



Performance Standards for Non-Turf Cricket Pitches Intended for Outdoor Use [TS6]

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01 Introduction and Scope

This Standard describes the requirements for non-turf cricket pitch systems intended for outdoor use. It sets requirements for match pitches and practice areas. It does not set requirements for outfielders for which there are currently no standards.

The Standard has four sections:

Performance Requirements

These define the ball/surface and player/surface interactions considered necessary to allow a satisfactory game of cricket to take place.

Construction Requirements

These define the dimensions, tolerances and gradients for match pitches and practice areas to ensure they provide a satisfactory playing environment.

Material Requirements

These define the quality of the synthetic material used to construct non-turf pitches to ensure they will last for a realistic period of time.

Identification tests

Once a surfacing system has been shown to satisfy the performance and material requirements a series of tests are undertaken to characterise the materials used in the surface's construction so that they cannot be replaced by inferior or different materials.

This Standard should be read in conjunction with the ECB's *Code of Practice and Technical Requirements for the Design and Installation of Non-turf Cricket Facilities*, which defines the design and workmanship standards the ECB consider appropriate for non-turf pitches.

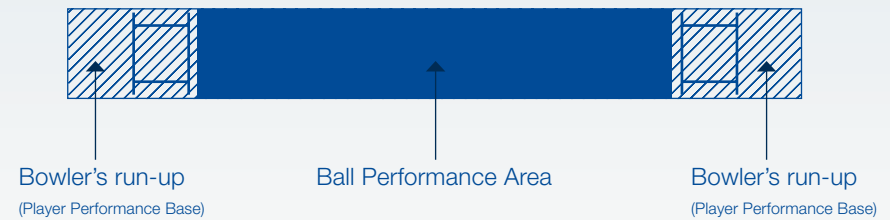
02 Normative References

Test methods from other publications are incorporated into this Standard by dated or undated reference. Where dated references are used, subsequent amendments to or revisions of any of these publications will apply to this Standard only when incorporated into it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

03 Definitions

03.1 Match pitch

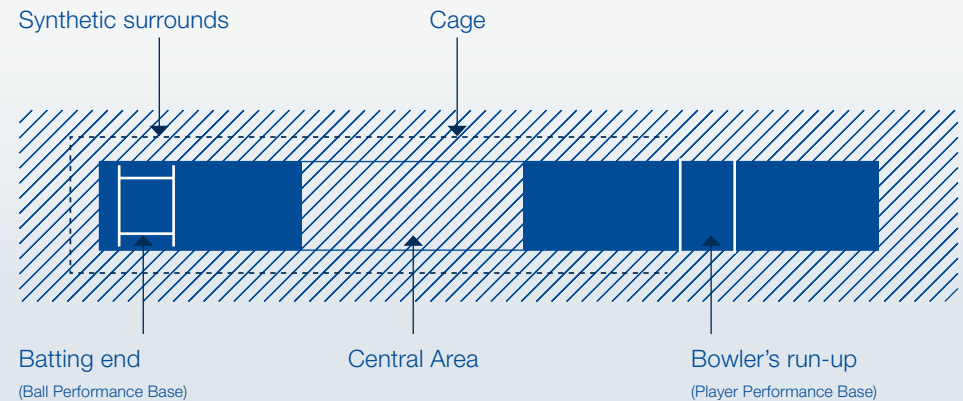
An area of non-turf (synthetic) surfacing together with its supporting layers, that is used for competitive play and comprises the principal playing area, which is the area between the wickets, and the two bowler's run-ups which extend beyond the wickets.



03.2 Practice pitches and areas

An area of non-turf (synthetic) surfacing, together with its supporting layers, that is used for practice and training activities. The area comprises two sections, a batting end and a bowling end with a central area in between.

The central area may be surfaced with the same synthetic surface as the batting and bowling ends (a continuous surface), an alternative form of synthetic surface or natural grass (not usually recommended due to increased maintenance).



03 Definitions

03.3 Wicket

The stumps and bails at each end of the match pitch or practice area.

03.4 Playing surface

All elements of the match pitch or practice area that influence the sports performance or biomechanical response of the surface including the non-turf surface, performance base and aggregate sub-base.

03.5 Non-turf surface

The upper layer of the playing surface on which the game is played; it may be formed from a synthetic turf, textile or synthetic material.

03.6 Ball performance base

Synthetic or particulate materials laid beneath the non-turf surface that are designed, in conjunction with the non-turf surface, to provide the ball performance (bounce, spin, pace etc.) of the playing surface.

03.7 Player performance base

Synthetic or particulate materials laid beneath the non-turf surface that are designed, in conjunction with the non-turf surface, to provide the dynamic performance of the playing surface as experienced by the player.

03.8 Synthetic surrounds

Synthetic surfacing that is used to surround the non-turf playing surface.

04 Classification

Surfaces are classified by their intended use and performance characteristics and not by materials or construction. There are three principal categories:

1. Junior (Under 12)
2. Club/Recreational
3. First Class Cricket & Centres of Excellence

All of which may be used for match play, practice, coaching and general training.

05 Test Conditions

05.1 Site tests

ECB approval tests shall be undertaken on facilities that have been subjected to at least 200 man hours of use by adults or 600 man hours of use by juniors on both batting and bowling ends.

Tests shall only be made during the cricket playing season under the prevailing meteorological conditions, but with the surface temperature in the range of +5°C to +40°C. The surface and ambient temperatures and the ambient relative humidity at the time of test shall be recorded and reported.

When ECB approval tests are being undertaken rotational resistance tests shall be made under dry and wet conditions. Wet tests shall be made in the test positions (see appendix A) that gave the highest and lowest mean values under dry conditions.

When tests are being undertaken for facility assessment purposes they shall be made under the prevailing site conditions unless performance under a particular condition is of concern.

Before the commencement of tests the match pitch or practice area should be prepared and maintained in accordance with the supplier's instructions to the satisfaction of the supplier and facility owner.

05.2 Wet tests

Wet test areas shall be prepared by evenly applying to the test piece a volume of water that thoroughly soaks the specimen (if in doubt this should be equal to the volume of the test specimen). Following wetting the test specimen shall be allowed to drain for 15 minutes and the test carried out immediately thereafter.

05.3 Laboratory tests

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

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

06 Test Laboratories

Tests for ECB approval shall only be made by ECB approved test laboratories.

07 Performance Requirements

07.1 Ball rebound

Ball rebound shall be measured from a drop height of 2000mm + 10mm in general accordance with BS EN 12235 using a cricket ball complying with BS 5993 and having a rebound on a rigid concrete floor of 640mm + 30mm. The results of the test shall be expressed as the absolute rebound in mm.

Note: a Reader Grade 1 County Ball has been found to satisfy these requirements.

Match pitches and practice areas shall be tested in the positions shown in Appendix A.

The ball rebound of match pitches and the batting ends of practice areas shall satisfy the requirements detailed in Table 1.

Table 1 - Ball rebound requirements		
Type of match pitch or practice net		
Junior	Club / Recreational	Centre of Excellence & First Class Cricket
240mm – 480mm	240mm – 520mm	320mm – 560mm

All test positions shall fall within the specified range.

The maximum individual result at any test position shall be no more than 1.5 times the minimum individual result at the test position.

The overall mean for all test positions shall be calculated. The variation from the overall mean of any test position shall be no greater than + 50mm of the overall mean.

07.2 Surface hardness – pitch of the ball area

When tested using the test procedure detailed in Appendix B the mean result for each test position shall be greater than 100 gravities. Match pitches and practice areas shall be tested in the positions shown in Appendix A.

07.3 Surface hardness – bowler’s run-ups

When tested using the test procedure detailed in Appendix B the mean result for each test position shall be less than 300 gravities. Match pitches and practice areas shall be tested in the positions shown in Appendix A.

07.4 Rotational Resistance (traction)

When tested under dry and wet conditions in accordance with BS EN 15301 Part 1 using the dimpled rubber test sole the rotational resistance of the playing surface, including any synthetic surrounds, shall be between 25Nm and 50Nm. Synthetic surrounds shall have values within + 5 Nm of the mean value of the playing surface.

Match pitches and practice areas shall be tested in the positions shown in Appendix A. Synthetic surrounds shall be tested in at least five positions selected at random. All test positions shall fall within the specified range.

08 Construction Requirements

08.1 Dimensions

The minimum dimensions of non-turf cricket pitches and practice areas shall be as detailed in the Table 2. The area of the ball performance base shall be constructed from continuous rolls of material with no seams or joints in the non-turf surface or ball performance base.

Table 2a – minimum dimensions of match pitches						
	Overall area		Area containing performance bases			
	Length	Width	Ball Performance Base		Player Performance Base	
			Length	Width	Length*	Width
Match Pitches						
Club/Recreational	30.0m	2.74m	16.12m	2.0m	6.94m	2.5m
Junior (Under 12)	24.0m	2.74m	15.22m	2.0m	4.40m	2.5m
Centres of excellence	32.0m	3.00m	16.12m	2.5m	7.94m	2.5m
* to include 0.6m in front of popping crease at either end.						

Table 2b – minimum dimensions for club/recreational practice areas						
	Overall area		Area containing performance bases			
			Ball Performance Base		Player Performance Base	
			Length	Width	Length	Width
Batting end	11.0m	2.74m	11.0m	2.0m	-	-
Bowling end in front of delivery crease	4.0m	2.74m	-	-	4.0m	2.5m
Bowling end behind delivery crease	4.0m	2.74m	-	-	3.9m	2.5m
Central area	The distance between the batting and bowling wickets shall 20.12m (22yds).					

08 Construction Requirements



Table 2c – minimum dimensions for junior practice areas						
Overall area			Area containing performance bases			
			Batting end		Bowler's run-up	
			Length	Width	Length	Width
Batting ends	10.0m	2.74m	10.0m	2.0m	-	-
Bowling end in front of delivery crease	4.0m	2.74m	-	-	4.0m	2.5m
Bowling end behind delivery crease	4.0m	2.74m	-	-	3.9m	2.5m
Central area	The distance between the batting and bowling wickets shall 19.22m (21yds).					

Table 2d – minimum dimensions for practice areas at centres of excellence						
Overall area			Area containing performance bases			
			Batting end		Bowler's run-up	
			Length	Width	Length	Width
Batting ends	18.0m	3.0m	18.0m	2.5m	-	-
Bowling end in front of delivery crease	10.0m	3.0m	-	-	9.9m	2.5m
Bowling end behind delivery crease	5.0m	3.0m	-	-	5.0m	4.9m
Central area	The distance between the batting and bowling wickets shall 20.117m (22yds).					

08 Construction Requirements

Table 2c – minimum dimensions for junior practice areas						
Overall area			Area containing performance bases			
			Batting end		Bowler's run-up	
			Length	Width	Length	Width
Batting ends	10.0m	2.74m	10.0m	2.0m	-	-
Bowling end in front of delivery crease	4.0m	2.74m	-	-	4.0m	2.5m
Bowling end behind delivery crease	4.0m	2.74m	-	-	3.9m	2.5m
Central area	The distance between the batting and bowling wickets shall 19.22m (21yds).					

Table 2e – minimum dimension of practice area surrounds		
Club / Recreational and Junior	Distance from stumps to netting at batting end	1.50m
	Distance outside cage frame	0.17m
Centres of Excellence	Distance from stumps to netting at batting end	3.00m
	Distance outside cage frame	0.17m

08.2 Surface regularity

08.2.1 Match Pitches

When tested in accordance with BS 7370: Part 3, Appendix 4 the maximum undulation shall be in accordance with Table 3.

08 Construction Requirements

08.2.2 Practice areas

When tested in accordance with BS 7370: Part 3, Appendix 4 the maximum undulation shall be in accordance with Table 3.

Table 3 – Surface regularity	
Playing surface	
Straightedge length	Maximum undulation
2.0m	6 mm
0.3m	4 mm
Transition from playing surface to surrounds (Match Pitches and Practice Areas)	
2.0m	10 mm
0.3m	4 mm
Synthetic surrounds and central areas	
2.0m	6 mm

08.3 Slope

08.3.1 Match Pitches

When match pitches are constructed on existing cricket squares they shall follow the general gradient of the square and where possible comply with Table 4.

Match pitches not located on existing cricket squares shall be constructed in a single plane with a slope not exceeding the requirements of Table 4 unless the existing topography makes this cost prohibitive in which case the client shall agree in advance to a deviation from this requirement.

08 Construction Requirements

08.3.2 Practice Areas

Practice areas shall be constructed in a single plane with a slope not exceeding the requirements of Table 4. Where separate batting and bowling ends are used they, along with the central area, shall be built on the same plane and level.

Table 4 – maximum gradients	
Along line of play	1.25%
Across line of play	2.0%

08.4 Surface water drainage/run-off

The design of match pitches and practice areas shall ensure that water does not pond on the playing surface for more than 15 minutes after rain fall stops.

08.5 Markings

Match pitches and practice areas shall be marked out in accordance with the laws of the game. At hand over and for at least the following 100 man hours use the markings shall be clearly visible from a distance of 20m.

Markings are considered to be part of the playing surface and as such shall not affect the performance of the playing surface outside the requirements of this standard.

09 Material Requirements

Synthetic turf and textile surfaces used to form the playing surface, central areas and synthetic surrounds shall satisfy the following requirements:

09.1.1 Abrasion Resistance of non-filled surfaces

When tested in accordance with BS EN 13672 the percentage mass loss after 2000 cycles shall be equal to or less than 5%.

09.1.2 Tuft withdrawal

When tested in accordance with ISO 4919 the tuft withdrawal force of tufted carpets shall be greater than 30N.

09.1.3 Tensile properties of carpet

When tested in accordance with BS EN ISO 13934 Part 1 the maximum force shall be greater than 15N.

09.1.4 Resistance to artificial weathering

Following artificial weathering in accordance with BS EN 14836 the synthetic turf or pile yarn(s), as appropriate, shall satisfy the relevant requirements of Table 5.

Table 5 – Resistance to Artificial Weathering		
Property	Test Method	Requirement
Colourfastness	ISO 105 – AO2	> Grey Scale 3
Tensile strength of yarn	BS EN 13864 or BS ISO EN 5079 as appropriate	50% of the tensile strength of the unaged yarn

09 Material Requirements

09.1.5 Joint strength

Where synthetic turf materials are designed to be bonded or stitched together they shall be tested for joint strength in accordance with BS EN 12228 following hot water ageing in accordance with BS EN 13744. The joint strength shall satisfy the requirements of Table 6.

Table 6 – Joint strength		
Type of joint	Test Method	Requirement
Stitched or welded	BS EN 12228 Method A	> 1000N/100mm
Bonded joints	BS EN 12228 Method B	> 25N/100mm

09.1.6 Surface Gloss

The surface shall be sufficiently matt to avoid glare.

09.2 Synthetic surfaces

Synthetic surfaces shall satisfy the following requirements:

09.2.1 Abrasion resistance

When tested in accordance with BS EN 13672 the weight loss after 1000 cycles shall be no greater than 3.0g.

09.2.2 Tensile Strength

When tested in accordance with BS EN 12330 the tensile strength of the surface shall be equal to or greater than 0.4Mpa.

09 Material Requirements

09.2.3 Joint Strength

When tested in accordance with BS EN 12228 the strength of welded or stitched joints shall be equal to or greater than 1500N/100mm.

09.2.4 Surface Gloss

The surface shall be sufficiently matt to avoid glare.

09.2.5 Resistance to artificial weathering

Following artificial weathering in accordance with BS EN 14836 the synthetic surface shall satisfy the relevant requirements of Table 7.

Table 7 – Resistance to Artificial Weathering		
Property	Test Method	Requirement
Colourfastness	ISO 105 – AO2	> Grey Scale 3
Tensile strength	BS EN 12330	> 0.4Mpa
Abrasion resistance	BS EN 13672	<3.0g

10 Product Identification



Each element of an ECB approved non-turf cricket surface shall be identified using the test methods detailed in Table 8. Materials used to subsequently construct non-turf pitches for which the supplier is claiming or implying ECB Approval shall not differ from the approved materials by more than the tolerances stated in Table 8.

Table 8 – Product identification and consistency			
Component	Characteristic	Test method	Max variation
Artificial turf and pile yarn(s)	Mass per unit area	ISO 8543	< ± 10%
	Tufts per unit area	ISO 1763	< ± 10%
	Tuft withdrawal force	ISO 4919	< ± 10%
	Pile length	ISO 2549	< ± 5%
	Pile weight	ISO 8543	< ± 10%
	Pile yarn characterisation	DSC	Same polymer
Under layers	Mass per unit area	ISO 8543	< ± 10%
	Thickness	BS EN 1969	No less than 90%
	Polymer composition	DSC or Thermo-gravimetric analysis	Same polymer
Synthetic surfaces	Mass per unit area	ISO 8543	< ± 10%
	Thickness	BS EN 1969	No less than 90%
	Polymer composition	DSC or Thermo-gravimetric analysis	Same polymer
Aggregate used in performance bases and infills	Particle size	EN 933 - Part 1	Similar grading
	Particle shape	prEN 14955	Similar shape
	Bulk density	EN 1097-3	+ 15%

Appendix A Site Tests

Tests shall be carried out in the positions detailed in Table A1 or in the case of a dispute in the area of concern.

Table A1 - Test positions		
Property	Match pitch	Practice net
Ball rebound	Five individual tests across the pitch in each test segment a to j as shown on Figure 1	Five individual tests across the pitch in each test segment a to e as shown on Figure 2
Surface hardness	Five individual tests across the pitch in segments a, c, e, g, and i as shown on Figure 1	Five individual tests across the pitch in segments a, c and e as shown on Figure 2
Rotational Resistance	Five individual tests in the positions shown in Figure 2 and test segments d and g shown on Figure 1	Five individual tests across each position shown in Figure 2 and individual tests in each position shown in Figure 3
Surface hardness (bowler's run-up)	Five individual tests in the each position shown in Figure 3	Five individual tests in the each position shown in Figure 3

The surface regularity of the non-turf surface and synthetic surrounds shall be measured over the entire area; both along the length and across the width. The position and magnitude of any undulations found that exceed the specified maximums shall be recorded and detailed in the test report.

The surface regularity of the transition from the non-turf surface or synthetic surrounds to the surrounding natural turf shall be measured along each boundary by placing the 2m straightedge across the transition, with a 0.5m length of the straightedge on the non-turf surface or synthetic surrounds and a 1.5m length of the straightedge on the

natural turf surround, as shown in Figure 4. The position and magnitude of any undulations found that exceed the specified maximums shall be recorded and detailed in the test report.

Test reports shall detail the orientation of the pitch/practice net so test positions can be subsequently identified.

Figure 1 – tests positions

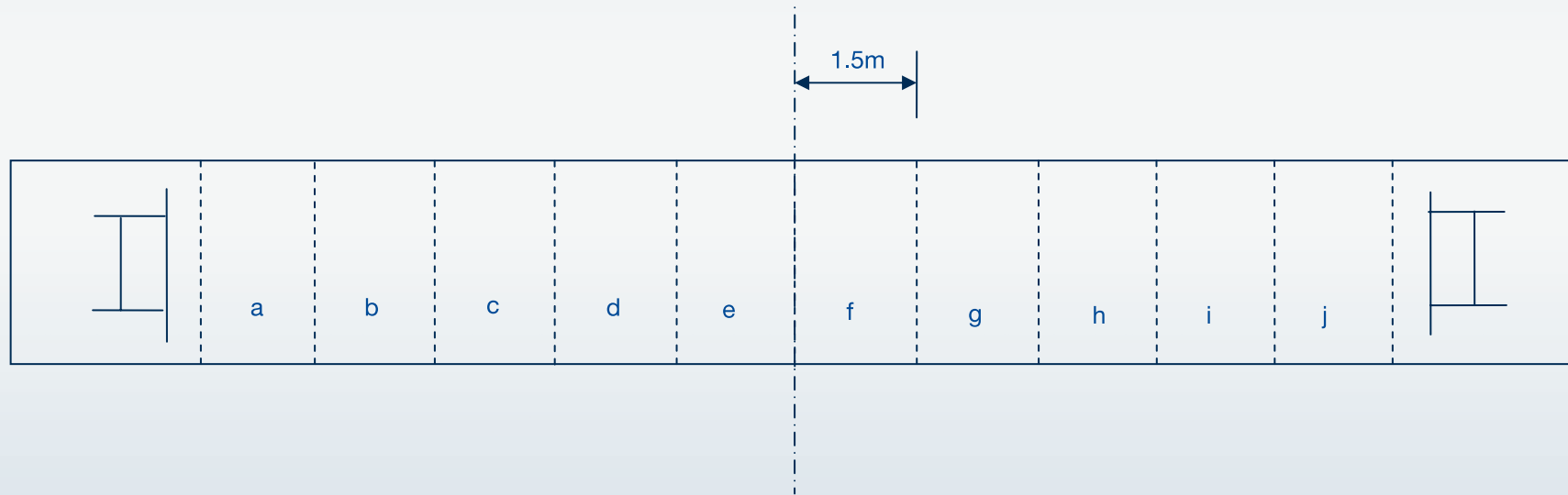


Figure 2 – tests positions

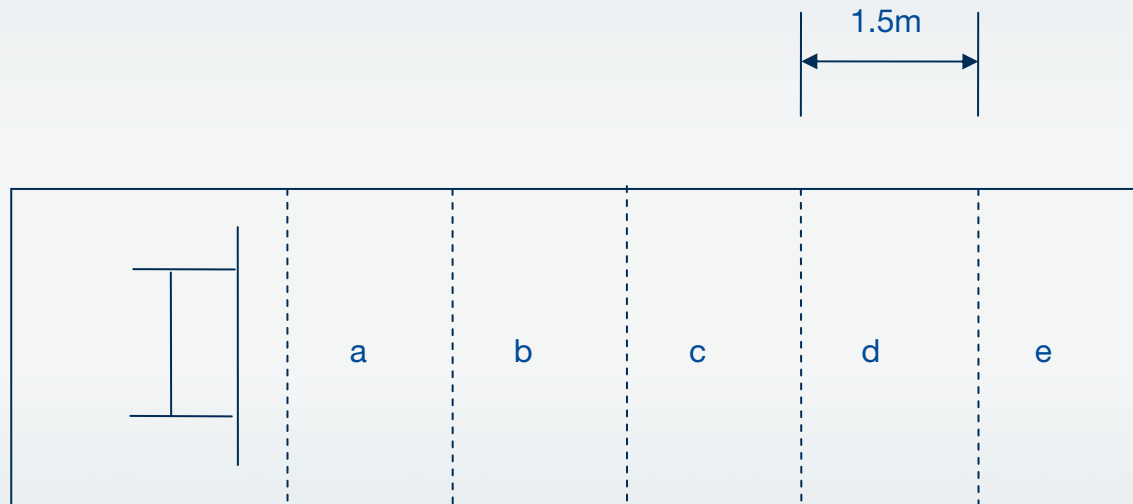


Figure 3 – tests positions

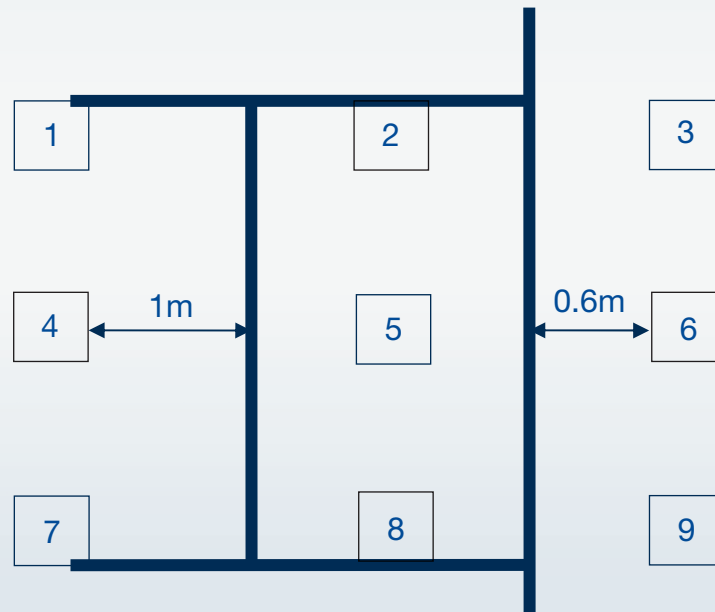
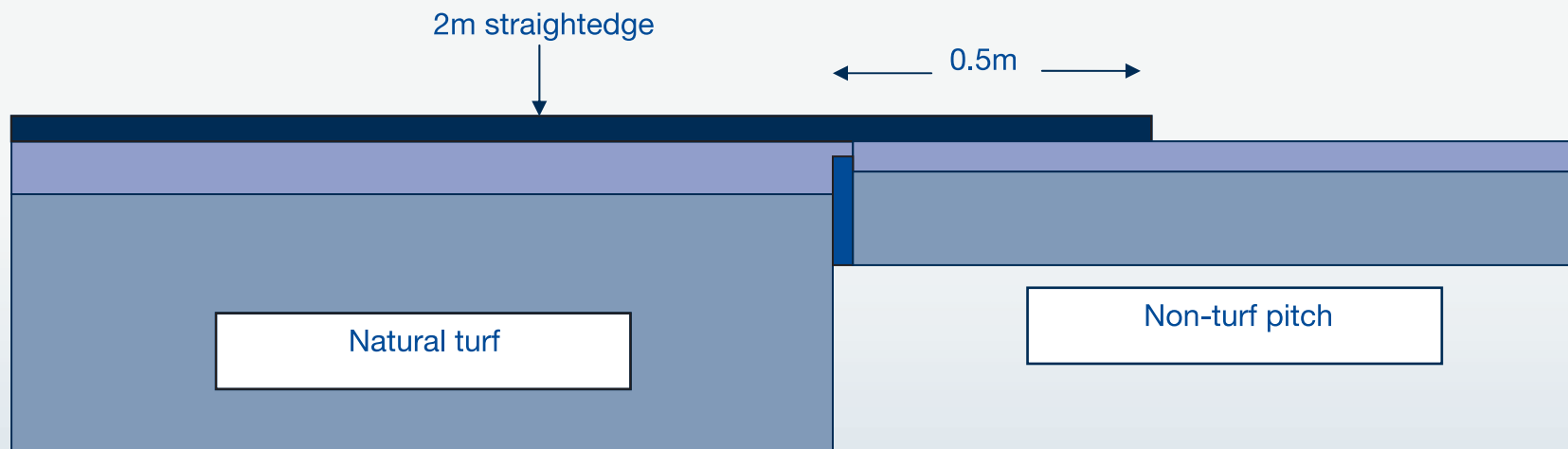


Figure 4 – assessment of regularity at transition between natural turf and synthetic surfacing



Appendix B Method of test for determination of surface hardness

1 Principle

A cylindrical mass is released from a standard height and its peak deceleration during impact with the surface is recorded.

2 Apparatus

A Clegg Impact Soil Tester shall be used. The apparatus consists of a cylindrical compaction hammer with a mass of 2.25kg and a diameter of 50mm attached to a piezoelectric accelerometer which feeds into a peak level digital meter. The peak deceleration of the hammer on impact with the ground shall be displayed in units of gravities.

3 Procedure

Ensure that the guide tube is held vertically and drop the compaction hammer down the tube from a height of 450+10mm. After the impact of the hammer on the surface record the peak deceleration in units of gravities.

Repeat the procedure five times in each test position moving the guide tube by at least 100mm so that the compaction hammer does not impact with the surface on the same spot twice.

4 Expression of Results

Calculate the mean hardness value of the five individual impacts for each test position.