

Laboratory Report AS-0703

Multi Si-PU

Synthetic surfacing

Summary:

A programme of testing has been carried out on Multi Si-PU, a synthetic surfacing from STF International Construction Engineering Limited. The product was tested to the requirements of *BS EN 14877: 2013 - "Synthetic surfaces for outdoor sports areas - Specification"*.

This report describes the method of test employed and details the results obtained.

Reported by:



Susana Ruiz de Castroviejo
Operations Manager

Date of this report:

1st December 2022

*Tests marked * are outside the scope of our accreditation under UKAS*

Contents

1	Introduction.....	3
2	Sample Details.....	4
3	Test Procedures.....	5
3.1	Shock Absorption.....	5
3.2	Vertical Deformation.....	5
3.3	Resistance to Wear*.....	5
3.4	Tensile Properties*.....	5
3.5	Absolute Thickness.....	5
3.6	Colour*.....	5
3.7	Friction*.....	6
3.8	Vertical Ball Rebound.....	6
3.9	Artificial Weathering*.....	6
4	Results.....	7-9
5	Conclusions.....	9
	Appendix 1- Test Certificate.....	10

1 INTRODUCTION

Instructions were received from Jason Zhang of STF International Construction Engineering Limited to carry out a programme of testing on their sports surfacing *Multi Si-PU*. The product was tested to the requirements of *BS EN 14877: 2013- "Synthetic surfaces for outdoor sports areas – Specification"*.

This standard lays down different requirements for surfaces intended for Athletics, Multi sports and Tennis and the performance of the product was compared with the requirements for Multi sports use.

Samples were received from:

STF International Construction Engineering Limited
Room 2103
Tung Chiu Commercial Centre 193
Lockhard Road, Wan Chai
Hong Kong
CHINA

Samples were tested at Centre for Sports Technology facility:

CST
Unit C
Circle Line House
8 East Road
CM20 2BJ
UK

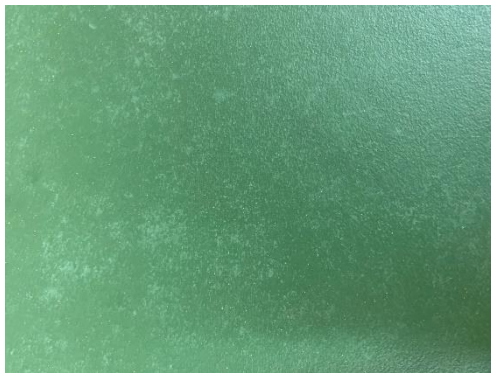
The results obtained relate only to sample provided for test.

Sample was tested in the "as received" condition unless otherwise stated.

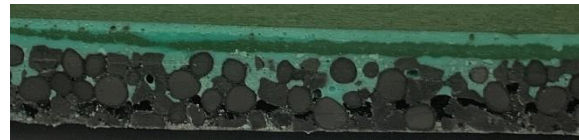
2 SAMPLE DETAILS

4 No. identical samples of Multi Si-PU, measuring 500 x 500mm, were supplied for test. The samples were received on 24th July 2022.

Multi Si-PU is a non permeable, synthetic surfacing constructed in two layers with an overall thickness of 12.9mm. The bottom layer was formed of resin bound, black rubber crumb approx. 7.6mm thick and the top layer was polyurethane, approx. 5.3mm.



Top surface



Cross-section

Samples were tested at 23°C and 44% RH.

Samples were assembled on a rigid concrete substrate for testing.

3 TEST PROCEDURES

The following tests methods were carried out:

- 3.1 Shock Absorption** is determined using the method described in EN 14808:2005. This test measures the degree by which the surface reduces the impact force which occurs when an athlete lands on it. The test was devised to simulate the forces observed when a runner's heel strikes the ground. The apparatus consists of a 20kg mass, which is allowed to fall onto a stiff spring resting on the floor. The force which results from the impact depends on the relative stiffness of the floor to that of the spring. The test is carried out on a concrete floor as well as on the floor under test and the result quoted is the amount by which the force measured on the test floor is lower than the force measured on concrete.
- 3.2 Vertical Deformation** is determined using the method described in EN 14809:2005. In this test, the amount by which the floor deflects under impact load is measured directly. The test is similar in principle to the shock absorption test. However, a softer spring is used and the drop height is adjusted so that the peak force produced falls within a certain range.
- 3.3 Resistance to Wear*** was performed in accordance with EN ISO 5470-1:1999 and utilises the Taber Abraser apparatus fitted with Type H18 wheels, each operating under a 1kg load. The mass loss between 500 and 1500 cycles shall be less than 4g. A value outside this range implies that the material could change its behaviour significantly once the surface coating had abraded away. To assess the environmental resistance of the product the same test, carried out on a specimen in the as-received condition, is repeated after artificial weathering in accordance with EN 14836:2005.
- 3.4 Tensile Properties*:** The Tensile Strength and Elongation at Break were determined according to the method described in EN 12230:2003 and shall be not less than 0.4MPa and 40% respectively. To assess the environmental resistance of the product under test, the same test carried out on a specimen in the as-received condition is repeated after artificial weathering in accordance with EN 14836:2005.
- 3.5 Absolute Thickness** was determined as described in EN 1969:2000, Method A (destructive test method) where a core of the sample was taken and its thickness measured with a dial gauge before and after abrading the top layer with a grade 60 abrasive paper.
- 3.6 Colour*** is assessed following method described in EN ISO 20105-A02.

3.7 Friction* is determined using the method described in EN 13036-4:2011, using the CEN rubber and in both dry and wet conditions. This test uses a pendulum carrying at its end a spring-loaded slider, which makes contact with the surface over a set distance. The angle through which the pendulum swings after it has made contact with the surface to test depends on the friction between the slider and the floor. The standard specifies that a value between 55 and 110 units should be obtained under either wet or dry conditions and no individual test result shall differ from the mean by more than four units.

3.8 Vertical Ball Rebound was determined using a basketball following the method described in EN 12235:2013 in which the rebound height is measured acoustically and quoted relative to the rebound from concrete from the same drop height.

3.9 Effects of Ageing*

After exposing the surface to artificial weathering in accordance with EN 14836:2005, any effects on the surface are assessed by re-measuring shock absorption, tensile strength, resistance to wear and spikes and colour to determine the degree of change. The sample is subjected to an exposure of 4896±125kJ (takes 3000h with cycling to complete).

4 RESULTS

4.1 GENERALLY

BS EN 14877: 2013 sets out different performance requirements for outdoor sports facilities intended for three different applications: Athletics, Tennis and Multi-sports. The product was assessed against the requirements for Athletics applications.

4.2 Shock Absorption

The requirements for shock absorption depend on the application and the results obtained place the product in one or other Type for each application, thus:

Multi Sports		
SA25 - SA34	SA35 -SA50	SA45 -SA70
25-34	35-50	45-70

Results:

Tested:	Unit	Accuracy ¹	Result
@ 10°C	%	± 1	31
@ 23°C			32
@ 40°C			33
After artificial ageing	%	± 1	33

¹ Accuracy refers to the precision of the test.

4.3 Vertical Deformation

	Unit	Accuracy ¹	Result	Requirements Multi Sports
@ 10°C	mm	± 0.1	1.3	≤ 6
@ 23°C			1.3	
@ 40°C			1.4	

¹ Accuracy refers to the precision of the test.

4.4 Resistance to Abrasive Wear*

	Units	Accuracy ¹ (±)	As received	After artificial weathering	Requirement Multi Sports
Wear Index	g	0.02g/1000 revs	3.45	3.70	≤ 4.0

¹ Accuracy refers to the precision of the test.

4.5 Tensile Properties*:

	Tensile strength (MPa ± 0.02)	Elongation @ break (% ± 5)
As received	0.76	104
After artificial weathering	0.82	127
Requirement – Athletics	≥ 0.40	≥ 40

4.6 Thickness:

	Units	Accuracy ¹	Result	Requirement Multi Sports
Overall	mm	± 0.01	12.9	-
Absolute			8.4	≥ 7

¹ Accuracy refers to the precision of the test.

4.7 Colour*

	Units	Accuracy ¹	Result	Requirement – Multi Sports
As received	Methuen	± 1	28D Deep green	For identification only
Colour change after ageing	Grey Scale	± 1	No change	No less than 3

¹ Accuracy refers to the precision of the test.

4.8 Friction*

	Units	Accuracy ¹ (±)	Result	Requirement – Multi Sports
Dry	μ	3	94	80-110
Wet	μ	3	68	55-110

¹ Accuracy refers to the precision of the test.

4.9 Vertical Ball Rebound

	Units	Accuracy ¹ (±)	Result	Requirement Multi-sport
Basketball	%	1	98	≥ 85

¹ Accuracy refers to the precision of the test.

5 CONCLUSIONS

5.1 When tested according to *BS EN 14877: 2013 - "Synthetic surfaces for outdoor sports areas - Specification"* the sample of **Multi Si-PU** tested conformed to the requirements for Multi Sports use with regards to its:

- Friction* (wet and dry)
- Shock Absorption (Type SA24–SA34)
- Vertical Deformation
- Absolute Thickness
- Resistance to Wear*
- Tensile Properties *
- Vertical Ball Rebound
- Colour*
- Effects of Ageing*

5.2 Results relate only to the sample provided for test.

END OF TEXT

Appendix 1 - Test Certificate

TEST CERTIFICATE

THIS IS TO CERTIFY THAT THE SAMPLE OF

Multi Si-PU

Supplied for test by:

STF International Construction Engineering Limited

has been tested in accordance with BS EN 14877: 2013- "Synthetics surfaces for outdoor sports areas – Specification" and met the following requirements relative to a surface for:

"Multi Sports use"

Friction* (wet and dry)
Shock Absorption (Type SA25–SA34)
Vertical Deformation
Absolute Thickness
Resistance to Wear*
Tensile Properties *
Vertical Ball Rebound
Colour*
Effects of Ageing*



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Susana Ruiz de Castroviejo
Operations Manager



Date: 1st December 2022

IMPORTANT: The performance of many sports and recreation surfacing products can be influenced by changes to their thickness, density and other properties and by the manner in which they are installed. The sample was tested in the "as received" condition unless otherwise stated. Reference should always be made to the Laboratory Report relating to this Certificate, to ensure relevance to the intended situation. The Laboratory Report to which this Certificate relates is numbered:

AS-0703 dated 1st December 2022

CST is a member of the International Association for Sports Surface Sciences (ISSS) and formally accredited by the World Athletics (WA), the International Tennis Federation (ITF), World Squash Federation (WSF), World Bowls (WB), International Basketball Federation (FIBA) and the Union des associations européennes de football (UEFA) for the testing of products to their specification.