



DEUTSCHER
FUSSBALL-BUND

DFB RECOMMENDATIONS FOR
ACTION FOR FOOTBALL CLUBS &
LOCAL AUTHORITIES

MICROPLASTIC DISCHARGE FROM EXISTING SYNTHETIC TURF PITCHES



VERSION 1.0



IMPRINT

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CONTENT

1. INTRODUCTION	6
2. STATUS OF THE CURRENT CONSULTATIONS AT EU LEVEL (ECHA)	9
3. SYNTHETIC TURF AND POLYMERIC FILLERS	11
3.1 THE DEFINITION OF MICROPLASTICS	11
3.2 THE SIGNIFICANCE FOR SYNTHETIC TURF SYSTEMS	13
3.3. THE SITUATION IN GERMANY	13
4. SYSTEM CONSTRUCTION METHODS USING FILLERS CURRENTLY AVAILABLE ON THE MARKET	14
4.1 COMMON CONSTRUCTION METHODS OF SYNTHETIC TURF PITCHES IN GERMANY	14
4.2 WHY USE RUBBER GRANULATE AS INFILL?	16
4.3 WHICH FILLERS ARE USED ON SYNTHETIC TURF PITCHES?	18
5. MAINTENANCE MEASURES AND PREVENTING PLASTIC GRANULATE DISCHARGE	20
5.1 GENERAL MAINTENANCE MEASURES	20
5.2 GENERAL USE AND CARE INSTRUCTIONS FOR SYNTHETIC TURF SURFACES	22
5.2.1 Before use	22
5.2.2 Even use	22
5.2.3 Non-sporting use	22
5.2.4 Use of maintenance vehicles	22
5.2.5 Heavy soiling	23
5.2.6 Players, officials, spectators	24
5.2.7 Collection points, access points, path areas and drainage facilities	25
5.3 MAINTENANCE LOG	26
5.4 WHAT MEASURES CAN BE TAKEN TO FURTHER MINIMISE THE DISCHARGE OF PLASTIC GRANULES AND ENSURE THAT THE PLASTIC PARTICLES REMAIN ON THE PITCH?	27
5.4.1 Avoiding the discharge of plastic granulate during pitch care and maintenance	27
5.4.2 Avoiding the dispersion of rubber granulate by players and visitors	29
5.4.3 Dispersion through environmental influences	30
5.5 INSTRUCTIONS FOR KEEPING THE AREAS BEYOND THE ACTUAL PLAYING AREA CLEAN	31
6. USEFUL LIFE PHASES AND THE REQUISITE MEASURES	32
6.1 EXISTING MORE RECENT SYSTEMS	32
6.2 EXISTING OLDER SYSTEMS	34
7. OBLIGATIONS UNDER BUILDING REGULATIONS AND PLANNING LAW	37
APPENDIX	38
MAINTENANCE CHECKLIST	38
CHART FROM THE EUROPEAN SYNTHETIC TURF COUNCIL (ESTC)	40
BIBLIOGRAPHY	42
FURTHER INFORMATION	43

FOREWORD



**Dear Club Directors,
Dear Sports Friends,**

Since 2019, the European Chemicals Agency (ECHA) has been working hard on behalf of the European Commission on the topic of microplastic discharges of all kinds. Some of the microplastics dispersed into the environment in this pan-European context is also caused by the sport of football, which uses synthetic turf pitches for training and matches.

In the field of synthetic lawns, there are still gaps in our knowledge, understanding and handling of such pitches. However, thanks to the Europe-wide debate on the matter, many new findings have been brought to light in the last two years.

With these initial recommendations for action, we would like to respond to any existing uncertainties regarding how to deal with the issue of “microplastics discharge at existing synthetic turf pitches” in a knowledge-based way. With a wealth of concrete information, explanations, useful handling tips and helpful checklists, we want to help you to choose, with a sense of proportion, the right measures for existing pitches and to apply them in the best possible way.

With your interest in the topic and your active support, you play a decisive role in positively changing the situation of microplastic dispersion into our surroundings from existing synthetic turf pitches. Accompany us down this not easy path. You'll find it's worth it!

A handwritten signature in black ink that reads "Hermann Winkler". The script is fluid and cursive.

Hermann Winkler
Vice-President for Grassroots Football and Popular Sports

1. INTRODUCTION

The present recommendations for action are intended to help make the debate about synthetic turf systems more objective and to provide assistance to the users of existing synthetic turf systems, especially those that use synthetic granulate as infill. It also aims to help ensure that these systems are used in such a way that as few microplastics as possible – and in the best case scenario no microplastics at all – are dispersed from the playing field into the surroundings.

At EU level, the European Commission has charged the European Chemicals Agency (ECHA), which is subordinate to it, with examining how the discharge of microplastic particles into the environment can be minimised in the future. The basis for ECHA's proposals is the EU Regulation on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). On this basis, the ECHA published a restriction proposal (dossier) in March 2019 in the spirit of the REACH Regulation. It proposes a restriction on the marketing of products to which microplastics are intentionally added. This includes

plastic granules¹ used as fillers² for synthetic turf systems³. This has caused considerable uncertainty in many sectors, markets and among investors (e.g. cities, local authorities, sports clubs and associations and funding bodies). In principle, this restriction proposal applies to all types of products containing intentionally added microplastics that are placed on the market in the European Union through trade or processing. This affects, in particular, the agricultural and cosmetics industries, but also the synthetic turf sector – insofar as it concerns systems that contain plastic granules as a filler.

¹ This also includes rubber granules. In the ongoing document, plastic granulate(s) is used as a collective term.

² Other terms used in this context are infill, infill granules or infill material(s). In the ongoing document, „filler(s)“ is used as a collective term.

³ „Synthetic turf systems“ is the generic term for synthetic turf playing surfaces of various types; it originates from the language of standardisation.

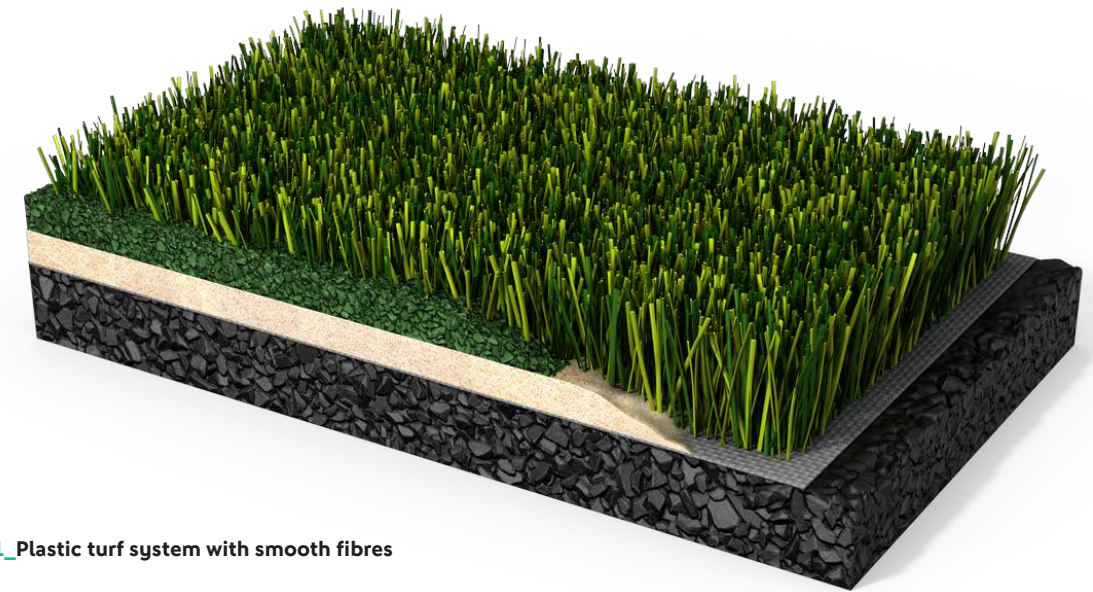


Fig 1_Plastic turf system with smooth fibres

MICROPLASTICS DO NOT BELONG IN THE ENVIRONMENT!

Microplastics are now ubiquitous in nature and in our surroundings. There they are not biodegradable, remain in the environment for a very long time, and are absorbed by living creatures. They are passed on through the food chain, which means they can even be consumed by humans.



Fig. 2_SBR granulate near a synthetic turf pitch



Microplastics have been detected in numerous living organisms. The impact of microplastics on living organisms and communities varies greatly depending on the species, certain developmental stages, feeding behaviour and lifestyles. Microplastic particles can also act as vectors for certain substances and so harm living organisms, too. In manufacturing, a wide range of additives are added to plastics (e.g. UV stabilisers or flame retardants) which specifically determine certain properties.⁴

When using a synthetic turf pitch with plastic granulate as a filler, care must be taken to ensure that as little microplastic as possible is discharged from the playing surface into the environment. This is important regardless of the outcome of the decision on the ECHA restriction procedure.

However, the recommendations for action cannot currently provide any prospect regarding technical possibilities and solutions for

the future. Even though projects and studies on this topic do exist, there are still no sufficiently robust and formulable findings that are comprehensively and generally valid. It is, therefore, not clear at present what recommendations can be made for the future. It is obvious that no more use of synthetic fillers should be made in Germany. It is also obvious that tests have been carried out with sand, cork, etc., filter systems and also without any use of granulate at all. Since the initial recommendations for action presented here are a “growing” document, they will be expanded or updated as new findings become available. Therefore, we, as the DFB, are currently unable to give any concrete and reliable recommendations for the future. From our point of view, any measures regarding restrictions or the like are currently the sole responsibility of the funding bodies or are subject to obligations under building regulations and planning law.⁵

⁴ In this context, it is worth mentioning that, in August 2018, the ECHA published another restriction dossier for eight polycyclic aromatic hydrocarbons (PAHs) in plastic granules and rubber mulch materials used as infill material in synthetic turf pitches and in loose form on playgrounds and in sports applications. Polycyclic aromatic hydrocarbons (PAHs) are organic compounds consisting of at least two benzene rings linked together. Benzene itself consists of a ring with six carbon atoms. Almost all PAHs consisting of more than four benzene rings have carcinogenic, mutagenic and/or reprotoxic properties for humans or are toxic. With regard to its restriction proposal for PAHs, the ECHA has proposed changing the permissible limit values to 20 mg/kg of the 8 applicable PAHs as a sum value. A corresponding decision by the EU Commission has yet to be taken.

⁵ See also: “Recommendations for the design of new or operation of existing synthetic turf systems with synthetic granulate as infill material for sports clubs and associations as well as local authorities”, April 2020: https://cdn.dosb.de/user_upload/Sportstaetten-Umwelt/DOSB-AG_Mikroplastik_-_Handlungsempfehlungen_Kunststoffrasensysteme__Stand_20200420_.pdf

2.

STATUS OF THE CURRENT CONSULTATIONS AT EU LEVEL (ECHA)

On 13 September 2018, the European Parliament adopted a “European Strategy on Plastics in the Circular Economy”. It called on the Commission to consider and, if need be, adopt an EU-wide ban on microplastic particles in cosmetics as well as in personal care, laundry and cleaning products by 2030. The ECHA should also assess and, if need be, develop a ban on microplastics that are also “intentionally added” to other products, if there are no reasonable alternatives to a ban. The analysis of the current situation in the EU Member States was based on the findings of various surveys and studies carried out by the Member States.⁶

In January 2019, the ECHA published its first restriction proposal. It proposed banning “the placing on the market or use” of microplastic particles in products that “intentionally” release microplastic particles into the environment across the EU. In an amended restriction proposal dated 20 March 2019, the ECHA clarified that, in its view, plastic granules used as infill for synthetic lawns are also covered by this ban because this infill material used for synthetic lawns (e.g., granules from used tyres or synthetic elastomer

materials) is “intentionally added” microplastic. According to the ECHA, plastic granules used to fill synthetic turf sports surfaces are the largest source of microplastic pollution across the EU, discharging an estimated 16,000 tonnes per year. The ban is expected to prevent the release of 500,000 tonnes of microplastics into the environment over the next 20 years. The ECHA estimates the cost of a ban to be between €10.8 billion and €19.1 billion across the EU.⁶

⁶ ECHA, press release of 9 December 2020 on the decision of the SEAC Committee. Available at :<https://echa.europa.eu/de/-/scientific-committees-eu-wide-restriction-best-way-to-reduce-microplastic-pollution>

Scientific committees: EU-wide restriction best way to reduce microplastic pollution - All news - ECHA (europa.eu)

In 2019 and 2020, the ECHA carried out a total of three consultations that allowed stakeholders to submit comments. The consultations served to collect data in order to be able to weigh the risks to the environment against any socio-economic impacts. On this basis, the ECHA's two expert committees, the "Committee for Risk Assessment" (RAC) and the "Committee for Socio-economic Analysis" (SEAC), submitted their findings and proposals. The RAC had come out in favour of a ban on the placing on the market of plastic granules six years after the entry into force of the restriction proposal in July 2020. The SEAC was unable to commit itself. In December 2020, it advocated either the mandatory introduction or retrofitting of risk management systems (e.g. retention or filter

systems) for existing synthetic lawns in the EU or a ban on the placing on the market of plastic granulate six years after the entry into force.

Finally, the EU Commission, together with the European Parliament and the Member States, must decide whether to adopt the ECHA's restriction proposal in full and to adapt the annex to the REACH Regulation accordingly, or whether it should submit an amended proposal for further consultation. With regard to the ban on the placing on the market of plastic granulate, a Commission recommendation is expected in June 2021. Subsequently, the European Parliament and the EU Member States meeting in the EU Council of Ministers will have to deal with the Commission's proposal for a decision. A final decision is not expected until early 2022. A possible ban on the placing on the market could then possibly come into force in mid-2028.

3.

SYNTHETIC TURF AND POLYMERIC FILLERS

As already explained, a restriction or possible ban on products with intentionally added microplastics also covers plastic granulates used as fillers for synthetic turf systems. This becomes clear from the following definitions.

3.1 THE DEFINITION OF MICROPLASTICS

On the question of what is meant in detail by the term "microplastics" – and which products would be affected by or possibly exempted from a restriction – the ECHA has drawn up a definition, as stated below.

According to the ECHA, microplastics include

- Freely moving particles in all dimensions with a size of at least 1 nm and at most 5 mm, or fibres with a length of at least 3 nm up to at most 15 mm and a length to diameter ratio of > 3 .
- The synthetic particles concerned are not biodegradable.
- Materials containing polymers (plastics) in pure or mixed form
- Particles containing solid polymer, to which additives or other substances may have been added and where, the same time, the polymers in the product or mixture attain a weight percentage of more than 1%.



In the course of the public consultation and the internal consultations, a number of additional clarifications emerged which are also of particular relevance for polymeric fillers or variants thereof:

- “Solid” or firm – i.e. a substance or a mixture which does not meet the definitions of gas or liquid.
- Particles containing solid polymer, i.e. either materials of any composition with a continuous solid polymer surface coating of any thickness

or

- Particles of any composition with a solid polymer content of $\geq 1\%$ w/w.⁷

Such materials (microplastics) could no longer be placed on the market (and thus in the environment) as a substance on its own or in a mixture as a microplastic once the amendments to the REACH Regulation has entered into force (transitional period: probably in 6 years’ time).

However, the ECHA has also proposed exceptions, in particular with regard to fillers, which should not be affected by this restriction.

These exceptions are:

- Natural fillers (i.e. materials made from natural substances, such as cork granules)
- Biodegradable polymer fillers (i.e. materials containing a polymer that is biodegradable according to the EU definition)
- Abrasion of fibres⁸ during use (as this does not concern microplastics introduced intentionally)

This means that further system components of the synthetic turf, such as

- the synthetic turf itself (synthetic turf covering⁹)

and

- the elastic base layers, which provide the necessary damping of the synthetic turf systems.

are **not** affected by this ECHA restriction procedure “for products containing intentionally added microplastics”.

⁷ Weight by weight, weight fractions per weight fraction = weight percentage

⁸ Other terms used in this context are culms, blades of turf, plastic turf blades, turf fibres or filaments. In the ongoing document, „fibre(s)” is used as a collective term.

⁹ Synthetic turf surface” is the generic term used in the language of standardisation for the top layer of synthetic turf playing surfaces. Colloquially, the designation “synthetic turf carpet” is also used as a synonym, among other terms.

3.2 THE SIGNIFICANCE FOR SYNTHETIC TURF SYSTEMS

What are affected are the synthetic turf systems that use plastic granulates as a filler, since they have been widely used in Germany since the 1990s.

These systems mostly use plastic granules as a filler in line with the definition of microplastics (see above) in order to influence the player-surface or ball-surface interaction in such a way that the protective function and player comfort can be guaranteed as ideally as possible at all times (weather or age of the playing surface). As these systems are already very close to natural turf and have been continuously improved over the years, they have a high level of acceptance among operators and users. Thus, most of synthetic turf systems installed for football pitches or multi-purpose sports facilities in Germany up to 2019 are systems that use synthetic granulate as a filler.

Plastic turf systems filled with sand or with sand and a natural filler are not affected, nor are synthetic turf systems that do not use any fillers at all, whether natural or polymer-based.



3.3 THE SITUATION IN GERMANY

As of July 2021, there is no ban at federal or state level on the continued use of synthetic granules at existing facilities or on refilling them as and when required. Constructing new synthetic turf pitches with synthetic granulate is theoretically still possible, too. However, for environmental reasons and due to the threat of a reduction in service life in the event of a ban, products without plastic granulate should be used.

Moreover, synthetic turf pitches with synthetic granules are excluded from financial support in the vast majority of state subsidies. When converting old pitches or constructing new ones, the public sector also predominantly dispenses with pitches filled with synthetic granulate.

4. SYSTEM CONSTRUCTION METHODS USING FILLERS CURRENTLY AVAILABLE ON THE MARKET

4.1 COMMON CONSTRUCTION METHODS OF SYNTHETIC TURF PITCHES IN GERMANY

As regards the technological development of synthetic turf, surfaces are now divided into three categories, namely

- **First-generation synthetic turf surfaces (as of the mid-1970s):**
short, dense, unfilled pile layer, combined with an elastic layer on a bituminous sub-base.
- **Second-generation synthetic turf coverings (as of the late 1980s):**
longer, not too dense pile layer filled with quartz sand almost to the surface, usually on an elastic layer (a bonded elastic base layer 35 mm thick or an elastic layer 25 mm thick) or on prefabricated sheeting or other prefabricated elastic systems.
- **Third-generation synthetic turf coverings (since the late 1990s):**
pile layer with long, considerably softer plastic strips, which are filled with sand and plastic granulate or natural fillers, usually on an elastic layer (a bonded elastic base layer or an elastic layer) or on prefabricated sheeting or other prefabricated elastic systems.¹⁰

¹⁰ Previous requirement for EL DIN 18035-7 2014 was 30 mm. In the new DIN 18035-7, there is no minimum requirement for the elastic layer or EL, as this should always be built on asphalt. However, such construction methods are not yet widespread.

Synthetic turf systems generally consist of the following components:

- Pile layer (actual fibres of the synthetic turf) made of polypropylene (PP), polyethylene (PE), polyamide (PA) or various polyolefin copolymers and additives as well as a base layer made of materials such as PP, polyester (PES) or glass fibre, with a coated backing, e.g. made of latex or polyurethane.
- Separate elastic layers on bonded bitumen base courses or elastic base layers made of elastomer granulates, e.g. plastic granulates, binder and mineral aggregates
- Fillers made of quartz sand, recycled rubber granules (also colour-coated), EPDM granules (virgin or recycled), TPE granules (virgin), PE granules (virgin) and natural fillers.

The main distinguishing features are the filling, the fibre type, the fibre structure, the pile height, the pile density or number of nubs and the filling height.

As regards the filler, a distinction is made between highly filled and partially filled systems, with pure sand filler and layered sand and rubber granulate filler being used.

The fibre type consists mainly of straight or crimped monofilaments or fibrillated foil ribbons. The fibre structure can be straight or textured or crimped. The common pile heights are 35 mm to 45 mm, depending on the type of covering.

4.2

WHY USE RUBBER GRANULATE AS INFILL?

Fillers are an essential component of modern synthetic turf systems for pile filling.

A synthetic turf sports surface must have the required playing characteristics of the sport in question and guarantee the level of comfort and protection that players need when running, falling and sliding on the surface. Thanks to the development of third-generation synthetic turf surfaces with a sand and synthetic granulate infill, synthetic turf has become a suitable alternative to natural grass in football.

To ensure that the playing characteristics of these surfaces are comparable to natural grass, they typically have a pile height of between 35 mm and 45 mm. Without a filler, the

fibres would lie flat on the surface. However, by partially filling the gaps between the individual fibre bundles, they are held upright and so provide the properties considered necessary for football.

The sand weighs down the synthetic turf so that it can be laid loosely, which means it no longer requires any additional fixing. In addition, the sand serves as a moisture reservoir and supports the fibres of the synthetic turf.

The plastic granulate component covers the sand at the top and serves to protect the players.¹¹



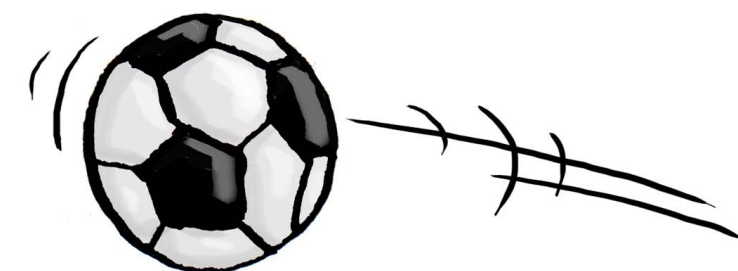
The correct infill level is important so that the system can protect the players. Furthermore, the infill protects and supports the synthetic turf fibres, thus ensuring the optimum ball roll and bounce (sports function).

According to the current state of the art, plastic granulate-filled 3G systems are, above all, the best possible imitation of natural grass. From this point of view, the sports function is clearly in the foreground here, as also stated in the 2nd paragraph and in the last paragraph. Mention should also certainly be made of playing comfort.

The following order as regards function and importance is thus apparent:

1. Sports function, playing comfort (close to natural grass)
2. Protection function (traction, rotation – no damping, see below)
3. Coverage of the sand layer

¹¹ The filler has no significant impact on force reduction, as this is mainly attributed to the action of the elastic base layer (cf. DIN 18035-7:2019-12, Table 12).



4.3
WHICH FILLERS ARE USED ON SYNTHETIC TURF PITCHES?

The following is an overview of the fillers commonly used in Germany on synthetic turf systems:

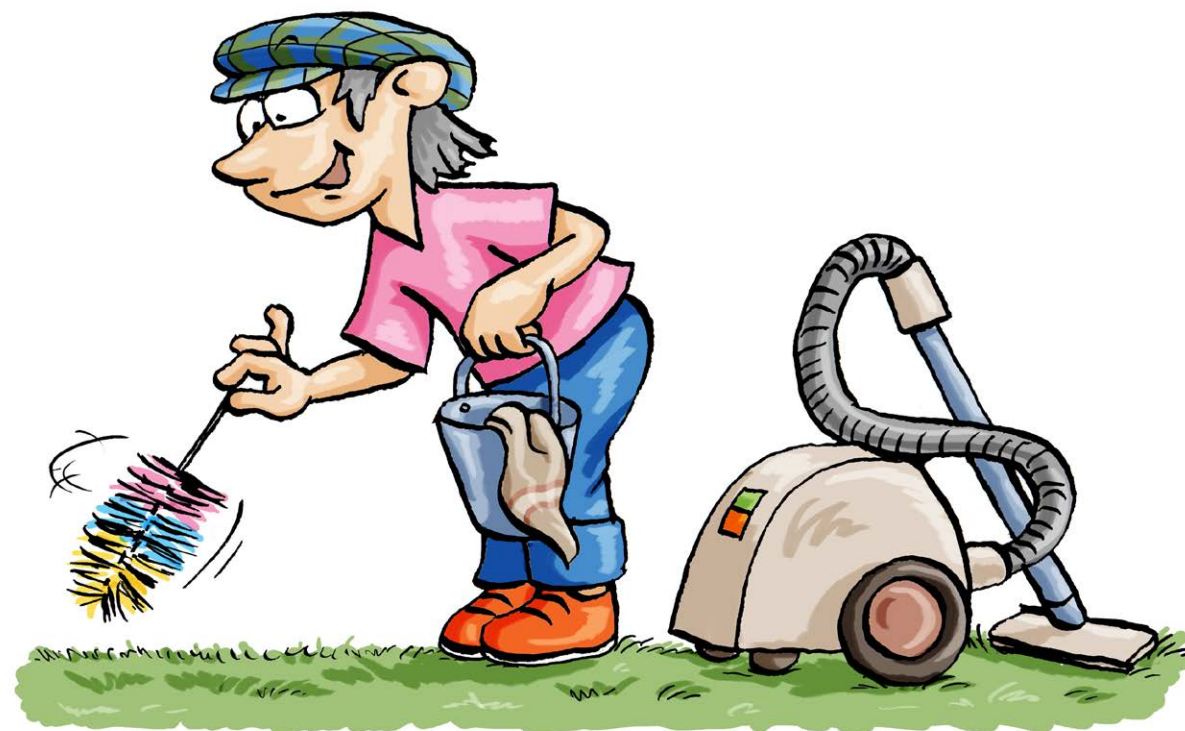
<u>SBR GRANULES</u>	SBR granules (Styrene Butadiene Rubber) are made from shredded car and lorry tyres. They have been used as a filler on synthetic turf pitches since third- generation synthetic turf surfaces started to become more widespread.
<u>POLYURETHANE-COATED SBR GRANULES</u>	These are SBR granules coated with a polyurethane layer. The coating mainly serves to colour the otherwise black recycled granules and reduce the typical rubber odour.
<u>EPDM RUBBER</u>	EPDM rubber (ethylene propylene diene monomer rubber) is a traditional component of many sports flooring systems, e.g. in the elastic base layers of indoor floors and as a component of plastic running tracks. EPDM rubber is produced as a virgin material and adapted to the special demands as a filler.
<u>RECYCLED EPDM RUBBER</u>	Recycled EPDM rubber often comes from different sources, which can subsequently be sold sorted or unsorted. Both single-origin EPDM rubber products and technical rubber products are not usually made from recycled old materials, but arise in new production as, for example, high-quality waste material.



Fig. 3_Artificial turf pitch with lines

<u>PE GRANULES</u>	Fillers that have polyethylene as the main ingredient are made from polymer that is a by-product of fibre production and mixed with elastomers.
<u>TPE GRANULES</u>	TPE granules are thermoplastic elastomers that have only been used as fillers for a few years and are usually produced as a virgin material. Various types of TPE granulates can be tailored to suit requirements as regards elasticity and ageing behaviour.
<u>NATURAL INFILL MATERIAL</u>	<p>Sand is used as weighting or as a functional filler in most artificial turf systems.</p> <p>Cork is currently the most widely used organic functional filler. It is extracted from the bark of the cork oak, reduced in size and then scattered as granules. Other organic fillers are already used or are being developed or tested (e.g. olive pits, mixtures thereof, etc.).¹²</p>

¹² As things stand at present, there are no reliable findings on this that can be substantiated in the long term. At the moment, it is mainly tests that are being carried out and initial experience that is being gathered. As soon as there are reliable and longer-term findings, we will provide additional information.



5. MAINTENANCE MEASURES AND PREVENTING PLASTIC GRANULATE DISCHARGE

5.1 GENERAL MAINTENANCE MEASURES

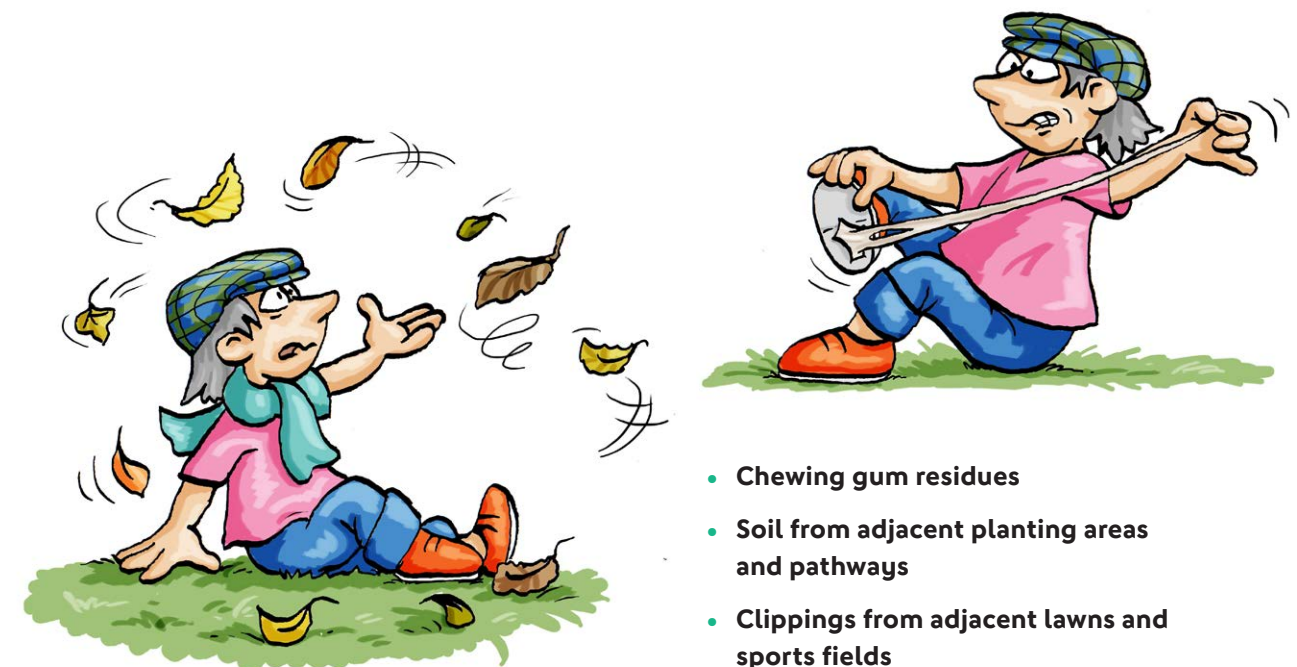
The professional and regular maintenance of synthetic turf surfaces is an indispensable requirement to preserve their usability in the long term and to permanently retain their value. The manufacturer of the surface must provide instructions on how to use and maintain it after installation. In particular, the preservation of the protective and sports function or football-specific proper-

ties of the respective synthetic turf system is of particular importance. The discharge or dispersion of synthetic granulate can also be significantly minimised by proper care. And if plastic granulate is discharged from the pitch into the surrounding areas such as pathways, meadows and lawns this must be removed. If not soiled, it can be returned to the pitch.

POSSIBLE SOILING OF SYNTHETIC LAWN

In principle, the extent of the care and maintenance work required depends on the location and immediate environment of the sports surface as well as on its intensity of

use. In general, the following kinds of soiling and damage can occur with synthetic turf surfaces:



- Leaves, needles, flowers and other plant remains
- Growth of moss and weeds

- Chewing gum residues
- Soil from adjacent planting areas and pathways
- Clippings from adjacent lawns and sports fields
- Cover layer material from adjacent cinder pitches
- Fibre / ribbon abrasion
- Dust and deposits from polluted air
- Lubricants and fuels from vehicles.



5.2

GENERAL USE AND CARE INSTRUCTIONS FOR SYNTHETIC TURF SURFACES^{13,14}

Regular cleaning is required to keep the pitch clean. The pitch should be cleaned at least once a week.

5.2.1 BEFORE USE

Contaminants such as leaves, flowers, fruit, twigs and litter must be removed (see above). Cleaning devices that “collect” the leaves with simple brushes are suitable for this. Leaf blowers are not suitable. Leaf vacuums are only suitable if the filters are cleaned regularly after use and the contents are correctly separated or disposed of. Vacuumed material often contains granules and fibre residues and must be disposed of properly. In addition, depending on the type of surface, artificial lawns should be cleaned regularly with sweeping, vacuum sweeping or washing equipment in line with the manufacturer’s instructions. Weeds and moss should be removed by hand, but can be largely avoided by regular cleaning.

5.2.2 EVEN USE

One of the common features of youth football in particular is that it played in 6v6 or 7v7 formats, with goals positioned on the side-lines rather than on the goal lines of a pitch. This will help to ensure that the playing surface is subjected to an alternating and more even load. In addition, after particularly intensive training (goal kicks, corner kicks, penalty kicks), we recommend that the areas in question be swept with special care to ensure that the infill material is evenly distributed again.

5.2.3 NON-SPORTING USE

In the case of non-sporting use, the surface must be protected against mechanical and chemical influences (e.g. lubricants, fuel residues, chewing gum, smouldering objects) and excessive point loads. Use of the pitch with such damaging effects must be avoided.

5.2.4 USE OF MAINTENANCE VEHICLES

The following must be observed when using maintenance vehicles:

- Maintenance vehicles must be fitted with wide tyres
- Maintenance vehicles may only drive at walking speed and may not steer in tight turning circles
- Maintenance vehicles must avoid rapid acceleration and braking
- Maintenance vehicles must not leak lubricants and fuels
- Maximum load for substructure with bound base layer: wheel load max. 2 t, total load max. 5 t.
- Maintenance vehicles must be thoroughly cleaned before leaving the field and being taken to the garage in order to avoid any dispersion of microplastics.

When using motorised machines, make sure that no engine and/or hydraulic oil leaks out! Oil or fuel oil is hard to remove and damages synthetic turf. That is why it is essential to remove such contamination as soon as possible.

5.2.5 HEAVY SOILING

If the pitch is heavily soiled, e.g. in autumn, it may be necessary to clean it more often. The following work should be carried out:

- Removal of weeds
- Removal of moss, dirt, leaves and needles
- Removal of debris

It is not uncommon for moss, dirt, needles and leaves from trees and bushes to end up on the field. If they are not removed in good time, they get caught up in the fibre structure of the synthetic turf; this impairs water permeability. There are special requirements for waste such as glass, cans, cigarettes, fireworks residues and chewing gum.

¹³ See maintenance checklist in the appendix; DFB Compendium Chapter E “Synthetic Turf”: pp. 204-237 (<https://www.ninobility.de/dfb/sportplatzbau/#204>).

¹⁴ The sports field contractor commissioned should provide a manufacturer’s maintenance checklist that is suitable for the pitch installed.

5.2.6

PLAYERS, OFFICIALS, SPECTATORS¹⁵

It is imperative that all players clean their shoes before and after using the playing surface since dried mud and dust, particularly on shoes with studs, can be a major cause of pitch soiling. If they are cleaned at a central cleaning point after the synthetic turf has been used, this can prevent or minimise

the dispersion of fillers and fibre abrasion through shoes and studs. Care should be taken to ensure that the drains of grids and catchment gratings are equipped with appropriate tightly fitting screens and are emptied regularly.

Players, officials and spectators should, therefore, clean their shoes thoroughly before and after entering the pitch, for example:

- on a grating
- on a shoe scraper
- with brushes



a) Stamping



b) Wiping the shoes on brushes / mats



c) Emptying collection containers

¹⁵ The information contained in these recommendations for action generally refers to both the masculine and the feminine as well as the diverse form. For better readability, the additional designations in the female or diverse forms have been omitted.

5.2.7

COLLECTION POINTS, ACCESS POINTS, PATH AREAS AND DRAINAGE FACILITIES

It is important that the collection points are located centrally and that they offer the chance to easily and completely dispose of or recycle the materials that accumulate there. Removable collection containers under the grating or shoe scraper retain the granules and are easy to maintain.

Specific information and signs must be posted at the entrances to the field of play, informing players of these regulations and also indicating what footwear is permitted.

All paved path surfaces along the field must be swept regularly. The grating, shoe scraper, brush or container of pebbles at the entrance to the field must also be checked and cleaned.

All drainage facilities such as perimeter gutters, yard and street drains must be opened regularly in the course of the maintenance walks and the related collection facilities ("buckets") cleaned. Any granulate accumulating here can also be returned.





5.3 MAINTENANCE LOG¹⁶

Also, in order to be able to enforce any warranty claims, it is essential that the intended maintenance measures are carried out regularly and recorded in a maintenance log.

Creating a so-called “maintenance book” in which the individual maintenance measures are described and their respective times recorded is recommended. The name of the person who has carried out or checked this work must also be recorded.¹⁷

Heavy play, use and improper maintenance generally lead to a loss of infill. In snowy areas, removing snow also contributes to a loss of infill material (cf. 5.4.3.).

Missing filler (sand and plastic granulate) must, therefore, be topped up as part of the ongoing maintenance work. Recording the quantities refilled in the maintenance log is also a good idea. The actual quantities to be topped up depend on various factors: the intensity of use, the expertise and professionalism of the maintenance of the synthetic turf, and the design of the synthetic turf all influence the displacement and dispersion of the filler.

An appropriate supply of infill material should, therefore, always be available on site to ensure the protective and sports function of the synthetic turf. Care should be taken to ensure environmentally compatible storage so that no plastic granules are dispersed into the surroundings.

Also, when new infill is being delivered and when the infill is being topped up, care must be taken to ensure that no plastic granulate gets into the surroundings. If the “big pack” has to be placed next to the artificial turf, e.g. on the (natural) grass verge, in order to remove the quantity required to top up the infill material, the grass verge should be temporarily covered with sheeting. By doing this, no plastic granulate is lost on the one hand and, on the other, it can be guaranteed that no microplastic gets onto the onto the green verge and remains there.

Care must be taken to ensure that only filler of the same type and from the same manufacturer is topped up. Otherwise, undesirable reactions may occur between the plastic turf fibres and the filler. This reaction can cause

damage to the artificial turf system, the synthetic turf fibres or the synthetic turf backing.

Furthermore, in this event, the warranty claim against the manufacturer may be void.

5.4 WHAT MEASURES CAN BE TAKEN TO FURTHER MINIMISE THE DISCHARGE OF PLASTIC GRANULES AND ENSURE THAT THE PLASTIC PARTICLES REMAIN ON THE PITCH?

A large number of possibilities have already been developed for this purpose, some of which have been in practical use for some time. Firstly, all the possible discharge paths must be analysed:

- Discharge through care and maintenance
- Discharge by players and use
- Discharge due to environmental influences

5.4.1 AVOIDING THE DISCHARGE OF PLASTIC GRANULATE DURING PITCH CARE AND MAINTENANCE

Any care and maintenance work must be done in such a way that the synthetic granulate remains on the pitch and is not dispersed into the surrounding areas or beyond the synthetic turf pitch during maintenance work.

The measures mentioned in the general care instructions also apply here. They include:

- Adjusting the speed of maintenance vehicles
- Avoiding “jumping” granules
- Avoiding driving over the surrounding areas when turning with maintenance equipment in operation.

¹⁶ See the maintenance checklist in the appendix.

¹⁷ The person contracted to build the sports field should provide a manufacturer's maintenance book that has been adapted for the pitch installed.



Fig. 4_Stress zones of a pitch

It is particularly important that the direction of travel is chosen correctly. The plastic granulate generally shifts from the stress zones outwards to the areas at the edge. If such a shift is observed, work from the outside to the middle of the pitch when carrying out initial maintenance measures. Do so from both the right and left edges of the pitch.

If plastic granulate has to be topped up, care must be taken that, when removing it from the storage containers ("big packs") and when transporting it to and from the pitch, the

means of transport and containers are carefully chosen so that no plastic granulate is lost in transit. The plastic granulate must then be carefully incorporated so that it actually settles in between the plastic turf fibres, i.e. into the fibre structure, and does not remain on top of the (often) folded-over plastic turf fibres. This can be easily and quickly ensured by using a suitable rake or a coarse broom.

After the round of maintenance work has been carried out, the equipment used must also be cleaned. These measures must be carried out on the pitch so that the granules don't have to be moved again.

Fig. 5_Brushes not in use



The following measures have to be carried out:

- The cleaning of the maintenance equipment and the tractors – sweeping them down with brushes or brooms
- The sweeping off of the residual granulate from brushes and traction mats or the equipment of the devices and machines (plates, beams and girders etc.)

Disable brushes and drag mats before driving to the storage depot¹⁸ or load them onto the towing equipment.

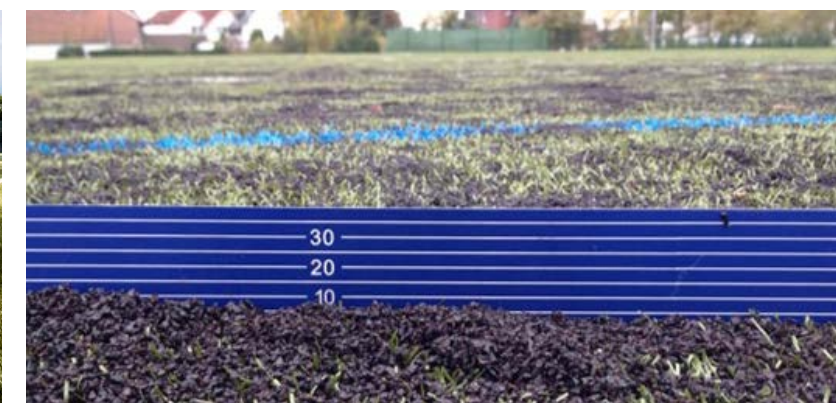


Fig. 6 and 7_ Clean and well-kept pitch vs unkempt pitch/discharge: what it should look like and what it should not look like (good vs bad) (FBR/TKR/FSÖ)

5.4.2 AVOIDING THE DISPERSION OF RUBBER GRANULATE BY PLAYERS AND VISITORS

With just a few measures, a large part of the filler can already be secured in place here before it is lost on the way to or in the changing room.

The measures already mentioned in the general maintenance guidelines are suitable here. Care should be taken to ensure that the drains of grates and granulate traps are fitted with appropriate tightly fitting sieves and emptied regularly. The area of the coach's or substitutes' bench must be cleaned regularly, too.

Fig. 8_Dispersed granulate under the subs' bench



¹⁸ No contact between equipment or tools and surface covering (See Fig. 5)

5.4.3

DISPERSION THROUGH ENVIRONMENTAL INFLUENCES

If the above-mentioned maintenance measures are carried out regularly and correctly, the risk of the granulate being dispersed by wind and rain is regarded as relatively low. In the event of heavy rainfall, however, plastic granulate may be displaced and discharged into the surrounding areas.

In this case, the most important thing is that the drainage facilities are fitted with appropriate filter systems that are capable of catching the plastic granulates and preventing them from entering the water cycle or bodies of water. Here, too, the regular inspection and emptying of the sieves are important (cf. 5.2).

If you want to ensure that no plastic granules are displaced or blown away when they move into the area beyond the playing surface, then appropriate protective or collecting strips can prevent discharge in the fencing area. Often, a ridge on the outer side of the surrounding pathway or an existing natural earth wall is sufficient to avoid or prevent discharge, in particular due to strong winds.

In the event of flooding or heavy rainfall, additional and appropriate maintenance measures must be taken (removing granulate from filters, checking and cleaning secondary surfaces, etc.).

If the pitch is cleared in winter, separate storage areas must be provided near the pitch so that, even after the snow has melted, the synthetic granules can be collected again and returned to the pitch after appropriate cleaning (if necessary). Topping up the same amount that was dispersed during snow

removal is vital for maintaining the playing characteristics, the protective function and the durability of the artificial turf system. Failure to return the discharged granules will result in the turf being underfilled, which can lead to the premature folding over of the fibres.

These recommendations can only give limited advice regarding the construction of the artificial grass pitch, as this must always be individually tailored to the existing system and the prevailing circumstances.



Fig. 9_Granules discharged by snow removal

The main points to note are as follows:

- the location of the playing surface
- the surroundings of and the ways around the playing area
- the location of the utility buildings (club buildings, changing rooms, equipment rooms for vehicles and materials as well as suitable storage facilities for material such as equipment and plastic granulate for refilling)
- the area beyond the pitch and its approaches or entrances
- the coach's or subs' bench on the side-lines

With regard to the issue of which constructional measures can be taken to minimise discharge, the European Standard CEN/TR 17519 provides some technical guidance. A large number of case studies are given here; they can be used individually or in combination, as shown or appropriately modified, depending on requirements. A German translation of the technical guideline is also available.¹⁹

¹⁹ The text has not yet been published in German as CEN/TR 17519 by DIN. It is not possible to say whether there will be a translation in the future. Approval for an unofficial working translation was not yet available at the time of publication of these recommendations for action.

The ESTC (EMEA Synthetic Turf Council, www.estc.info) has kindly provided a translated version for use. See chart in the appendix, page 40.

5.5

INSTRUCTIONS FOR KEEPING THE AREAS BEYOND THE ACTUAL PLAYING AREA CLEAN

Areas adjacent to the synthetic turf playing field, such as pathways, lawns, meadows, etc., must be inspected regularly for synthetic granules.

If plastic granulate is found on or in these areas, it must be picked up and the areas cleaned. The plastic granulate picked up can either be returned to the pitch field or disposed of correctly. Plastic granulate must not remain in these areas.

When using (manual) sweeping machines, care must be taken to ensure that the sweepings container is emptied “cleanly” and that the sweepings are disposed of correctly. If there are plastic granules in the sweepings, they do should not be put into the organic waste bin!





Fig. 10_Bursting up of the granulate due to play activity (so-called splash)

6. USEFUL LIFE PHASES AND THE REQUISITE MEASURES

6.1 EXISTING MORE RECENT SYSTEMS

In general, when planning to buy and install a new synthetic turf system, a system configuration should be selected that fixes the infill in place as well as possible, thus counteracting any possible dispersion from the start.

This applies to natural fillers made of sand, cork, olive pits or other natural materials and their mixed forms.

With mineral fillers, particular care must be taken to ensure that the system's drainage capacity is maintained and that the grains of sand are covered as well as possible by the fibres. In this case, all synthetic turf systems that have a high stitch density²⁰ and reduce

the "splashing" of the granules due to the large number of fibres (see Fig. 10) are suitable. This way, the displacement of the granules can be avoided and the accumulation of smaller granules on and in shoes and clothing reduced.

For some years now, synthetic turf systems have been available which, besides straight fibres, also have textured (crimped) fibres in

the turf carpet. These crimped fibres form a kind of "sub-zone" and are basically intended to add more volume to the turf and also hold the granules in place even better thanks to their irregular shape (see Fig. 11).

Combined turf systems are always heavier than a standard turf with only one type of fibre. This additional volume ensures that smaller quantities of granulate need to be used as a filler than with previous synthetic turf systems. At the same time, the curved, crimped fibres also hold the filled-in granules better, thus greatly reducing the afore-mentioned splash effect.

Such a system also facilitates maintenance, since any shifting of the granules is hardly noticeable.

BEST MEASURES:

- **Regular maintenance and loosening**
(see chapter 5. "Maintenance measures and preventing plastic granulate discharge")
- **Request advice from the manufacturer**
(maintenance protocols, checklists, etc., see appendices)

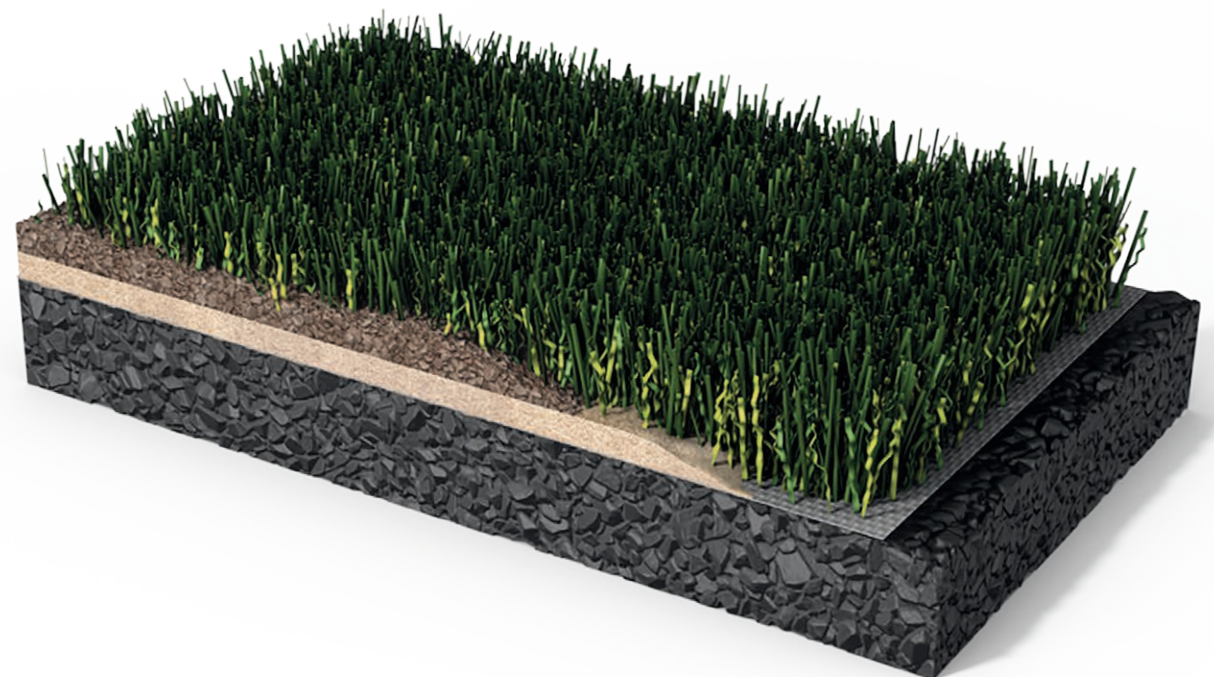


Fig. 11_Artificial turf system consisting of a combination of smooth and textured fibres

²⁰ Number of studs per 100 cm

6.2 EXISTING OLDER SYSTEMS

Regular maintenance throughout the service life of all synthetic turf systems is nevertheless necessary. This helps to ensure that the technical sports properties (ball-surface interaction, player-surface interaction) are maintained and that the protective function of the turf (traction, rotation, deformation and force reduction) can also be guaranteed.

The plastic granules protect the player from injury due to their mobility in the event of any fall. In combination with the fibres, they provide defined rotation and traction forces.

This is why it is essential that both components are evenly distributed over the playing surface and lie loosely on the pitch. An upright fibre supports the correct position of the plastic granules and the traction values set accordingly by the mixture of infill material, sand and the number of fibres.

It is, therefore, also important in this case to unfailingly top up the components for the lawn that were originally selected and filled in. Only then can the test values determined and certified in the test certificate also be adhered to within the permitted limits during use (and not just after refilling).

Different plastic granules and other filler materials have different material properties, which also affect the technical functions. On the one hand, some materials do not need to be used in large quantities, while on the other, natural materials are often lighter than plastic granules, segregate, or are dispersed or discharged more on the pitch due to environmental influences.

Synthetic turf systems that use only mineral fillers – in this case especially sand – require particularly intensive maintenance. Through use, but also through precipitation, sand has a tendency to become compacted. In this case, the fibres act like a kind of reinforcement that further supports or stabilises the compaction process. If this compaction continues, a hard layer of sand forms above the elastic layer, and this restricts or even partially prevents the function of the elastic layer below the hard layer. The pitch becomes hard and the sports functional and safety values thus

change. A sand-filled turf surface must be loosened regularly in line with the manufacturer's instructions and the compacted layers of sand loosened, since the simple brushing up of the fibres and levelling the sand surface by brushing alone is insufficient.

Besides the above-mentioned regular maintenance measures, special care must be taken when refilling the fillers in the case of heavily used lawns or in the case of synthetic lawns that already show clear signs of use or wear.

BEST MEASURES FOR SAND-FILLED SYSTEMS:

- Regularly loosen the sand layer to maintain the protective function of the system
- Request advice from the manufacturer (maintenance protocols, checklists, etc., see appendices).

This applies in particular when the fibres lie "flat" and the other layers of plastic granulate and sand are no longer visible or have become compacted. In such cases, granules lying on the fibres are no longer fixed in place there and can easily be carried away by the wind or rain.

It is often assumed that the deteriorated playing characteristics can be improved and the hardening of the surface reversed by refilling with synthetic granulate. However, the lack of plastic granulate is often not the cause of any noticeable changes in the playing characteristics of the turf system.

BEST MEASURES FOR 3G SYSTEMS (SAND AND PLASTIC GRANULES):

- Regularly carry out maintenance measures
- Brush the fibres to achieve the optimum function and so that they stand up straight
- Loosen the granules and level the filling heights
- Avoid overfilling when topping up lost material
- Avoid microplastic dispersion of any kind
- Refill material with the same material properties to ensure system, sport and protection function.
- Request advice from the manufacturer (maintenance protocols, checklists, etc., see appendices).

That is why the loosening the overall system of plastic granulate and sand is particularly important for older synthetic turf systems. This is the only way to improve the position of the fibres. The compacted sand must be carefully loosened in several sweeps and any compacted filler must also be decompacted.

In the synthetic turf system, work from the top to the bottom, layer by layer. Care must be taken to ensure that the turf and the line areas are not displaced. Such loosening sweeps can, therefore, also be made along

the direction of play longitudinally across the pitch from goal to goal.

The loosening of the granulate and sand layers can result in the fibres being better supported again due to the now lower pile protrusion and it may not be necessary to top up the granulate.

Any dispersion of microplastics must also be prevented in the case of older pitches.

BEST MEASURES FOR OLDER SYNTHETIC TURF SYSTEMS:

- Carefully loosen the older pitches and layer by layer in several work steps
- Working direction also along the pitch, especially in the area near the sidelines
- Regularly brush the fibres on older pitches to avoid compaction and the accumulation of fillers on the fibre surface



7.

OBLIGATIONS UNDER BUILDING REGULATIONS AND PLANNING LAW

With regard to the award regulations in Germany, special obligations may also arise with regard to the care and maintenance of synthetic turf surfaces, which have an impact on the warranty or insurance. These requirements cannot be outlined in full here.

However, it should be noted that, in Germany, construction services of any kind are regulated by the German Construction Contract Procedures (VOB). This set of rules was developed for use as general terms and conditions by client and contractor associations. It regulates the entire course of the project, listing all the rights and obligations

for the client and contractor – from drawing up the offer to the warranty via execution and invoicing. Furthermore, as a rule, the currently valid version of DIN 18035-7 should be used as a basis in conjunction with quality assurance in accordance with RAL-GZ 944.

SYNTHETIC TURF SYSTEMS WITH SAND-PLASTIC GRANULATE INFILL

SPORTS FACILITY: _____

MAINTENANCE REPORT FOR CALENDAR WEEK: _____ YEAR: _____ SHEET NO: _____

TYPE OF WORK	MON	TUE	WED	THUR	FRI	SAT	SUN
GENERAL INSPECTION MEASURES							
Surface dirt							
General boundary zone check							
Check technical zone (trainer / subs' bench) for synthetic granulate (microplastic) – dispersion							
Check paths and adjacent areas for synthetic granulate (microplastics) – dispersion							
Check drainage systems (gutters, screens) for synthetic granulate (microplastics) – dispersion							
Pavement check							
Removal of weeds							
Removal of sharp objects							
Removal of oils / fuels, gum / adhesives							
Line and seam check							
Fillers							
Check and, if necessary, fill penalty spots and corner arcs							

SIGNATURE: _____ CHECKED: _____

SYNTHETIC TURF SYSTEMS WITH SAND-PLASTIC GRANULATE INFILL*

SPORTS FACILITY: _____

MAINTENANCE REPORT FOR CALENDAR WEEK: _____ YEAR: _____ SHEET NO: _____

TYPE OF WORK	WEEK	WEEK	WEEK	WEEK	WEEK	MONTH	HALF-YEARLY / YEARLY
System care of lawn blades and granules							
Brushing up the blades							**
Homogenisation of granules							**
Loosening of granulate (depending on intensity of use)							**
Checking the granulate supply and granulate storage area for leaks in the containers	***	***	***	***	***		**
Special care and maintenance							
Basic cleaning of grass blades / granules	***	***	***	***	***		

SIGNATURE: _____ CHECKED: _____

* Note: The maintenance checklists are suggestions which should, of course, be adapted to the particular circumstances and the manufacturer's warranty requirements. If there is no play during the summer holidays, for example, there is no need to remove broken glass or etc. or to check daily if necessary.

** at least one monthly rota is recommended


*** a weekly rota is not required

IMPLEMENTING THE RECOMMENDATIONS OF THE EUROPEAN STANDARDS COMMITTEE TECHNICAL REPORT 17519


CHECK YOUR ARTIFICIAL TURF FILLERS – PROTECT THE ENVIRONMENT!

FIELD DESIGN


- 1




SPLASH
(Splashing of the granulate due to playing activity)
Select a synthetic turf system that has low infill splash characteristics
- 2




BARRIERS
Place barriers around the perimeter of the field to ensure that infill cannot leave the control zone
- 3




GRATES
Fit decontamination grates or mats at all field entrances.
- 4



BOOT CLEANERS
Place boot cleaning brushes at the main player access gates
- 5



STORM DRAINS
Ensure that all stormwater drains within the control zone have suitable microfilters to capture any infill in rainwater run-off.
- 6



SNOW
Ensure that snow cleared from the field is always stored in dedicated areas within the control zone



FIELD MAINTENANCE

- 7



BRUSHING
Use a dedicated maintenance brush that never leaves the control zone if possible.
- 8



CLEANING
Clean maintenance tractors and equipment thoroughly before they leave the control area.
- 9



STORAGE
During installation, ensure that the infill is carefully stored and stockpiled without any losses
- 10



DISPOSAL
Dispose of the synthetic turf responsibly at the end of its service life

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DISCLAIMER

The content of the “DFB Recommendations for Action for Football Clubs and Local Authorities: Microplastic Discharge from Existing Synthetic Turf Pitches” was written with great care. Therefore, the user’s own technical or professional examination remains indispensable. The contents of these recommendations for action are, therefore, to be understood as non-binding suggestions. Thus no guarantee can be given for the correctness and suitability of these suggestions in individual cases.

In particular, it should be noted that the current state of the art and legal requirements were taken into account at the time these recommendations for action were issued.

The DFB and the authors (editorial management and editorial team) who worked on these recommendations for action cannot, therefore, be held liable.



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