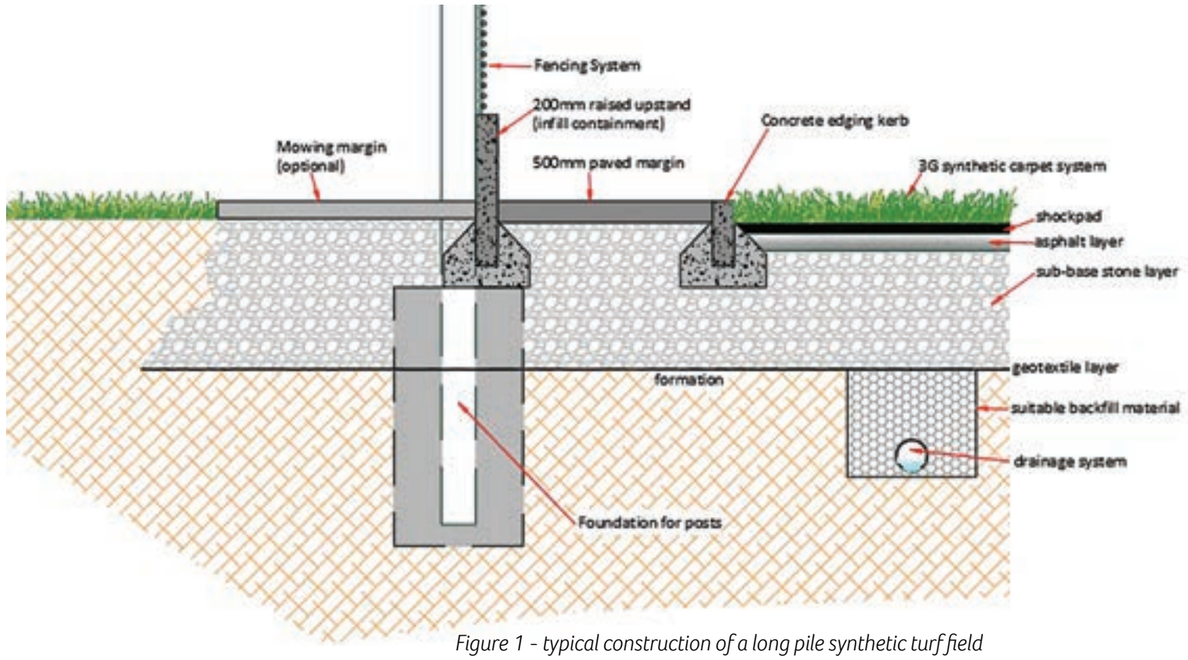


Figure 1 - typical construction of a long pile synthetic turf field

5 Synthetic turf components

5.1 The carpet

The carpet is one of the most important parts of the synthetic turf surface, so it is very important to choose one suited to the specific needs of the facility.
The carpet:

- influences the playing characteristics, durability and visual appearance of the playing surface.
- normally manufactured from polyethylene yarn, which provide a durable and non-abrasive playing surface
- may include secondary yarns to provide infill stability

Most synthetic turf carpets for sport are now manufactured using mono-filament yarns. 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. Surfaces with higher tuft densities generally offer enhanced performance for Gaelic sports.

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 characteristics. Fibrillated yarns do 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.

Factors that will influence the performance of the carpet include:

- *Pile length* – this is normally expressed as the height of the pile above the backing of the carpet and is typically between 45mm and 60 mm, depending on the system's configuration.
- *Stitch rate* – normally expressed as the number of stitches per square metre. The stitch rate is a combination of the number of stitches per unit length (e.g. 20 per 100mm) and the spacing (gauge) of the rows of stitches (e.g. 5/8"). Experience suggests carpets with higher (denser) stitch rates are more suited to Gaelic games; particularly hurling.
- *Pile dtex* – the ratio of weight of the pile yarn to its length which is expressed in units of dtex (1 dtex = 1g per 10,000m). Thicker or wider yarns will have higher dtex values than thinner or narrower yarns.
- *Pile weight* – the combination of the number of stitches and the profile, length and width of the pile yarn from which the stitches are formed. Higher quality surfaces will normally have higher pile weights than cheaper alternatives, the actual values depending on the pile length.

5.2 Infill materials

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

- support the pile of the carpet.
- help it remain vertical.
- contribute to the playing and cushioning qualities of the surface and
- provide weight to ensure the carpet is held in place.

The infill normally comprises sand as a ballast and either some form of rubber or organic granules. 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.

The most common infill is produced from recycled end of life (ELT) car and truck tyres (often referred to as SBR infill). This material provides good performance and has excellent durability.

In some countries, there have been concerns about the use of rubber infill and its possible effects on human health. These led the European Chemical Agency (an agency of the European Commission) to investigate if there are any scientific reasons for regulators to be concerned. Their report states that in the various research studies they evaluated, the concentrations of potentially harmful chemicals (PAHs) found, were well below the threshold limits set in the relevant EU regulations and therefore they consider the risk to human health of ELT infill to be acceptably low, with no reason to ban its use .

To ensure all infill materials are safe to use the European Commission have introduced a new Regulation specifically for infill materials. This Regulation states that granules or mulches shall not be used as infill material in synthetic turf pitches if they contain more than 20 mg/kg (0,002 % by weight) of the sum of all listed PAHs. This Regulation will be effective from August 2022. Granules or mulches that are in use on 9 August 2022 as infill material in synthetic turf pitches may remain in place and continue to be used there for the same purpose.

Between now and the implementation date the GAA recommends that all infill (irrespective of type) is compliant with the latest forthcoming EU restriction for infill and is only purchased from suppliers that have adequate quality control procedures to ensure that they can be certain of providing materials that fall below the proposed limit. To assist in identifying compliant materials the UK Sport and Play Construction Association (www.sapca.org.uk) has developed a protocol with an approved list of infill materials. It is therefore recommended that only infills appearing on the SAPCA list are used in synthetic turf surfaces used for Gaelic games.

When considering the use of synthetic turf surfaces indoors the flammabilty of the infill should be considered.

5.2 Infill materials (continued)

Manufacturers are also increasingly 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 synthetic turf carpet's life. Some are also known to float in heavy rain, which can increase maintenance and replacement costs. Manufacturers are also developing 4G turf systems that have no infill or only a sand dressing. The suitability of these for Gaelic sports has yet to be established, but it is noted that other sports report concerns about an increased potential for players suffering carpet burns and lower levels of foot grip.

The health concerns relating to infill materials has also resulted in revised personal hygiene guidance being issued. This recommends that players using synthetic turf facilities should always take basic hygiene measures. For example, after play, they should always wash their hands before eating and quickly clean any cuts or scrapes. Players who accidentally get infill in their mouths should not swallow it.

5.3 Shockpads & elastic layers

To ensure a synthetic turf field can provide the levels of protection considered necessary for Gaelic games, it will include a shockpad or elastic layer. These are laid beneath the synthetic turf carpet and act like a thick carpet underlay, isolating the rigid sub-base and providing enhanced cushioning during player impacts.

There are an increasing range of shockpads and elastic layers being offered on the Irish market. Shockpads are normally produced either from flexible foams that are laid as rolls or tiles or from rubber granules and polyurethane binders that are mixed on site and laid with a small paving machine to produce a continuous sheet covering the base of the field. Both forms of shockpad are considered acceptable. The key considerations are the performance of the shockpad/elastic layer and its ability to retain this for, ideally, the life of two synthetic turf carpets (i.e. 16 – 20 years).

To help ensure only good quality shockpads/elastic layers are laid beneath the synthetic turf, the performance and durability criteria established by the European Synthetic Turf Council (ESTC) have been incorporated into the GAA performance and quality guidelines.

Figure 7 - Shockpad laid as tiles on an asphalt base

6 So is a synthetic turf field right for your facility?

When considering the installation of a synthetic turf field the first step should be to undertake a feasibility study to identify what you really want to achieve from your facility; this decision process is a fundamental element in the success of the future field. 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 of your sport development plan? Will training be the main use or will you be looking to stage matches?
- What are the demands for synthetic turf facilities in your area?
- What will your hiring fee structure be across the various times the facility will be open?
- Can the local community afford the proposed hiring fees, and will they provide sufficient funds for your sinking fund?
- How will your development affect the key policies of the GAA development strategies?
- Are you able to commit to the maintenance requirements of the surface? The maintenance of the surface is of vital importance if the facility is to retain acceptable performance and be long-lasting. It is therefore essential that this vital aspect of management is not overlooked.

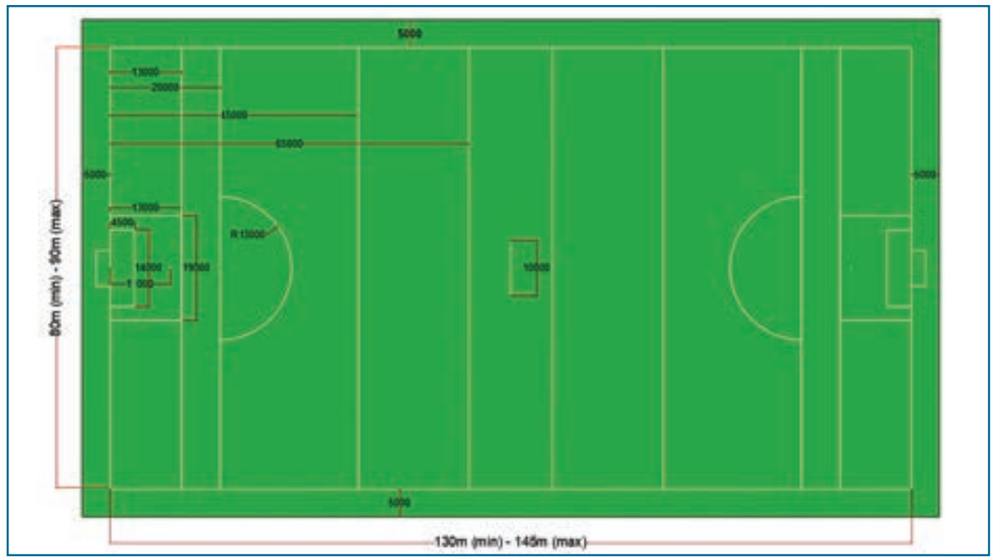
Dependent on your answers, you should make your own informed judgement on the type of playing surface most suited to your needs. This judgement can often be reached by visiting similar facilities in your area to seek information on best practice and to learn from other's experiences. This guide also aims to provide you with independent information on the many aspects that you will need to consider.

When considering a synthetic turf facility, it is very important to undertake a risk assessment to determine if long-term compliance with the requirements of the GAA Synthetic Turf Field Register is achievable.

7 Location

Ideally a field should be:

- Positioned on relatively flat ground - to reduce construction complexity and costs;
- orientated so the main playing direction is approximately north (between 285° and 20°) / south, to minimise the effect of a setting sun on the players;
- located close to changing accommodation and other support facilities;
- positioned in a sheltered location, away from exposed terrain;
- located where the installation of services (electricity and drainage) will not be prohibitively expensive;
- located where easy access for maintenance and emergency vehicles is available;
- located where players, spectators and maintenance equipment do not have to cross natural turf areas, as mud, and debris will contribute to deterioration of the playing surface;
- positioned away from trees, as roots and leaf litter can cause ongoing structural and maintenance issues.



8 Dimensions & markings

8.1 Field Dimensions

On a full-size adult field, the field of play is rectangular, with dimensions of:
Length – 130 m (minimum) - 145m (maximum)
Width – 80 m (minimum) – 90 m (maximum)

8.2 Run-offs

Beyond the field of play there must be adequate safety run-offs to allow players appropriate time to stop before colliding with fencing, floodlight columns, etc; thereby ensuring they are free from injury or danger. For full size fields the recommended run-offs width is 5.0 m on all boundaries of the field. For sites with multiple fields laid in one continuous block 6.0 m common run-offs should be allowed between each pair of fields.

For smaller outdoor and indoor training facilities, where no matches are played, run-off areas with a minimum of 2.5 m are considered adequate.

The GAA recommends viewing areas are included, typically located along one side boundary and should be at least 2.5 m in width. They should be separated from the field of play by a low-level internal fence located outside the run-off margin.

8.3 Field markings

At distances of 13m, 20m, 45m (football) and 65m (hurling), lines are marked parallel to the end lines. The intersection of these lines and the end lines with the side-lines are marked with flags.

The mid-line of the field of play is marked parallel to the end lines and has a maximum length of 10m; the dimensions may be reduced by local byelaws for U15 or younger grades.

The scoring space is marked in the centre of each end line by two goalposts 6.5m apart, with a height of not less than 7m above ground level. A cross bar is fixed to the goal posts at a height of 2.5m above the ground (Note: goalpost dimensions may be reduced by local byelaws for U15 or younger grades).

Two rectangles are formed in front of each set of goalposts.

a) Small Rectangle: 14m long by 4.5m wide. The distance from the inside of each goalpost to the beginning of each line of width is 3.75m
b) Large Rectangle: 19m long by 13m wide. The distance from the inside of each goalpost to the beginning of each line of width is 6.25m

A semi-circle arc of 13m radius, centred on the mid-spot of the 20m line, is marked outside of each 20m line.

An area of the side-line extending 5m on either side of the centre line denotes the substitution zone. All substitutions and temporary replacements occur through this zone, when given permission by the referee.

9 Field furniture

9.1 Goal posts

Goal posts should be manufactured and certified as complying with IS EN 16579.

Goal nets should be securely fixed to the back of the crossbar and the back of each goalpost. The roof of the net shall be supported for a horizontal distance of not less than 900mm, at crossbar height, by a metal net support fixed to the back of the goalposts. The mesh of the net shall have a diagonal length not exceeding 150mm for football and 50mm for hurling. Cup hocks must not be used to attach the net.

9.2 Flags

All flags posts used on boundary lines shall have smooth round tops. Where possible flexible flag posts should be used.

9.3 Team benches / shelters

It is recommended that team shelters with seating for substitutes are provided for fields that will be used for competitive matches. They should be manufactured with heavy duty frames (aluminium is recommended) and typically be 2.1m high by at least 1.2m deep. If transparent panelling / roofing is used it should be at least 3mm thick and shatterproof. End frames should be fully welded, and the shelters should be permanently installed using anchoring plates. The shelters must not be positioned so they encroach onto the run-offs from the field of play.

10 Fencing and edging details

10.1 Perimeter fencing and access gates

Perimeter fencing is normally erected around a synthetic turf field to help contain balls within the boundaries of the field and to protect the playing surface from contamination, unauthorised use and vandalism. The GAA recommends the external perimeter fence height on all sides of a synthetic turf field is at least 4.5 m high. If, as recommended viewing areas are included on all full-size fields, these should have an internal fence 1.2 m high, rising to 2 m behind the goals. The internal fence must be located outside the run-off.

The fencing is normally constructed from twin bar super-rebound panels or rolls that are supported by box section posts. This type of fencing is used as it is better suited to the repeated impacts of footballs hitting it.

Steelwork should be galvanised to minimise premature corrosion and may be plastic coated to improve its appearance.

If catcher/ ball nets are used, they should have no cross wires or stay wire poles located in the run-off's.

At least one pair of double gates should be provided to allow maintenance and emergency vehicle access.

Single gate access should be provided to each section of the field available for cross-play use, and also at the furthest portion of the field from the spectator entrance to aid ball retrieval.

Access gates should open outwards away from the playing area to ensure the safety of players.

10.2 Accessways

To minimise the possibility of dirt and detritus being carried onto the synthetic turf surface by players, maintenance equipment, etc. paved (asphalt, pavers, etc.) pathways should be provided to all main points of access to the field. The pathway(s) should be fenced to prevent people taking short cuts across adjacent grass areas, etc.

Access routes should be level or have the shallowest gradients possible to enable disabled access. Where the route is steeper than 1:60, but no steeper than 1:20, it should have a level landing for each 0.5m rise along the route. Ideally the pathway should be a minimum of 1.8m in width, unless there are unavoidable pinch points where the width may be reduced to 1.2m for a distance no greater than 6m in length.

10.3 Infill containment

Infill materials used within long pile synthetic turf have been identified as a potential source of environmental pollution, so it is important that the design and maintenance of the facility is undertaken in a way that minimizes the possibility of the infill migrating from the surface.

The European Standards Committee (CEN) responsible for setting European Standards for sports surfaces have produced a report describing how infill migration can be controlled and the GAA recommends these are incorporated into all synthetic turf facilities.

The guidance of the CEN report is summarized as follows:

- if a synthetic surface is enclosed by a non–solid (e.g. mesh) fence it should incorporate some form of physical barrier to prevent infill leaving the surface. Several different edge barriers have proven successful including:
  - a combination of a paved margin (at least 0.5 m wide) and 200 mm high timber or plastic boards, mounted to the fencing system so they sit flush with the ground and do not allow infill to migrate under them.
  - 0.5 m or higher solid panels; these may be formed from brickwork, timber, rigid plastic extrusions, metal work or other materials.
  - raised precast concrete edgings or kerbs (minimum 200 mm high) located inside and adjacent to the fence line.
  - cast concrete plinth/kerb (minimum 200 mm high) on which the perimeter fencing is flush mounted.
- Paved margins should be designed to allow ground–staff to collect any dispersed infill that has worked its way to the sides of the surface and put it back onto the playing area, before it leaves the facility.
- To minimise the risk of synthetic turf infill being carried away on players' footwear or maintenance equipment the entrances to a facility should have cleaning or decontamination grates. These typically comprise:
  - Smooth bar industrial decontamination grates
  - Heavy duty rubber scraper mats
  - Heavy duty honeycomb profile mats

The cleaning grates should be the full width of the entrance gate and at least 1.5 m in length, so people cannot step over them. They should be positioned immediately adjacent to entrance gates, either internally, when located in a paved surround/spectator area, or externally, when the synthetic turf surfacing is laid to the perimeter fence. The mats should be set in recessed concrete bases that will contain any infill or other detritus being taken off the surface by players' footwear or maintenance equipment, etc. To prevent the bases filling with water they should contain a suitably designed drain, fitted with a silt trap to capture infill being washed away.

Multi-person boot cleaning stations, with suitable signage encouraging players to use them, should be located at the main points of exit from the surface. If mounted outside the synthetic turf surface, they should be positioned over a hard-paved area that has a suitable design to contain dislodged infill and drains, with suitable filters, to prevent rainwater washing the infill away.

Typical examples of the containment solutions based described in the European Standards Committee report are shown in the drawings on the following pages. All dimensions are in millimeters. The drawings are reproduced with permission of Sport England.

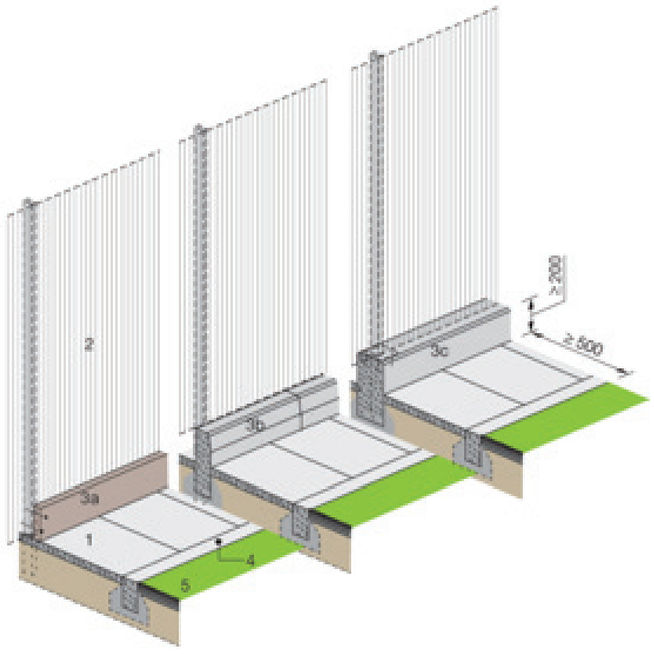


Figure 10 - raised perimeter edging details, used when a field has a paved margin between the synthetic turf surface and the perimeter fence

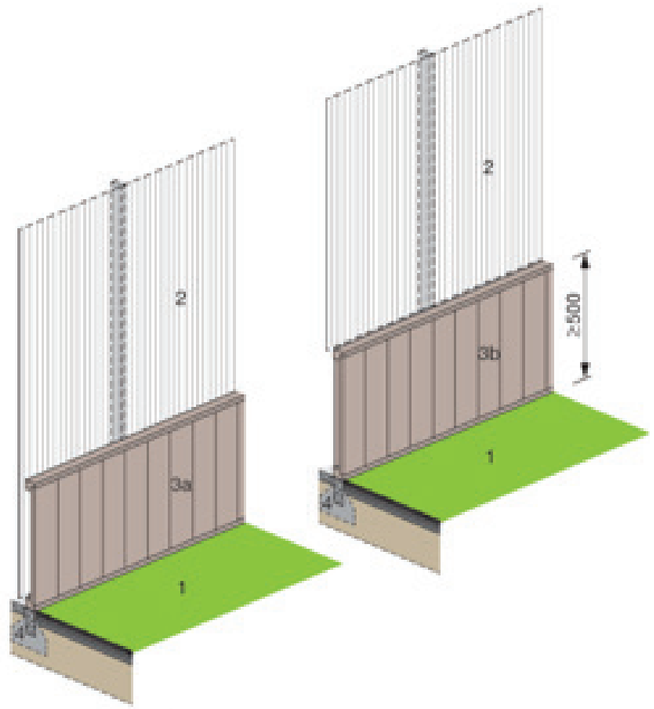


Figure 11 – perimeter fencing with containment panels used when the synthetic turf surface is laid up to the perimeter of the field

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

Key:
1 Synthetic turf surfacing
2 Perimeter fencing
3 a Fencing boards mounted in front of fence (may be used on new-build fields or be fitted to existing fields)
b Fencing mounted above boards - most suited to new fields and fencing systems
4 Perimeter kerb

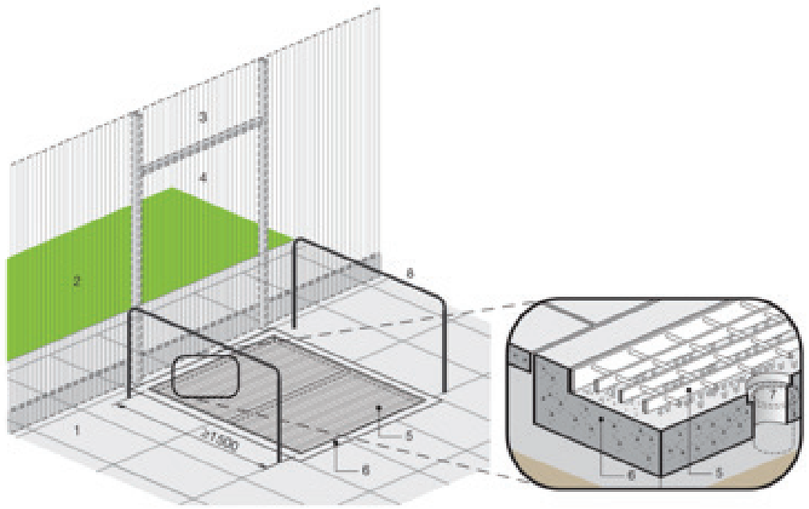


Figure 12 - Decontamination / boot cleaning grate (located outside all entrances)

Key:
1 Area outside field
2 Synthetic turf surfacing
3 Perimeter fencing with raised kerb
4 Gate
5 Heavy duty decontamination grates / mats
6 Concrete base with drain and silt trap
7 Drain with filter bucket

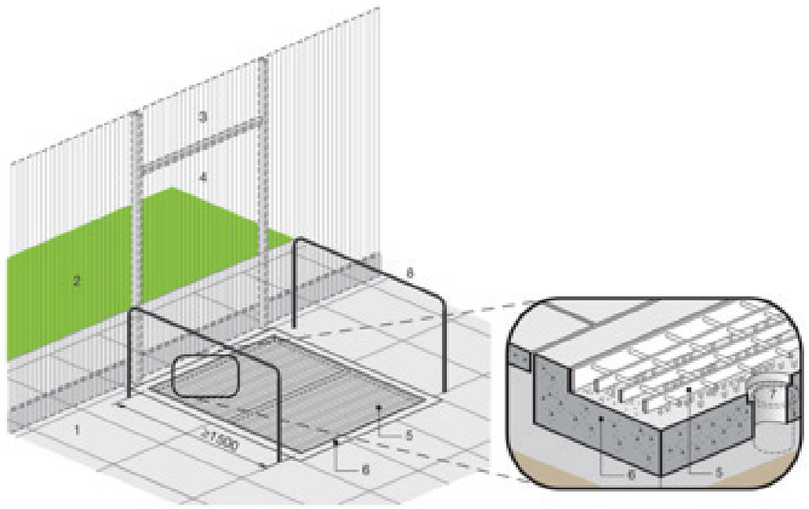


Figure 13 - Decontamination / boot cleaning grate (located outside all entrances)

Key:
1 Area outside field
2 Synthetic turf surfacing
3 Perimeter fencing with raised kerb
4 Gate
5 Heavy duty decontamination grates / mats
6 Concrete base with drain and silt trap
8 Access barrier / fence

11 Sports lighting

11.1 Introduction

The GAA believes that good sustainable sports facilities are fundamental to the development of sporting opportunities for everyone, from the youngest beginner to the top-class player.

The use of synthetic turf playing surfaces means there is an increasing desire to use them over an extended period each day and this will often entail the use of sports lighting. However, it is important that the lighting is of an appropriate type and quality:

- to ensure the safety of players and others involved in the game;
- to be environmentally sensitive;
- to ensure the effective use of money spent on capital and operating costs over time;
- to provide better viewing for spectators and television where applicable.

Sports lighting is much more complex than erecting a few columns and mounting some lights on top and it is recommended that assistance from professionally accredited lighting engineers should be used in all installations.

The development of a sports lighting scheme may be broken into seven key stages:

Stage 1 – Project conception

- Scope out project brief and demonstrate the need for sports lights
- Consult with key stakeholders (proposed users, local authority planners, etc.)
- Determine the lighting standards required for level of competition or training
- Identify planned hours of use per week
- Engage with lighting specialist for initial consultation and determine outline feasibility
- Outline budget (capital and revenue)
- Identify risks: planning challenges, unsecured finance, etc

Stage 2 – Feasibility

- Appoint an accredited lighting consultant
- Conduct electrical surveys to assess power supply (your appointed lighting engineer should be able to help)
- Hold informal talks with relevant planning department
- Design feasibility: explore viable options (advantages and disadvantages)

Stage 3 – Outline

- Produce layouts and project specification
- Engage and consult with residents, particularly those most affected by the scheme
- Obtain budget estimates, review funding
- Submit planning application

Stage 4 – Procurement

- Obtain quotations from specialist lighting suppliers / contractors
- Select and appoint lighting contractor

Stage 5 – Installation

- Site preparation
- Electrical works, including power supply
- Supply and installation of the sports lights
- Post installation testing

Stage 6 – Handover

- Sign off
- Performance and electrical certification

Stage 7 – Maintenance

- Annual general maintenance (in accordance with manufacturer guidelines and warranty conditions)
- Periodic retesting and certification

11.2 Sports lighting - planning

Lighting a sports surface will require planning approval and applications can be contentious as neighbours raise concerns about increased use, noise and light pollution. Prior to making a planning application, early consultation with the relevant authorities is recommended so that the level of information required can be determined in advance. This is likely to require a lighting spillage drawing showing the levels of light pollution and their impact on the surrounding neighbourhood. Lighting engineers or specialist lighting contractors can provide these. Consideration should be given to the visibility of the lighting columns and a field's location in relation to nearby residential properties. The use of screening and tree planting can significantly reduce light and noise levels and the visual impact of columns. If the visual impact of lighting columns is a major concern, consider using retractable columns.

Experience shows it is often advisable to research the impact of other similar local sports facilities with lighting so that persuasive arguments can be put forward to counter any concerns. Consideration may need to be given to the hours and pattern of use. Planning approval may be granted but with conditions attached that may impact upon your ability to deliver the planned sports activities and income generation.

11.3 Selecting the most appropriate lighting system

Lighting technology is making rapid advances as new technology becomes available. Today there are two predominant light sources used:

Metal Halide lighting

For the past 30 plus years, the metal halide light source has been the principal source of sports lighting and has been superseded by LED technology. Metal Halide technology is a form of High Intensity Discharge (HID) lighting and is like that used for street lighting, etc. In HID lighting, electricity heats a metal for several minutes until it vaporizes inside a bulb to give off the light. The bulbs are housed inside a lamp that has reflectors that focus the light downward and outward at the required angles and trajectory. The lamps produce a white light.
Life expectancy of metal halide blubs can vary greatly, depending on the level of illumination and frequency of turning on and off. As Gaelic games require a certain minimum level of illumination to be played in a satisfactory and safe environment it is important that the concept of lumen maintenance is fully understood when considering lamp replacement and life expectancy.

LED lighting

The light-emitting diode (LED) is one of today's most energy-efficient and rapidly developing lighting technologies. Advances now mean that they are a cost-effective option compared with metal halide lighting for sports applications. They work by allowing an electrical current to pass through a microchip converting the electricity into light.

It is important to invest in a robust product, with a solid warranty, that provides quality lighting. LEDs use heat sinks to absorb the heat produced and dissipate it into the surrounding environment. This keeps the LEDs from overheating and burning out. Thermal management is generally the single most important factor in the successful performance of an LED light over its lifetime. The higher the temperature at which the LEDs are operating, the more quickly the light will degrade, and the shorter their useful life will be.

11.4 Recommended light levels for non-televised matches & training

Lighting levels for non-televised matches and training should be as detailed below. Three lighting levels are detailed based on the various levels of competition and training that may be played on a field.

- Class I is considered suitable for high level competitions
- Class II is considered suitable for lower level club competitions and training
- Class III is considered suitable for recreation play and training.

Lighting systems are not normally designed solely to achieve Category III lighting; it is normally provided through switching or diming of a Class I or I Class II lighting system.

Sport & Class of play		Eh maintain lux	Horizontal uniformity ratio		UG	GR-Max	CRI (Ra)	Colour temp. (Tk)*
			U1	U2				
Hurling	Class I	≥ 500	≥ 0.50	≥ 0.70	0.65	<50	>65	>4000
	Class II	≥ 300	≥ 0.50	≥ 0.70	0.65	<50	>65	>4000
	Class III	≥ 200	≥ 0.40	≥ 0.50	0.60	<55	>65	>4000

Sport & Class of play		Eh maintain lux	Horizontal uniformity ratio		UG	GR-Max	CRI (Ra)	Colour temp. (Tk)*
			U1	U2				
Football	Class I	≥ 500	> 0.50	≥ 0.70	0.65	<50	>65	>4000
	Class II	≥ 200	≥ 0.40	≥ 0.60	0.60	<50	>65	>4000
	Class III	≥ 75	≥ 0.40	≥ 0.50	0.60	<55	>65	>4000

Eh maintain	Minimum horizontal maintained illumination, measured in lux
U1	Minimum/Maximum illuminance
U2	Minimum/Average illuminance
UG	Uniformity Gradient - the rate of change of illuminance between adjacent (grid) values

GR-Max	Glare rating
CRI	Colour Rendering Index
Colour temperature	A way to describe the light appearance provided by the lighting. * The same colour temperature lamps should be used for a venue

12 Facility procurement

12.1 Project team

A synthetic turf facility is a major investment, so do not take contractual risks. Experience shows the design, specification and project/ construction management of the facility is best undertaken by people with specialist expertise. A typical project team is likely to include:

- Design consultant
- Planning advisor
- Geo-technical engineer
- Project manager / quantity surveyor
- Floodlighting engineer

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 provide references from previous relevant engagements.

The appointment of a project team is likely to incur professional fees, some of which may have to be paid early in a project and possibly before any external funding awards have been secured. Adequate budget allowance for professional services should therefore be made at an early stage of a project. The complexity and size of a project will ultimately dictate the level of external professional advice and services required. As a budget guide, professional services may be expected to typically cost between 5% and 10% of the actual cost of constructing the facility depending on the complexity of the scheme.

12.2 Preliminary site investigations

Understanding the conditions of the ground where a facility is to be located is fundamental to ensuring a good quality, long lasting construction.

Experience has shown the greatest risk of unforeseen problems usually result from ground problems or inadequate design provision for the site conditions. Therefore, specific site investigations should be carried out in the location of the proposed facility at an early stage in the planning to generate the following information:

- Topographical survey showing the profile and levels of the site
- Trial pits to determine soil types and conditions
- Services, underground and overhead
- Orientation
- Indication of any ground abnormalities (mining, landfill, etc.)

For sites that have previously been used for industrial processes or landfill a full geo-environmental survey and contaminant testing will normally be required; and for more difficult sites, such as flood plains, steeply sloping sites or sites with problematic sub-soils, more extensive site investigation may be required.

The cost of the facility will be greatly influenced by the ground conditions; with costs being much higher when building on a difficult site; and it should be recognised that on some sites enhanced engineering solutions such as soil stabilisation may be required, whilst on others it may just not be cost effective to develop it as a sports facility.

12.3 Project specifications

There are various forms of specification that can be used when inviting contractors to bid for the construction of a synthetic turf facility. Most are, however, designed and specified using a design and build approach where 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 using the GAA Standards as the basis.

It is essential that a synthetic turf sports surfacing system is laid on a well-engineered sub-base with a drainage system capable of withstanding the different stresses and climatic conditions that it will be exposed to throughout its life. It cannot be over emphasised that failure to consider all elements of the facility's design is likely to result in a surface that fails to achieve and retain the appropriate levels of performance, resulting in expensive remedial works at the time of the synthetic turf replacement. The UK Sport and Play Construction Association (www.sapca.org.uk) has developed a Code of Practice for the Design, Specification and Testing of Bases for Outdoor Synthetic Sport Areas and it is recommended that all synthetic turf surfaces used for Gaelic games and training are designed and constructed in accordance with the principals of this Code of Practice.

12.4 Contract & project administration

Many organisations have little experience of managing a major infra-structure construction project and fail to appreciate the risks and implications of not having robust contractual protection; if you don't use a formal building contract you will be legally bound to the contractor's terms and conditions, or common law to resolve payment, disputes, insurance issues and even disagreements about what is actually included in the works.

It is therefore strongly recommended that you use a recognised contract, professionally drawn up by an independent expert.

12.5 Levels and types of insurance

In addition to the forms of insurance required to operate legally, it is important that each of the various parties involved in the design and construction of a synthetic turf facility have adequate insurance to provide all parties protection. Based on good practice the following minimum levels of insurance are normally recommended:

- Public Liability / Contractors all Risk insurance: €10,000,000
- Professional Indemnity (for all parties involved in the design of the field): €2,000,000

12.6 Liquidated damages

Liquidated damages may be claimed if the construction of a facility is delayed for reasons within the contractor's control. The damages are designed to compensate the client for any costs and losses they may incur as a result of the delay in completing the project – the damages are not a penalty payment. The value of costs and losses will be specific to each project, but sums in the order of €1000 per week are not uncommon.

12.7 Defects liability period

A defects liability period is the period of time following practical completion during which a contractor remains liable for dealing with any defects which become apparent. For synthetic turf fields a defects liability period of 12 months is normally advised. During this period a retention of typically 2.5% is held by the Employer, this being released at the end of the period or when any outstanding defects are made good, whichever comes later.

12.8 Key stage construction inspections

Due to the demands that will be placed on the synthetic turf surface it is important that proper quality assurance procedures are applied throughout the construction process. Site inspections and material sampling should be undertaken throughout construction, with attention being paid to the completion of each key stage.

12.9 Warranties

Each manufacturer or supplier of a synthetic turf surface will offer their own specific warranty and it is important that the terms, conditions and limitations of the warranty being offered are fully understood before a contract is awarded.

Typically, most synthetic turf manufacturers will offer warranties of up to eight years on the quality of the synthetic turf. These warranties normally cover aspects such as material failure, degradation of the pile yarns due to UV exposure, manufacturing defects, etc.

Shockpad manufacturers will also offer warranties on the quality and performance of their products. The length of these varies, but many will now offer warranty periods that should ensure the shockpad will offer acceptable performance for at least the life of two synthetic turf carpets.

With an increasing range of performance infills coming onto the market, many of which have yet to pass the test of time, it is important that the infill material is also warrantied in a similar way to the synthetic turf carpet.

Finally, the industry is seeing an increasing desire for performance warranties. This is where a supplier will warrant that providing a surface is correctly maintained and the levels of use (which need to be monitored) are as agreed, the surface will satisfy the relevant sports performance requirements for a defined period of time. Performance warranties are typically based on 5 years with usage being no more than 1500 play hours per year (with one playing hour = 2 x 15 players).

Recording use accurately can be challenging, but systems are now being introduced that allow this to be done automatically by 24/7 intelligent monitoring. As these systems not only allow compliance with warranty conditions to be honoured, but also help ensure adequate and appropriate maintenance is undertaken, they are recommended.

12.10 Replacement funds (sinking fund)

It is generally recognised that a synthetic turf playing surface has a life span of approximately eight to ten years depending on factors such as usage and maintenance. Field managers should therefore be aware of, and plan for, the full life costs of the facility and supporting infrastructure from an early stage.

A sinking fund should be established as soon as the new surface is brought into use to ensure that sufficient funds are available to replace it 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 just possible to take the today's cost and divide it by the number of years until replacement is due. A more complex calculation that considers compound interest to the replacement date needs to be used.

Current estimates for the resurfacing of a full-size field (12,000m²), including removal of the existing surface and disposal of the surface and fill suggests a budget of between €300,000 and €380,000 plus VAT is realistic. Based on 2% inflation a sum of €360,000 will equate to €440,000 in 10 years' time. To achieve this figure, and assuming a compound interest rate of 3%, a monthly contribution of approximately €3,300 (€39,600 per annum) is required every month from the first month of the field's life.

13 Ongoing Maintenance

When a new synthetic turf facility 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 facility 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 surface performance and quality. What is important, is minimising the rate of deterioration, through appropriate maintenance.
It is very important to spread wear to various locations across the surface to prevent uneven or accelerated wear in certain areas.

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

13.1 Routine maintenance

Understanding the conditions of the ground where a facility is to be located is fundamental to ensuring a good quality, long lasting construction.
It is important that the surface is inspected regularly to ensure that any debris is removed, that there are no hazards, and any unknown issues are identified and assessed/repaired 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 surface 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 result in much larger and more complex/expensive repairs being needed.

13.2 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, increase 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 and surface evenness;
- 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 field in different directions, use large turning circles at the end of each pass.

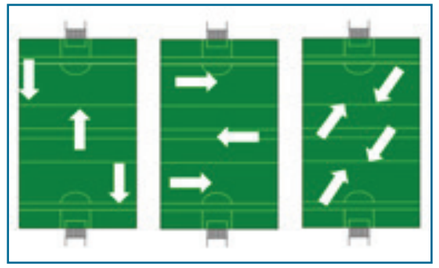


Figure 18 - alternate the direction of brushing

13.3 Infill levels

The correct depth of infill is vital to the safety of players and performance of the field; 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.

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

13.4 Deep grooming
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.

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

13.6 Debris removal
You should remove any foreign matter including twigs, leaves, rubbish, tape, gum etc. as soon as 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.

13.7 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 removing, 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.

13.8 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.

13.9 Frequency of maintenance
It is important to recognise that synthetic turf fields 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.

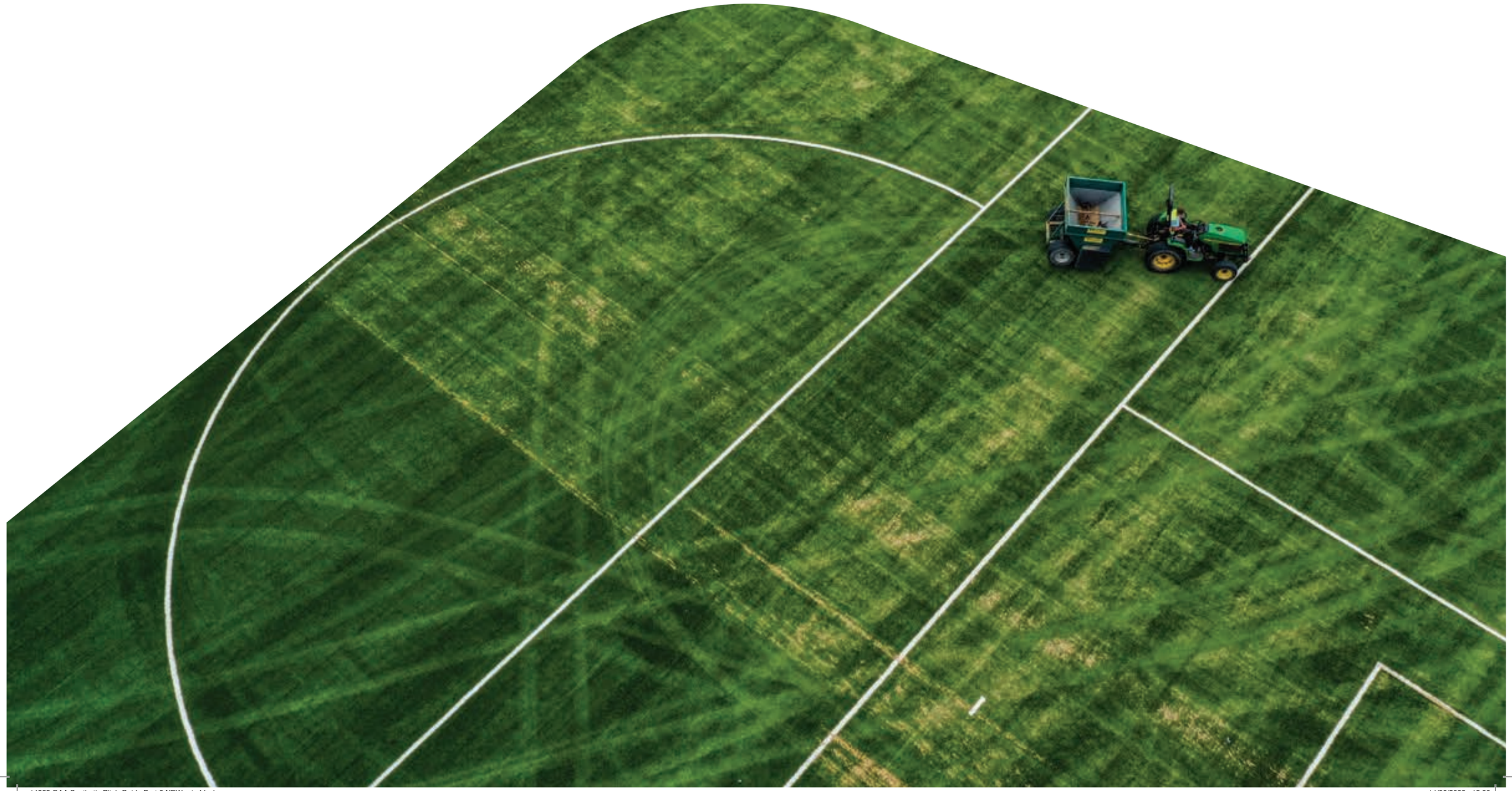
Operation	Minimum frequency	Recommended	Typical time allowance
Litter removal	As required	Daily	0.5 hour
Infill redistribution	Weekly	2 / 3 times per week	1 hour per operation
Brushing / grooming to lift carpet pile	Weekly	Every 10 hours use	2 hours per operation
Inspection of seams and joints	Weekly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

WHERE WE ALL BELONG

Synthetic turf surfaces for Gaelic Games

Part 2 -
Performance and quality standards for synthetic turf surfaces

2022 Edition



1 Introduction

The GAA guide to synthetic turf surfaces for Gaelic games comprises three parts. Each is published as a separate document for ease of reference. The three parts are:

- Part 1 - Guide to the design, construction and maintenance of synthetic turf fields and training areas
- Part 2 - Performance and quality standards for synthetic turf products
- Part 3 - Performance and construction standards for synthetic turf fields and training areas

Part 1 provides general guidance and information on the many aspects that any organisation considering a synthetic turf facility for Gaelic games should consider.

Part 2 describes how a synthetic turf surface should be tested to verify that it is able to provide the necessary playing, safety and durability characteristics required to enable Gaelic games to be played satisfactorily for typically eight to ten years, subject to acceptable use and maintenance. This document is primarily intended for the manufacturers of synthetic turf surfaces and the Test Institutes that assess them.

Part 3 describes the performance and construction requirements the GAA recommend for synthetic turf fields and training areas intended for Gaelic games. This document is primarily intended for those designing and building synthetic turf fields and training areas and the test institutes that assess them.

The GAA require all full-size fields that are used for Gaelic games to be listed on their Register of Synthetic Turf Fields, and also recommend all training areas are periodically tested to verify acceptable performance.

For a field to be listed on the GAA Register it needs to be periodically tested and shown to satisfy the requirements of Part 3.

2 Performance and quality requirements for synthetic turf surfaces

When tested in the laboratory the synthetic turf system should satisfy the requirements detailed in Table 1.

Table 1 – synthetic turf performance & quality requirements				
Property	Test Method	Requirement		
		New test specimen		After simulated use - Dry
		Dry	Wet	
Gaelic Football Rebound	IS EN 12335	0.65m – 0.80m		0.65m – 0.80m
Gaelic Football Ball Roll	IS EN 12334	4.5m – 7m		-
Reduced Gaelic Football Ball Roll	FIFA TM 16	-		4.5m – 7m
Sliotar Ball Roll	GAA 01	5m – 9m		-
Critical Fall Height	pr IS EN 17435	≥ 1.30 m[1]		
HIC at 1.30m		-	-	≤ 1000 (see note 1)
	Note 1 - this requirement should be met without any maintenance being carried out to the playing surface after the simulated use conditioning			
Shock Absorption	IS EN TS 16717	55% - 65%		55% - 65%
Surface Deformation	IS EN TS 16717	≤ 8.5 mm (see note 2)		-
		-		≤ 8.5 mm
	Note 2 - tests on the 'New test specimen' shall be made after 100 conditioning cycles on the Lisport XL			
Rotational Resistance	football stud sole / FIFA TM 06a	35 - 55Nm		35 - 55Nm
Water permeability	IS EN 12616	≥ 300mm/h		> 300mm/h
Skin Friction	FIFA TM 08	≤ 0.75μ	-	≤ 0.75μ
Skin Abrasion	FIFA TM 08	< 30%	-	< 30%
Infill splash	Recommended	FIFA TM 16		< 1.5%
	Maximum acceptable			< 5%
Pile Compression	GAA 02	< 10mm or 50% of free pile height, which-ever is the lesser value		
Table 1 – synthetic turf performance & quality requirements				
The synthetic turf carpet should comply with the requirements of the REACH[2] Regulations, Annex XV11, Entry 50.				
		Unaged		After Water ageing
Joint Strength - stitched joints	IS EN 12228 Method A	≥ 1500/100mm		≥ 1500/100mm
Joint Strength - Bonded joints	IS EN 12228 Method B	≥ 75N/100mm		≥ 75N/100mm
Resistance to tuft withdrawal	IS ISO 4919	≥ 40N		≥ 75% of unaged result
Tensile strength of carpet (both parallel & perpendicular to direction of tufting)	IS ISO 13934-1	≥25N/mm		-
Tensile strength of pile yarn	IS EN 13864	Mono filament yarns		Fibrillated yarns
		≥ 8N per strand		≥ 30N
Resistance to UV degradation – pile yarn	Tensile strength after UV exposure	≥ 8N per strand		≥ 30N
	% change from un-aged	≤ 25%		≤ 25%
	Colour change	Grey Scale 3 or greater		

1 The GAA requirements for Critical Fall Height in this edition of the GAA Standard have been aligned with the requirements of the One Turf Initiative.
2 Registration, Evaluation, Authorisation & Restriction of Chemicals

Polymeric infills					
Performance infill placed within the synthetic turf carpet should comply with the draft REACH Restriction requirements of the European Union (20mg/kg of the REACH 8-PAHs)[3]					
Resistance to UV degradation – polymeric infills			Colour change	Grey Scale 3 or greater	
			Physical composition	No change	
Shockpads and elastic layers					
	Shockpads and elastic layers less than 25mm thick	EN 12230	Unaged	≥ 0.15 MPa	
			After air ageing	% 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	ESTC Performance Guide for Shock-pads – Annex D		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	ESTC Performance Guide for Shock-pads – Annex C		Maximum degree of bowing or curling	5 mm	

Product identification tests

As part of the product assessment test programme, each component forming the synthetic turf surface should be characterised using the test methods specified in Table 2 and the results should be within the tolerances specified when compared to the manufacturer's declared values for each property. The manufacturer's declared values should be reported in the laboratory test report.

3 Reference to the REACH restriction shall always refer to the latest published edition.

Table 2 – Product identication tests			
Component	Characteristic	Test Method	Tolerance[4]
Properties of synthetic turf carpet	Pile height above backing	ISO 2549	± 10%
	Tufts per unit area	ISO 1763	± 10%
	Filaments/m²	See note 1	± 10%
	Pile weight	ISO 8543 – see note 2	± 10%
	Pile dtex	FIFA TM 23	± 10%
	Pile Thickness	FIFA TM 25	> 90%
	Pile Profile	FIFA TM 25	Same profile
	Pile polymer characterization	ISO 11357-3 / FIFA TM 22	Same number of peaks, same profile ± 3 °C (peak)
	Carpet mass per unit area	ISO 8543	± 10%
	Water permeability of carpet	FIFA TM 24	> 90%
Properties of inlaid / tufted line markings	Colour	RAL Classic	Same as approved product
	Polymer characteri-zation	FIFA TM 22	Same number of peaks, same profile ± 3 °C
Properties of shockpads and elastic layers	Thickness	EN 1969	90% - 130%
	Mass per unit area	ISO 8543	± 10%
	Shock Absorption	EN TS 16717	± 5% SA
	Water permeability	FIFA TM 244	> 90%
Properties of infills	Particle Grading	FIFA TM 20	60% between d and D
	Particle Shape	EN 14955	Similar shape
	Bulk density	EN 1097-3	± 15%
	Polymer composition (polymeric infills only)	FIFA TM 11	± 15%
	Water permeability	FIFA TM 244	> 90%

4 Maximum permitted difference between tested laboratory or pitch sample and manufacturer's declaration

3 Test procedures and conditions

3.1 Test institutes
The testing of synthetic turf surfaces, to demonstrate compliance with this Standard, should be undertaken by an independent test institute authorised to test synthetic turf products by the One Turf Initiative[5].

3.2 Normative references
This Standard incorporates references from other publications. These normative references are cited at the appropriate places in the text. For dated references, subsequent amendments to or revisions of the publication applies to this Standard only when it is incorporated into it by amendment or revision. For undated references, the latest edition of the publication referred, to applies.

The designation IS or IS EN used in this Standard refers to a test procedure published by the National Standards Authority of Ireland (www.nsai.ie). The designation BS refers to a test procedure published by the British Standards Institution (www.bsi-global.com). The designation FIFA TM refers to a test procedure described in the FIFA Quality Programme for Football Turf Handbook of Test Methods, and incorporated into the One Turf Initiative.

3.3 Test balls
Ball tests for Hurling should be made using a Sliotar that has a rebound on concrete of 0.65 ± 0.03m, when tested in accordance with IS EN 12235, from a drop height of 2.0 ± 0.01m.

Ball tests for Gaelic Football should be made using an O'Neills All-Ireland Official Match Ball. When inflated to the manufacturer's specified pressure and tested in accordance with IS EN 12235 from a drop height of 2.0 ± 0.01m the rebound on concrete should be 1.10 ± 0.03m.

3.4 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 should 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 ball rebound, shock absorption, surface deformation and HIC / Critical Fall Height should be made on a test specimen comprising the synthetic turf surface and the base, laid to the depth and compaction levels specified by the manufacturer or supplier.

3.5 Laboratory test conditions
Laboratory tests should be made at an ambient laboratory temperature of 23 ± 2º C. Test specimens should be conditioned for a minimum of 3 hours at the laboratory temperature prior to test.

3.6 Laboratory test specimens
Test specimens should be prepared strictly in accordance with the manufacturer's instructions and IS EN 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 should be used on all test specimens being prepared for ball/surface and player/surface tests.

3.7 Wet test specimens
Laboratory tests should be made on dry and wet test specimens as specified in the appropriate test procedure. Wet specimens should 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 should 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 should be allowed to drain for 15 minutes and the test carried out immediately thereafter.

3.8 Simulated use conditioning
Test specimens should be conditioned using a Lisport XL in accordance with FIFA Test Method 15. The number of conditioning cycles should be 6,010 cycles and any dispersed infill should be reapplied to the test specimen in accordance with the test method. Following completion of the simulated use conditioning and after the HIC test (see Table 1), the test specimen should be maintained in accordance with Appendix 1 of the FIFA Handbook of Test Methods, prior to all other tests being undertaken.

3.9 Water ageing
Test specimens should be conditioned in accordance with IS EN 13744.

3.10 Resistance to artificial weathering
Test specimens should be exposed to Ultraviolet radiation using the procedure described in IS EN 14836: 2018. The exposure for pile yarn and polymeric infills shall be 9 600 ± 125 kJ/m2/nm at 340 nm radiation.

5 An initiative lead by World Rugby to set common guidelines for long pile synthetic community pitches, that the GAA support

Appendix A - GAA specific test methods

A.1 GAA 01 - Sliotar Ball Roll

Test apparatus
Test apparatus comprising:
- Electronic timing gates as described in IS EN 12334.
- Pendulum or other means of imparting an initial impact force so the sliotar has a mean velocity of 4.0 ± 0.05m/s when measured over a distance of 1000 ± 5mm, the first timing gate being positioned 1000 ± 5mm from the leading edge of the Sliotar prior to impact. The calibration floor should be smooth concrete having a slip resistance of 65 ±3 when tested in accordance with IS EN 13036-4.
- Means of measuring the distance the ball rolls to an accuracy of ±0.01m
- Sliotar

Test procedure
Place the Sliotar on the surface. Strike the Sliotar with the initial impact force and allow the resulting roll to end. Measure the roll distance.

Laboratory tests
From one end of the test specimen determine the Sliotar Ball Roll in five positions, each at least 100mm from the sides of the test specimen.

Repeat the test from the opposite end of the test specimen to assess the influence of factors such as turf pile pattern, etc.

Undertake tests under dry and wet conditions, as appropriate. Calculate the mean value of Ball Roll from the 5 tests in each direction. Calculate the mean of the two test directions.

Field tests
At each test location make five individual measurements, each at least 100mm apart.

Undertake the tests in at least four directions (0°, 90°, 180° and 270°) to determine if the result is influenced by factors such as slope or turf direction.

For each test position/direction calculate the mean value of ball roll from the five tests.

Calculate the mean value of ball roll from all tests at each test position.

A.2 GAA 02 – Pile compression

Test apparatus
- Graduated gauge capable of measuring pile height / ball diameter to an accuracy of ± 1mm
- Sliotar

Test procedure
Align the Sliotar so the seams are horizontal and measure the diameter of the Sliotar to an accuracy of ± 1mm.

Prepare the test specimen of synthetic turf (minimum dimension 400mm x 400mm) in accordance with the manufacturer's instruction and IS EN 12229. Brush the carpet pile as required to lift the pile.

Condition the test specimen for 30 ± 10 minutes under standard laboratory conditions. Determine the free pile height using the graduated gauge as shown in Figure GAA 02/1.

Repeat the procedure five times and calculate the mean Free Pile Height.

Align the Sliotar so the seams are horizontal and place it on the test specimen. Determine the distance between the top of the infill and top of the Sliotar as shown in Figure GAA 02/2, ensuring the gauge does not place pressure on the Sliotar.

Figure GAA 02/1 determination of free pile height

Note: placing a thin sheet of rigid plastic film on the pile has been found to aid the measurement. Ensure the film does not compress the pile and adjust the Free Pile height value to consider the thickness of the plastic film.

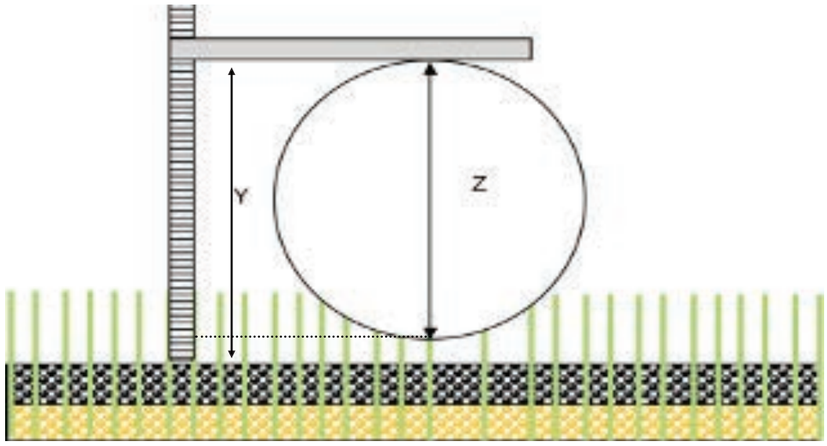


Figure GAA 02/2 determination of pile compression

Repeat the procedure five times and calculate the mean height.

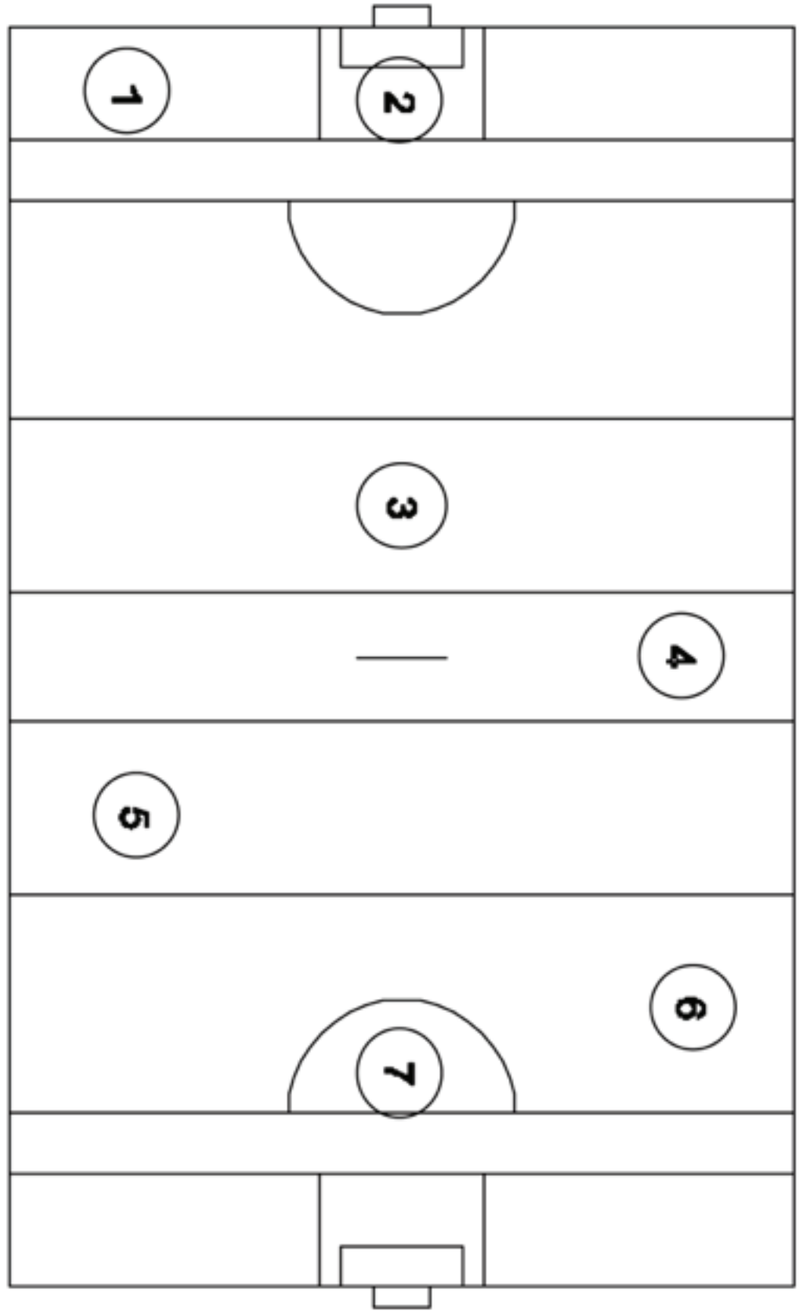
Calculation and expression of results

Key
X = Free pile height (figure GAA 02/01)
Y = Infill Sliotar Height (figure GAA 02/02)
Z = Sliotar diameter

Calculate the Pile Compression using the formula:
Pile Compression = free pile height – (Infill Sliotar Height – Sliotar diameter)

Report the Free Pile Height and Pile Compression values.

*APPENDIX A – Field Test Positions**



Orientation to be marked on diagram

WHERE WE ALL BELONG

Synthetic turf surfaces for Gaelic Games

Part 3 – Performance & construction standards for synthetic turf fields and training areas

2022 Edition

1 Introduction

The GAA guide to synthetic turf surfaces for Gaelic games comprises three parts. Each is published as a separate document for ease of reference. The three parts are:

- Part 1 - Guide to the design, construction and maintenance of synthetic turf fields and training areas
- Part 2 - Performance and quality standards for synthetic turf products
- Part 3 - Performance and construction standards for synthetic turf fields and training areas

Part 1 provides general guidance and information on the many aspects that any organisation considering a synthetic turf facility for Gaelic games should consider

Part 2 describes how a synthetic turf surface should be tested to verify that it is able to provide the necessary playing, safety and durability characteristics required to enable Gaelic games to be played satisfactorily for typically eight to ten years, subject to acceptable use and maintenance. This document is primarily intended for the manufacturers of synthetic turf surfaces and the test institutes that assess them.

It is recommended that any organisation considering a synthetic turf surface that will be used for Gaelic games, ensures it has been independently tested and shown to fully comply with the recommendations described in Part 2.

Part 3 describes the performance and construction requirements the GAA recommend for synthetic turf fields and training areas intended for Gaelic games. This document is primarily intended for those designing and building synthetic turf fields and training areas and the test institutes that assess them.

2 GAA Register of Synthetic Turf Fields

Experience has shown that the quality of even the best quality synthetic turf fields can deteriorate and result in a poorly performing or even unsafe playing environment that exposes athletes to unacceptable risks. To ensure that such fields are not used for GAA competitions or training the GAA has introduced a Register of Synthetic Turf Fields and only fields that appear on the Register should be used for any form of GAA sanctioned event.

For a field to appear on the Register it must be tested and shown to satisfy the requirements of the GAA Performance and construction standards for synthetic turf fields and training areas, applicable at the time the field was built.

An initial field test should be undertaken following construction of a new field, ideally before it is brought into use. Thereafter the field should be retested every three years throughout its life to verify it is still providing acceptable levels of performance and adequate protection to players.

Following the testing of a field a copy of the test report prepared by the test institute should be sent to:
GAA Insurance Department
Croke Park
Jones Road
Dublin 3

Email: syntheticregister@gaa.ie

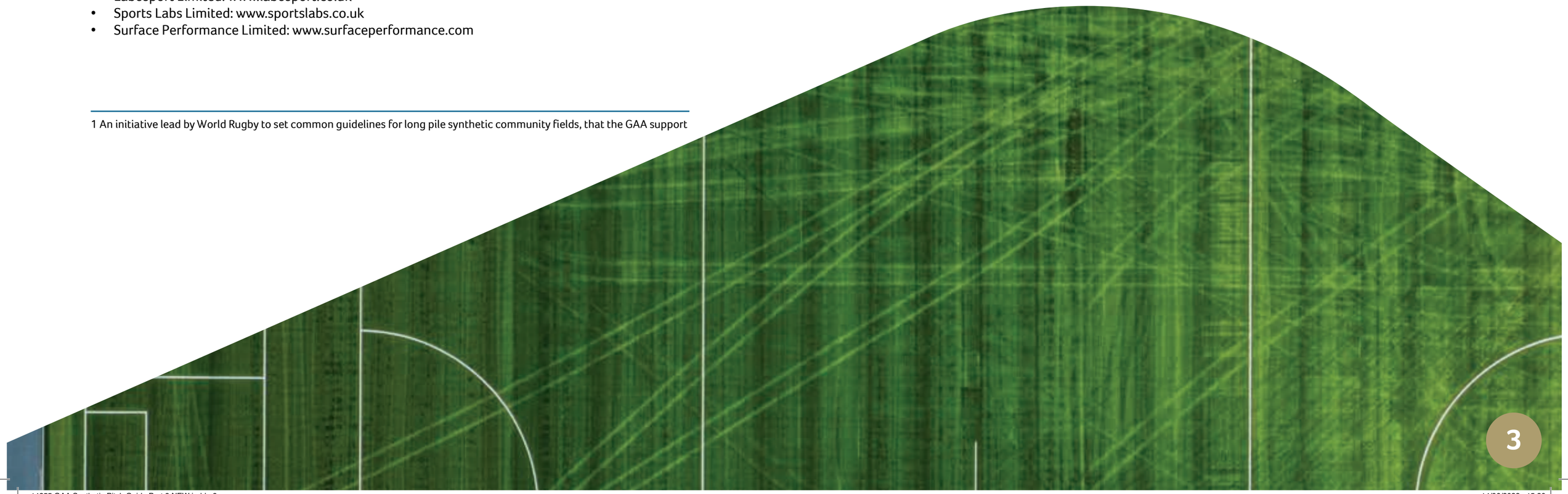
Should a field fail a test, the GAA should be notified immediately; failure to do so may compromise the public liability insurance cover provided for activities taking place on the field. Depending on the severity of the failure the field owner should then either:

- arrange for a programme of rectification works to be undertaken, in a timescale agreed with the GAA (normally no more than three months). During this period the field my remain in use, and once proof that the defects have been rectified is supplied to the GAA the field will be placed on the Register for a further three years.
- stop all activities on the field until the defects are rectified.

The testing of synthetic turf fields, to demonstrate compliance with the GAA Standard, should be undertaken by an independent test institute authorised to test synthetic turf products by the One Turf Initiative[1]. At the time of preparing this Standard the following test institutes are known to meet this criterion and also undertake field tests in Ireland:

- Labosport Limited: www.labosport.co.uk
- Sports Labs Limited: www.sportslabs.co.uk
- Surface Performance Limited: www.surfaceperformance.com

1 An initiative lead by World Rugby to set common guidelines for long pile synthetic community fields, that the GAA support



3 Field Test Conditions

3.1 Test balls

Ball tests for Hurling should be made using a Sliotar that has a rebound on concrete of 0.65 ± 0.03m, when tested in accordance with IS EN 12235, from a drop height of 2.0 ± 0.01m.

Ball tests for Gaelic Football should be made using an O'Neills All-Ireland Official Match Ball. When inflated to the manufacturer's specified pressure range and tested in accordance with IS EN 12235 from a drop height of 2.0 ± 0.01m the rebound on concrete should be 1.10 ± 0.03m.

4 Performance & construction requirements

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

The designation IS or IS EN used in this Standard refers to a test procedure published by the National Standards Authority of Ireland (www.nsai.ie). The designation BS refers to a test procedure published by the British Standards Institution (www.bsi-global.com). The designation FIFA TM refers to a test procedure described in the FIFA Quality Programme for Football Turf Handbook of Test Methods, and incorporated into the One Turf Initiative[2].

This Standard incorporates references from other publications. These normative references are cited at the appropriate places in the text. For dated references, subsequent amendments to or revisions of the publication applies to this Standard.

4.1 Field performance

Synthetic turf fields intended for Gaelic games (competition play or training) should satisfy the performance requirements detailed in the Table 1. In recognition that the performance of a surface may deteriorate as a result of high intensity use, the ranges of acceptable performance for some properties are wider for older fields than when they are new. If for any reason a field is required to be retested before the normal initial three-year period has passed, the Initial Field Test Requirements should apply if the field has been in use for less than 18 months.

Table 1 – synthetic turf performance & quality requirements

Property		Test Method	Requirement	
			Test on field less than 18 months old	Test on field more than 18 months old
Gaelic Football Rebound		IS EN 12335	0.65 m – 0.80 m	0.65 m – 1.0 m
Gaelic Football Ball Roll		IS EN 12334	4.5 m – 7.0 m	4.5m – 10.0 m
Sliotar Ball Roll		GAA 01 [3]	5.0 m – 9.0 m	5.0m – 12.0 m
HIC at 1.30m		pr IS EN 17435 [4]	≤ 1000	≤ 1000
Shock Absorption		IS EN TS 16717	55% - 65%	50% - 65%
Deformation	Fields less than 3 months old	IS EN TS 16717	≤ 9.5 mm	≤ 8.5 mm
	Fields over 3 months old		≤ 8.5 mm	
Rotational Resistance		IS EN 15301-1 using football stud test sole or FIFA TM 06a	35 - 55Nm	35 - 55Nm

2 An initiative lead by World Rugby to set common guidelines for long pile synthetic community fields, that the GAA support
3 As detailed in Appendix A, Part 2 - Performance and quality standards for synthetic turf products
4 Surfaces for sports areas – Test Method for the Determination of Head Injury Criterion (HIC) and Critical Fall Height (CFH)

4 Performance & construction requirements (continued)

4.2 Test locations

Tests should be made in the seven positions shown on Figure 1. Tests may be made in additional positions if the performance of the field in these areas is of concern.

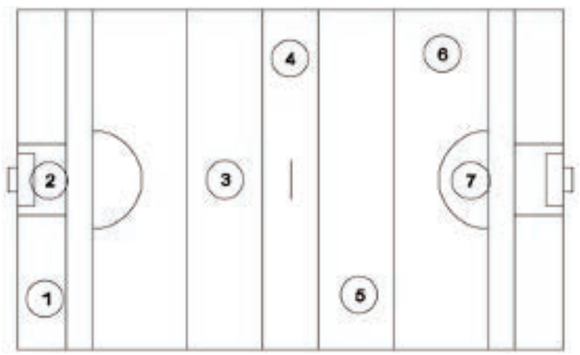


Figure 1 field test locations

If, as recommended, training areas (including hurling practice walls), are tested to verify acceptable performance the number of test positions should be determined proportionally for the area of the facility, with a minimum of three areas, representing low medium and high use areas, being assessed.

4.3 Test conditions

Tests should be made under the prevailing meteorological conditions, but with the surface temperature above 5°C.

Ball roll tests (unless the test area is screened from the wind) should be made when the prevailing wind speed is less than 5 m/s. The wind speed at the time of test should be recorded and reported.

The surface and ambient temperatures and the ambient relative humidity at the time of test should be recorded and reported.

4.4 Product identification

In order to verify the components of a synthetic turf surface installed on a field are the same as those previously tested in the product assessment it is recommended that an initial field test also includes the identification tests detailed in Part 2 Table 2 of the GAA Performance and Quality Standards for Synthetic Turf Products.

The maximum variation between the installed materials and the manufacturer's declared values shall be also be as specified in Part 2 – Table 2.

5 Construction parameters

5.1 Layout & line markings

The design of the synthetic turf GAA sports field should be in accordance with the Laws of the Game as detailed in the current GAA Official Guide and the guidance given in the GAA Guide to the design, construction and maintenance of synthetic turf fields and training areas. This should include containment features to ensure infill materials cannot migrate from the field to surrounding environment.

5.2 Surface Regularity (evenness)

The field should be constructed and maintained so that when it is assessed with a 3m straightedge and graduated wedge, in accordance with IS 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 fields 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.

5.2 Gradients

The gradient of a field should be no more than 1.0% in any direction.

5.3 Water permeability

The field should have a water permeability rate of 150mm/h or greater. Whenever a field is tested the ability of the surface to drain freely shall be assessed during the testing. When required (in cases of concern, etc.) this shall be measured in accordance with IS EN 12616, to verify compliance.

5.4 Installation quality requirements

The shockpad or elastic layer shall be installed to provide a uniform and consistent under-layer on which the synthetic turf is laid. There shall be no variations in quality or installation that adversely affect the performance of the field, so it falls outside the relevant requirements of this Standard. Insitu elastic layers shall be formed from materials and be laid in accordance with the manufacturer's instructions and specifications. Prefabricated shockpads shall be laid in accordance with the manufacturer's instructions; including the taping of all head and side joints as required.

The installed synthetic turf surfacing should be free of manufacturing and visual defects.

The carpet should be laid in full width rolls running across the FOP (side-line to side-line) without head seams. Head seams in the perimeter run-offs shall be kept to a minimum. There should be no carpet rucks, wrinkles or any other form of installation defect within the Field of play or run-offs. All carpet joints shall be fully bonded/stitched with no joint failures. The maximum gap at the base of the carpet pile on any carpet joint or any in-laid line markings, shall be equal to or less than the carpet's stitch gauge.

Bonded carpet joints shall not have any adhesive beads within the pile of the carpet that may cause a ball to lift or deviate as it passes over the joint. Stitched joints shall not cause a ball to lift or deviate as it passes over the joint.

The pile of the synthetic turf or textile carpet immediately either side of a joint shall be consistent with the remainder of the field. The carpet pile should not be trapped within the joint nor should adhesive layers and backing films beneath the carpet cause ridges outside the tolerances stated for surface regularity.

Repairs to the playing surface should only be permitted if:

- They have no adverse effect on the performance or consistency of the field.
- On new fields, the field owner is willing to accept such repairs and confirms this in writing;
- On new fields, the specification and colour of any patch matches the surrounding area.

5.5 Performance infill

Performance infill, placed into the synthetic turf carpet when the field is built, or subsequently as part of the ongoing maintenance programme, should comply with the REACH restriction requirements of the European Union (20mg/kg of the REACH 8-PAHs)

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 REACH requirements.

2 Reference to the REACH restriction requirements shall always refer to the latest edition applicable at the time a field is tested.

Appendix A - Pitch Test Report Template

1 Site Details

Club (if applicable)	
Pitch location	
Site contact	
Telephone	
Email	
Surface Name	
Surface Manufacturer	
Infill Type	
Installation company	
Date of installation	

2 Test Laboratory Details

Test Laboratory Name			
Address			
Telephone			
Email			
Client			
Report Reference No.			
Date of Issue			
Prepared by		Signature	

3 Test Conditions

Date of test				
Type of test	Initial		Re-test	
Surface condition	Dry		Wet	
Surface temperature (°C)	Min		Max	
Ambient temperature (°C)	Min		Max	
Humidity (%)	Min		Max	
Max Wind speed (m/s)	Gaelic		Sliothar	

4 Test Programme

The artificial grass surface was tested in accordance with the procedures as described in the GAA performance and construction standards for Synthetic Turf Surfaces for Gaelic Fields (please tick).

2009 Edition	
2022 Edition	

5 Conclusions

Surface passed		***Surface failed***	

Stated reason(s) for failure	
General comments regarding current status of pitch	
Laboratory Director – name	
Laboratory Director – signature	
Date	

6 Detailed Test Results

a. Turf performance requirements

Test Method	***Specified range in accordance with 2022 standards***	***Units***	***Results***		***Pass/Fail***
Gaelic Football Rebound	***0.65 – 0.80m (field <18 months)*** ***0.65 – 1.0m (field >18 months)***	***M***	***Position 1***		
			Position 2		
			Position 3		
			Position 4		
			Position 5		
			Position 6		
			Position 7		
			Mean		

Test Method	Specified range in accordance with 2022 standards	Units	Results		Pass/Fail
Gaelic Football Ball Roll	4.5 – 7.0m (field <18 months) 4.5 – 10.0m (field >18 months)	M	Position 1		
			Position 2		
			Position 3		
			Position 4		
			Position 5		
			Position 6		
			Position 7		
			Mean		
Sliothar Ball Roll	5.0 - 9.0m (field <18 months) 5.0 – 12.0m (field >18 months)	M	Position 1		
			Position 2		
			Position 3		
			Position 4		
			Position 5		
			Position 6		
			Position 7		
			Mean		
Head Injury Criterion at 1.30 m	≤1000		Position 1		
			Position 2		
			Position 3		
			Position 4		
			Position 5		
			Position 6		
			Position 7		
			Mean		
Shock Absorption	55 – 65% (field <18 months) 50 – 65% (field >18 months)	%	Position 1		
			Position 2		
			Position 3		
			Position 4		
			Position 5		
			Position 6		
			Position 7		
			Mean		
Vertical Deformation	≤ 9.5 mm (field <3 months) ≤ 8.5 mm (field >3 months)	mm	Position 1		
			Position 2		
			Position 3		
			Position 4		
			Position 5		
			Position 6		
			Position 7		
			Mean		

Test Method	Specified range in accordance with standards	Units	Results		Pass/Fail
Rotational Resistance (studded sole)	35 – 55 Nm	Nm	Position 1		
			Position 2		
			Position 3		
			Position 4		
			Position 5		
			Position 6		
			Position 7		
			Mean		

b. Construction requirements

Field of play Dimensions (m)	
Length	
Width	
Artificial turf run off (m)	
Behind goals	
Wings	

Surface regularity in accordance with IS EN 13036-7	Pass/Fail*
No deviations ≥10 mm found anywhere on the field of play	

** If the surface fails, all undulations ≥10 mm shall be marked on Figure 1*

Water permeability in accordance with IS EN 12616	Pass/Fail*
The infiltration rate of the surface >150 mm/hr	

** If the surface fails, areas of concern shall be marked on Figure 1*

Gradient of surface (%)	Direction of maximum gradient

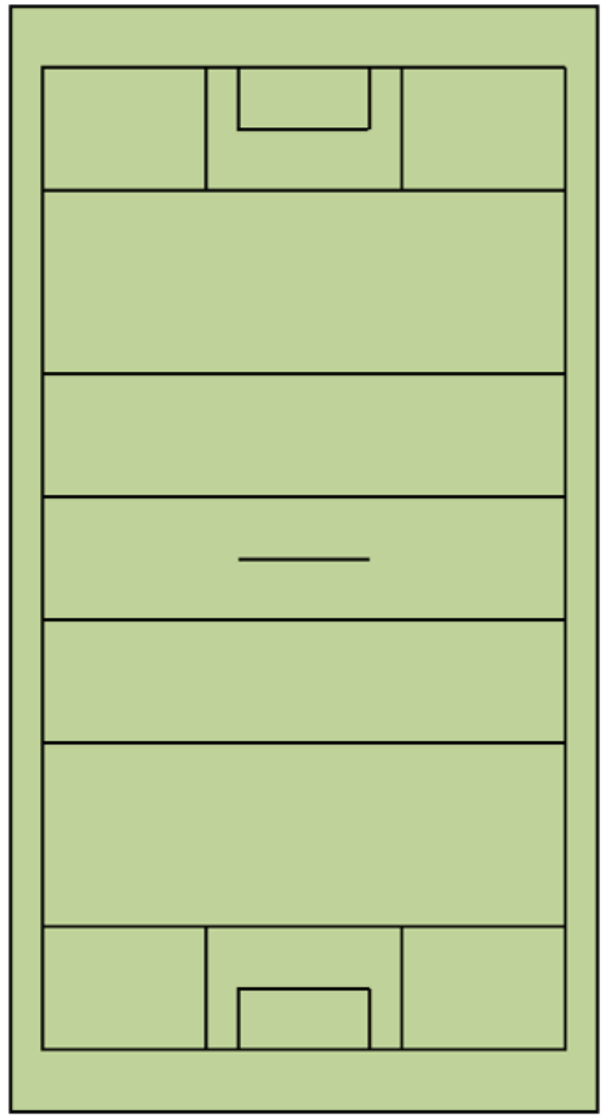


Figure 1

APPENDIX A – PRODUCT IDENTIFICATION

Component	Characteristic	Site Sample	Declaration	Variation (%)	Permitted Tolerance*	Pass/Fail
Properties of synthetic turf carpet	Pile height above backing				± 10%	
	Tufts per unit Area				± 10%	
	Filaments/m^2				± 10%	
	Pile weight				± 10%	
	Pile dtex				± 10%	
	Pile thickness				>90%	
	Pile profile				Same profile	
	Pile polymer characterisation				Same polymer	
	Carpet mass per unit area				± 10%	
	Carpet mass per unit area				>90%	
Properties of performance infill	Particle grading				60% between d and D	
	Particle shape				Similar shape	
	Bulk density				± 15%	
	Polymer composition				± 15%	
Properties of Stabilising infill	Particle grading				60% between d and D	
	Particle shape				Similar shape	
	Bulk density				± 15%	
Properties of shockpads & elastic layers	Thickness				90 – 130%	
	Mass per unit area				± 10%	
	Shock adsorption				± 5% SA	
	Water permeability				>90%	

*Maximum permitted difference between tested laboratory or pitch sample and manufacturer's declaration

National Pitch Workgroup comprises the following members:-

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