



**SYNTHETIC TURF LANDSCAPING FLOOR
COVERINGS FOR OUTDOOR USE**
ESTO QUALITY CLASSIFICATION



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Scope

This document describes the ESTO classification of synthetic turf landscaping floor coverings that are designed for outdoor use. It details how the products are classified based on their resistance to pile wear and fibrillation and the pile's ability to remain vertical when subjected to simulate use. It also describes an 'ESTO Luxury Rating' based on the appearance and feel of certain types of synthetic turf landscaping turf.

The objective of the ESTO Classification is to provide guidance in the form of a set of criteria and testing methods, to assist interested parties in comparing the relative performance, durability and appearance of different landscaping turfs.

The Classification only applies to Landscaping Turfs designed for outdoor use. Landscaping Turfs designed for indoor use are already covered by European Standard EN 14041: *Resilient, Textile and Laminate floor coverings. Essential Characteristics*.

The document has been developed with administrative support from the European Synthetic Turf Organisation (ESTO). This document is not, nor is intended to create, a standard or equivalent for landscaping turf (although it may in time be used as a basis for an application for the establishment of a European CEN standard in the future). It is not intended to impose any obligations or have binding effects on any party, nor is it intended as a recommendation of any particular product or manufacturer; purchasers should independently obtain information relevant to their specific situation prior to any purchase.

1. Normative references

This Classification makes reference to the following documents, in whole or in part. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 933-1 Test for geometrical properties of aggregates – Part 1: Determination of particle size distribution – sieving method

EN 986, Textile floor coverings — Tiles — Determination of dimensional changes due to the effects of varied water and heat conditions and distortion out of plane

EN 1097-3 Tests for mechanical and physical properties of aggregates – Part 3: Determination of loose bulk density and voids

EN 1963:2007, Textile floor coverings — Tests using the Lisson Tretrad Machine

EN 1969 Surface for sports areas – Determination of thickness of synthetic sports surfaces

EN 13746 Surfaces for sports areas. Determination of dimensional changes due to the effect of varied water, frost and heat conditions

EN 14836 Synthetic surfaces for outdoor sports areas – Exposure to Artificial weathering

EN 14955 Surfaces for sports areas- Determination of composition and particle shape of unbound mineral surfaces for outdoor sports areas

EN 15306 Surfaces for outdoor sports areas – Determination of resistance to wear of synthetic turf

ISO 105-J03 Textiles – Tests for colour fastness – Part J03: Calculation of colour differences

ISO 1763, Carpets — Determination of number of tufts and/or loops per unit length and per unit area

ISO 1765, Machine-made textile floor coverings — Determination of thickness

ISO 1766, Textile floor coverings — Determination of thickness of pile above the substrate

ISO 2424, Textile floor coverings — Vocabulary

ISO 2549 Textile floor coverings – Hand-knotted carpets – Determination of tuft leg length above the woven ground

ISO 2551, Machine-made textile floor coverings — Determination of dimensional changes due to the effects of varied water and heat conditions

ISO 4919, Carpets - Determination of tuft withdrawal force

ISO 8543, Textile floor coverings - Methods for determination of mass

ISO 11357-3 Plastics – Differential scanning calorimetry (DSC) – Part 3: Determination of temperature and enthalpy of melting and crystallization

2. Terms and definitions

For the purposes of this document the Terms and Definitions detailed in ISO 2424 apply. In addition the following Terms and Definitions also apply:

- 2.1**
Landscaping turf - woven, knitted or tufted synthetic turf floor covering; with a pile of monofilament or split tape yarn that is designed to replicate the appearance of natural grass (irrespective of colour).
- 2.2**
Carpet tile - a textile floor covering of predetermined shape intended to be used in a modular mode (see ISO 2424 for more details)
- 2.3**
Non-adhered tile (loose laid) - tile installed loose or free (see ISO 2424 for more details)
- 2.4**
Adhered tile - tile installed by full adhesion or partial adhesion to the underlying floor (see ISO 2424 for more details)
- 2.5**
Nominal value - a property or value declared by the Landscaping Turf manufacturer
- 2.6**
Fibrillation - the splitting of one filament/tape in two or more strands. On tapes yarns this is where splitting occurs that are not a result of incisions made during the manufacturing of the yarn.
- 2.7**
Felting - the splitting of one filament/tape into five or more strands.
- 2.8**
Filament - A single strand made during production or a tape with the incisions made during manufacturer.
- 2.9**
Infill - Particulate material laid within the pile to provide support and stability to the Landscaping Turf.

3. Levels of use classification

Landscaping Turf is classified by ESTO on its suitability for different levels of use, which are based on the performance requirements detailed in Section 7. Three categories have been established, as described in Table 1.

Table 1 — Levels of use classification

Level of use	Typical examples
Light use	Decorative use with limited foot traffic
Medium use	Domestic use (gardens, etc) with moderate foot traffic
Heavy use	Commercial and public areas with high foot traffic

4. Product identification requirements

The following information on the Landscaping Turf shall be reported in the Summary Test Report. See Annex B for an example of the report's format).

- » Product name and any commercial references
- » type of manufacture process used to produce the landscaping turf (Annex B ref 1);
- » type of surface (Annex B ref 2)
- » type of primary backing (if applicable) (Annex B ref 3)
- » type of secondary backing (if applicable) (Annex B ref 4)
- » type of yarn (Note EU regulation 1007/2011 applies to the fibre composition and is incorporate into national regulations of member states of the European Community)
- » type of infill (if applicable)
- » the nominal values of the characteristics listed in Table 2.

Table 2 : Characteristics

Table 2 : Product Identification characteristics to be declared by the manufacturer and measured and reported by test institute, together with permitted production tolerances

Characteristic	Test method	Tolerances (to nominal value)
Landscaping Turf		
Pile length above the carpet backing (in mm)	ISO 2549	± 2mm
Total mass per unit area of the Landscaping Turf (in g/m ²)	ISO 8543	± 15%
Mass of the pile above the substrate per unit area (in g/m ²)	ISO 8543	+ 15% / -10%
Number of tufts or loops (per m ²)	ISO 1763	+ 10% / -10%
Colour(s) of the pile yarn - L*a*b*	ISO105-J03	ΔE+/-2
Infill materials (if applicable)		
Particle grading of infill materials (if applicable)	EN 933-1	60-100% between d and D
Bulk density of infill materials (if applicable)	EN 1097-3	±15%
Shape of infill materials(if applicable)	EN 14955	Similar shape

a NOTE

EU regulation 1007/2011 covers the fibre composition and is reflected in national regulations

5. Principal requirements

5.1 Landscaping Turf shall conform to the principal requirements specified in Table 3

Table 3: basic and safety requirements

Characteristic	Test method	Requirements
Resistance to artificial weathering of the pile yarns	EN 14836 (a)	Degradation in tensile strength: <50% of unaged strength Colour fastness: grey scale >3
Tuft Withdrawal	ISO 4919	≥ 20 N
Dimensional stability (c)	EN 13746	Shrinkage ≤1.0% (c) Extension ≤1.0% (c)
Water permeability d)	EN 12616	min 150mm/h
Migration of heavy metals (e)	EN 71-3	The heavy metals content of each component shall comply with EN 71-3 table 2 category 3

- a 5.1 The use of previous test results for the resistance of artificial weathering of piles is allowed if:
- » The original tests were made by an ESTO member testing body
 - » The same polymer is used in both yarns – to be proved by DSC in accordance with ISO 11357-3
 - » The pile thickness of each filament is a minimum of 90% of the previously tested yarn
 - » The yarn has same profile and colour ($\Delta E+/-2$)
 - » A declaration by the yarn manufacturer states that the same colour pigments have been used in each yarn master-batch
- b 5.2 At the every stage of the test due to the varied effects of the temperature and water conditions
- c 5.3 Conformity to be declared by the manufacturer. This requirement may not be necessary if installation method are used that prevents shrinkage or extension.
- d Only applicable for systems designed to be permeable.
- e 5.4 Test shall be undertaken on all components forming the landscaping turf.
- The use of previous yarn results for the migration of heavy metals may be carried forward if:
- » The report was made by an ESTO member testing body
 - » The same polymer is used (proven by DSC: ISO 11357-3)
 - » The yarn has same colour ($\Delta E+/-2$)
 - » A declaration by the yarn manufacturer states that the same colour pigments have been used in each yarn master-batch
- The use of previous results for backing and coating may be carried forward if a signed declaration is provided by the manufacturer and the test report was made by an ESTO member testing body

5.2 In addition, for carpet tiles the additional requirements detailed in Annex A shall apply.

6 Classifications

6.1 Determination of the ESTO Use Class

Landscaping Turf is classified by assessing the turf's ability to withstand the effects of simulated use in terms of the carpet pile's ability to remain vertical (Pile Standing), fibre loss and fibrillation.

Following simulated use conditioning for 2000 cycles in accordance with EN 15306 but without the chain linking the two rotating rollers and using a rollers coated with a Lisson tetrad rubber sole (see annex C) instead of football studs.

At least 24 hours after the simulated wear test, the pile height of the test specimens of the original and conditioned samples shall be measured in accordance with EN 1969 Method B on three places and the total pile height above the backing (not stretched) measured.

The fibrillation factor is evaluated by taking out 20 tufts from the uniform abraded surface and assessing on how many tufts the filament/tape is splitting. Fibrillation/felting is only considered to occur if 10 or more filaments or parts of a, tape in between the incisions, are showing fibrillation or felting (as described in the definitions).

The Fibre Loss Factor is calculated by weighing each of the 20 tufts taken out of the carpet for the determination of the fibrillation factor. The number of tufts with a weight of less than 25% of the original weight shall be determined.

Calculations:

ESTO Use Factor = P+S+F+L

Where:

Pile height factor P:

Pile factor P = $\frac{\text{average pile height before Lisport} - \text{average pile height after Lisport}}{\text{Average pile height before Lisport}} * 100$

Pile Standing factor S: (see annex D)

- » straight piles: 0
- » flat piles: 50
- » pile in between straight and flat: 25

Fibrillation factor F:

- a. No fibrillation: 0
- b. Fibrillation: 50
- c. Felting: 100

Fibre loss factor L:

- a. 0-2 tufts with weight less than 25% of the original weight : 0
- b. 3-5 tufts with weight less than 25% of the original weight 40
- c. 6-20 tufts with weight less than 25% of the original weight 80

The calculated ESTO Use Class for the product shall be determined in accordance with Table 4

Table 4 ESTO Use Factor Classification

Use factor	Level of use
0-30	Heavy use
31-60	Medium use
>61	Light use

For landscaping Turfs to be classified as suitable for heavy use they shall also satisfy the following additional requirements:

- » Tensile strength of carpet when measured in accordance with EN ISO 13934-1: min 10N/mm in both directions of production (warp and weft)
- » Tuft withdrawal force: min 25N

6.2. Determination of the Appearance and feel Luxury Class

For certain applications the appearance and feel of the Landscaping Turf are important. This is considered to primarily apply to carpets with pile heights between 20 and 40mm. Therefore carpets in this range shall be classified for their ESTO Luxury Rating in accordance with Table 5. Carpets outside this pile height range are not classified

The ESTO Luxury Rating is calculated as follows:

$$\text{ESTO Luxury rating} = \frac{\text{Mass of pile per unit area above substrate (in g/m}^2\text{) according to ISO 8543}}{\text{Pile height (in mm) according to ISO 2549}}$$

The ESTO Luxury Rating is classified and reported in accordance with Table 5.

Table 5 - ESTO Luxury Rating

Luxury Rating Class	ESTO Luxury Rating
LC0	<25
LC1	> 25
LC2	> 50
LC3	> 75

7. Report

The test report for a Landscaping Turf shall contain the individual tests results and the summarised information detailed in the Summary Report shown in Annex B. The layout of the Summary Report may differ from that shown in Annex B.

Annex A - Additional requirements for Landscaping Turf carpet tiles

Characteristics	Test method	Non adhered tile	Adhered tile
		Loose laid	Removable
Total mass of individual tile	ISO 8543	≥ 0,875 kg	≥ 0,500 kg
Total mass per unit area (m ²)-	ISO 8543	≥ 3,500 kg	≥ 2,000 kg
Dimensions	EN 994	± 0,20 % in the same batch	
Squareness and straightness of edges	EN 994	± 0,15 % in both directions	
Dimensional stability	EN 986	Shrinkage and extension ≤ 0,2 % in both directions	Shrinkage ≤ 0,4 % in both directions Extension ≤ 0,2 % in both directions
Distortion out of plane	EN 986	Max deviation of any part of the sample from its plane ≤ 2 mm	
Damage at cut edge (fraying)	EN 1814	No damage	

Annex B - Example of summary test report

Identification, basic information and classification

Photo of carpet under angle of 90° with a minimum of 10x10cm visible on the photo

Product name			
Manufacturer/applicant			
Date of report			
Type of manufacture (ref 1)		Type of surface (ref 2)	
Primary backing (ref 3)		Secondary backing (ref 4)	
Basic requirements (Table 3)	Pass/Fail	Safety requirement (table 3)	Pass/Fail
Yarn type 1		Yarn type 2 , 3, 4, ...	
Pile length above the backing		Total carpet mass	
Mass of pile per unit area above substrate		Number of tufts or loops per m²	
Colour fiber 1		Colour fibre 2, 3,..	
Type of infill material1		Granulometry infill material 1: d&D	
Bulk density infill material 1		Shape of infill material 1	
Nature of infill material 2		Granulometry infill material 2: d&D	
Bulk density infill material 2		Shape of infill material 2	
ESTO Level of Use Clarification		ESTO Luxury Rating	

Specific information for carpet tiles

Type of tile		Basic requirements Annex A	Pass/Fail
Non adhered/loose laid	Yes/No	Dimensions of the tile (cm)	
Adhered removable	Yes/No	Total mass individual tile (kg)	
For permanent bonding	Yes/No	Total mass per unit area (kg/m ²)	

List of references to Annex B

Ref 1 Type of manufacture

Ref-Nr	D	EN	F	NL
M1	Gewebt	Woven	Tissée	Geweven
M2	Gewirkt	Knitted	Tricotée	Gebreid
M3	Geklebt	Bonded pile	Nappé à velours	Geplakt
M4	Nadelvlies	Needle felt	Aiguilletée	naaldvilt
M5	Getuftet	Tufted	Touffetée	Getuft
M6	Flocked	Flocked	Flocked	Flocked

Ref 2 Type of surface (combinations are possible)

EN	D	EN	F	NL
A1	Schnittpol	Cut pile	Velours coupé	Gesneden pool

Ref 3 Type of primary backing (combinations are possible)

Ref-Nr	D	EN	F	NL
P1	Gewebe	Woven fabric	Tissu	Weefsel
P2	Folie	Foil	Film	Folie
P3	Vlies	Non-woven fabric	Voile non-tissé	Vlies

Ref 4 Type of additional backings (combinations are possible)

Ref-Nr	D	EN	F	NL
S1	Appretur	Finish	Apprêt	Appret
S2	Schaumrücken (SBR)	Foam (SBR)	Mousse (SBR)	Schuim (SBR)
S3	Schaumrücken (PUR)	Foam (polyurethane)	Mousse de polyuréthane	Polyurethaanschuim
S4	Schwerbeschichtung (PUR)	PUR heavy backing	Dossier PUR lourd à envers textile	PUR rug met textiellaag
S5	Schwerbeschichtung (APO)	Heavy backing (APO)	Deuxième dossier lourd (PO atactique)	Rug atactisch PO
S6	Noppenrücken (PVC)	PVC nep back	Enduction PVC à boutons	PVC noppenrug
S7	Noppenrücken (SBR)	Latex nep back	Enduction latex à boutons	Latex noppenrug
S8	EVA Schwerbeschichtung	EVA backing	Dossier EVA	EVA rug
S9	Schwerbeschichtung Polyolefine basiert	Polyolefine based backing	Dossier polyolefine lourd	Polyolefine gebaseerde rug
S10	Textilrücken	Textile backing	Dossier Textile	Textiel rug
S11	PVB Schwerbeschichtung	PVB backing	Dossier PVB	PVB rug
S12	Glas-Verstärkung	Glass reinforcement	Renforcement fibre de verre	Glas versterking

Annex C - Lisport test sole

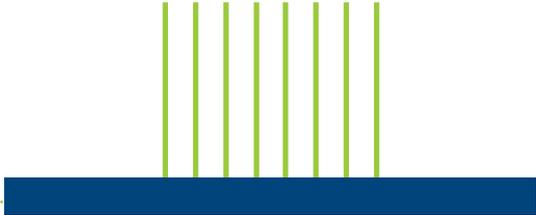
The test sole shall be made from vulcanised styrene butadiene rubber (SBR) with silicic acid-based white filler additives. The sole shall have a wave profile on one face and their slip resistance shall be controlled to ensure standard behaviour in the Lisport (see EN 1963 for details).

Thickness (mm)	:2.5±0.3
Hardness (Shore A)	:90±3
Wave length (mm)	:13.0±0.5
Amplitude (mm)	:2.0±0.3
Profile height (mm)	:0.6±0.1

Photograph of test sole



ANNEX D - Assessment of Pile Standing

Assessment of pile stand	Average angle	Example
Straight	60-90°	
Flat	0-30°	
Pile in between straight and flat	30-60°	

ANNEX E - Product declaration

This product declaration is for internal use only by ESTO and will not be published. The summary test report (annex B) is only valid in combination this document (annex E).

Product name			
Manufacturer/applicant			
	Producer	Name + code	Reference of test report by an ESTO member body
Yarn type 1			
Yarn type 2			
Yarn type 3			
Yarn type 4			
Primary backing			
Latex			
Secondary backing			
Infill material			

Note: Without this signed document, the test institutes are not allowed to use data from other lab reports for safety and UV results (table 3).

Name of applicant:

Date of applicant:

Signature of applicant:

Bibliography

ISO 3018, Textile floor coverings — Rectangular textile floor coverings — Determination of dimensions

ISO 2076 Textiles - Man-made fibres - Generic names

This International Standard lists the generic names used to designate the different categories of man-made fibres currently manufactured on an industrial scale for textile and other purposes,

EU regulation 1007/2011 which covers the fibre composition and is reflected in national regulations