

WE CARE ABOUT FOOTBALL



Section 3

Part 2: Turf Use, Maintenance and Turf Exhibition



Turf Use, Maintenance and Turf Exhibition

Environmental and Security Compatibility

The manufacturer and purchaser must abide by all relevant local security and environmental legislation during the construction, use, operation and disposal of the football turf and its supporting layers. The purchaser must request the relevant certifications and declarations.

Regulations with regard to the technical, security and environmental compatibility of products currently vary from country to country. The buyer should therefore insist that the manufacturer/supplier of all the products and materials used in the fabrication and laying of the artificial turf provide the corresponding certification.

Security compatibility

Security compatibility concerns in particular the hazard of fire and fumes, especially in closed stadiums.

Environmental friendliness

Environmental compatibility concerns in particular ground water, which could be affected by the breakdown of the chemical components present in the artificial turf system.

The ecological recommendations of football turf systems and their components, i.e. the artificial turf piles, the turf backing, the elastic layer and the infill material, have to be designed and installed in compliance with local legislations. The following recommendations concern risks to soil and ground water.

Measuring parameters (leachate / extract)	Recommendations
DOC	≤ 20 mg/l or ≤ 40 mg/l
EOX	≤ 100 mg/kg
Lead (Pb)	≤ 0.04 mg/l
Cadmium (Cd)	≤ 0.005 mg/l
Chromium (Cr) total	≤ 0.05 mg/l
Chromium VI (Cr VI)	≤ 0.008 mg/l
Mercury (Hg)	≤ 0.001 mg/l
Zinc (Zn)	≤ 3 mg/l or 0.5 mg/l
Tin(Sn)	≤ 0.05 mg/l
Toxicity (as nitrification inhibition)	Inhibition $\leq 50\%$ or no standard

The DOC and toxicity parameters are measured in a neutral aqueous 48-hour leachate, the heavy metals in an acid CO₂ leachate after 48 hours, and the EOX in a hexane extract. The raised DOC of 40 mg/l is only allowed if the EOX condition is met.

The requirement that a zinc content of 3 mg/l in acid leachate may not be exceeded applies to the artificial turf pile and the elastifying layers. In the case of the infill materials, the recommendations are increased. The infill must meet either the condition ≤ 3 mg/l in acid leachate or the condition ≤ 0.5 mg/l in neutral leachate. In both cases, the KO criteria of zinc content of 20 mg/l in acid leachate and of 1 mg/l in neutral leachate should not be exceeded.



Turf Use, Maintenance and Turf Exhibition

Artificial turf pile and elastic layers which are manufactured according to the latest technical advances can generally meet the recommendations.

Regarding the infill materials, a distinction has to be made between:

- EPDM granules manufactured freshly for infill purposes,
- recycled rubber granulates, and
- miscellaneous infills.

The critical point is always the mobilised quantity of zinc. All other requirements can generally be met.

EPDM granulates can be manufactured either in sulphur-cured variants or in peroxide-cured variants. Nowadays, using the latest technical advances, it is possible to manufacture sulphur-cured EPDM granulates with relatively low zinc content and low-zinc and zinc-free peroxide-cured EPDM granulates which satisfy the recommendations. On account of the defined formulations, a continuously constant quality has to be maintained.

Due to their different original uses, recycled rubber granulates vary enormously from a substance point of view. There are selected old tyre rubber granulates that can also meet these recommendations. Were one to measure the infill only in terms of the amount of mobilised zinc in acid leachate, the predominant part of the old tyre rubber granulates would not be able to meet the requirement because of the high zinc content of the non-volatile matter. This also applies *inter alia* to waste from technical rubber. Here, the situation is even more complicated because of the quite different rubber requirements, and no approximately constant quality can be guaranteed. However, since ecologically sound recycling possibilities should be encouraged, selected old tyre rubber granulates have a fair chance through the alternative claim that the zinc content in neutral aqueous leachate may not exceed 0.5 mg/l. However, this requires a strict choice and therefore a relatively close continuous supervision of the quality of these recycled materials.

Components of the football turf systems should be produced, installed and certified in conformity with national laws and rules. This concerns in particular:

Elastic layer

- Elastic material (rubber)
- Bonding agent (polyurethane)

Artificial turf

- Turf fibres
- Backing (fabric and latex)

Infill material

- Quartz sand
- Rubber granules
- Miscellaneous infills



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Quality control

Product identification

Football turf can be manufactured in many ways. The manufacturer can choose between many different fibre qualities, manufacture the turf in various heights and densities (and many more subtleties), fill the turf with different products and in varying quantities or have no infills at all, and, finally, install it onto different infrastructures built according to local conditions.

The technical turf characteristics are mentioned in the UEFA test certificate under “**turf identification declaration by the manufacturer**”. The product identification provides the necessary information on the quantity and quality of the offered material.

Turf product properties

Does the manufacturer/supplier observe his own specifications for the quantity and quality of the material used in his turf system?

As UEFA requires only footballistic qualities of the turf, it is the responsibility of the owner to ensure that the quantity and the quality of each component correspond to the certified sample mentioned in the test certificate. The test laboratory mentioned in the test certificate keeps a sample of the tested and registered football turf system and is thus able to test and compare the installed turf with the certified turf system.

If the quality of the turf does not seem satisfactory, or should any visible polymer change occur (fibres and rubber infill), some of the following recommended tests can be carried out:

- **Wear and abrasion resistance**

As a general rule, the best way is to visually inspect actual turf installations and to compare the various fields in terms of year of installation and hours of play, if available.

A more accurate way is to resort to the Lisport test (according to CEN specifications, but with traversing movements). The aim of this test is to characterize the interaction between studded shoes and the turf and to determine the changes in physical and sport properties.

This test has been developed for sand-filled turf and is now also used for football turf.

However, many further laboratory abrasion tests need to be carried out and their results compared with installed fields, in order to be able to predict the possible service life of a turf before it loses its technical and footballistic characteristics.

- **Pile fibre quality**

The quality of the fibres depends on the quality and degree of the fibre stabilisation.

The chemical composition of the fibre can be analysed with the DSC test and UV-light resistance test (example: OISS turf requirements, 03/2001).



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- **Tear strength**

In tufted fabrics, the fibres (“the blades of grass”) are inserted into a backing fabric and fixed with a latex or other adhesive.

How strong are the backing and the fibres?

Will they withstand the forces of competing athletes?

Are they hard to pull out, or do they break?

- **Environment, toxicology and infallibility**

The manufacturer should supply the purchaser with environment, toxicology and infallibility declarations for all products used. It is the responsibility of the installer to obtain approval according to national legislation.

- **Flammability and fumes**

The surface should not burn as a result of sources of ignition such as fireworks, etc. Pitches often serve as an emergency escape route. It is essential that expert advice be sought from the competent public authorities before any form of synthetic surface is installed.

- **Static charges**

The turf system has to be designed so that the infill will not stick to the ball.

- **Surface colour**

The colour of the surface pile must be green and the markings must be white. It is not acceptable to incorporate material that can cause glare to the players from sunlight or artificial lighting.

- **Installation of football turf**

In order to avoid any warranty litigation after the installation of the turf, it is advisable to have all the construction phases recorded in a specific report containing all decisions made during the construction process (minutes of meeting, photos, etc.). In this report, emphasis should be put on:

- Infrastructure
- Elastic layer
- Turf backing
- Turf fibers
- Infill

- **Climatic conditions**

The manufacturer and purchaser must take the prevailing climatic conditions into consideration when establishing the surface specifications.

Note: To assure good installation - quality, the football turf system should be laid at certain temperatures and levels of air humidity (above 10°C and below 70%).



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Life Expectancy/Quality Insurance/Guarantee

The life expectancy of football turf depends on the following factors:

- Quality of manufacturing
- Quality of the fibres
- Quality of the infrastructure
- Quality of the laying of the turf
- Local climatic conditions
- Frequency of use
- Maintenance

The elements that adversely affect the original footballistic characteristics of the turf are, above all: insufficient and/or inadequate maintenance and, of course, the frequency of use of the playing surface.

The following typical signs of wear appear after several years of use:

- Unravelling of the artificial turf fibres
- Hardening of the infill material (compaction of the rubber granules and silica sand)
- Reduction in the height and density of the fibres

and, generally as a result of incorrect installation:

- Deformation of the infrastructure
- Disintegration of the elastic layer
- Tearing at the line markings and seam joints
- Stagnation of water on the turf



Deformation of the infrastructure

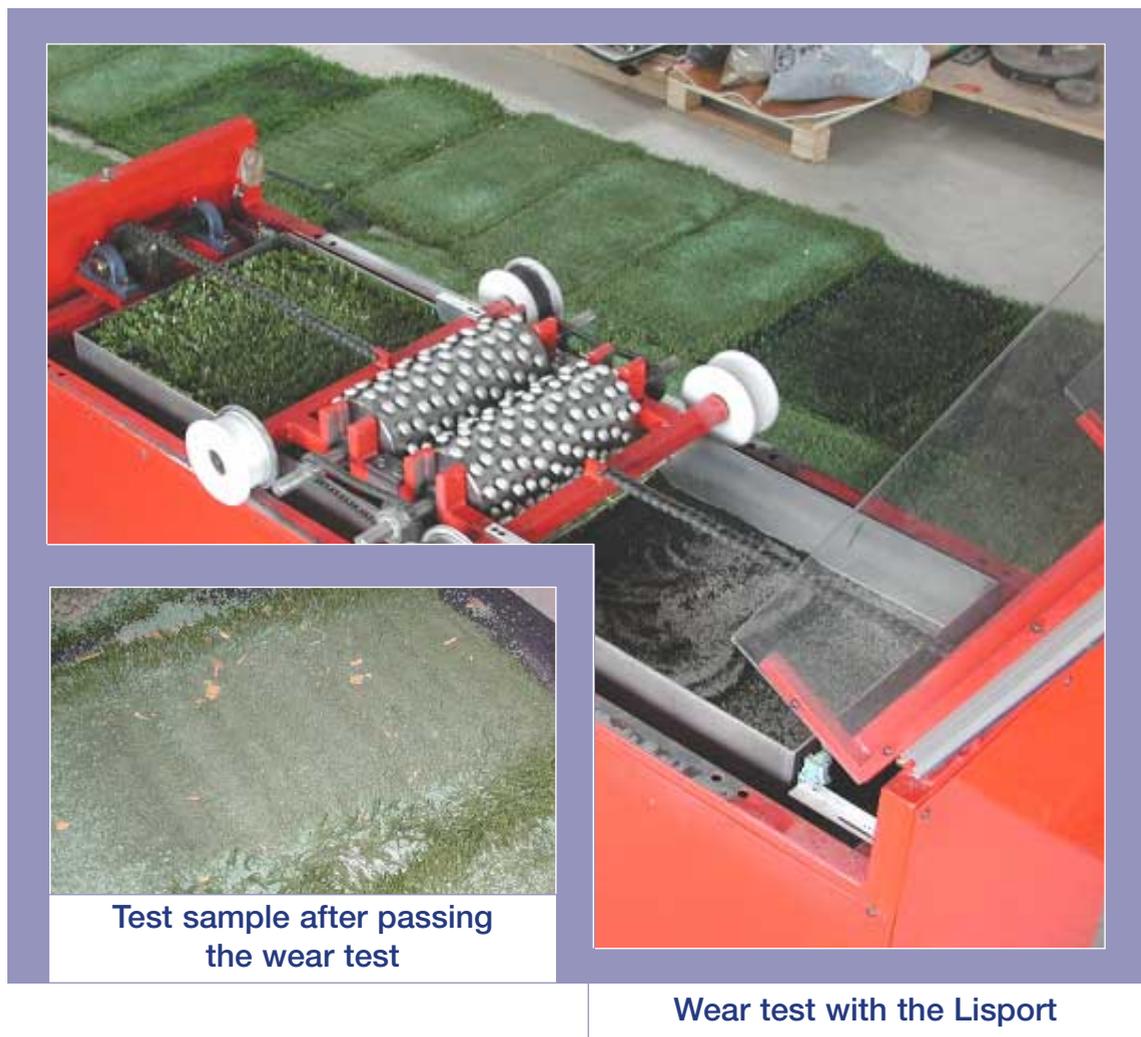


Torn seam joint



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At the time this manual went to press, no conclusive data had yet been published regarding the first appearance of signs of wear or the service - life expectancy of football turf. With this new football turf system, it is of course mainly the fibres that are subjected to the greatest use – and which therefore suffer the most wear. In this respect, it is in fact possible to rely on the data obtained from 100% sand-filled artificial turf surfaces that have been subjected to much heavier wear.



The previous generations of artificial turf used the same or similar fibres as the current turf manufactured especially for football. With the sand-filled turf systems, monofil fibres have proved more resistant than fibrillated fibres. To date, fibrillated fibre has been used more often than monofil fibre, as the abrasion factor with rubber-filled turf is lower. Research by the manufacturers has not yet provided a clear answer as to which type of fibre is most suitable for a long service life, or even if a mixture of both fibres gives the best result. Time will tell which system is more resistant.

Note: Some turf products can present an especially good wear resistance even when their footballistic characteristics no longer fulfill the UEFA criteria.



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Quality control by the turf manufacturer and the company entrusted with the installation

How to make sure that the quality of the ordered material corresponds to that of the installed turf:

- Test the playing surface according to UEFA's footballistic requirements.
- Quality control by taking three samples on the construction site, to be kept by the owner, the installer/manufacturer and the testing laboratory.

Implementation:

- The manufacturer and his installer are jointly liable.
- The manufacturer and his installer compile all the manufacturing and construction parameters / quantities of material used for each phase of application.
- This information is kept along with the samples for at least five years (or the warranty period) and remains accessible to turf experts or turf testing laboratories at any time.

Advantages for the turf manufacturer / installer:

- Permanent control of the quality of the products manufactured.
- Internal control on site through the taking of samples.
- Greater responsibility on the installer's personnel.

Advantage for the football turf owner Product ordered = product manufactured and installed



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Multi-Purpose use of football turf for other sports and non-sporting events

This new generation of artificial turf has been specifically developed for the use of football. It can, however, also be used for other sports or even for non-sporting events.

Use for other sports

- **Rugby:** possible
- **Field hockey:** impracticable
- **Running training:** possible
(reaction of users = similar to that of a woodchip - surface track)
- **Track and field athletics**
In stadiums with athletics facilities, the turf surface is normally used for throwing events. This can however damage its surface. In order to determine the consequences of such use, UEFA has carried out a number of trials on an artificial - turf surface with a stabilised base layer and an elastic layer capable of absorbing at least 50% of the force acting upon it.

The results of these tests are briefly described below:

- **Shot-put:** This throwing event does no serious damage to the turf.
The accuracy of the length measurement is 2 cm.



- **Discus:** This throwing event does no serious damage to the turf surface.
The accuracy of the length measurement is 2 cm.
- **Hammer:** The impact of the hammer can result in damage to or deformation of the base layer.
This event should therefore not be held on football turf.



Turf Use, Maintenance and Turf Exhibition

- **Javelin:** The tip of the javelin penetrates the artificial - turf surface and elastic layer, and remains stuck in the turf. This leaves a hole in the artificial - turf surface of 1-2 cm in diameter. This event should likewise not be held on football turf.



The various athletic throwing events present an important challenge to the artificial - turf industry. If it is nevertheless planned to hold throwing events on football turf, the use of protective mats – similar to those already used in indoor sports facilities – is recommended.

Multiple non-sporting uses

Football turf can be used for non-sporting events. However, it should be adequately protected with covers in order to avoid the time and expenses associated with dirt removal.

It might be advisable to consult the manufacturer before heavy duty equipment is put on the turf, in order to avoid load - related damages.



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Maintenance

There is a general but erroneous belief that once an football turf has been installed, the groundsman can sit back.

It is true that the construction of football turf results in numerous cost savings, as it is no longer necessary to spread fertiliser or pesticides, the turf no longer requires regular watering or mowing, and there is not even the need to paint markings.

Another cost - saving factor is the possibility using football turf intensively during bad weather conditions.



Daily, weekly and annual maintenance work on football turf

However, as with virtually everything else, artificial turf still requires care and maintenance and must not under any circumstances be allowed to fall into disrepair. A lack, or indeed a total absence, of proper maintenance will inevitably shorten the service life of the turf and cause its playing surface to deteriorate.

Future owners of artificial - turf playing surfaces should heed the following advice:

As with its natural counterpart, the areas of artificial turf that are most likely to show the first signs of wear are those located where the majority of the action takes place – around the goal mouth and the penalty area.

For this reason, these areas are liable to lose their original quality extremely fast and will fail to meet UEFA criteria after a certain time. As worn patches cannot be replaced with “fresh” turf as easily as on a natural pitch, ground staff are advised to take special care of these parts of the playing surface.

The partial replacement of used turf is in any case possible, especially with a stabilised infrastructure (Note: the problem with an unstabilised infrastructure is how to maintain the surface perfectly level after the replacement of an area of turf).



Turf Use, Maintenance and Turf Exhibition

Maintenance Schedule

- The manufacturer/supplier should be asked to provide a “major clean-up, at the pitch owner’s expense once or twice a year over an eight to ten year period, contractually agreed upon at the time the turf is ordered, or at least during the guarantee period.
- Major clean-up: When the pitch is dry the infill material is extracted from the turf system using a suitable sweeping and suction machine. The main requirement for this important cleaning work is that the surface of the turf should be “open”, so that the brushes in the machine can draw up the infill material.
- After the infill material has been picked up, the machine separates out all the fine particles (fibres, rubber, shoe wear and sand) and the remaining infill materials are then brushed back into the turf system.

Daily and weekly maintenance recommendations

- The infill material must be kept (depending on the football turf system) to approx. 10mm to 20mm under the fibre tips and brushed regularly to keep it even.
- The goal mouth, penalty spot and corner areas must be checked to ensure that the rubber infill is even and to the correct level. The infill material in these areas suffers the most displacement in every game or training session. Only if they are permanently and correctly infilled do they offer optimum protection and therefore a long service life for the football pitch.
- Displaced infill material must therefore be replaced continuously, which means that the ground staff must have an adequate supply of infill material at all times.
- Only by regular dragging, drag-matting, brushing, aspiration etc. can the level of infill material be kept at the prescribed level and the football turf system in perfect condition.
Note: The infill material also protects the fibres!
- Please note that after every 25-30 hours of use, the pitch must be dragged or drag-matted, brushed and aspirated. If the pitch is used more frequently, the maintenance schedule has to be increased to maintain its performance characteristics in the long term.
- The regular drag-matting of the so-called edge zones (for example the outside areas) is also important to ensure that natural grass, moss and weeds do not start to grow there. Plants will only start to grow if you fail to maintain certain areas. Any existing vegetation growth must be removed mechanically (tear the plants out, cut them or spray them with high water pressure).



Turf Use, Maintenance and Turf Exhibition

- In extreme circumstances, weed killer (in the appropriate dilution) may be used for specific areas. To prevent the large - scale migration of vegetation into the edge areas, it is advisable to cut back the vegetation outside the edge zones periodically.
- Remove surface dirt on a regular basis. Remove leaves, twigs, etc. immediately (use a leaf blower if necessary).
- After the initial phase (three to four months after installation depending on the number of play hours), the infill will settle/compact. Check the infill level of the system and redress with new infill where necessary.
- Wear losses (fine particles) must be removed by thorough cleaning.



- Dirt such as sand, topsoil and grass cuttings from neighbouring natural grass pitches should be removed immediately using sweeping machines where necessary.
- Snow removal: In principle when clearing snow, a layer of approx. 2-3 cm of snow should be left, so as to protect the artificial turf from mechanical damage. Partially iced pitch surfaces can be thawed using conventional “winter salt” (please consult your local department of the environment).
- Sharp objects (stones, shards of glass, etc.) must be removed immediately.
- Chewing gum waste can be removed easily after it has been iced with refrigerant spray.
- Oil and fuel must be soaked up as quickly as possible using sand or sawdust and then removed in full.
- Other contaminants can be scraped off the surface by shovel. Residual animal faeces can be treated with vinegar and water.



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Instructions for preventing damage

- Follow the aftercare and maintenance instructions of the turf supplier.
- When operating maintenance equipment on the surface, excessive braking, turning, etc. that could damage the synthetic turf fibres should be avoided.
- Do not drive on the pitch without the prior consent of the manufacturer.
- Do not apply any high static loads to the system.
- Proceed with care when clearing snow.
- Do not use any chemicals that may damage the surface.
- Do not light fires on the turf system.

Recommended maintenance equipment

- Drag brushes and drag mats and nets.
- Hand-held equipment such as a hard road-sweeping brush for brushing the infill material into the turf system.
- High-pressure cleaner (wet cleaning with a pressure of approx. 200 bar).
- Manually-operated sweeping machines with an hourly capacity of around 1,000 m² or a sweeping and suction machine, self-propelled, with an hourly capacity of up to 3,000 m².



Brushing, aspiration, cleaning and levelling in one go.



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Choice and construction of the Football turf at UEFA Headquarters in Nyon, Switzerland



Summer 2000

Removal of the existing sand-filled turf. Maintaining the 14-year-old shock-absorption (58%) pad built in situ on top of a bituminous mortar.

Only a few square metres of the stock pad had to be replaced!





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Tender document specifications

Artificial turf of the third generation (now called football turf) with no special requirements, except that the product should have the optimum footballistic characteristics.

Testing on site

All the companies had the possibility to test their product on site on the existing shock-absorption pad.

Synthetic turf ordered and installed



Specific turf manufactured according to the best footballistic test results obtained and adjusted to the existing elastic layer (rebound, absorption, etc.).

Turf exhibition

All manufacturers were asked to present their products on site.



Exhibition of turf samples in 2000



Meeting the manufacturers

All the products are still on site opposite the UEFA headquarters as a permanent turf exhibit.



Turf Use, Maintenance and Turf Exhibition

Permanent Turf Exhibition



Football turf samples exposed in 2001



Football turf samples exposed in 2002

The manufacturers can use this permanent turf exhibit it as a showcase and permanently renew their exhibited products.