Doc. 20.h.1

European Tyre Recycling Association

ETRA Report

In respons to points 1 to 6 of above call for comments. General comments have been uploaded to ECHA web-portal.

Call for comments and evidence
Substance name: Benzo[a]pyrene (BaP); Benzo[e]pyrene (BeP); Benzo[a]anthracene (BaA); Chrysene; Benzo[b]fluoranthene (BbFA); Benzo[j]fluoranthene (BjFA); Benzo[k]fluoranthene (BkFA); Dibenzo[a,h]anthracene (DBAhA)
EC Number: 200-028-5; 205-892-7; 200-280-6; 205-923-4; 205-911-9; 205-910-3; 205-916-6; 200-181-8
CAS Number: 50-32-8; 63466-71-7; 192-97-2; 56-55-3; 1718-53-2; 218-01-9; 1719-03-5; 205-99-2; 205-82-3; 207-08-9; 53-70-3
Scope: Restricting placing on the market of plastic and rubber granulates containing PAHs above a set concentration limit for use on synthetic turf pitches.

Points 1 to 6

1:Please provide information on the concentrations of PAHs in plastic or rubber granulates used as infill material in synthetic turf pitches you are producing or importing. In case you have taken samples from pitches, please provide the measurement data. Do you have information on how the rubber granulate changes during use (e.g. changes in the composition after 10-15 years)? (If you have already submitted such information during the preparation of the preliminary report by ECHA, there is no need to resubmit this information.)

Response

Information already provided during the preparation of the preliminary report

2:What are the possible health or environmental aspects and technical/quality aspects and other differences of using alternative substances/mixtures as infill material? We are particularly interested in a comparison of the properties of PAH-containing and PAH-free granulates with regard to health and environmental hazards or risks, service durability, maintenance and replacement requirements, playability in different weather conditions, etc. Please specify all viable alternatives in your reply.

Response

There are various materials used as infill for artificial turfs. Following is a brief description.

Black SBR is the **main** used material. It requires low maintenance as there is no need to add further materials or other ingredients during its life span. It is the **least expensive** and the best from the bio-mechanical point of view. ThePAHs content has been widely studied and discussed **during more than a decade. Results to date, with a focus on post-2012 produced materials indicate that "....health effects are unlikely from exposure to the levels of chemicals found**

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in synthetic turf.... (2014 NYC, STC)" Numerous studies have been forwarded to ECHA during the past year.

Coated SBR (mainly green) is currently used when a more natural looking surface is required, either for the color or the reduced rubber odor and reduced heating owing to sun rays. After a while, the lining made with a slim color velvet with polyurethane resin, becomes black again especially on the most used trajectories of players. The green film breaks and becomes brittle, breakinginto small particles. Considering that the coating is roughly 10% of the granulatemass, it means that each field can contain about 10tons of polyurethane coating. After few years the granulate starts to show the black of the granulate. We estimate that after 10 years about 50% of the polyurethane coating is lost. The question is what happens to the 5 tons of particles of polyurethane? Is it in the environment ? Absorbed by the players? The PAHs content is the same as black SBR. It does not seem that the polyurethane has any role in creating a stronger shield from PAHs, as they are strongly retained in the rubber alloys.

Thermoplastic Elastomers (TPE) are used less and less because their quality / durability / price ratio does not place them in a competitive position. They are very low weight in comparison to other materials and in order to make them more comparable, calcium carbonate is often added to the mix, which also makes it more fragile and brittle, giving them a shorter life span. They further decrease in volume due to the combined action of the weather and friction. Because of their brittleness and the friction, quantities of dust are dispersed into the environment and every year, as maintenance, the quantities that have 'escaped' must be replaced to retain the necessary depth and elasticity. Where do the TPE particles that escape go? Into the environment? Absorbed by the players? It should also be noted that unlike SBR, the composition of TPEs is not consistent from manufacturer to manufacturer.

EPDM granulate is a very good material in terms of quality and durability. It is a very expensive virgin material that mimics many characteristics of the less expensive recycled SBR. It is produced from sheets of vulcanised rubber that contain a range of unexplored ingredients including additives that are also used in tyres and other virgin rubber products, (paraffinic oils, extended oils, some aromatics, etc). The rubber sheets arevulcanised and then undergo a similar granulation process as many recycled outputs. It has been suggested that these materialsshould undergo the same scientific tests as do recycled tyregranulates – with parallel material profiles.

Organic materials can include compounds from recycled organic materials such as cork, crushed coconut shells, rice chaff, either alone or mixed in different percentages with other materials, in some cases with the addition of black SBR granulate in different percentages. These materials have some major contra-indications : they absorb water and release it slowly, which is a negative effect for moisture perceived by the players, although it can also be a positive element because water retentionmay maintain a cooler surface than the SBR. Being an organic material, being used under UV and atmospheric agents reduces its volume. Thus every year as maintenance practice, as with thermoplastics, it is necessary to replace some tons of material to retain the shape of the field. Again, we must raise the same question: where do the missing quantities that are replaced every year go ? Into the environment ?Is it absorbed by the players?

In comparison, in terms of player health, the environment, durability and cost, the positive aspects of SBR exceed those of the competition – whether they are natural, virgin, or even recycled.

Natural fields require even further explanations. As noted earlier, in a majority of cases the field-fractions *without* grass are predominant, which offers a positive scenario. In most cases, natural fields are no longer constructed of grass because of the intensive useage required. They are no longer watered. Thus these fields have become hard surfaces of soil and dust, on which the pollutants and hazardous substances from the surrounding city have accumulated in higher quantities, well beyond the PAHs contained in rubber. Because the dust is free-floating, it is more readily inhaled. Rubber granulate are not free-floating. **(See Figure 1).**

Figure 1

Pictures showing the problem of dust dispersion comparison natural fields and artificial fields

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ETRA 25 YEARS

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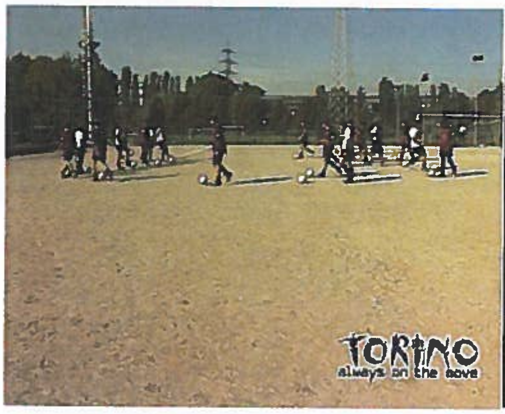

It should be noted that there is also a small risk of some level of accumulation of environmental pollutants on artificial turf. Some of the micro powders may also remain on the surface, but they are not free-floating as they are on soil. There is less of a chance that these particles will be inhaled by the players for diverse reasons among which is the fact that the turf is periodically watered, which reduces the risk.

Environmental pollutants, PAHs included, originate from a wide variety of different sources including household heating, construction, vehicle emissions, industrial emissions, among others. They may settle on the turf surface because they are readily available in the air.

According to recent research results, the PAHs that are in the rubber granulate do not have any particular tendency to be released. However, in the unlikely instance that these substances might be released, there are only three possible means by which the players could ingest them :

a) swallow the granulate

b) through skin contact

c) by inhalation

These three cases are quite unlikely as well, because:

a) **Swallowing**. There is no reason why the players should swallow granulates even accidently. They are not intended to be eaten, but to be walked or run on. But in case for any reason a player should accidently swallow some rubber granulate s/he will digest them and they will be ejected through the feces, with no impact on health.

b) **Skin contact.** A player can run on the artificial turf with socks and shoes, and s/he will be sufficiently covered to reduce the potential of skin contact in case of falls on the turf. Further, the elasticity of the turf reduces the severity of the impact – cushioning the fall and reducing breaks, concussions, etc.. Dependent upon the way in which the player falls, contact will usually occur

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with the hands and knees, the head or, under certain extreme circumstances, the back or stomach areas. At worst, there could be an abrasion. We talk about falls on the turf noting that the rubber granulates are in between the blades of grass, generally 1 cm below the top grass surface. Thus, the contact is primarily with the shoes, socks, or 'uniform'.

c) **Inhalation.** It should be noted that artificial turf fields are typically located in urban areas, where the air inhaled by players is itself polluted by PAHs derived from many urban sources (pollution, combustions, house heating, vehicle emissions, commercial activities, etc.) It is difficult to imagine that the eventual air pollution above an artificial turf field is due to the release of the PAHs from the granulate, of which there is no scientific evidence.

3: As a manufacturer or an importer, please provide information on how many tonnes (metric tonnes) of plastic and rubber infill material (describe which infill material) you are producing or importing every year.

Response

Sector data have been provided during the preparation of the preliminary report.

4: What are per unit prices and production costs of different infill materials? Can you provide an estimate of the substitution costs per pitch (including costs for labour, material, disposal of old material, transportation, etc.) when changing from an existing PAH-containing material to a different infill material? Are there any differences with respect to how frequent the whole infill material needs to be changed or replenished, i.e. are there different maintenance costs involved with the use of different infill materials?

Response

The prices of materials can have variations due to the location of the country and / or market conditions as well as other factors such as labour and transport costs, other overhead expenses including insurance, etc. However we can identify a range of value that might help to illustrate of the values involved.

Each regular field for 11 players of 6.000 sm requires approximately 100 tons of infill materials. The market prices of the materials described above are in the range of :

- Black recycled SBR: 180-270 Euro / Ton
- Coated SBR: 600-750 Euro / Ton
- TPE: 1200 - 1500 Euro / Ton
- EPDM: 1.500 - 1.800 Euro / Ton
- Organic: 600 - 900 Euro / Ton

About the maintenance costs we may estimate, for each category the following costs, that also include the recharge of infill material:

- SBR and EPDM: 2.000-3000 euro / year
- TPE : 8.000 - 12.000 Euro / year

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- Organic : 6.000 - 8.000 Euro / year

These costs are altogether very low compared to the maintenance of a natural field.
About removal and disposal we estimated the following costs:
- removal 6000 sm at 3 euro / sm = 18.000 euro
- disposal of about 180 tons (carpet and infill material) 125 Euro / Ton = 22.500 Euro
- Transport to disposal, 4-14 Euro/ sm = between 24.000 and 84.000 Euro.

The total cost for removal and disposal of an artificial field could be between 64.500 and 100.500 Euro.

5:What are the impacts (positive and negative) on your industry/organisation (manufacturer, distributor, importer, sports club/community owning the field) if a restriction on PAHs in granulates is imposed to lower the limit value to close tothose set in the restriction entry 50 on PAHs in articles supplied to the general public? (see: substances restricted under reach)
Response

Artificial turf is currently the largest market for SBR granulate produced from tyre recycling. Football is the most popular and practiced sport in the world. In Europe alone, there are over 80 million people, of different ages, social background, race, etc. playing football together at various skill levels and divisions. Sport has positive physical and psychological effects on people of every age. Sports contribute to building social relationships and educating youth in a sound way, throughout the world – in rich and poor neighborhoods alike. RTMs help this to happen – implementing the Circular Economy goals by providing high performance, inexpensive materials in substitution to virgin resources – and making them readily available. "Menssana in corporesano", Latin used to say.

The availability of a good number of sports facilities well dispersed in the territory of cities and regions contributes to promoting the practice of sport and social interaction.

Tyres constitute one of the smallest waste-streams in the EU. However, tyre recycling has the potential to recycle 100% of the original product, contributing to three material outputs : rubber, steel and textiles. In recent years tyre management bodies have collected +3,200,000 tonnes of post-consumer tyres per year in the 28 Member States and Norway. However, not all tyres are included in the count. Current arisings in most States tend to include only passenger car, utility, heavy truck and bus tyres. In most States the remainder, i.e., off-road, construction, mining, air plane, and others, are neither counted nor officially collected, which if effectively managed in future, could provide many additional tonnes of these valuable raw materials to recycling markets.

Estimates are that over the past 25 years +70,000,000 tonnes of tyres have been collected - of which increasing amounts have been materially recycled. Of the valorisation options available for tyres, material recycling and energy recovery are the two most prevalent today, with material recycling accounting for 38% and energy recovery almost 37%. Retreading has declined sharply during this time, starting at +13% and tumbling to 6% or below in recent years, primarily due to the availability of inexpensive Asian imports. While landfilling hovers at +9%, exports have increased consider-ably, often to countries outside of the EU, which use them for uncontrolled burning or on the road. It must be noted that data on material recycling focus exclusively on materials, products and applications that will re-enter the economic stream. They do not include tyre derived fuel used for energy recovery.

In addition to providing cost-effective, clean, environmentally sound, and durable materials that contributes to the EU goal of a circular economy with reduced reliance on energy inputs, each tonne of tyres materially recycled as granulated infIll material equals a savings of an equivalent of +20.5 barrels of petroleum in energy costs for production alone.

The materials are sustainably produced and effectively used to substitute virgin materials for increasingly diverse markets – without substituting quality. In many instances, the characteristics and properties of recycled tyre materials contribute to improved performance, often more cost-effectively. Many have taken their place in the mainstream for construction, sports and leisure (including maintenance and infrastructure), surface transport, moulding of automotive parts (including tyres), and civil engineering, to name a few.

The earliest markets were for materials produced from the simplest treatments, e.g., whole tyres for stabilisation, sea walls, reefs, etc., or cuts/shred/chips for fill, rail beds, drainage, etc. Through the years, treatments and technologies have become more sophisticated and multi-cycle. Today, RTMs are as likely to be an ingredient in another material as to be used alone.

The Sports market is currently the most important in terms of volume and turn over, but what is even more critical, is the fact that it is the most representative in terms of demonstration and visibility. There is a direct contact between the material and the end user. Here the end user is not an industry technician or a specialised worker. Here the end users are kids and people who represent the more susceptible part of a society. They can immediately feel the good performance of the SBR granulate, see what is a recycled rubber granulate and understand the importance of tyre recycling. Recycled rubber has a lower environmental impact because it helps to reduce wastes and to contrast climate changes. This makes the end user aware and happy that with their responsible behaviour they contribute to helping the environment.

Using products produced from recycled rubber is a socially and environmentally responsible behaviour. Among market segments - molded and extruded products, rubber modified asphalts and sealants, rubber plastic blends, athletics surface, construction/indoor, playground and other safety surfaces, agrimats and equestrian footing, landscape, trails and walkways, automotive parts and tires - the most prominent and important market for recycled rubber is the sport market, where it is being used as infill material for artificial turf to provide elasticity and durability. Artificial turf is replacing natural turf because the artificial grass can be played on at all times (about 2200 hours per year compared to natural grass that can be played on for an average of 250 hours per year). In addition, artificial turf retains its characteristics while its composition combines durability with long-lasting resilience and 'soft touch' developed for intensive use. It is maintenance-friendly and environmentally friendly:

- no need to irrigate → no water wastage; A soccer field of an average dimension, requires between 6.3 million and 16.8 million of litres of water per year for watering depending on the latitude.
- No mowing or weed removal → no CO2 emissions and pesticides. At least 60 hours per year of machines moved by gasoline engine are needed, about 1.000 kg of fertilizer and pesticide per year, to maintain a soccer field.

The most common infill material adopted in the industry is the recycled rubber granulates SBR in appropriate sizes and curves: its performance in the specific use of sport surfaces is perfect for its elasticity, durability, and other physical characteristics that derive directly from its original use.

The artificial turf expansion will bring the following benefits if compared to natural ones:

Water savings: Depending on which region and on which country, one full-size synthetic turf sports (multi – sport facility) field could save from 1.9 to 3.8 million litres of water per year (water utilised to irrigate an equivalent natural turf field). As of 2013, the estimated total amount of synthetic turf installed in North America saved 9.25 billion litres of water (and eliminated close to 4 billion litres of pesticides and chemicals).

Energy is a critical concern:Efficient, effective material recycling produces vast savings in terms of material, energy and manpower. Energy in different forms is a crucial part of each phase of a product life cycle – from the production of raw materials, to manufacturing, distribution and use, through collection during the waste phase, and, finally, for recycling and delivery of sustainable products to market.

In addition to providing clean, environmentally sound, cost-effective and durable materials for fifty industry sectors, tyre recycling contributes to the EU goal of a Circular Economy, with reduced reliance on virgin resources and energy inputs.A few simple facts about the energy used for tyres, tyre rubber and recycling :

- Manufacture of 1 tonne of tyre rubber requires 121,000,000 Btus of energy[4]
- Manufacture of 1 tonne of recycled tyre materials requires only 2,200,000 BTUs of energy
- The energy recovered from 1 tonne of tyres is ±28,600,000 BTUs, a nominal recovery

In terms of ***energy*** alone, the savings that accrue as a result of the material recycling of ±15,000,000 tonnes of tyres, rather then manufacturing the same amount of new tyre rubber, or using tyres for 'energy', is equivalent to :

- ±400,000,000 barrels of petroleum
- That amount is somewhat more than 2 full years of daily petroleum imports for 7 Member States (Bulgaria, Cyprus, Estonia, Hungary, Luxembourg, Slovakia, Slovenia) –
- or±800 days of petroleum imports for Greece –

[4]: Approximately 159 liters per barrel ; 1 barrel is equivalent to 5.8 million Btus

- Or numerous trips circumnavigating the globe (31.45 barrels per trip)

Each tonne of tyres materially recycled equals a savings of an equivalent of ±20.5 barrels of petroleum in energy costs for production alone. The difference in energy use between manufacturing 1 tonne of new tyre rubber and recycling 1 tonne of tyre rubber is equivalent to 20.86 barrels of petroleum.

Noxious emissions and municipal solid waste: Synthetic turf helps to reduce noxious emissions that could be harmful to the environment. According to the Environmental Protection Agency (EPA), lawn mowers used on natural turf are a significant source of pollution (1 hour usage of a push mower is equivalent to 11 cars, while 1 hour usage of a riding mower is equivalent to 34 cars) that impairs lung function, inhibits plant growth, and is a key ingredient of smog. Moreover, the use of synthetic turf reduces grass clippings, which the EPA states are the third largest component of municipal solid waste for landfills.

Environment: Most recent synthetic turf sports fields feature rubber crumb infill recycled from used tyres, keeping more than 105 million used tyres out of landfills.

The Synthetic Turf Council estimates that the market for artificial turf is already over 500 million € per year, and is growing very quickly. Considering the large variety of different features and customer requirements for artificial field (infill material, turf fibres and turf height) and the potential needs of including, other than the substratum, a primary and/or secondary backing to install the turf, a drainage system, and safety fencing, the infill material may impact between 20% and 70% the artificial turf final cost. The above data describes a market that is able to demand every year between 100M€ and 350M€ for the infill materials, whereas the volume of the global market for artificial turf and children's playgrounds will increase by an average of approximately 15% annually, in the coming years.

As described above the use of recycled rubber granulate in Sports activities has major positive impacts, social, environmental and economic.

On the other side any alarm or fear about the soundness and healthiness of recycled rubber spread through this market would have a prejudicial negative effect on the whole market of recycled rubber. Among the players there are also other end users of recycled rubber in numerous other sectors unrelated to sport. It would seem quite logical that anyone who has an interest in damaging the image of recycled rubber would act in the sport sector.

Football is the most popular European sport. The news that it generates arrives to most homes and families. What could be the reaction of a parent who works, for instance, in the building sector or road construction and uses recycled rubber? "Let's stop using it. If it is dangerous in Sports applications, it is better not to take risks".

Key sport surface markets have been under attack and impacted upon with vigour during the past years. However, as this key market has declined at least 10%, the market for complex materials,

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e.g., mono-and-poly carbonaceous materials, thermoplastics, devulcanisates and others, have improved by 2-3 %, with other products and applications improving as well.

Each artificial turf field requires up to 100 tons of rubber granulate or other infill material. This huge amount of rubber may be obtained from the treatment of 25.000 car tyres. The price of new virgin infill material is up to 7 times more expensive compared to recycled SBR, but not necessarily healthier. That would makeownership available only to rich people to play football in private exclusive sports clubs, or oblige P.A.s to spend more money to build sports facilities for the rest of the population. As a result, the quantity of sport facilities available would be reduced. The quality of recycled SBR is the same or sometimes better than expensive virgin materials. However, these crucial points are not often well brought to the knowledge of the consumers.

There are about 20.000 artificial turf fields installed in Europe, and the annual demand for new fields, or the replacement of older ones amounts to about 1500.

The use of recycled rubber as infill material in artificial turf and sports surfaces is in line with EU policy objectives because:

- It implements and develops Circular Economy concepts for Recycled Tyre Materials (RTMs)
- It contributes to the CO2 reduction down by 40 times less than that released by the production and use of virgin materials.
- It contributes to waste reduction as it represents a sound and sustainable outlet for a recycled material.
- It reduces the consumption of fresh water used for watering natural grass used for sport fields. Water is the most widely consumed substance on Earth and owing to the global warming and ice melting it would be advisable to consider a more responsible use.

The correct risk assessment for heath issues related to the use of artificial turf based on recycled tyre granulate, could encourage the growth of the most important recycling path of such materials with direct benefits on climate-related matters such as CO2 emissions. The alternative route for rubber granulate from RTMs is their use for incineration in the cement industry. The use as turf filler leads to CO2 savings of 157ton/fields, up to 235.500 ton per year in the EU. Each tonne of tyres materially recycled equals a savings of an equivalent of 20.5 barrels of petroleum in energy costs for production alone, with an estimated saving of 1 ton CO2-eq emissions.
A restriction of the PAHs concentration in the rubber granulates, close to the restriction entry 50, would create huge damage to sector, without any demonstrated benefit to the players' health or to the environment.

As there is no proven release of PAHs from the rubber and migration to the environment or any intake into the body of a playes, we wonder what would be a lower concentration of PAHs that should be recommended, as the rubber granulate used in artificial turf is something on which people walk and run with their shoes. They are not intended to be gripped or held in their in hands for long periods of time, swallowed, worn, or put in close and long or short contact with the

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skin. The player's skin contact with rubber granulate is just accidental, sporadic and shielded by the clothes and the artificial grass that surpass in height the rubber granulate by about 1,5 cm.

Furthermore the concentration of PAHs in rubber granulate is a consequence of the concentration of PAHs in the production of new tyres. It is not clear how the PAH concentration can be reduced in the recycled rubber granulate without reducing the content in the tyres.
It is important to note that during its on-road life, 10% of tyre weight is released in micro particles into the atmosphere owing to their friction on the road and logically prior to the reduction of PAHs concentration in rubber granulates.

6:Please provide any information you may have on other substances (e.g metals such as cobalt and zinc, phthalates, benzothiazole and methyl isobutyl ketone) contained in plastic of rubber infill or in synthetic turf pitches (including substances used during the maintenance)) or other relevant information concerning possible risks to human health or the environment.
Response
Chemicals used in plastic and rubber technology are under restriction of REACH regulation, and the most of dangerous substance was eliminated from these materials In rubber infill we should observed the zinc oxide content, still used in the rubber industry, but influencing human health. Phthalate derivatives are now prohibited.

Brussels, 17th October 2017

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European Chemicals Agency
Helsinki

Date
18 October 2017

Our reference
TC/TSD/BW-121017a

Concerns:
Request for information on PolyAromatic Hydrocarbons in plastic or rubber used as infill material in synthetic turf.

Page
1

To: the Members of the European Chemical Agency,

In response to the call for evidence on the proposed restriction on polycyclic aromatic hydrocarbons (PAHs) in rubber granules for artificial turf pitches dated August 23, 2017, Ten Cate Grass Holding B.V. wishes to submit evidence and information on behalf of itself and its affiliated companies.

TenCate Grass Holding B.V. is the Dutch head office and holding company of a group of worldwide companies that are all active in the supply chain for the manufacture, commercialization and installation of artificial turf pitches, and any components thereof (hereinafter "TenCate Grass"). The annual turnover for TenCate Grass is approximately 300 million Euro and TenCate Grass has established manufacturing plants (in Nijverdal (the Netherlands), Dubai (UAE) and Tennessee (United States of America), sales organizations (known under the brand names Greenfields and TigerTurf) and installation companies in all five continents of the world.

TenCate Grass manufactures components for artificial turf pitches, such as grass fibers, backing, shock pads and infill made of plastomers and HDPE. Apart from that TenCate Grass has a substantial R&D department that performs research and development activities related to alternative forms of infill and non-fill fields. For further information on the current available options in relation to current and anticipated developments of infill and non-fill artificial turf pitches, we refer to the below Part I of the document.

Although TenCate Grass does not manufacture rubber granules for use in artificial turf pitches, many of the turf pitches that are manufactured with TenCate Grass components or sold by TenCate Grass affiliates (including Greenfields and TigerTurf) or third parties, are installed and filled with rubber granulate material. Rubber granulate is known for its sport technical features, is relatively cheap compared to other types of infill such as cork and PP/PE, and has been promoted as a sustainable way of reusing of end-of-life tires. At the same time, there is also a lot of publicity and concern from the public in some member states, among which is the Netherlands, on the possible effects on human health and the environment.

Since the introduction of the amended Annex 50 of REACH Regulation by means of Regulation 1272/2013 per 27 December 2015, TenCate Grass experienced that the ambiguity about the classification of rubber granules for application in artificial turf pitches affects the industry. Different authorities, including ECHA, the European Commission and national authorities (among which the Dutch government) make contradictory statements on the qualification of rubber granules for application in artificial turf pitches. ECHA stated that the rubber granules should be qualified as a Mixture, while the Dutch government and some members of the European Commission indicated that the rubber infill for application in artificial turf pitches may be qualified as an Article. The regulations for Articles or Mixtures differ substantially and require different measures and instructions for internal application as well as instructions to third parties (customers). Moreover, the levels of acceptable PAHs in rubber granules as a Mixture are substantially higher than the levels of PAHs allowed for Articles.

Currently, the rubber granules that TenCate Grass acquires from third parties fit the levels of PAHs as established under the above referenced Regulation 1272/2013 related to Mixtures. Both TenCate Grass and producers and suppliers of rubber granules have adhered to the European Commission letter dated November 14, 2016 with reference GROW/D1/EGJ/al, that rubber infill for application in artificial turf pitches qualifies as a Mixture and therefore the levels of PAHs for Mixtures apply. For further detailed information in relation to the levels of PAHs in rubber granules, we refer to the European Tyre and Rubber Manufacturers Association (ETRMA).

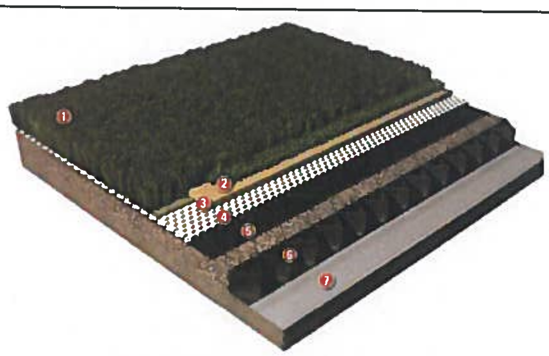
In accordance with article 3 (3) REACH and as further elaborated in paragraph 2.4 of the Guidance for substances for in Articles (ECHA-11-g-05-EN), the key question to decide whether an object is an Article or a Mixture/substance is whether the ultimate shape/surface/design is more relevant than the chemical composition. As argued in more detail below in Part II, we are of the opinion that there are cases in which rubber granules may be qualified as a Mixture. However, for the specific application of rubber granules in artificial turf fields, the shape and size define the object and its qualification for sport functional performance, and therefore it would be logical to qualify these specific type of granules as an Article. Moreover, defining these types of rubber granules as an Article (with more stringent rules on the levels of PAHs) would be in line with REACH regulation's objective to ensure a high level of protection of human health and the environment.

Therefore, TenCate Grass respectfully requests ECHA to avoid further legal uncertainty and formally declare the status of rubber granules for application in artificial turf pitches as Articles in the next Annex XV dossier that is being prepared.
Lastly, and if rubber granules for application in artificial turf pitches is indeed formally qualified as an Article in accordance with REACH regulation, TenCate Grass pleads that the levels of PAHs permitted for such use of rubber granules are set at a reasonable but acceptable level, both from a health as well as from an environmental perspective.

TenCate Grass would like to express the hope that the above will be acknowledged and taken into consideration in the ongoing work to prepare the Annex XV dossier and the expert employees of TenCate Grass remain at your disposal to provide further support and input to the relevant authorities, including ECHA, in these discussions.

PART I – Detailed information in relation to types of infill for use in artificial turf pitches as well as non-fill artificial turf pitches.

As the world leading company in development and sales of artificial turf yarns, backing material and producer of woven artificial turf carpets, TenCate Grass strives to create durable -both from technical and ecological point of view-, sport functional, recyclable artificial turf systems.



1. Artificial turf fibers
2. Loose laid infill granules
3. Loose laid stabilizing infill sand
4. Optional: shock pad
5. Geo-textile
6. Stabilizing layer
7. Stabilizing and water drainage layer

The worldwide turnover of TenCate Grass is related mainly to the production and sales of artificial turf yarns and carpet backing. TenCate Grass is also developing and producing new components like shock pads and infill materials to be applied in artificial turf systems. These components are mainly based on plastomers and/or polyolefins.

Another part of the turnover is related to two downstream affiliated companies Greenfields and TigerTurf that both are selling and installing complete artificial turf systems for soccer, field hockey, rugby, etc. The Turf Systems Development department of TenCate Grass is supporting these two downstream companies in the development, design and testing of the complete artificial turf system – that are then installed on real fields.

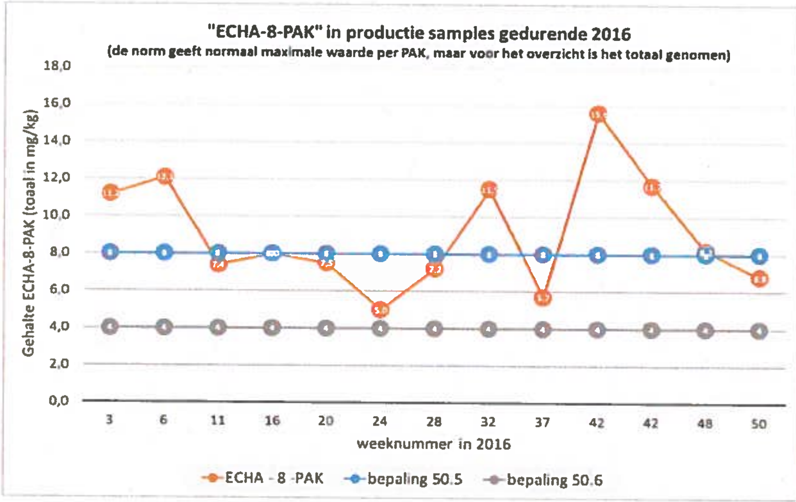
Artificial turf pitches that are manufactured with TenCate Grass components, can be filled with different types of infill materials. The main types of infill materials are:

1. Post-consumer car and truck tire material ("SBR")
2. "Non-SBR"-infill materials that are based on new polymers or organic/natural material
3. Non-fill artificial turf systems whereby the construction of the carpet does not contain any infill material.

Infill options (1 & 2).

There are many types of materials for infill on the market in different shapes. Infill is considered by TenCate Grass as an end product for which a quality assessment test is developed. This can be divided in six aspects:

1. The material as applied to produce infill granules must be fit for purpose (e.g. outdoor exposure and high shear and impact forces). Infill granules that are made of polymers that are having difficulties in outdoor applications or with less protection or bad stabilization are not accepted.
2. The infill must have the right particle shape and size.
   a. The infill can only function if the size is between 0,5 and 4 mm - with optimal size of 1-2,5 mm. This counts for all infill types.
   b. The shape must be rectangular to round shape.
3. The infill material must contribute to the sport functionality in the artificial turf system such as improving shock absorption, ball bounce and rotational friction.
4. The infill is tested on performance for player comfort, for example smell and heat in sunny high temperature weather.
5. The infill granules must fulfill the applicable the safety level towards environment and (human) health
   a. For "SBR" material we are using the risk level towards PAH of 20 mg/kg as was given in the risk assessment of the RIVM (http://www.rivm.nl/dsresource?objectid=c0129dcc-a3cf-4a65-9659-f42d7caf3d8a&type=pdf&disposition=inline) as a safe level. In the table below, it is shown that the PAH level of one supplier stays below 20 mg/kg PAH (the gray and blue data are the accumulated levels of annex 50 (which normally should be seen as 0,5 or 1,0 mg/kg per PAH-type)).



b. For "non-SBR" material TenCate Grass applies the restriction level of entry 50 of Annex XVII of REACH. This means that new produced materials may not contain any trace of PAHs. This is possible because the producer can select the raw materials that are free of PAH. The TPE, Cork and EPDM based infill granules are tested at non-detectable levels for PAH so fulfilling the requirement of entry 50.5 and 50.6.

6. Is the infill re-useable or recyclable?
   a. For "SBR" material it assessed if the material can be re-used in a new pitch. If not, it is disposed.
   b. For "non-SBR" material it is required by TenCate Grass that the material can be re-used for a second installation. At the end-of-life of an artificial turf pitch it must be possible to recycle as much of the materials as possible, including the infill material.

Non-fill (option 3).

Supported by the discussion of infill materials, TenCate Grass has already invested significantly in the development of a non-filled system. The principle of idea is that a root-zone is added to the system that is replacing the infill layer. The fibers that are applied here have "non-detected" levels of PAH and heavy metals and therefore fulfilling the requirements of entry 50.5 and 50.6 of Annex XVII of REACH..

Currently these systems can already reach the normal sports performance "FIFA Quality" level and the goal is to achieve the top-level FIFA Quality Pro certificate.

TenCate Grass believes that the non-fill solution may be able to replace the majority of the market of 3rd generation artificial turf systems. This would imply that that in the near future no infill is required for the installation of new fields.

PART II Detailed elaboration on Articles and Mixtures in accordance with REACH regulation.

The ECHA communication of 28th August 2017 and the corresponding publication on the ECHA website on the call for evidence on a proposed restriction on polycyclic aromatic hydrocarbons (PAHs) references a study report from the Dutch National Institute for Public Health and the Environment (RIVM)[1] and a preliminary report published by ECHA[2].

The reports from RIVM and ECHA recommend setting lower limits for the content of certain PAH substances in rubber granules used as infill in synthetic turf pitches, assumed that rubber granules are defined as mixtures with respect of the REACH regulation.

Both the study report from RIVM and the preliminary report from ECHA conclude that rubber granules are defined and regulated as Mixtures according the REACH Regulation, cf. Regulation no. 1907/2006 and -as a consequence- the requirements on PAHs in Mixtures apply.

Based on the reports the ECHA IS now preparing an Annex XVII dossier according to the REACH Regulation to propose a more stringent restriction on PAHs in rubber granules used as infill.

Qualification of Infill: Mixture or Article

First of all, instead of the assumption that the rubber granules for use in artificial turf pitches qualifies as a Mixture, TenCate Grass has the opinion that the application of rubber granules in artificial turf pitches must be qualified as an Article. The regulatory basis for defining rubber granules as Articles according to the REACH Regulation when used as infill in artificial turf pitches is presented in more detail below.

Physical appearance

1 http://www.rivm.nl/en/Documents_and_publications/Common_and_Present/Newsmessages/2017/Scientific_background_information_on_rubber_granulate_now_available_in_English/Download/Evaluation_of_health_risks_of_playing_sports_on_synthetic_turf_pitches_with_rubber_granulate_Scientific_background_document

2 https://echa.europa.eu/documents/10162/13563/annex-xv_report_rubber_granules_en.pdf/dbcb4ee6-1c65-af35-7a18-f6ac1ac29fe4

The rubber granules used as infill in artificial turf pitches are typically granules made of tire material in the granule size between 1-4 mm and round to rectangular shape, which is specifically used and applied in sport surfaces (infill, e-layers and running tracks).

According to Art. 3(3) of the REACH Regulation and as further elaborated in paragraph 2.4 of the Guidance for substances in Articles (ECHA-11-g-05-EN), the main criterion that defines an Article under REACH is that the surface, construction and design determine the main function of the product to a greater degree than the chemical composition. This is applicable for rubber infill granules.

Based on the known uses of the specific quality of rubber granules used as infill in artificial turf pitches it can be assumed that this use is defined mostly by the physical and structural properties, i.e. the size and shape of the granules, rather than the chemical properties of the specific quality of granules. Rubber granules as infill material is solely used as loose laid layer between artificial turf fibres.

Other materials for infill

In this respect it must also be noted that many different materials (both synthetic and natural) can be used for infill granules if particle shape and size ensures the right sport-functional performance. This shows that the similarities in particle shape and size determines the function of the granules to a greater degree than the difference in the chemical properties of the different materials.

Infill is an Article

It is therefore concluded that in accordance with article 3(3) of the REACH regulation rubber granules for use in artificial turf pitches should be qualified as an Article.

To avoid legal uncertainty and in order to ensure and maintain a strict and coherent definition of Articles and Mixtures, we suggest that for the coming proposal for a restriction of PAHs levels on rubber granules it must be clarified in the Annex XVII dossier that rubber granules when used as infill in artificial turf pitches cannot be defined as Mixtures as indicated earlier by ECHA but are defined as Articles according to the REACH Regulation.

Rubber granules as a mixture

As noted above ECHA defines rubber granules as a Mixture according to REACH definitions. With respect to the regulatory basis for the definition as a Mixture, ECHA refers to an agreement on this definition between EU Commission and Member States communicated to CARACAL-21 at the meeting from 29. June-1. July 2016[3]. Based on available information regarding the definition of rubber granules as a Mixture as presented by the EU Commission it appears that the definition is based on several other and different uses of rubber granules, and not only related to use in artificial turf pitches, cf. EU Commission document CA/30/2016 addressed to the CARACAL-21 meeting.

[3] Cf. Page 8 of the ECHA Preliminary Report.

The definition of rubber granules as Mixtures stated ECHA seems to be mostly based on other uses of rubber granules which are fundamentally different from the use as infill (e.g. the use as industrial raw material). If we would assume that the definition of rubber granules under the REACH Regulation may for other uses, which are not related to the use as infill in artificial turf pitches, be different; it is not possible to provide one single general definition of rubber granules according to REACH definitions as the definition needs to consider the many different uses and applications of rubber granules.

ECJ judgment C-106/14

Furthermore, as referenced by the EU Commission in document CA/30/2016, the ECJ judgment C-106/14 must be considered when interpreting the requirements for an "Article" according to the REACH Regulation. In this respect the European Court of Justice has confirmed that the interpretation of the REACH Regulation requirements on Articles must ensure that the interpretation of the REACH Regulation must be in keeping with the regulation's objective of ensuring a high level of protection of human health and the environment.

Conclusion

In conclusion, rubber granules used as infill in artificial turf pitches should in accordance with Article 3(3) of the REACH regulation be defined as Articles as this specific use of the rubber granules is based mostly on the physical and structural properties of the granules.

By defining the rubber granules for use in artificial turf pitches as an Article, more stringent and realistic levels of PAHs can be established for this specific application of rubber granules by means of an amended ANNEX XVII entry 50 dossier.

Geweigerd

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CONFIDENTIAL SUBMISSION

Celanese So.F.teR.'s comments on ECHA's
Call for Evidence PAH in plastic and rubber granulates

Question 3: As a manufacturer or an importer, please provide information on how many tonnes (metric tonnes) of plastic and rubber infill material (describe which infill material) you are producing or importing every year.

Non-confidential information

Details on production capacities will be submitted as confidential information. Providing such information publicly would impact Celanese So.F.teR.'s commercial interests since competitors would be made aware of these numbers.

Confidential Submission

Celanese So.F.teR.'s annual production capacity for sports fields TPE infill materials is currently between 14.000 and 16.000 tonnes. If required by demand in the market, we could double or even triple our capacity within 12 to 18 months. Any increaase in capacity would also result in investments into equipment and the generation of a small number of additional jobs at our Italian site.

Considering

- a need of 35 tonnes TPE performance infill per field
- with Celanese's production capacity of 14.000 to 16.000 tonnes annually

ca. 400 to 450 new sports fields per year could be filled with Celanese So.F.teR.'s annual production capacity.

This calculation is based on sport fields with regular FIFA dimension for 11 players, and on the installation of an artificial turf system with a shock pad.

Details on Artificial Turf systems, including an explanation the elements such as the shock pad, are provided in the answer to question 2in the Call for Evidence.

This correlates to approximately 25 to 35% of new installations every year: ESTO, European Synthetic Turf Organisation in its "Market Report Vision 2020" , of 2016 estimates a need for 1.200 - 1.400 new pitches per year.

Celanese So.F.teR.'s comments on ECHA's Call for Evidence PAH in plastic and rubber granulates

Question 2: What are the possible health or environmental aspects and technical/quality aspects and other differences of using alternative substances/mixtures as infill material? We are particularly interested in a comparison of the properties of PAH-containing and PAH-free granulates with regard to health and environmental hazards or risks, service durability, maintenance and replacement requirements, playability in different weather conditions, etc. Please specify all viable alternatives in your reply.

Detailed Comments

While we cannot directly compare Celanese So.F.teR's Thermoplastic Elastomer (TPE) granules to other materials, we can provide detailed information on our products' properties, allowing a later comparison with PAH-containing materials by the regulators.

Celanese So.F.teR. manufactures Thermoplastic Elastomer (TPE) granules for the infill of Artificial Turf (AT) systems for both indoor and outdoor use in different climate zones. PAH-free infill product made from virgin raw materials is manufactured on industrial scale and represents a sustainable substitution of crumb rubber.

Properties of Celanese PAH-free Thermoplastic Elastomer (TPE) granules

All Celanese So.F.teR. TPE infill materials have been designed to deliver high level sports performance, while complying with stringent environmental and consumer product requirements as well as REACH Annex XVII.

<u>Environmental and consumer product considerations</u>

- We consider our products to be articles as defined by the REACH regulation, as the shape, surface, and design determine the main function of the product to a greater degree than the chemical composition. Articles require for example far lower concentrations of PAHs (100 to 1000-fold lower) compared with the standard for mixtures. Since a substance's properties and possible health effects are independent of its categorization as mixture or article, we regard this as especially important when sensitive populations are definitely going to be exposed to the material. Details on the TPE infill material composition are provided in the answer to Question 6[1] of the Call for Evidence.
- TPE infill materials are compliant with the Dutch Soil Quality Decree[2] requirements and do not contain hazardous organic components or leaching inorganic compounds (metals, halogens) at levels even close to the approved limits. Details on the compliance with the Dutch Soil Quality Decree are provided in the answer to Question 6[3] of the call for Evidence.
- TPE infill materials offer the UV resistance needed for the area of installation - suitable polymers for outdoor use (e.g. high melting point) and additives (all covered by Dutch Soil Quality Decree)

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[1] Document "Infill Granules Synthetic turf - Q 6 - Celanese 2017-10-18.pdf", submitted as non confidential comment
[2] Bulletin of Acts, Orders and Decrees of the State of the Netherlands, 2007, 469; Decree of 22 November 2007 containing rules with respect to the quality of soil (Soil Quality Decree); (http://rwsenvironment.eu/publish/pages/97215/soilqualitydecree_24_275037.pdf)
[3] Document "Infill Granules Synthetic turf - Q 6 - Celanese 2017-10-18.pdf", submitted as non confidential comment

- TPE infill materials are reusable and recyclable. Disposal of these materials by landfilling is not necessary. While crumb rubber is a cured, thermoset material which has undergone an irreversible chemical change, the Celanese So.F.teR. TPE infill materials have not undergone such reaction and can be reused or recycled. We have some experience with reuse of material (depending on product quality, mainly in professional soccer where top layer is changed more often, whenever there is a new technology for top layer of fiber). The Celanese So.F.teR. TPE infill material can as a worst case be used as an additive in recycling of plastics to improve quality.
- TPE infill materials are manufactured by extrusion under water. They are thus containing negligible amounts of dust, if any.

Technical alternative considerations to provide durable sports experience

- TPE infill materials are durable and have been successfully installed in several fields in conformity with the FIFA Quality Programme for Football Turf (previously FIFA 2 Stars Artificial Systems)[4] since the year 2004.
- TPE infill materials have a higher specific weight than water. The Celanese So.F.teR. TPE infill material does not float out of the sports fields when the field is in contact with water, while e.g. cork in an infill can float out of the field. Thus, the TPE infill provides a cost benefit when compared to cork, since cork would have to be replaced.
- TPE infill materials have a regular pellet shape which avoids compaction and contributes to the full system efficiency, constant reliable performance, and no dust formation.

Components in Artificial Turf (AT) systems and their impact on Cost and Maintenance

Artificial turf is a surface of synthetic fibers made to look like natural grass. Nowadays, so-called "third generation systems" are most widely used. These 3rd generation AT systems use infills that are mixtures of sand and infill granules.

The entire range of Celanese So.F.teR. infill granules have been designed such that the AT system delivers a performance as similar as possible to that of natural turf. The infill is a key element in the AT system and contributes most to its performance.

As shown in Figures 1 and 2 below, AT systems generally consist of artificial turf fibers, infill granules, sand infill, carpet backing, and sub-base. The systems differ in the presence of the so-called shock pad. They also differ remarkably in the necessary volumes of materials to install the sports field (details in Table 1), as well as potentially in the type of infill material (crumb rubber vs. TPE performance infill).

Figure 1 shows an AT system consisting of artificial turf fibers, TPE performance infill, sand infill, carpet backing, shock pad, and sub-base.

[4] https://football-technology.fifa.com/en/media-tiles/fifa-quality-programme-for-football-turf/

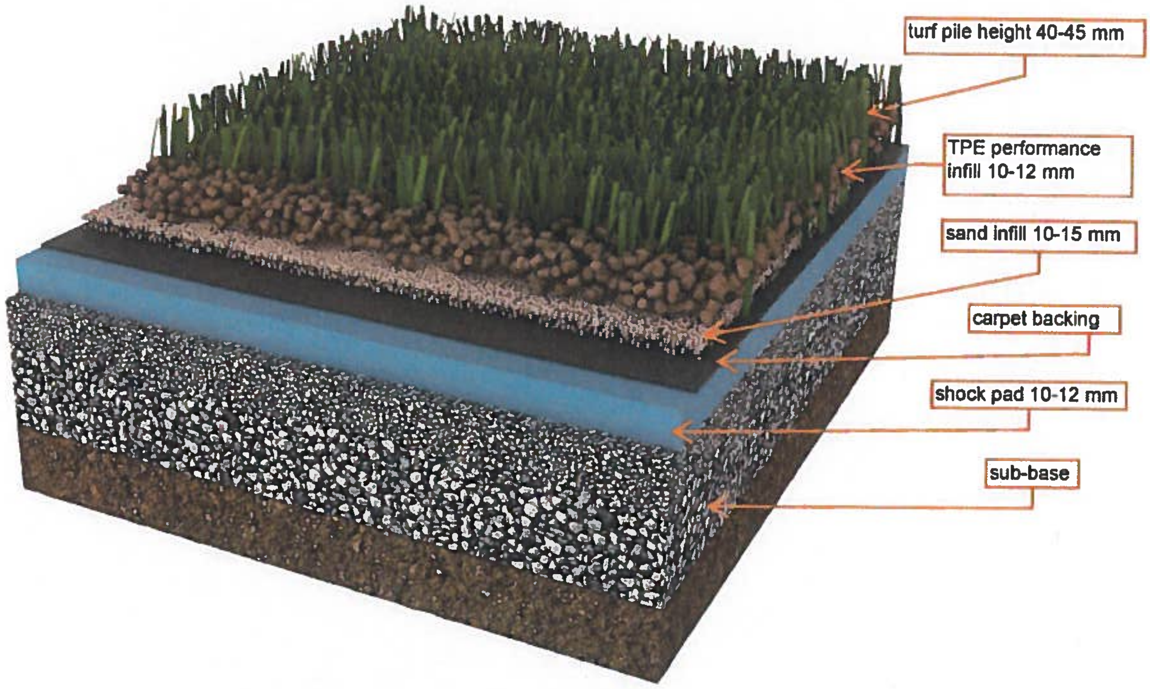

Figure 1: Artificial Turf (AT) System with Shock Pad

The performance infill as shown in Figure 1 is made of specially designed TPE. In case of Celanese So.F.teR., the TPE infill is manufactured from virgin raw materials. The performance infill can also consist of elastomeric granules made of thermosets[5], like crumb rubber. The main difference between these two materials is that thermoset rubbers cannot be further reused or reprocessed at the end of their life cycle while Thermoplastic Elastomers are fully recyclable and can be reused and transformed several times. The performance infill as key element in the AT system creates the necessary shock absorption, ball bounce, torsion and affects the sliding performance. Also, it aids the yarns to bend back to their original position and contributes to a consistent performance.

The Celanese So.F.teR. portfolio includes two different shapes of granules which show differences in bulk density (a property which determines the total quantity of granules necessary to infill an entire pitch) and shock absorption:

- Open cylindrical shapes ensuring excellent shock absorption due to the compressible form, (Holo® products),
- solid cylindrical shape (Terra® and Forgrin® products).

The use of the shock pad (also called elastic layer or e-layer) beneath the turf carpet adds shock absorption to the playing surface and allows to reduce the thickness of the infill layer and use of shorter grass fibers, which allows reduction of overall construction costs when installing an AT system.

The main function of the sub-base is the creation of a durable, stable, flat surface on which the AT system is installed. The depth of the sub-base depends on the AT system installed on it and the climate conditions at

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[5] A thermosetting polymer, also called a thermoset, is a polymer that is irreversibly cured from a soft solid or viscous liquid prepolymer or resin. (https://en.wikipedia.org/wiki/Thermosetting_polymer ; citing IUPAC Compendium of Chemical Terminology. 2007.)

the location of installation. A system with a shock pad has better isolating properties than a long pile system using Styrene Butadiene Rubber (SBR; from End of Life Tires (ELT)) as filler (Figure 2).

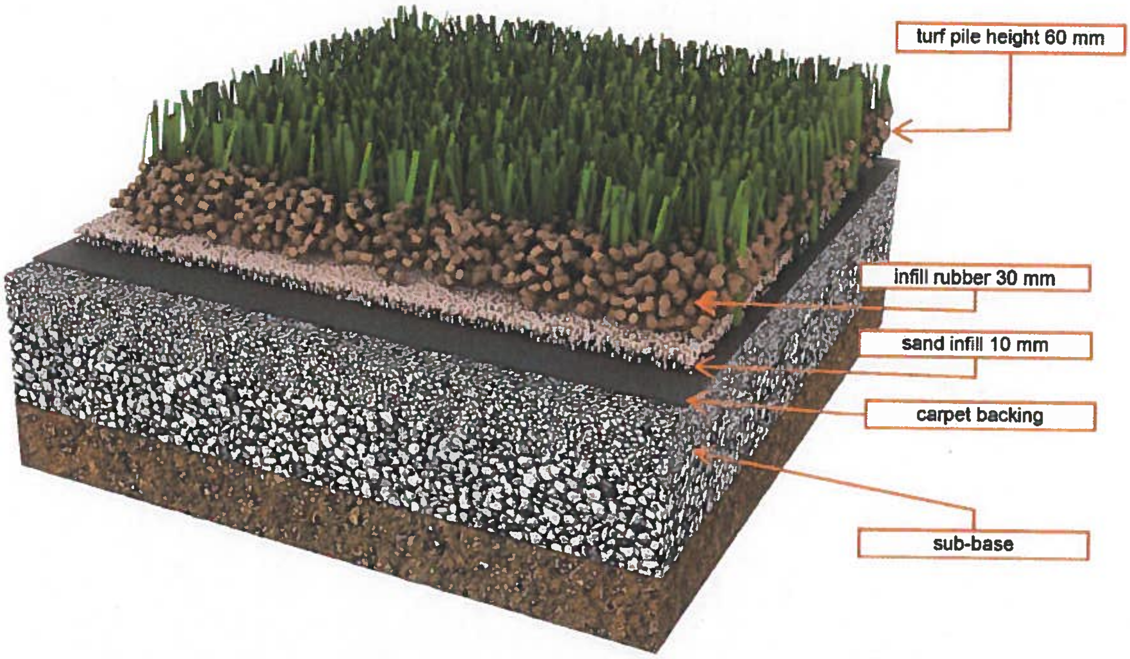

Figure 2: Artificial Turf (AT) System without Shock Pad

An additional function of the sub-base is to prevent leaching substances to reach the soil or groundwater below the installation, especially in SBR-containing AT systems in which presence of (heavy) metals is to be expected as the granules are made from End of Life Tires (ELT).

An AT system without shock pad is characterized by longer turf pile height for the grass fiber (60 mm), approximately 10 mm sand infill, and 30 mm infill layer. The infill in this system can consist of crumb rubber as well as of TPE performance infill.

Cost of Ownership Considerations

Comparison of a Styrene Butadiene Rubber (SBR; from End of Life Tires (ELT)) system with a Thermoplastic Elastomer (TPE) infill systems provides information on initial installation cost and Follow-up costs during installation's life cycle.

Comparing an average long pile 60 mm Styrene Butadiene Rubber (SBR; from End of Life Tires (ELT)) system (as exemplified in Figure 2) with a typical combination system based on a shock pad (Figure 1), the initial installation cost for the TPE system is approximately 20% higher (see Table 1).

When taking into consideration not only the price for the installation, but the complete life cycle of the installation including the necessary follow - up costs for the owner of the sports fields, the maintenance cost for a TPE system is lower than for an ELT/SBR infilled field:

- TPE infill materials can be reused, or recycled and reused in other plastics applications.
- Installations with TPE infill materials

- Do not require environmental monitoring and control measurements on leaching metals, especially zinc, since absence of leaching metals is experimentally confirmed
- Due to absence of heavy metals which can leach into the lower installation levels, no cost for cleaning a potentially contaminated subbase and renovation of this layer, and for possible soil remediation arises

Table 1: Comparison of SBR-based and TPE-based infill systems

System	Average SBR system	TPE-based infill or Combination system
Pile height	Long pile system, 60 mm fibers	short pile system, 45 mm fibers, including shock pad
Infill material	Styrene Butadiene Rubber (SBR) granules	Thermoplastic Elastomer (TPE) granules
Infill material origin	mainly from End of Life Tires (ELT)	virgin, prime raw materials
Infill layer thickness	30 mm SBR, mainly from ELT	10 mm TPE
Infill volume	120 tonnes	35 tonnes
Sand layer thickness	10 mm	10-15 mm
Shock pad	No	yes
Estimated cost for initial installation	€ 300.000	€ 360.000 - 380.000
Infill reusable	No (resulting in cost for disposal)	yes
Infill recyclable	No (resulting in cost for disposal)	yes
Follow-up costs during installation's life cycle	Possible cost elements: • environmental monitoring and control measurements on leaching metals • cost for cleaning a potentially contaminated subbase and renovation of this layer after heavy metals leaching into lower installation levels • soil removal and soil remediation	None known due to material's composition

An assessment of the environmental impact on artificial turf is also published by FIFA in the "Environmental Impact Study on Artificial Football Turf"[6]. The study's goal and scope are described as "to provide an overview of the environmental impacts of artificial football turf. [...] The scope of this study is limited specifically to artificial turf that meets [...]standards under the FIFA Quality Programme. As such, it reflects the higher end of the market,[...]." (Section 2.1)

[6] "Environmental Impact Study On Artificial Football Turf" prepared by Eunomia Research & Consulting Ltd for FIFA (March 2017) published at https://football-technology.fifa.com/media/1230/artificial_turf_recycling.pdf

Regarding the results on environmental impacts of FIFA certified football turf it is stated "Where the turf is recycled, the analysis suggests that if recycling is carried out effectively, in this idealised situation, many of the infill options (**with the exception of TPE**) have a similar environmental impact." (Section 2.2, emphasis added)

Celanese So.F.teR.'s comments on ECHA's
Call for Evidence PAH in plastic and rubber granulates

Question 6: Please provide any information you may have on other substances (e.g. metals such as cobalt and zinc, phthalates, benzothiazole and methyl isobutyl ketone) contained in plastic of rubber infill or in synthetic turf pitches (including substances used during the maintenance)) or other relevant information concerning possible risks to human health or the environment.

Detailed Comments

Considering the exposure paths and duration to infill granules at sports activities, it is critical that such infill materials do not pose a risk to human health and the environment. For this reason, Celanese So.F.teR.'s performance TPE infill portfolio is manufactured from PAH-free, virgin thermoplastic elastomer and components which are provided by qualified, regularly audited suppliers.

The TPE infill materials are analyzed for a multitude of organic and inorganic parameters. The analytical results for the TPE infill materials indicate for example

- Concentration of PAHs (including the eight specific PAHs governed by REACH Annex XVII (50)) below detection limit (< 0, 1 mg/kg), method ZEK 01.4-08:2011-11
- to be regarded as halogen-free as defined by the International Electrochemical Commission (IEC) per IEC 61249-2-21 (900 ppm maximum chlorine, 900 ppm maximum bromine, 1500 ppm maximum total halogens)
- phthalate concentration below 0,1 % (method TR DIN CEN ISO/TS 16181; DIN SPEC 91181:2011-10)
- No heavy metals detected in SEM (Scanning Electron Microscope)
- Heavy metals in analysis of eluates per DIN 18035-7: below detection limit or DIN limit
- Dissolved organic carbon (NF EN 1484) in analysis of eluates per DIN 18035-7 below DIN limit
- Emission or leaching of zinc was determined to be below detection limit; only one metal emission was detected at all, in a concentration way below the limit value
- organic content, including concentration of PAHs, below analytical detection limit

The Celanese So.F.teR. TPE infill materials can be considered as safe for the environment since they are proven to comply with the stringent requirements established by the Dutch *Besluit bodemkwaliteit* (Soil Quality Decree)[1].

The Dutch Soil Quality Decree is one of the most severe environmental standards for building materials in Europe and describes the requirements for building materials used on or in soil: The manufacture, import, possession for use or use of building materials is prohibited, unless the composition and emission values of a building material have been determined and do not exceed the maximum composition and emission values (laid down in Section 28, Soil Quality Decree).

Celanese So.F.teR. TPE Infill materials meet the definition of "Building materials" under the Dutch Soil Quality Decree, thus when used in sports installations in the Netherlands, the TPE infill materials need to

[1] Bulletin of Acts, Orders and Decrees of the State of the Netherlands, 2007, 469.
Decree of 22 November 2007 containing rules with respect to the quality of soil (Soil Quality Decree) (http://rwsenvironment.eu/publish/pages/97215/soilqualitydecree_24_275037.pdf) and Besluit bodemkwaliteit; Geldend van 24-05-2016 t/m heden (http://wetten.overheid.nl/BWBR0022929/2016-05-24) (websearch on October 09, 2017)

fulfill the high standards established for building materials: Appendix 1 to the Soil Quality Decree, as referred to in Section 28 (1) thereof, provides the composition and emission values which need to be determined and are not to be exceeded. The parameters to be analyzed include[2]

- leaching of metals (e.g. heavy metals and Zinc) and other inorganic substances, and
- content of certain organic substances (e.g. aromatic substances like benzene and benzene derivatives, Polycyclic aromatic hydrocarbons (PAHs), Chlorohydrocarbons like Polychlorobiphenyls (PCBs))

The Celanese So.F.teR. TPE infill materials were tested by the accredited laboratory SGS Intron B.V. and found to comply with all parameters established by the Soil Quality Decree.

- All organic content, including concentration of PAHs, is below analytical detection limit.
- Emission or leaching of zinc was determined to be below detection limit; only one metal was detected at all, in a concentration way below the limit value.

It should be noted that crumb rubber, when used as infill for sports fields, does not have to comply with these stringent environmental standards.

The concentration of PAHs (including the eight specific PAHs governed by REACH Annex XVII (50)) in several Celanese So.F.teR. TPE infill materials was determined in an additional, independent analysis for the products Terra® XPS, Holo® SP, Holo® GT, and Forgrin® HT140. The sum of Polycyclic aromatic hydrocarbons (PAH) was determined to be < 0.1 mg/kg, using method ZEK 01.4-08:2011-11.

Additional confirmation of the environmental safety of Celanese So.F.teR. TPE infill materials is obtained through the company's entitlement to issue a Manufacturer's declaration (Fabrikant-eigenverklaring): Infill material in the Netherlands must be accompanied by an environmental declaration[3] which needs to be available at the construction site when the infill is spread onto the field.

The Dutch Soil Quality Regulation (Regeling bodemkwaliteit)[4] provides the option to certify a product so that the material does not have to be tested for each individual project. A manufacturer may issue a manufacturer's declaration for a building material if all parameters comply with the maximum values for inorganic parameters, including (heavy) metals and halogens, and for organic parameters including aromatic substances, PAHs, and PCBs.

The Dutch Rijkswaterstaat Environment publishes the list of approved products[5] to provide a quick control option if a product with manufacturer's declaration is delivered.

After being successfully audited by the accredited test institute, Celanese So.F.teR. as a manufacturer of TPE infill material is entitled to provide the Manufacturer's declaration (Fabrikant-eigenverklaring) for the products Holo® SP-D, Terra® XPS, Terra® Basic and Forgrin® HT-140 D.

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[2] The complete list of parameters is available at http://wetten.overheid.nl/BWBR0022929/2016-05-24#Bijlage1

[3] *Environmental declaration*: a. for building materials [...]: batch inspection, manufacturer's declaration or recognised quality statement,

[4] Based on the Dutch Soil Quality Regulation (Regeling bodemkwaliteit, Geldend van 01-02-2017 t/m heden, http://wetten.overheid.nl/BWBR0023085/2017-02-01#Opschrift), paragraph 3.5

[5] https://www.bodemplus.nl/aanvragen/fabrikant/lijst/

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Bonn, den 18. October 2017 Reg.-Nr.: 57/02455-17

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UST-ID: DE 122128379

Call for evidence on restriction proposal on PAHs in plastic and rubber granulates

Dear Sirs and Madams,

We represent and act as counsel for Conradi + Kaiser GmbH and Kraiburg Relastec GmbH & Co. KG. Our clients are reputed manufacturers of fall protection panels made of premium-grade SBR granulate.

We have already stated a position regarding the preceding public consultations of ECHA held on 23 January 2017 and 1 June 2017 for these clients with our statements of position dated 18 April 2017 and 28 July 2017. Our clients do not produce any filling material for artificial turf playgrounds. In the safety analyses performed by our clients for the fall protection panels they manufacture, however, scientific testing was conducted on input material to determine its migration to human organisms, and the findings produced by these analyses are also of importance to the evaluation of SBR granulates used as filling material for artificial turf playgrounds.

As far back as our statements of position dated 18 April 2017 and 28 July 2017, we drew attention to the comprehensive testing programme performed by Fraunhofer Institute for Process Engineering and Packaging (Fraunhofer IVV) and its final report on this.

Fraunhofer IVV Report PA/4453/17
Analyses on the migration of polycyclical aromatic hydrocarbons (PHA) from rubber products containing used tires

This study has also been submitted to the Rijksinstituut voor Volksgezondheid en Mileu (RIVM), whose initiative led to the public consultation that is now being performed by ECHA.

In consideration hereof, we would like to comment on the public consultation in the following:

1. <u>No hazard posed to health by using SBR granulates</u>

It would appear that the ECHA consultation initiated by RIVM is based on the assumption that it may be necessary to regulate the PAH content of plastic or rubber granulates to be used as filler for artificial turf playgrounds in order to protect the health of human users of such artificial turf playgrounds.

In its preliminary assessment from 28 February 2017, ECHA arrived at the conclusion that concerns regarding persons playing on artificial turf playgrounds in which recycled rubber is used as a filler, including children, as well as workers installing and maintaining such artificial turf playgrounds, are at most very low level.

Recycled rubber infill causes a very low level of concern,
ECHA/PR/17/04

According to the study conducted by Fraunhofer Institute, which has been submitted to ECHA and RIVM in the meantime, the possibility of a risk for users is ruled out with regard to filling material made of premium-grade SBR granulates. As we discussed previously in our statements of position from 18 April 2017 and 28 July 2017, the Fraunhofer IVV studies have demonstrated that SBR granulates produced by reputed European manufacturers do not constitute any source of PAH migration that could pose a risk to the health of human users.

2. <u>Inadequate regulatory system employed in the REACH Regulation/need for a migration-based approach</u>

The ECHA consultation initiated by RIVM contains questions that suggest that RIVM may seek to regulate filling material for artificial turf playgrounds, which is at present based on the system (maximum concentration of contents) laid down in entry 50, nos. 5 and 6 of Annex XVII of the REACH Regulation. As we already demonstrated in our statements dated 18 April 2017 and 28 July 2017, this system is not capable of guaranteeing protection of human health.

The maximum content of PAH in rubber and plastic parts that come into contact with the skin of humans is completely irrelevant to possible negative effects on health. The decisive factor is the amount of PAH that users may absorb through their skin when the panels are used for their intended purpose or in their foreseeable use. All these reasons make it necessary to fundamentally change the system from the regulation of maximum contents to a migration-based approach when revising entry 50, nos. 5 and 6 of Annex XVII to the REACH Regulation.

3. <u>Inappropriate question regarding substitute/recycling material</u>

The ECHA consultation initiated by RIVM raises questions regarding the use of substitute material (in particular whether and in what amount such would lead to higher costs, etc.). Given the fact that the use of SBR granulates poses no risk to health whatsoever, this question is inappropriate. It would make more sense to pose questions about what types of options there are for recycling of products from upstream manufacturing and recycling stages (in particular used tires that are processed into SBR granulates). It has been demonstrated that the processing of used tires into SBR granulate for fall protection plates to serve as filler for artificial turf playgrounds poses no hazard to health whatsoever and is therefore preferable for reasons relating to environmental protection and the need to save resources.

If you have any questions, we shall of course be at your disposal.

Best regards,

[redacted]

Attorney at Law

Analysis of two real sample of infill material in synthetic turf piches

Two samples of rubber granulates used as infill material in synthetic turf pitches were collected from two different real football playgrounds, and analyzed according to the ISTISAN 16/13 analytical method. The results are reported above.

	D (Std. Dev %)	G (Std. Dev %)
Benzo[a]anthracene (ug/Kg)	<60	<60
Chrisene (ug/Kg)	<55	<55
Benzo[b]fluoranthene (ug/Kg)	396 (4,2)	1283 (2,9)
Benzo[k]fluoranthene (ug/Kg)	<54	<54
Benzo[j]fluoranthene (ug/Kg)	<59	<59
Benzo[e]pyrene (ug/Kg)	516 (4,5)	1435 (1,2)
Benzo[a]pyrene (ug/Kg)	<56	<56
Dibenzo[a,h]anthracene (ug/Kg)	<175	<175

The method performance were evaluated comparing the results applying both the ISTISAN 16/13 analytical method and the ISO 21461: 2012 to the same samples. In addition the method was applied during a proficiency test organized by the Netherlands Food and Consumer Product Safety Authority (NVWA) for quantification of PAHs in two rubber samples. The method was applied by all the contributor to the development of the ISTISAN 16/13 method, obtaining good Z-score values.

The results on real sample D and G reported amount of Benzo[b]fluoranthene and Benzo[e]pyrene] exceeding the value of 1 mg/kg on the sample G while the content of each PAH in the sample D is lower that 1mg/kg.

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Stockholms stad
Miljöförvaltningen
Fleminggatan 4
112 26 Stockholm
SWEDEN

Fürth, 03.02.2017

Test report No. FUHLP2016-16462

Arrival in lab: 12.12.2016, processing time: 12.12.2016 – 03.02.2017
Lab Director: [redacted]

General note: Copying this test report partially is permitted only in agreement with the contracted lab. The tests results refer only to the tested item.
This report consists of 25 pages.
Remark: The sample quantities of yarns and labels are usually insufficient for testing. So it might happen that positive results could not be detected. If this is not acceptable for the client, these parts shall be provided in adequate amounts (minimum 5 –10 g).
The test method signed with * is not listed in the attachment of the accreditation certificate.

Sample description: Rubber

Comment:
n.d. – not determinable
CS – combined sample

No.	Tested components
1	Granules red, KC 161205.1
2	Granules black, KC 161205.2
3	Granules red, KC 161205.3
4	Granules black, KC 161205.4
5	Granules red, KC 161205.5
6	Granules red, KC 161205.6
7	Granules black, KC 161205.7
8	Granules green, KC 161205.8
9	Granules red, KC 161205.9

Various SVHC and organic substances in mg/kg

Test method: Phthalate: Extraction with organic solvent, GC-MS; brominated flame retardants: Extraction with organic solvent, GC-MS resp. LC-MS; Aliphatic and aromatic hydrocarbons, screening on non volatile substances: Extraction with organic solvent, GC/MS
Limit of quantification = LOQ
Measurement uncertainty: ± 10% resp. a range was given due to strong matrix

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 1
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154-52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)- UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	150	n.d.

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 1
Hydrocarbons	Aromat >C16-C35		10	n.d.
	Alifat >C16-C35		100	400-1000
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	n.d.

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Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 2
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154–52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	150	n.d.

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Sitz Fürth
Amtsgericht Fürth, HRB 5756
Ust-IdNr. DE169317871

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 2
Hydrocarbons	Aromat >C16-C35 *		10	780-900
	Alifat >C16-C35		100	800-900
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	n.d.

*

Substance name	Concentration range in mg/kg
N-Isopropyl-N'-phenyl-1,4-phenylenediamine	550-600
N-(1,3-Dimethylbutyl)-N□-phenyl-p-phenylenediamine	150-200
4,4'-(1,4-Phenylendi-2,2-propandiyl)diphenol	80-100

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Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 3
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154-52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	150	n.d.

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 3
Hydrocarbons	Aromat >C16-C35 *		10	12-21
	Alifat >C16-C35		100	>1000
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	n.d.

*

Substance name	Concentration range in mg/kg
0,0'-Dihydroxy-m-diisopropylbenzene	2-6
1-[4-(1-Hydroxy-1-methylethyl)phenyl]ethanone	10-15

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 4
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154-52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	12
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)- UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	150	n.d.

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 4
Hydrocarbons	Aromat >C16-C35		10	310-350
	Alifat >C16-C35		100	700-1000
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	29

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Substance name	Concentration range in mg/kg
N-Isopropyl-N'-phenyl-1,4-phenylenediamine	7-10
N-(1,3-Dimethylbutyl)-N□-phenyl-p-phenylenediamine	260-280
4,4'-(1,4-Phenylendi-2,2-propandiyl)diphenol	45-55

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Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 5
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154-52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)- UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	10	n.d.

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 5
Hydrocarbons	Aromat >C16-C35		10	n.d.
	Alifat >C16-C35		100	>1000
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	n.d.

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Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 6
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154-52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	10	n.d.

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Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 6
Hydrocarbons	Aromat >C16-C35 *		10	n.d.
	Alifat >C16-C35		100	>1000
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	n.d.

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Substance name	Concentration range in mg/kg
2-Benzothiazolyl Diethyldithiocarbamate	3-5

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Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 7
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154-52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	150	n.d.

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Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 7
Hydrocarbons	Aromat >C16-C35 *		10	350-370
	Alifat >C16-C35		100	180-220
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	n.d.

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Substance name	Concentration range in mg/kg
N-(1,3-Dimethylbutyl)-N′-phenyl-p-phenylenediamine	320-330
4,4'-(1,4-Phenylendi-2,2-propandiyl)diphenol	32-38

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Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 8
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154–52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)- UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	150	n.d.

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 8
Hydrocarbons	Aromat >C16-C35		10	n.d.
	Alifat >C16-C35		100	>1000
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	n.d.

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 9
Phthalates	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester (DEHP)	117-81-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dibutyl ester (DBP)	84-74-2	200	n.d.
	1,2-Benzenedicarboxylic acid, diisononyl ester (DINP)	28553-12-0	200	n.d.
	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (DIBP)	84-69-5	200	n.d.
	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester (BBP)	85-68-7	200	n.d.
	1,2-Benzenedicarboxylic acid, dioctyl ester (DNOP)	117-84-0	200	n.d.
	1,2-Benzenedicarboxylic acid, diisodecyl ester (DIDP)	26761-40-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7-rich	71888-89-6	200	n.d.
	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkylesters	68515-42-4	200	n.d.
	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	200	n.d.
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	200	n.d.
	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters (EC-nr 201-559-5)	68515-51-5 och 68648-93-1	200	n.d.
	Dihexylphthalate	84-75-3	200	n.d.
	Diisopentylphthalate	605-50-5	200	n.d.
	bis(2-methoxyethyl) phthalate	117-82-8	200	n.d.
	di-n-pentyl phthalate	131-18-0	200	n.d.
	N-pentylisopentylphthalate	776297-69-9	200	n.d.
	1,2-Benzenedicarboxylic acid, diethyl ester (DEP)	84-66-2	300	n.d.
	1,2-Benzenedicarboxylic acid, dicyclohexyl ester (DCHP)	84-61-7	300	n.d.
Phenols	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	140-66-9	200	n.d.
	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 327	3864-99-1	200	n.d.
	Phenol, nonyl-	25154-52-3	10	n.d.
	Phenol, 4-nonyl-, branched	84852-15-3	10	14
	Phenol, 4,4'-(1-methylethylidene)bis- (Bisfenol A)	80-05-7	10	n.d.
	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-UV 320	3846-71-7	200	n.d.
Chlorinated parafins	Alkanes, C10-13, chloro	85535-84-8	200	n.d.
	Alkanes, C14-17, chloro	85535-85-9	200	n.d.
	Alkanes, C18-20, chloro		200	n.d.
Brominated flame retardants	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo	1163-19-5	200	n.d.
	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo- (TBBPA)	79-94-7	150	n.d.

Substance group	SUBSTANCE	CAS	LoQ (mg/kg)	No. 9
Hydrocarbons	Aromat >C16-C35*		10	200-220
	Alifat >C16-C35		100	>1000
	Aromat >C16-C35		10	n.d.
Others	Benzenamine, 4,4'-methylenebis[2-chloro-	101-14-4	200	n.d.
	Stannane, dibutyldichloro- (via Sn as additonal Metal to upper metals)	683-18-1	200	n.d.
	4-Nonylphenol, branched or linear		200	n.d.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	200	n.d.
NPEO	Nonylfenoletoxilater, NPEO		10	n.d.

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Substance name	Concentration range in mg/kg
N-(1,3-Dimethylbutyl)-N□-phenyl-p-phenylenediamine	150-160
4,4'-(1,4-Phenylendi-2,2-propandiyl)diphenol	50-55

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Headspace-Screening on volatile substances; test results in mg/kg

Test method: HS-GC/MS*
Limit of quantification: 2-10 mg/kg due to the tested substance
Measurement uncertainty: ± 10%

Substance name	CAS	LOQ in mg/kg	No. 1	No. 2	No. 3
Benzene	71-43-2	0.0122	n.d.	n.d.	n.d.
Benzene, ethyl-	100-41-4	10	n.d.	n.d.	n.d.
Benzene, dimethyl-	1330-20-7	10	n.d.	n.d.	n.d.
Propane, 2-methoxy-2-methyl- (MTBE)	1634-04-4	0.2	n.d.	n.d.	n.d.
Toulen	108-88-3	10	n.d.	n.d.	n.d.
Alifat >C5-C8		12	n.d.	n.d.	n.d.
Alifat >C8-C10		20	n.d.	n.d.	n.d.
Alifat >C10-C12		100	n.d.	n.d.	n.d.
Alifat >C12-C16		100	n.d.	n.d.	n.d.
Alifat >C5-C16		100	n.d.	n.d.	n.d.
Alifat >C5-C16		100	n.d.	n.d.	n.d.
Alifat >C16-C35		100	n.d.	n.d.	n.d.
Aromat >C8-C10		10	n.d.	n.d.	n.d.
Aromat >C10-C16		3	n.d.	n.d.	n.d.
Aromat >C8-C10		10	n.d.	n.d.	n.d.
Aromat >C10-C16		3	n.d.	n.d.	n.d.

Substance name	CAS	LOQ in mg/kg	No. 4	No. 5	No. 6
Benzene	71-43-2	0.0122	n.d.	n.d.	n.d.
Benzene, ethyl-	100-41-4	10	n.d.	n.d.	n.d.
Benzene, dimethyl-	1330-20-7	10	n.d.	n.d.	n.d.
Propane, 2-methoxy-2-methyl- (MTBE)	1634-04-4	0.2	n.d.	n.d.	n.d.
Toulen	108-88-3	10	n.d.	n.d.	n.d.
Alifat >C5-C8		12	n.d.	n.d.	n.d.
Alifat >C8-C10		20	n.d.	n.d.	n.d.
Alifat >C10-C12		100	n.d.	n.d.	n.d.
Alifat >C12-C16		100	n.d.	n.d.	n.d.
Alifat >C5-C16		100	n.d.	n.d.	n.d.
Alifat >C5-C16		100	n.d.	n.d.	n.d.
Alifat >C16-C35		100	n.d.	n.d.	n.d.
Aromat >C8-C10		10	n.d.	n.d.	n.d.
Aromat >C10-C16		3	n.d.	n.d.	n.d.
Aromat >C8-C10		10	n.d.	n.d.	n.d.
Aromat >C10-C16		3	n.d.	n.d.	n.d.

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Substance name	CAS	LOQ in mg/kg	No. 7	No. 8	No. 9
Benzene	71-43-2	0.0122	n.d.	n.d.	n.d.
Benzene, ethyl-	100-41-4	10	n.d.	n.d.	n.d.
Benzene, dimethyl-	1330-20-7	10	n.d.	n.d.	n.d.
Propane, 2-methoxy-2-methyl- (MTBE)	1634-04-4	0.2	n.d.	n.d.	n.d.
Toulen	108-88-3	10	n.d.	n.d.	n.d.
Alifat >C5-C8		12	n.d.	n.d.	n.d.
Alifat >C8-C10		20	n.d.	n.d.	n.d.
Alifat >C10-C12		100	n.d.	n.d.	n.d.
Alifat >C12-C16		100	n.d.	n.d.	n.d.
Alifat >C5-C16		100	n.d.	n.d.	n.d.
Alifat >C5-C16		100	n.d.	n.d.	n.d.
Alifat >C16-C35		100	n.d.	n.d.	n.d.
Aromat >C8-C10		10	n.d.	n.d.	n.d.
Aromat >C10-C16		3	n.d.	n.d.	n.d.
Aromat >C8-C10		10	n.d.	n.d.	n.d.
Aromat >C10-C16		3	n.d.	n.d.	n.d.

Heavy metals after total digestion in mg/kg

Test method:
Digestion: Microwave HNO_3/H_2O_2
Measurement: ICP-OES: DIN EN ISO 11885 (E22) 2009-09 and ICP-MS: DIN EN ISO 17294-2 2005-02 resp.
Hg: AFS: DIN EN 17852 (E35) 2008-04
Limit of quantification in mg/kg = LOQ
Measurement uncertainty: ± 10%

Substance name	CAS No.	LOQ	No. 1	No. 2	No. 3	No. 4
Antimony, Sb	7440-36-0	12	n.d.	n.d.	n.d.	n.d.
Arsenic, As	7440-38-2	10	n.d.	n.d.	n.d.	n.d.
Barium, Ba	7440-39-3	200	n.d.	n.d.	n.d.	n.d.
Lead, Pb	7439-92-1	50	n.d.	n.d.	n.d.	n.d.
Cadmium, Cd	7440-43-9	0.5	n.d.	n.d.	0.54	0.77
Cobalt, Co	7440-48-4	15	n.d.	n.d.	n.d.	260
Copper, Cu	7440-50-8	80	n.d.	n.d.	n.d.	n.d.
Chrome, Cr	7440-47-3	10	41	n.d.	n.d.	n.d.
Mercury, Hg	7439-97-6	0.25	n.d.	n.d.	n.d.	n.d.
Molybdenum, Mo	13939-06-5	40	n.d.	n.d.	n.d.	n.d.
Nickel, Ni	7440-02-0	40	n.d.	n.d.	n.d.	n.d.
Vanadium, V	7440-62-2	100	n.d.	n.d.	n.d.	n.d.
Zinc, Zn	7440-66-6	250	2100	15000	n.d.	17000
Boron, B	7440-42-8	10	n.d.	n.d.	n.d.	n.d.
Manganese, Mn	7439-96-5	10	200	n.d.	29	n.d.
Selenium, Se	7782-49-2	10	n.d.	n.d.	n.d.	n.d.
Strontium, Sr	7440-24-6	10	420	n.d.	75	n.d.
Tin, Sn	7440-31-5	10	n.d.	n.d.	n.d.	n.d.

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Substance name	CAS No.	LOQ	No. 5	No. 6	No. 7	No. 8
Antimony, Sb	7440-36-0	12	n.d.	n.d.	n.d.	n.d.
Arsenic, As	7440-38-2	10	n.d.	n.d.	n.d.	n.d.
Barium, Ba	7440-39-3	200	n.d.	n.d.	n.d.	n.d.
Lead, Pb	7439-92-1	50	140	n.d.	n.d.	140
Cadmium, Cd	7440-43-9	0.5	n.d.	n.d.	0.81	n.d.
Cobalt, Co	7440-48-4	15	n.d.	n.d.	26	n.d.
Copper, Cu	7440-50-8	80	n.d.	n.d.	n.d.	n.d.
Chrome, Cr	7440-47-3	10	58	37	n.d.	18
Mercury, Hg	7439-97-6	0.25	n.d.	n.d.	n.d.	n.d.
Molybdenum, Mo	13939-06-5	40	n.d.	n.d.	n.d.	n.d.
Nickel, Ni	7440-02-0	40	n.d.	n.d.	n.d.	n.d.
Vanadium, V	7440-62-2	100	n.d.	n.d.	n.d.	n.d.
Zinc, Zn	7440-66-6	250	7200	2100	16000	7100
Boron, B	7440-42-8	10	n.d.	11	n.d.	n.d.
Manganese, Mn	7439-96-5	10	73	210	n.d.	44
Selenium, Se	7782-49-2	10	n.d.	n.d.	n.d.	n.d.
Strontium, Sr	7440-24-6	10	370	440	13	360
Tin, Sn	7440-31-5	10	18	n.d.	n.d.	n.d.

Substance name	CAS No.	LOQ	No. 9
Antimony, Sb	7440-36-0	12	n.d.
Arsenic, As	7440-38-2	10	n.d.
Barium, Ba	7440-39-3	200	n.d.
Lead, Pb	7439-92-1	50	n.d.
Cadmium, Cd	7440-43-9	0.5	1.8
Cobalt, Co	7440-48-4	15	150
Copper, Cu	7440-50-8	80	n.d.
Chrome, Cr	7440-47-3	10	n.d.
Mercury, Hg	7439-97-6	0.25	n.d.
Molybdenum, Mo	13939-06-5	40	n.d.
Nickel, Ni	7440-02-0	40	n.d.
Vanadium, V	7440-62-2	100	n.d.
Zinc, Zn	7440-66-6	250	14000
Boron, B	7440-42-8	10	n.d.
Manganese, Mn	7439-96-5	10	n.d.
Selenium, Se	7782-49-2	10	n.d.
Strontium, Sr	7440-24-6	10	n.d.
Tin, Sn	7440-31-5	10	n.d.

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Chromium VI (CAS-No. 18540-29-9) in mg/kg DS

Test method: Alkaline extraction IEC 62321: 2008*, measuring IC/UV-VIS
Limit of quantification: 10 mg/kg
Measurement uncertainty: ± 10%

Tested components	Test result
No. 1	n.d.
No. 2	n.d.
No. 3	n.d.
No. 4	n.d.
No. 5	n.d.
No. 6	n.d.
No. 7	n.d.
No. 8	n.d.
No. 9	n.d.

Polycyclic aromatic hydrocarbons according to US-EPA + 2 EFSA PAH in mg/kg

Test method: AfPS GS 2014:01 (2014-08)
Limit of quantification: 0.2 mg/kg
Measurement uncertainty: ± 10%

Substance name	CAS-No	No. 1	No. 2	No. 3	No. 4	No. 5
1 Naphthalene	91-20-3	n.d.	0.6	0.3	0.7	n.d.
2 Acenaphthylene	208-96-8	n.d.	n.d.	n.d.	1.0	n.d.
3 Acenaphthen	83-32-9	n.d.	n.d.	n.d.	n.d.	n.d.
4 Fluorene	86-73-7	n.d.	n.d.	0.2	0.4	n.d.
5 Phenanthrene	85-01-8	n.d.	1.0	n.d.	2.9	n.d.
6 Anthracene	120-12-7	n.d.	n.d.	n.d.	0.4	n.d.
7 Fluoranthene	206-44-0	n.d.	1.3	n.d.	8.9	n.d.
8 Pyrene	129-00-0	n.d.	5.4	n.d.	26	n.d.
9 Benzo(a)anthracene	56-55-3	n.d.	n.d.	n.d.	n.d.	n.d.
10 Chrysene	218-01-9	n.d.	n.d.	n.d.	n.d.	n.d.
11 Benzo(b)fluoranthene + 12 Benzo(j)fluoranthene	205-99-2 + 205-82-3	n.d.	n.d.	n.d.	0.2	n.d.
13 Benzo(k)fluoranthene	207-08-9	n.d.	n.d.	n.d.	n.d.	n.d.
14 Benzo(a)pyrene	50-32-8	n.d.	n.d.	n.d.	n.d.	n.d.
15 Indeno(1,2,3-cd)pyrene	193-39-5	n.d.	n.d.	n.d.	n.d.	n.d.
16 Dibenzo(a,h)anthracene	53-70-3	n.d.	n.d.	n.d.	n.d.	n.d.
17 Benzo(ghi)perylene	191-24-2	n.d.	n.d.	n.d.	1.6	n.d.
18 Benzo(e)pyrene	192-97-2	n.d.	n.d.	n.d.	0.7	n.d.
sum		n.d.	8.3	0.5	42.8	n.d.

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Substance name	CAS-No	No. 6	No. 7	No. 8	No. 9
1 Naphthalene	91-20-3	n.d.	0.8	n.d.	0.5
2 Acenaphthylene	208-96-8	n.d.	1.2	n.d.	0.5
3 Acenaphthen	83-32-9	n.d.	n.d.	n.d.	n.d.
4 Fluorene	86-73-7	n.d.	0.2	n.d.	0.7
5 Phenanthrene	85-01-8	n.d.	2.4	n.d.	5.3
6 Anthracene	120-12-7	n.d.	0.2	n.d.	0.8
7 Fluoranthene	206-44-0	n.d.	5.3	n.d.	6.9
8 Pyrene	129-00-0	n.d.	17	n.d.	21
9 Benzo(a)anthracene	56-55-3	n.d.	n.d.	n.d.	0.4
10 Chrysene	218-01-9	n.d.	n.d.	n.d.	0.6
11 Benzo(b)fluoranthene + 12 Benzo(j)fluoranthene	205-99-2 + 205-82-3	n.d.	n.d.	n.d.	0.5
13 Benzo(k)fluoranthene	207-08-9	n.d.	n.d.	n.d.	n.d.
14 Benzo(a)pyrene	50-32-8	n.d.	n.d.	n.d.	0.4
15 Indeno(1,2,3-cd)pyrene	193-39-5	n.d.	n.d.	n.d.	0.3
16 Dibenzo(a,h)anthracene	53-70-3	n.d.	n.d.	n.d.	n.d.
17 Benzo(ghi)perylene	191-24-2	n.d.	0.4	n.d.	2.8
18 Benzo(e)pyrene	192-97-2	n.d.	n.d.	n.d.	0.8
sum		n.d.	27.5	n.d.	41.5

Assessment criteria

Parameter	Legal Limit	GS-symbol-concession according to AfPS GS 2014:01 PAH		
		category 1	category 2	category 3
	Materials which come into direct as well as prolonged or short-term repetitive contact with the human skin or the oral cavity, under normal or reasonably foreseeable conditions of use	Materials indented to be put in the mouth, or materials of toys with intended long-term skin contact (longer than 30 seconds)	Materials not covered by category 1, with foreseeable skin contact for longer than 30 seconds (long-term skin contact) or repeated short-term skin contact	Materials not covered by category 1 or 2 with foreseeable skin contact up to 30 seconds (short term skin contact)
	Valid from 27th December 2015	Valid from 1st July 2015	Valid from 1st July 2015 [1)]	Valid from 1st July 2015 [1)]
Naphthalene	-	< 1 mg/kg	< 2 mg/kg	< 10 mg/kg
Acenaphthylene Acenaphthene Fluorene Phenanthrene Pyrene Anthracene Fluoranthene	-	< 1 mg/kg Sum	< 10 mg/kg Sum	< 50 mg/kg Sum
Benzo (a) pyrene	< 1 mg/kg	< 0.2 mg/kg	< 0.5 mg/kg	< 1 mg/kg
Benzo (e) pyrene Benzo (a) anthracene Benzo (b) fluoranthene Benzo (j) fluoranthene Benzo (k) fluoranthene Chrysene Dibenzo (a,h) anthracene	< 1 mg/kg each	< 0.2 mg/kg each	< 0.5 mg/kg each	< 1 mg/kg each
Benzo (g,h,i) perylene Indeno (1,2,3-cd) pyrene	-			
sum 18 PAH (EPA) mg/kg	-	< 1 mg/kg	< 10 mg/kg	< 50 mg/kg

[1)] Only for products in the scope of ProdSG; for toys in the scope of 2009/48/EC other limits apply

As the usage is unknown a categorisation regarding GS-symbol is not possible.

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Bisphenol A in mg/kg

Test method: Extraction with methanol/$CHCl_3$ 1 h by 70°C in ultrasonic bath, LC/MS*
Limit of quantification: 0.05 mg/kg

Substance name	CAS-No.	No. 1	No. 2	No. 3	No. 4	No. 5
Bisphenol A	80-05-7	n.d.	n.d.	n.d.	0.17	n.d.

Substance name	CAS-No.	No. 6	No. 7	No. 8	No. 9
Bisphenol A	80-05-7	n.d.	n.d.	n.d.	4.63

Conclusion:

The legal regulated parameters can be classified as marketable.

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Doc. 20.n.2

	kortn: cas nr		riskfras	sample 1 red/EPDM mg/kg	sample 2 SBR mg/kg	sample 3 red/EPDM mg/kg	sample 4 SBR mg/kg	sample 5 red/EPDM mg/kg	sample 6 red/EPDM mg/kg	sample 7 SBR mg/kg	sample 8 green/EPDM mg/kg	sample 9 SBR mg/kg
N-Isopropyl-N'-phenyl-1,	IPPD	101-72-4	H302 , H317, H400, H410		550-600		7-10					
N-(1,3-Dimethylbutyl)-N'	6PPD	793-24-8	egenkl H302 , H317, H400, H410		150-200		260-280			320-330		150-160
4,4'-(1,4-Phenylendi-2,2-	Bisfen	**2167-51-3**	egenkl H319		80-100		45-55			32-38		50-55
a,a-Dihydroxy-m-diisopropylbe		1999-85-5	egenkl H302 , H315, H319			2-6						
1-[4-(1-Hydroxy-1-methylethyl)		54549-72-:	finns ej i CLP			10-15						
2-Benzothiazolyl Diethyldithioc		95-30-7	egenkl H315, H319						3-6			
Aromat >C16-C35*					780-900	12-21	310-350			350-370		200-220
Alifat >C16-C35				400-1000	800-900	**>1000**	700-1000	**>1000**	**>1000**	180-220	**>1000**	**>1000**
nonylfenol							12					14
nonylfenoletoxilater							29					
bisfenol A							0,17					4,63
PAH-L					0,6	0,3	1,7			2,7		1,0
PAH-M					7,7	0,2	38,6			25,1		34,7
PAH-H							2,5			0,4		5,8
summa PAH:er				nd	8,3	0,5	**42,8**	nd	nd	**27,5**	nd	**41,5**
bly								140			140	
kadmium						0,54	0,77			0,81		1,8
cobolt							260			26		150
krom (tot)				41				58	37		18	
zink				2100	**15000**		**17000**	7200	2100	**16000**	7100	**14000**
Mangan				200		29		73	201		44	
Strontium				420		75	370	440	13	360		
Tenn							18					

Granulaten ska uppfylla följande krav
REACH, PAH förordning
begränsnings och POP-förordningar
kandidatlistan
sin-listan
naturvårdsverket, riktvärden för känslig markanvändning
vattendirektivet
leksaksdirektivet
kemikalieplanen

Link to the ECHA Template:

https://comments.echa.europa.eu/comments_cms/CallForEvidence.aspx?RObjectId=0b0236e181e23e1b

GENERAL COMMENTS*

The Public Health Department is part of the University of Turin, Italy. The numerous scientific activities of the Department are carried out with particular attention to primary prevention for the health of human populations. In particular, the sector "Environmental and Occupational Health" of the Department carries out its research activities focusing its attention on the relationship between widespread chemicals in the living and working environment and the biomarkers chosen to highlight, through molecular epidemiology techniques, the various risk conditions for health.

In 2013, along with some co-authors, I published the following paper: Schilirò, T., et al. Artificial turf football fields: Environmental and mutagenicity assessment. 2013. Archives of Environmental Contamination and Toxicology. 64,1: 1-11. This paper has been mentioned also in the "*Annex XV Report, An evaluation of the possible health risks of recycled rubber granules used as infill in synthetic turf sports fields*" (ECHA, 28 February 2017).

About University of Turin, it was founded in 1404, and is one of the largest and most prestigious Italian universities. The University of Turin is one of the most ancient and prestigious Italian Universities. Hosting about 70.000 students, 4.000 academic, administrative and technical staff, 1800 post-graduate and post-doctoral students and with 120 buildings in different areas in Turin and in key places in Piedmont, the University of Turin can be considered as "city-within-a-city", promoting culture and producing research, innovation,training and employment. The University of Turin is today one of the largest Italian Universities, open to international research and training. It carries out scientific research and organizes courses in all disciplines, except for Engineering and Architecture.

About myself. My name is Roberto Bono, professor of Public Health at the University of Turin (Deptarment of Publich Health and Pediatrics). I am responsible, for the city of Turin, of the GEIRD study: "Oxidative stress, aging and respiratory diseases, multi-center epidemiological study, multi-case control and the general elderly population in Italy. (www.geird.org), and the ECRHS Study: "European Community Respiratory Health Survey" (www.ecrhs.org). Below are the main research topics on molecular epidemiology of respiratory diseases and environmental and occupational health. I am the author of 140 scientific publications in national and international journals (SCOPUS 16/10/2017: h-index = 23, citations 1953), of dozens of interventions at international scientific meetings, including by invitation, and of 4 monographs.

- Oxidative stress, ageing, and respiratory diseases. A multi-centre epidemiological and genetic study on the general adult and elderly population in Italy GEIRD Study.
- The environmental and biological monitoring of workers exposed to formaldehyde. The environmental and biological evaluation of the exposure and the induction of oxidative stress.
- Exposure to formaldehyde, tobacco smoke (actively and passively smoked) and other environmental (air) risk factors inducing oxidative stress in adult populations, in children, in physiological and pathological conditions, in lving and working environment. Physiological, biomolecular and metabolic aspects measured in urine, blood, nasal and buccal cells.

1: Please provide information on the concentrations of PAHs in plastic or rubber granulates used as infill material in synthetic turf pitches you are producing or importing. In case you have taken samples from pitches, please provide the measurement data. Do you have information on how the rubber granulatechanges during use (e.g. changes in the composition after 10-15 years)? (If you have already submitted such information during the preparation of the preliminary report by ECHA, there is no need to resubmit this information.)

Response:
As University, we do not have any role in production of infill materials. About an example of epidemiological surveillance on this topic, please refer to the study "Artificial Turf Football Fields: Environmental and Mutagenicity Assessment" previously cited.

2: What are the possible health or environmental aspects and technical/quality aspects and other differences of using alternative substances/mixtures as infill material? We are particularly interested in a comparison of the properties of PAH-containing and PAH-free granulates with regard to health and environmental hazards or risks, service durability, maintenance and replacement requirements, playability in different weather conditions, etc. Please specify all viable alternatives in your reply.

Response:
As with any other sport, playing football in the outdoor environment implies environmental exposures to potential risk factors for health, which depend on many aspects. The main route of exposure is breathing that increases under stress and physical activity.
Different types of sport surfaces determine different exposure scenarios, depending on the seasonal and geographical climatic conditions. However, focusing only on the quality of the different playing surfaces, and excluding the grass fields, a very small part of the football fields in Europe, they can be distinguished from each other for both the differentmaterials usedand their bioavailability (breathability or dermal contact).
Another very important aspect of air pollutants intake when players play on the football fields, is that their activities take place mainly in urban settings where the players live and breathe the "normal" amount of airborne pollutants. It is therefore worth taking into account the role of the surrounding environment to assess the potential additional health risk of playing football in a field infilled with rubber granulate instead of a natural field.
Furthermore, the "natural" fields are usually made of soil and not grass, this means that during a period of drought it becomes dusty and therefore partially breathable or inhalable. This implies that breathable dust can carry inside the body numerous air pollutants or components of that soil.
As previously mentioned, football fields are usually located within metropolitan areas whose environmental characteristics must be quali-quantified to determine the background level to start the health risk assessment. Thus, the level of air pollutants conveyed by the breathable part of soil might be non-negligible. This, mainly in terms of air quality of the city, of proximity of the selected football fields to industrial settlements, and of the quality of the soil, which constitutes the "traditional" football field.
This aspect is crucial because the bioavailability of air pollutants transported by the soil can have a role not yet evaluated. Therefore, the assessment of the potential health risks of who plays on synthetic turfs should be made considering the background level of risk for health presented by the different environmental contexts, which could present an additional health risk for football players. This leads us to consider the risk of playing football on synthetic ground as a potential additional risk when compared to the "usual" risk presented in playing football on “natural” fields, largely "breathable".
The materials with which the synthetic football fields are made can also be a potential vehicle for breathable pollutants, but they should be further investigated before arriving to conclusions.

The analysis of the composition of these materials certainly highlights several elements that may represent a health hazard for players of which the presence of PAHs in tires is just one example.
However, the very long half-life of the rubber and the much shorter half-life of other substances used to infill the football fields, including the plastic materials used to coat the granules may present further exposure *scenario*. Despite that, it would be advisable to make appropriate and accurate investigations on this *scenario*; it is hardly possible to say that there is an increase of health risks, as until now there are not any valid scientific demonstrations of this.
The relationship between the quality of football field areas and the health of footballers has to go through four stages and analysis:
1) The quality of materials (including "natural" surfaces)
2) Their ability to emit toxic substances with different climates and temperatures,
3) The personal air exposure of players to breathable pollutants,
4) The biomonitoring of athletes.
Only after these evaluationare made on a broad statistical sample, would it be possible to express an opinion of the reduction of PAHs concentration in the rubber granulate.
The impact on health due to playing on synthetic fields must also consider the several aspects characterizing the lives of the subjects, their individual biodiversity, their lifestyles, and so on, which can represent confounding factors.
Individuals who encounter recycled rubber derivatives can be exposed in a very varied ways. In addition to the respiratory aspect, typical of the potential release of airborne contaminants from synthetic surfaces, exposure to the pollutants present in the rubber can occur through dermal contact. However, the dermal contact considered in relation to handles (tennis) or bags and suitcases, watch straps, etc. are different from the contact with the turf. This contact point must be evaluated because the absorption of PAHs is not excluded.
For what is presented above a reduction of PAHs in rubber granulate for infill materials, lower than the actual value or closer to 1 mg/kg, should be determined on a scientific basis, in order to verify:
a) if there is a risk for human health in the actual conditions;
b) if a lower concentration of PAHs may reduce such risks and if yes, what should be the appropriate new limit.
3) the cost-benefit ratio, including the possible indirect impact on health in the accumulation in the environment of used tires in such large quantities.
As far as we know, the risk of dermal absorption of PAHs is higher and it is reasonable to expect that this limit be lower than that which could be established for respiratory exposure, but again we do not until know which should be the appropriate limits. These limits should be verified and determined.
About respiratory exposure, it is known that PAHs can be inhaled in work environment but almost nothing is known about environmental exposure. It is therefore highly desirable to undertake in-depth studies before setting any limits for the respiratory route.

3: As a manufacturer or an importer, please provide information on how many tonnes (metric tonnes) of plastic and rubber infill material (describe which infill material) you are producing or importing every year.

Response:
As University, we do not have any role in production or import of infill materials.

4: What are per unit prices and production costs of different infill materials? Can you provide an estimate of the substitution costs per pitch (including costs for labour, material, disposal of old material, transportation, etc.) when changing from an existing PAH-containing material to a different infill material? Are there any differences with respect to how frequent the whole infill material needs to be changed or replenished, i.e. are there different maintenance costs involved with the use of different infill materials?

Response:
As University, we do not have elements to contribute to this response.

5: What are the impacts (positive and negative) on your industry/organisation (manufacturer, distributor, importer, sports club/community owning the field) if a restriction on PAHs in granulates is imposed to lower the limit value to close to those set in the restriction entry 50 on PAHs in articles supplied to the general public? (see: substances restricted under reach)

Response:
Not applicable.

6: Please provide any information you may have on other substances (e.g metals such as cobalt and zinc, phthalates, benzothiazole and methyl isobutyl ketone) contained in plastic of rubber infill or in synthetic turf pitches (including substances used during the maintenance) or other relevant information concerning possible risks to human health or the environment.

Response:
We do not have information about the presence of these substances. However, we could verify the possibility to make tests if necessary.

Weigeringsgrond 10.2.e

Doc. 21.a.2

National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Programme

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Postbus 1
3720 BA Bilthoven
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KvK Utrecht 30276683

T 030 274 91 11

F 030 274 29 71
info@rivm.nl

Date
21 November 2017

Dealt with by
[redacted]

[redacted]rivm.nl

Workshop 24-11-2017, REACH Annex XV restriction plastic and rubber granules used as infill material in synthetic turf pitches

Ministry Infrastructure and Water Management
Room 02.D.075
NOTE: At the reception you need to show your passport or ID card

Programme[1]
Chair: [redacted] (RIVM)

9.00 Welcome and purpose of the workshop

9.15 Tour de table

During this tour de table, participants will be asked to shortly introduce themselves. If you wish, you can make a policy statement (few sentences) regarding the use of rubber granulate as infill material. These statements will be added as appendix to the chairman's summary. These statements will not be discussed during the workshop.

9.45 Introduction on the Annex XV dossier and the discussion of today

10.00 Theme 1. Risk of granules used on synthetic turf pitches

11.15 Theme 2. Scope of the restriction and restriction options

12.30 Lunch break

13.30 Theme 3. Alternatives

14.45 Theme 4. Socio-economic effects of a restriction

16.00 Summary of discussions

17.00 Closure, drinks

17.30 End of the meeting

---

[1] Note that the meeting will be recorded to be able to prepare a chairman's summary of the meeting. The recordings will only be used for this purpose and will be destroyed afterwards.

Date
21 November 2017

List of participants

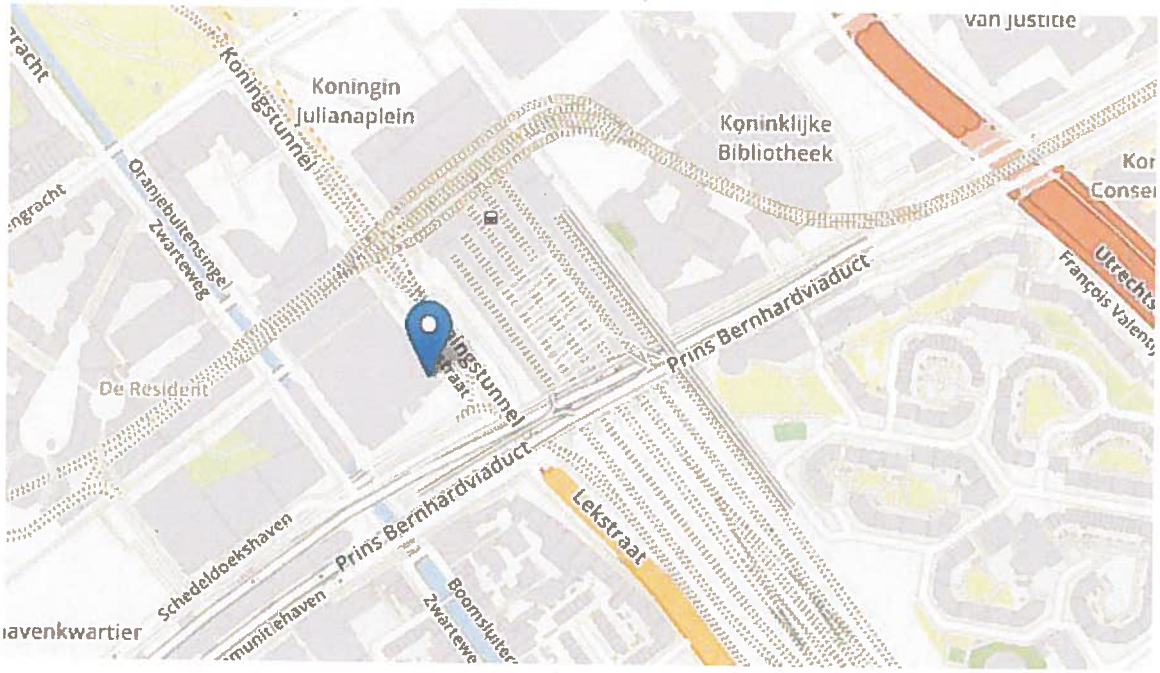
Berleburger Schaumstoffwerk GmbH	
BIR, Recybem	
BSNC/Sekisui Alveo	
Celanese	
Conradi+Kaiser GmbH	
Conradi+Kaiser GmbH	
ECHA	
ESTO	
ETRA	
ETRMA	
ETRMA	
ETRMA	
ETRMA/NVR	
European Commission	
Federazione Nazionale Gioco Calcio	
Fraunhofer	
Genan	
Granuband	
International Carbon Black Association	
Kempeneers-Milieu	
Labosport	
Ministry of Health, Welfare and Sport	
Ministry of Infrastructure and Water Management	
Ministry of Infrastructure and Water Management	
Polytan GmpH	
PVP Triptis GmbH	
Ragn-Sells	
RecyBEM/Band en Milieu	
RIVM	
RIVM	
RIVM	
RIVM	
RIVM	
RIVM	
Rumal	
Sekisui Alveo	
SGS Intron	
Stirling University	
Ten Cate grass holding	
Terra Sports Technology	
University Twente	
University Utrecht, IRAS	

Date
21 November 2017

Workshop location

Ministry Infrastructure and Water Management
Rijnstraat 8, Den Haag, Netherlands

Room 02.D.075



Weigeringsgrond 10.2.e

Doc. 21.a.3

National Institute for Public Health
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Ministry of Health, Welfare and Sport

Personal invitation

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Date
27 October 2017

Dealt with by
[redacted]

[redacted]@rivm.nl

Workshop 24-11-2017, REACH Annex XV restriction plastic and rubber granules used as infill material in synthetic turf pitches

Dear Madam, Sir,

The Dutch government intends to propose a REACH restriction on eight carcinogenic PAHs in plastic and rubber granules used as infill material in synthetic turf pitches. RIVM will prepare this restriction dossier and we aim to submit our proposal to the European Chemicals Agency (ECHA) by April 13th, 2018.

RIVM will together with ECHA, assess the risks to human health due to the use of infill material and assess the impacts of such a restriction. The dossier will include an analysis of alternatives. As part of the preparation of the restriction dossier, ECHA organised a 'call for evidence' from 23 August to 18 October 2017. To ensure that we have correctly interpreted the information that has been so far made available to us, to understand on which issues there is agreement between key stakeholders (and where there is not), and to assess which knowledge gaps still exist, RIVM organises a discussion workshop. For attending this one-day workshop we invite key stakeholders that have or are expected to be able to contribute effectively serving the aforementioned goals. The workshop will be organized under Chatham House Rules[1] facilitating open debate and exchange of information.

[1] https://www.chathamhouse.org/about/chatham-house-rule

Date
27 October 2017

You are cordially invited to attend the workshop. One week before the meeting a short discussion document will be distributed to facilitate and structure the discussion. A chairman's summary will distributed after workshop and will be made publically available. The workshop will be organized on:

Friday 24 November 2017
Ministry of Infrastructure and Environment
(Netherlands, The Hague)

If you are not able to come in person yourself, we would like to invite another representative from your organization. Please confirm your attendance or replacement by sending an email to bureau-reach@rivm.nl by Friday 17 November at the latest.

To be able to have fruitful discussions on this issue we have limited the number of attendants to a maximum of around 30 external participants. Based on established contacts with key European stakeholders and information received we have identified key organizations/experts that are expected to be able to contribute (see invitation list).

Yours sincerely,

[redacted]
Head NL Bureau REACH

Preliminary external invitation list

Date
27 October 2017

Organisation/company
Berleburger Schaumstoffwerk GmbH
BSNC
Celanese
Conradi+Kaiser GmbH and Kraiburg Relastec GmbH & Co. KG
ECHA
ELT granulate producers (2 representatives)
ESTO
ETRA
ETRMA
European Commission DG Grow
European Commission DG Environment
Federazione Nazionale Gioco Calcio
Fraunhofer Institut
International Carbon Black Association
Kempeneers-Milieu
KIWA
Labosport
Ministry of Health, Welfare and Sport
Ministry of Infrastructure and Environment
MRH Muelsen GmbH
Pirelli
Polytan GmpH
Recybem
Sekisui Alveo
SGS Intron
Stirling University
Ten Cate grass holding
Terra Sports Technology
University Twente
University Utrecht, IRAS
Wirtschaftsverband der deutschen Kautschukindustrie

Doc. 21.a.4

National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Workshop 24-11-2017: REACH Annex XV restriction plastic and rubber granules used as infill material in synthetic turf pitches

Introduction

Doc. 21.a.4

Workshop programme

9.00	Welcome and purpose of the workshop
9.15	Tour de table
9.45	Introduction on the Annex XV dossier and the discussion of today
10.00	Theme 1. Risk of granules used on synthetic turf pitches
11.15	Theme 2. Scope of the restriction and restriction options
12.30	Lunch break
13.30	Theme 3. Alternatives
14.45	Theme 4. Socio-economic effects of a restriction
16.00	Summary of discussions
17.00	Closure, drinks
17.30	End of the meeting

Doc. 21.a.4

Chatham House Rules

When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.

Legal background and concern

Restrictions (annex XVII) in the REACH Regulation

- When unacceptable risk to humans or the environment have been identified
- Initiative for <u>proposals</u>: Member State competent authorities or European Chemicals Agency (ECHA) (at request of European Commission)
- Commission decides based on opinions of ECHA's two scientific committees

Rubber granules used as infill in synthetic turf pitches

- <u>Concerns</u> raised related to recycled rubber granules
- US (cancer risk doubts), EU: MSs' and Commission's discussions
- <u>Knowledge gap</u> about substances in rubber granules and their concentrations and possible risks
- The Netherlands published an evaluation report in December 2016
- ECHA published a preliminary evaluation report in February 2017

I: Preparing REACH Restriction infill granules

The Netherlands

- Notified its intention to prepare the restriction proposal on PAHs in plastic and rubber infill material in June 2017
- Workshop in the Hague on 24 November

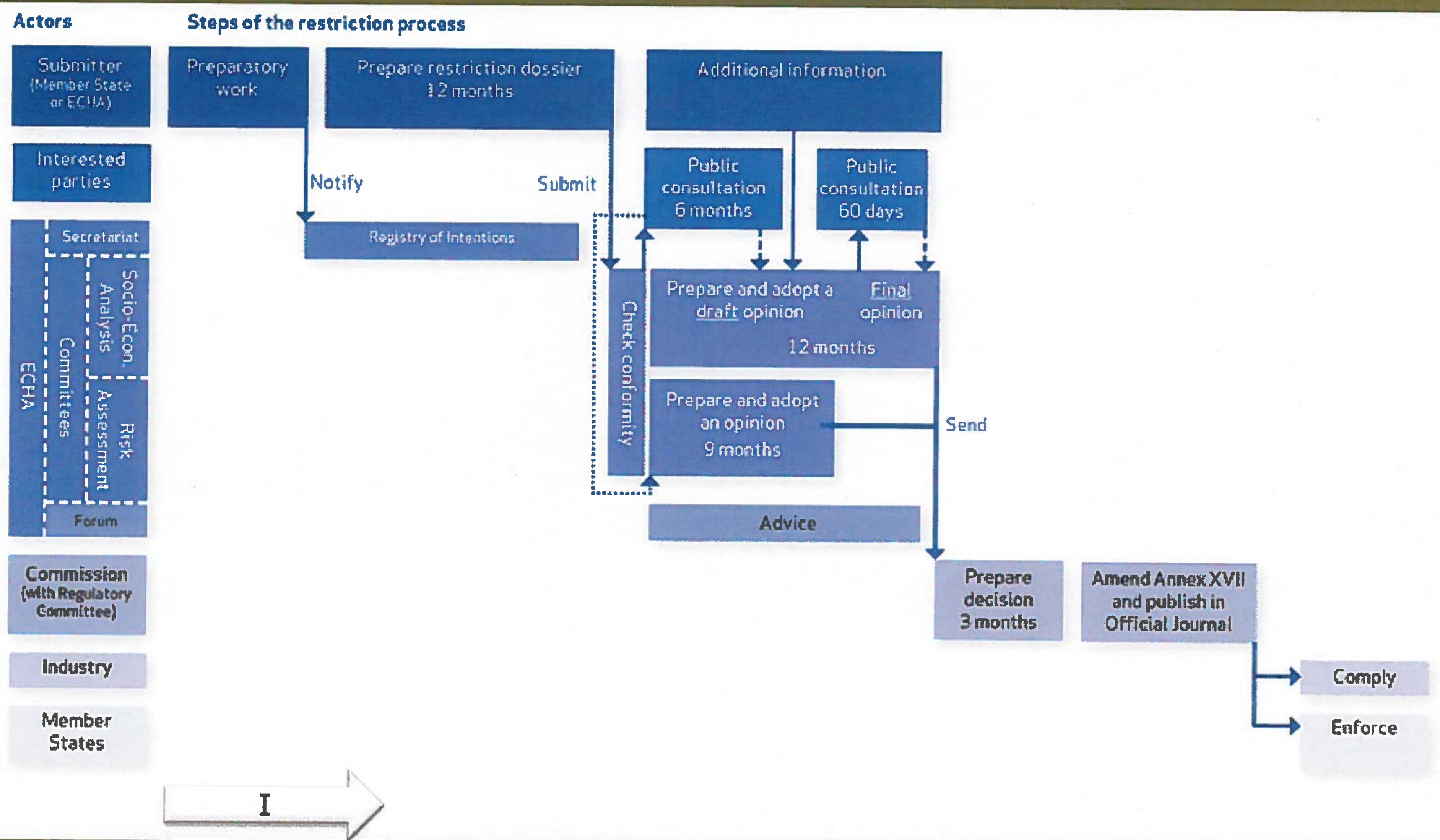
The European Commission

- Requested on 29 August ECHA to support the Netherlands and investigate if other substances may cause concern (both human health and the environment) that needs to be managed at EU-level

ECHA

- Continue to support the Netherlands
- Call for evidence ended on 18 October
- Further investigation related to other substances ongoing

Doc. 21.a.4



Actors
Steps of the restriction process
Submitter (Member State or ECHA)
Interested parties
Secretariat
Socio-Econ. Analysis
Risk Assessment
Committees
Forum
ECHA
Commission (with Regulatory Committee)
Industry
Member States
Preparatory work
Notify
Registry of Intentions
Prepare restriction dossier 12 months
Submit
Check conformity
Additional information
Public consultation 6 months
Public consultation 60 days
Prepare and adopt a draft opinion
Final opinion
12 months
Prepare and adopt an opinion 9 months
Advice
Send
Prepare decision 3 months
Amend Annex XVII and publish in Official Journal
Comply
Enforce

Processing the dossier

II Ongoing: Preparation and submission of the restriction proposal

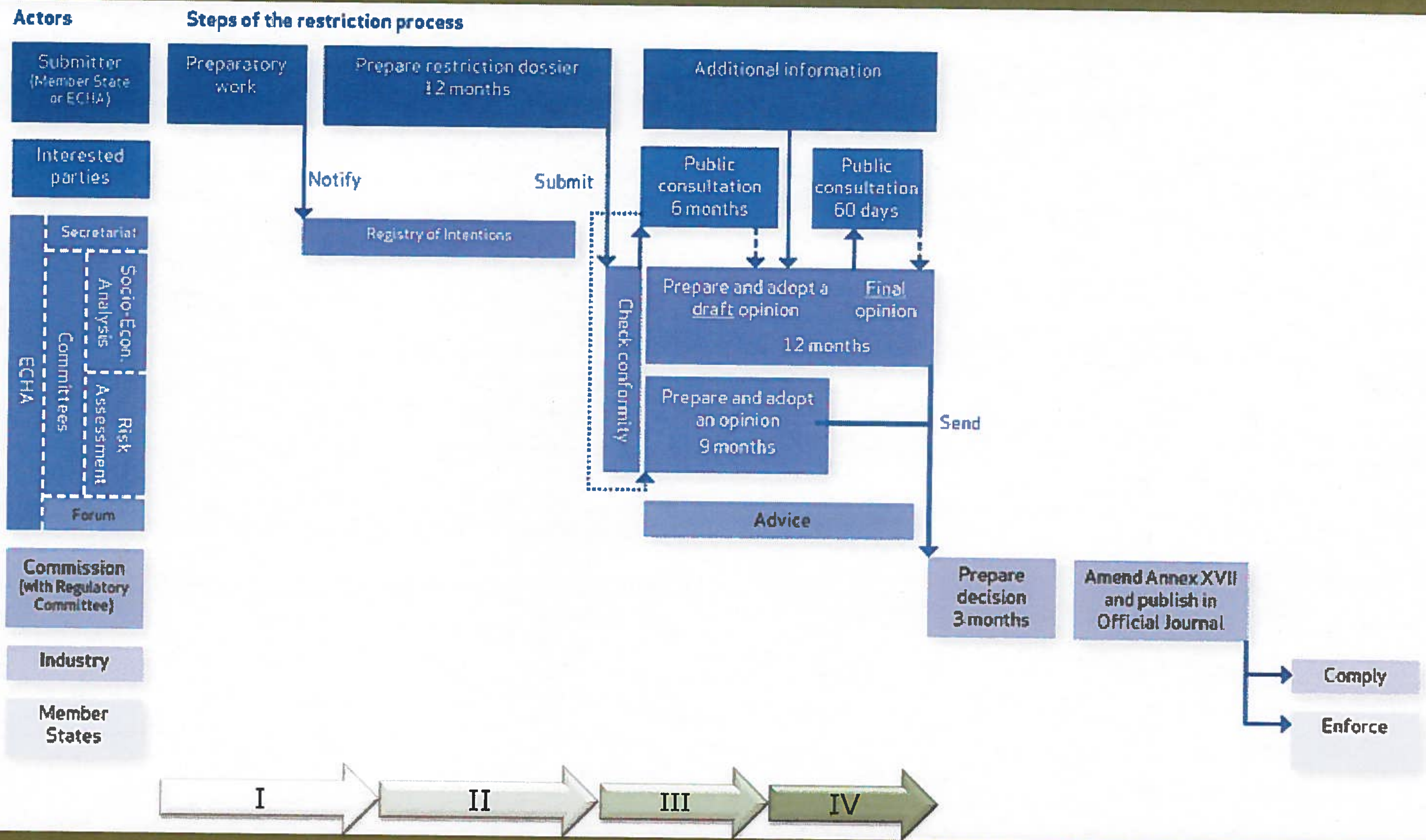
- Comments received from the call for evidence and during the workshop to be used in dossier development
- Submission of the restriction proposal to ECHA on PAHs in plastic and rubber granules in April 2018

III-IV Opinion development by RAC and SEAC*

- Six months' public consultation on the restriction proposal report to start in June 2018
- Opinion of RAC and draft opinion on SEAC in March 2019
- 60 days public consultation of the SEAC draft opinion
- Final opinion of SEAC in June 2019

** RAC= Committee for Risk Assessment*
SEAC= Committee for Socio-economic Analysis

Doc. 21.a.4



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Send
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Amend Annex XVII and publish in Official Journal
Comply
Enforce
I
II
III
IV

Decison making and possible further action

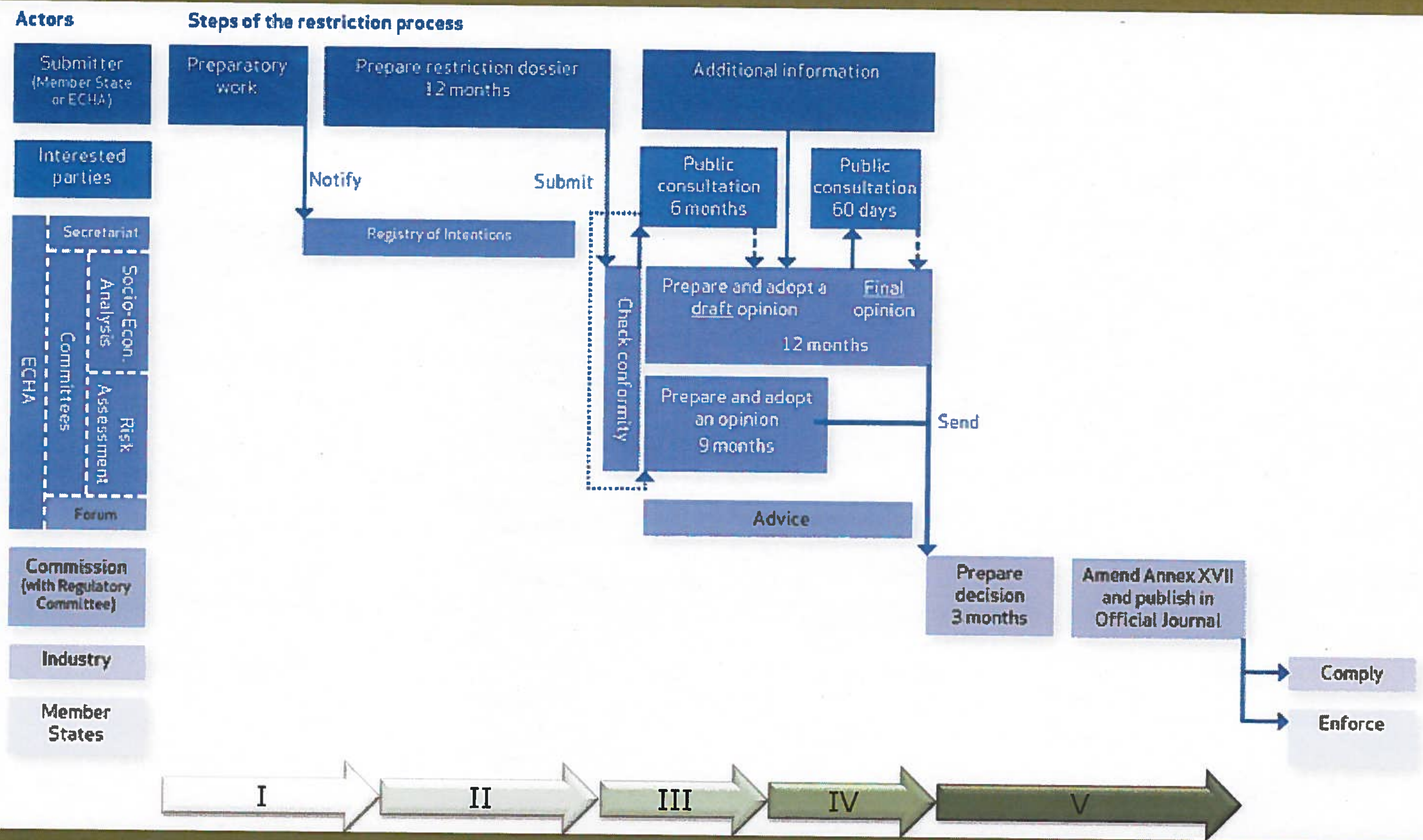
Decision on restriction proposal

- After receiving the opinions, the Commission drafts the amendment to the Annex XVII of REACH
- Comitology procedure involving the Member States and the European Parliament
- Restriction in place earliest in 2020

ECHA's investigation on other substances ongoing

- if concern from other substances arises;
  - preparation of a separate restriction proposal for other substances

Doc. 21.a.4



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Amend Annex XVII and publish in Official Journal
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Enforce
I
II
III
IV
V

Timelines for the restriction

Start ~ 2016
- Concerns raised, US, EU, NL
- RIVM/ECHA reports

Preparation June- Oct '17
- Registry of Intentions NL
- stakeholder consultation
- drafting

Submission Oct'17-Apr'18
- NL (RIVM) with ECHA's support'

RAC and SEAC Jun'18-Jun'19
- Consultation dossier (Jun-Dec'18)
- Consultation SEAC opinion (Apr-May'19)

Decision making 2019
- Comitology procedure
- Earliest entry into force 2020

Enforcement 2020 onwards
- Monitoring
- Inspection

Doc. 21.a.5

National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Workshop 24-11-2017: REACH Annex XV restriction plastic and rubber granules used as infill material in synthetic turf pitches

Discussion by Themes

Workshop discussion themes

Theme 1. Risk of granules used on synthetic turf pitches

Theme 2. Scope of the restriction and restriction options

Theme 3. Alternatives

Theme 4. Socio-economic effects of a restriction

Theme 1: Risk of granules used on synthetic turf pitches

- Scientific basis: current generic limit for PAHs in mixtures supplied to the general public does not ensure adequate protection of human health if the PAH-levels in granules used on synthetic turf pitches would be as high as currently allowed

- Aim of Restriction proposal: Set a PAH limit value for granules that guaratees that risks are controlled

- Risk assessment basis: current information on PAH levels in granules placed on the market in the EU and used on artificial turf pitches

- Hazard assessment + Exposure assessment: Risk assessment

1A: Representativeness of PAH data for the EU

<u>Key Questions:</u>

- PAH levels mostly available for infill granules in North-Western EU region. Is this representative?
- Are PAH levels in cryogenic ELT granules different compared to granules produced at ambient conditions, or not?
- To what extent are granules imported from outside the EU, and what is known about PAH levels in such granules?

1B: Uncertainties in the risk assessment

<u>Key Questions:</u>

- Are the exposure scenarios used by RIVM/ECHA appropriate?
  - Focus on football field players and goalkeepers age 4-50 years, oral and dermal exposure
  - Do we need to include a scenario for very young (0-4 years) children playing on (mini-)pitches or playgrounds?
  - Do we need to asses direct exposure through wounds?
- Need to use an additional assessment factor to estimate risks for children (4-10 years)
- How should we account for human exposure to PAHs from other sources?

Theme 2: Scope of the restriction and restriction options

- Concerns raised for PAHs found in rubber granules on sport pitches
- Current REACH Restriction for articles and extender oils: 8 carcinogenic PAHs
- However, the group of (carcinogenic) PAHs is larger and there may be more relevant chemicals to look at
- How to set the scope of the proposed Restriction in terms of:
  - Chemicals included
  - Materials included (and hence alternatives)
  - Limit value(s)
  - Transition period

2A: Which substances to include in the scope?

<u>Key Questions</u>:

- Initial focus is on 8 PAHs classified as carcinogens in the EU (also in entry 50 of Annex XVII). Do you agree with this approach?**...OR**
- Do you consider it necessary to account for more future classified carcinogenic PAHs? Should these be included in the chemical scope of the proposed restriction?

2B: What infill materials to include in the scope?

<u>Key Question</u>:

- The general idea is to cover in the scope any rubber or plastic granules used as infill material containing PAHs above the set limit. Reasoning: <u>any type of infill should be safe</u>. What do you think of this approach?

2C: How to set the limit value?

Key Questions:

- Limit value will be based on Risk Assessment. Socio-economic aspects will be accounted for. Restriction Scenarios will be discussed in the afternoon. Discuss now:
- Sum limit value for group of PAHs or limit value for individual PAH?
- Argumentation to set an appropriate transitional period for the Restriction to become effective

Theme 3: Alternatives (or various types of infill and fields)

- Group 1: Artificial turf with alternative infill
  - Synthetic material
    - EPDM (Ethylene-Propylene-Diene Rubbers)
    - TPE (Thermoplastic Elastomers) or Thermoplastic rubbers
    - PE (Polyethylene)
  - Natural materials
    - Cork
    - Mixture of natural fibers
- Group 2: Alternative types of pitches
  - Natural grass
  - Artificial turf without infill
  - Artificial turf filled with grass
- Group 3: Technical measures to reduce PAHs content in scrum rubber
  - Improved separation/selection of tires and/or other rubber articles with different PAHs contents
  - Further reduction of PAH content in feedstock (tires and other articles)

Theme 3: Discussion topics

- 3A: Potential human health and environmental risks of alternatives
- 3B: Properties of alternatives
- 3C: Promising alternatives

3A: Potential human health and environmental risks

Alternatives	3A: Human health/ environmental risk
Group 1: Alternative infill - EPDM - TPE - PE - Cork - Mixture of natural fibers Group 2: Alternative pitches - Natural grass - Artificial turf without infill - Artificial turf filled with grass Group 3: Technical measures to reduce PAHs content - Improved separation/selection of tires/rubbers - Further reduction of PAH content in tires/rubbers	Factors: - **Chemical composition?** - **Chemicals during use/maintenance?** *(pesticides/biocides/fungicides/ cleaning agents/de-icing)* - Recycled/virgin/recyclable? - Energy and water use, CO2 emissions - Micro plastics - ...?

3B: Properties of alternatives

Alternatives	3B: Properties
Group 1: Alternative infill - EPDM - TPE - PE - Cork - Mixture of natural fibers **Group 2: Alternative pitches** - Natural grass - Artificial turf without infill - Artificial turf filled with grass **Group 3: Technical measures to reduce PAHs content** - Improved separation/selection of tires/rubbers - Further reduction of PAH content in tires/rubbers	- Sport technical performance - Intensity of use of the pitch - Characteristics in extreme climates (sun, rain, frost) - Required maintenance - Life-time - **Availability** - Costs - ...?

Theme 4: Socio-economic effects of a restriction

- Estimate of the expected impacts of the restriction
- Costs and benefits **compared to the baseline situation**
- Impact categories to be discussed in the dossier:
  - Human health effects
  - Environmental effects
  - **Market impacts**
  - Other impacts, including
    - Social impacts
    - Wider economic impacts
    - Distributional effects

Theme 4: Discussion topics

- 4A: Baseline situation and expected trends
- 4B: Impacts of the proposed restriction of lowering the PAH limit value in plastic and rubber granules used on artificial turf

4A: Baseline

- Infill materials currently used in EU
- Number of artificial turf fields in EU (also compared to other fields)
- PAHs concentrations
- People exposed and potentially at risk

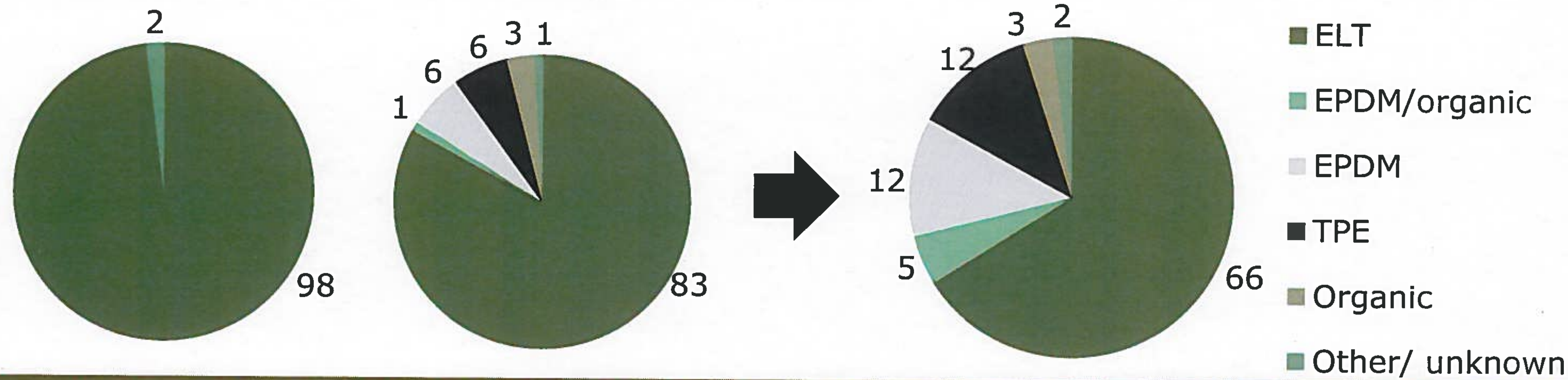
-> Estimates and trends

-> *Note that all estimates included in the next 3 slides are included for discussion purposes and do not necessarily represent the actual baseline situation and trend*

4A: Baseline: Infill materials currently used in EU

- Estimates
  - ELT: 80 000-130 000 tonnes per year (EU ETRMA, 2016)
  - Shares of ELT and other infill: what is realistic?
- Factors influencing trend? social unrest, EU waste management legislation and goals

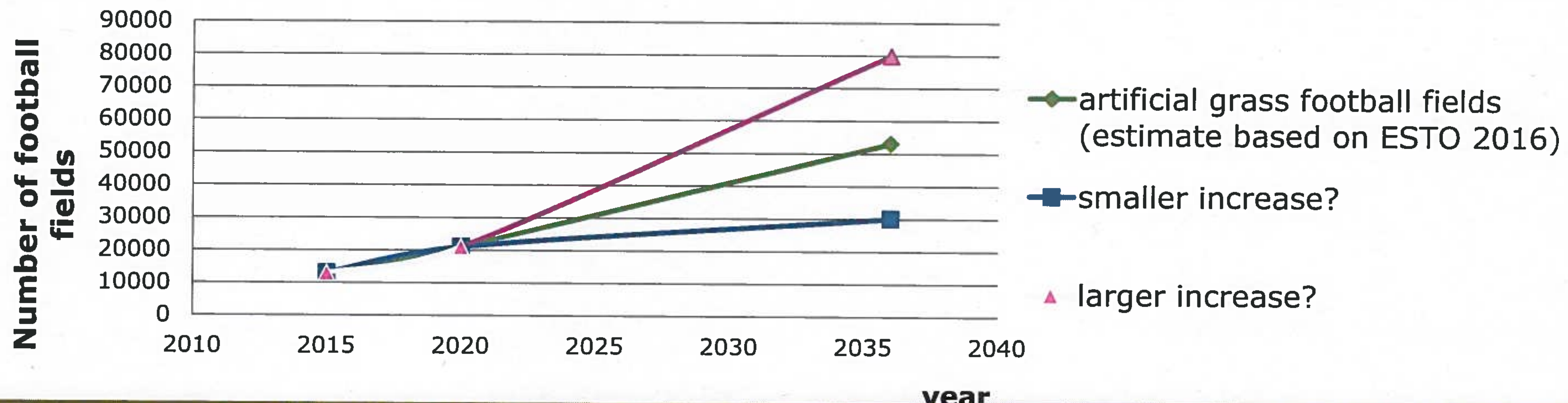
ESTO, 2015 (EU) | **FIFA certified turf 2017 (world)** | **Scenario for illustration: use of non-ELT infill doubled in 2037**



4A: Baseline: Number of artificial turf fields in EU

- Football fields
  - Trend estimated based on ESTO 2016
  - Artificial turf is estimated to be around 17% of total number of football fields (preliminary estimate, based on NL figures, 2015)
  - Question: what 2035 estimate is deemed realistic?
- Factors influencing trend? growing popularity of football/sports, growing popularity of artificial grass, social unrest

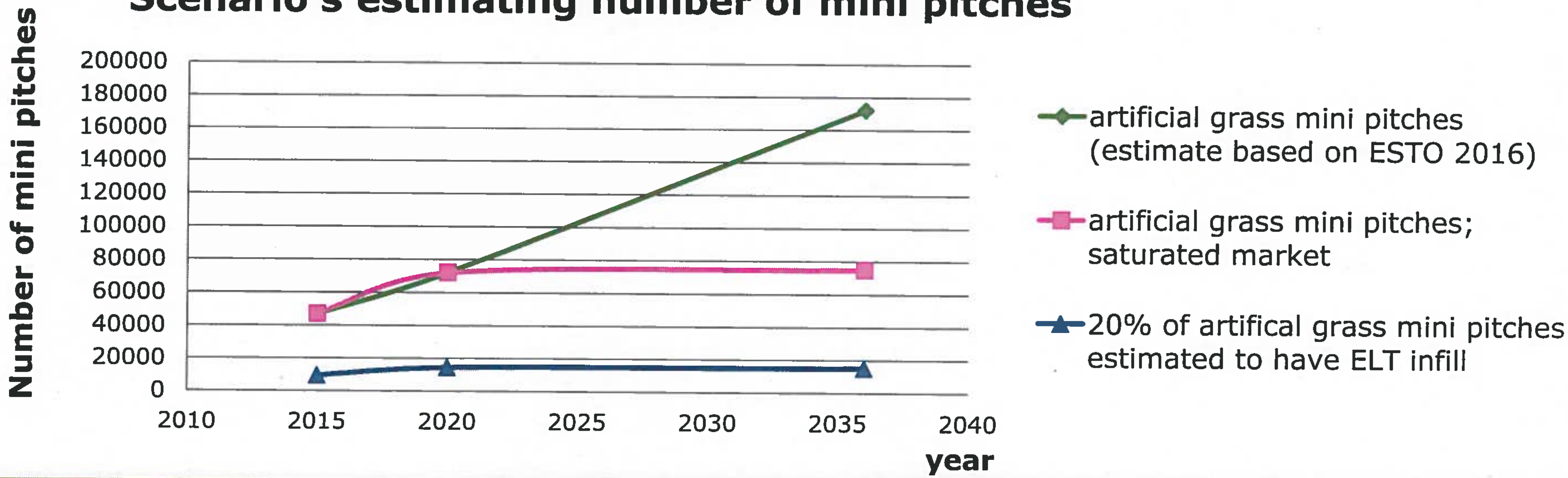
Scenario's estimating number of artificial grass football fields



4A: Baseline: Number of artificial turf fields in EU

- Mini pitches
  - Trend estimated based on ESTO 2016
  - Limited understanding of mini pitches market
    > What are these, where located, owners/users, use of infill/ELT?
  - Question: what 2035 estimate is deemed realistic?
- Factors influencing trend? market saturation, social unrest

Scenario's estimating number of mini pitches



4A: Baseline: PAHs concentrations

- Estimates
  - 5.8 – 19.8 mg/kg PAH8 (median and max RIVM figures), received information is analysed and will be added to estimate trend
  - First impressions:
    - › Variation in the received results
    - › No clear downward trend is observed over recent years
    - › Limited information on occurrence of peak concentrations (between 20 mg/kg and current mixture limit of 1000 mg/kg)
- Factors influencing trend? 2010 extender oil restriction, potential imports, recycling of infill of older fields, social unrest

4A: Baseline: Players exposed and at risk

- Estimate of the number of people involved with football in Europe can be made based on UEFA data
- However, how to estimate the number of football players potentially at risk?
- Workers, children and other users of artificial turf fields and mini pitches to be added. Who are they and how many?
- Factors influencing trend? depending on the elements mentioned earlier

4B: Expected market impacts

- To get an impression of how market actors will respond to various limit values, the consequences of two potential limit values are discussed in the workshop

  -> *Note that the limit value that will be included in the restriction proposal will be based on the outcomes of the risk assessment (currently ongoing)*

- Expected market impacts:
  - Tire producers
  - Tire (and other rubber article) recyclers/ELT granules formulators
  - Importers of (semi-finished) granules
  - Formulators of alternative infill
  - Producers of artificial grass systems
  - Municipalities
  - Sports clubs
  - Players
  - ...

Doc. 21.a.6

National Institute for Public Health
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Date
17 November 2017

memo

Discussion document PAHs in synthetic turf infill granules workshop

Introduction

This memo serves as a discussion document for the workshop organised 24 November 2017 on a REACH[1] Annex XV Restriction proposal on plastic and rubber granules used as infill material in synthetic turf pitches. RIVM is currently working on this restriction proposal on behalf of the Dutch government and in cooperation with the European Chemicals Agency (ECHA). The proposal is expected to be submitted by April 13th, 2018. By providing this memo we aim to streamline the discussions and obtain as much as possible new information and understanding that will help us in writing a well-founded Annex XV report and restriction proposal.
It is very helpful when participants prepare themselves specifically for discussing the main themes and topics we identified and for which we provide further information in this document.

This memo aims to inform and prepare the attendees of the workshop about the main discussion topics and to streamline the exchange of information and discussion. The document is distributed one week in advance of the workshop.

The restriction proposal will contain two major parts: a risk assessment and a socio-economic analysis. In the risk assessment RIVM, together with ECHA, will assess the risks to human health due to the use of infill material on synthetic turf pitches. The reports by RIVM published in December 2016 and ECHA published in February 2017 will serve as a starting point for the assessment. Additional information that has become available will be used to update the analysis. The risk assessment will characterise the risk for all identified uses and exposure scenarios with emphasis on the highest exposure and most vulnerable groups. The risk characterisation will also set a scientific basis for proposing one or more limit values for the targeted PAHs in the granules. In the socio-economic analysis (SEA) we will assess the impacts (costs and benefits) of the proposed restriction compared to the business as usual (baseline) scenario. The SEA will also include an analysis of alternatives. The SEA

[1] REACH Regulation (EC) No 1907/2006

will be based on the previous RIVM and ECHA reports but will include additional information from stakeholders, e.g. on the expected autonomous trends in the rubber granules markets (baseline), on the availability of alternatives and on the impact of a limit value on actors in the supply chain.

As part of the preparation of the restriction dossier, ECHA organised a 'call for evidence' from 23 August to 18 October 2017 which resulted in 21 responses (6 from granule manufacturers (and associations), 2 from turf manufacturers, 2 from tire manufacturers, 2 from trade organisations, 1 from academia, 5 from member states, 3 from private persons). In addition, RIVM and ECHA have during October and November organised bilateral meetings and site visits with some stakeholders to discuss specific questions about e.g. the manufacturing process of granules.

Purpose of the workshop and preparation by participants

The purpose of the workshop organised by RIVM and ECHA is to ensure the correct understanding of the information that has been made available to us. To understand on which issues there is common understanding among stakeholders (and where there is not), and to assess which knowledge gaps still exist. Key stakeholders that have or are expected to be able to contribute effectively serving the aforementioned goals are invited for this workshop. The workshop will be organised under Chatham House Rule[2] facilitating open debate and exchange of information.

The Chatham House Rule reads as follows:
When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.

Discussion topics

RIVM's and ECHA's reading of the available information is ongoing and is in a phase of preliminary analysis based upon which the Annex XV dossier and restriction proposal is drafted. We analysed information from sources submitted during the consultation and collected through stakeholder visits and communications. This preliminary analysis has resulted in a range of issues and questions for which we see added value of discussion in the workshop. Four main themes were identified.

The following themes will be on the agenda of the workshop:
Theme 1: Risks of granules on synthetic turf pitches
Theme 2: Scope of the restriction and restriction options
Theme 3: Alternatives
Theme 4: Socio-economic impacts of a restriction

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2 https://www.chathamhouse.org/about/chatham-house-rule

Issues outside the scope of the workshop:

There has been discussion within the European Commission whether rubber granules used on turf pitches and other applications should be seen as articles or mixtures. It has been concluded in the EU that granules should be considered as mixtures. ECHA is currently working on a guidance to further clarify the current Annex XVII of REACH Regulation entry 50.5 and 50.6 on PAHs in articles. Whilst we take note that diverging views still exist among stakeholders in the supply chain, it is not the focus of this workshop to discuss this policy decision as it forms the basis for the restriction proposal.

The European Commission is currently reviewing the need for standardising analytical methods for measuring PAHs in rubber and plastic articles. Although we recognise that this discussion is also relevant for this restriction proposal and this will also be recognised in the restriction dossier, this issue is addressed separately by the Commission and thus will not be part of the discussion in this workshop.

We acknowledge that for end-of-life tires and granules formulated from such streams currently no European harmonised criteria exist determining the End-of-Waste status of the products in accordance with the Waste Framework Directive (Directive 2008/98/EC). We note that the interpretation of the status of ELT granules may differ amongst member states of the EU. Whilst this legal interpretation will potentially have a large impact on enforceability of the proposed restriction, it does not influence the risk-based justification of the proposed EU-wide measure to ensure safe use of granules on synthetic turf pitches.

Theme 1: Risks of granules used on synthetic turf pitches

The scientific basis for the restriction proposal is the finding of both RIVM[3] and ECHA[4] that the current limit for PAHs in mixtures[5] supplied to the general public seems not to ensure adequate protection of human health if the PAH-levels in granules used on synthetic turf pitches would be as high as currently allowed. The restriction proposal aims to limit the PAH content in granules to a level of control of risks. The RIVM risk assessment will be used as a basis for the risk assessment section of the Annex XV dossier. Additional information obtained from the ECHA report, submitted by stakeholders during the consultation and from other available sources, will be used to update and improve the assessment where deemed appropriate. In the risk assessment we will calculate the magnitude of risks that would be the consequence of maximum allowed PAH levels in infill granules as high as the currently applicable PAH limits for mixtures supplied to the general public (100-1000 mg/kg). Furthermore, we will calculate the current risk level based on the current information on PAH levels in granules placed on the market in the EU and used on artificial turf pitches.

The risk assessment contains of a hazard assessment, an exposure assessment and a risk characterisation. The risk assessment work is ongoing and new information (such as on PAH levels relevant for the exposure estimation) will be taken into account. In the risk assessment there is a need to make assumptions and use scenarios to simulate representative exposure to PAHs. A level of uncertainty is inherent to the process of risk assessment. The report will present the uncertainties and analyse the sensitivity of these assumptions against the risk assessment results. Within Theme 1 the following main discussion topics are foreseen for exchange of information and discussion during the workshop:

- <u>Discussion topic 1A:</u> Representativeness of PAH data for the EU
- <u>Discussion topic 1B:</u> Uncertainties in the risk assessment

<u>Discussion topic 1A</u>: Representativeness of PAH data for the EU.
It is yet unclear whether the information available on PAH content in ELT granules in the RIVM and ECHA reports and made available to us can be considered representative for the EU as a whole. The RIVM and ECHA studies used samples on fields located in only a limited number of countries primarily located in the North-Western European region. The question is how representative these pitches are for the EU as a whole and how this will add to the uncertainty analysis. More information on PAHs measurements from other countries is still needed.

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3 Evaluation of health risks of playing sports on synthetic turf pitches with rubber granulate: Scientific background document. DOI 10.21945/RIVM-2017-0017

4 Annex XV Report: An evaluation of the possible health risks of recycled rubber granules used as infill in synthetic turf sports fields, ECHA, 28 February 2017.

5 Entry 28 of REACH Annex XVII prohibits the placing on the market for supply to the general public of substances or mixtures containing equal to or more than 0.1 weight percent (1000 mg/kg) of the PAH that are in the scope of entry 50 of Annex XVII. For two PAHs (Benzo[a]pyrene (BaP) and Dibenzo[a,h]anthracene (DBAhA) the limit is 0.01% (100 mg/kg).

Date
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Discussion topic 1B: Uncertainties in the risk assessment.
The hazard, exposure and risk evaluation of the Annex XV proposal will inevitably contain uncertainties as the information basis will not be complete. Where information is lacking assumptions will be made that will be duly justified. The dossier submitter will address those uncertainties in a separate section of the dossier analysing the sensitivity of the risk assessment to the uncertainties. During the workshop we would like to discuss the following aspects:

- Are the exposure scenarios for players used in the RIVM and ECHA reports regarded as a good starting point for our risk assessment? Do you have information on the basis of which we would be able to reduce the uncertainties in the chosen scenarios?
- Do you see important gaps in our scenarios? Do you think for instance that a separate scenario should be developed for very young children playing on synthetic turf pitches? An also: should we consider exposure of PAHs directly to blood (especially) goalkeepers may get wounds on knees and elbows. Wounds have been studied earlier by others. Would you expect RIVM and ECHA to also consider direct exposure through wounds?
- Human exposure to PAHs is not the result of a single source. Do you see a need to address in our assessment other PAHs sources and look at combined human exposure?
- In the RIVM and ECHA studies a so-called intraspecies safety factor is not included. The question is whether the risk assessment currently is sufficiently protective for children playing and sporting on synthetic turf pitches. Children in the age of 4-10 may be exposed relatively high, which is accounted for in the exposure scenarios. However, there is also scientific debate on the need to include an additional safety (uncertainty) factor to translate risks of exposed adults to carcinogens to risks of exposed children as the latter group may be more susceptible to effects (i.e. have a higher sensitivity for tumour formation). Do you have information that you think we should take into account in estimating the risks for children of certain age groups?
- The number of players (including children) that are exposed across the EU as a whole.

Theme 2: Scope of the restriction and restriction options

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Taking into account the existing REACH restriction, entry 50 on PAHs in articles[6], we are considering to propose an additional REACH restriction on eight carcinogenic PAHs in plastic and rubber granules used as infill material in synthetic turf pitches. The motivation to start this process is the finding of both RIVM and ECHA that the current limit for PAHs in mixtures seems not to ensure adequate protection of human health if the PAH-levels in granules would be as high as currently allowed. This is the rationale to elaborate an Annex XV proposal to limit the PAH content in such mixtures to a level at which risks are controlled.

When setting the scope of the restriction, the limit values and restriction options, various questions are open for consideration. Within Theme 2 the following topics will be discussed during the workshop:

- Discussion topic 2A: Which substances to include in the scope? REACH Annex XVII entry 50 has a chemical scope targeting eight carcinogenic PAHs. Should we have the same scope or approach this case differently?
- Discussion topic 2B: What infill materials to include in the scope? The main concern was raised because of debate on end-of-life-tire granules used as infill on artificial turf pitches. But shouldn't the restriction make sure that any type of infill is safe? Hence should the restriction cover all potential granules used as infill on artificial turf pitches?
- Discussion topic 2C: How to set the limit value? Discuss the difference between individual or sum limits and discuss the level to set the limit value?

Discussion topic 2A: Which substances to include in the scope?
The eight PAHs classified as carcinogens (Cat 1B) and in the scope of entry 50 of REACH Annex XVII[7] were also assessed by RIVM (2016) and ECHA (2017). Other approaches are possible such as including the two PAHs[8] for which currently a Risk Assessment Committee opinion is available supporting the classification of these substances as Category 1B Carcinogens, or even including other PAHs that may in future get an EU harmonised classification as carcinogen. The key question in this context is if there is added value to deviate from the chemical scope of entry 50.

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6 The placing on the market for supply to the general public of articles containing polycyclic aromatic hydrocarbons (PAHs) is restricted by entry 50 of Annex XVII to REACH Regulation (EC) No 1907/2006, paragraphs 5 and 6. Articles placed on the market for supply to the general public will contravene the restriction if any of their rubber or plastic components that come into direct as well as prolonged contact or short-term repetitive contact with human skin or the oral cavity, under normal or reasonably foreseeable conditions of use, contain more than 1 mg/kg (0.0001% by weight of this component) of any of the eight PAHs that are identified in Column 1 of the entry. Toys, including activity toys, and childcare articles, should not contain more than 0,5 mg/kg (0,00005 % by weight of this component) of any of the listed PAHs. Guidance for the interpretation of entry 50.5 and 6 is under development.

7 Benzo[a]pyrene (BaP) – CAS No 50-32-8, Benzo[e]pyrene (BeP) – CAS No 192-97-2, Benzo[a]anthracene (BaA) – CAS No 56-55-3, Chrysen (CHR) - CAS No 218-01-9, Benzo[b]fluoranthene (BbFA) – CAS No 205-99-2, Benzo[j]fluoranthene (BjFA) – CAS No 205-82-3, Benzo[k]fluoranthene (BkFA) – CAS No 207-08-9 and Dibenzo[a,h]anthracene (DBAhA] – CAS No 53-70-3

8 benzo[rst]pentaphene: EC Number: 205-877-5, CAS Number: 189-55-9 (RAC opinion: Muta 2, Carc 1B) and dibenzo[b,def]chrysene, dibenzo[a,h]pyrene: EC Number: 205-878-0, CAS Number: 189-64-0 (RAC opinion: Muta 2, Carc 1B). RAC opinions: https://echa.europa.eu/opinions-of-the-committee-for-risk-assessment-on-proposals-for-harmonised-classification-and-labelling

Can the eight PAHs as is currently the case in entry 50 of Annex XVII in a pragmatic way serve as 'representative' for a larger group of potential other PAHs. How do we find a good balance between a practicable and enforceable restriction and sufficient certainty on level of protection (risk control)?

Discussion topic 2B: What infill materials to include in the scope?
The basis for the current work on the Annex XV dossier was the concern raised by a debate on safety of end-of-life tire (ELT) granules used as infill on artificial turf pitches. However, in practice also other rubber and plastic materials or articles (non-tire), such as industrial items (conveyor belts, pipes, sheets, etc.) may end up in rubber waste streams and hence these may also be recycled into granules. Furthermore, virgin rubber and plastic materials may be used to produce granules infill material that may contain PAHs. The key question is: shouldn't the restriction make sure that any type of infill is safe looking at PAHs content? Hence should the restriction cover all potential granules (rubber, plastic or biological materials) used as infill on artificial turf pitches?

Discussion topic 2C: How to set the limit value?
The starting point in setting the limit value is to choose a value that will ensure protection of human health. Hence, the risk assessment will form the basis for the level at which a limit value will be proposed. As RIVM and ECHA are still working on the risk assessment of PAHs in granules, it is currently not known at what level the proposed limit value will be set. In the Annex XV dossier, however, we intend to include one or more possible restriction options (RO's) to show a variation in possibilities and analyse the expected impacts of the different options. When the risk assessment and the impact assessments are set, RIVM and ECHA will select one preferred RO that will be the proposed restriction. Other risk management options (RMO's) will be included in the Annex XV dossier as well, including options that were discarded and not further analysed for various reasons. It should be noted that as a result of the evaluation by the scientific committees of ECHA (Risk Assessment Committee (RAC) and Socio-Economic Analysis Committee (SEAC)) that follows after submission by the Netherlands, changes in the dossier may be considered necessary. Also information provided during the 6 months public consultation, may affect the dossier and the opinion development by RAC and SEAC. For the discussion in the workshop on the limit value and for comparative purposes we currently foresee three possible scenarios:

- Business as usual: a limit value of 100 or 1000 mg/kg per individual PAH as currently applicable for mixtures supplied to the general public (REACH Annex XVII, entry 28);
- RO1: The limit value for granules is set at the same level as the limit value that is currently in place for articles supplied to the general public through REACH Annex XVII, entry 50. I.e. this would mean a limit value of 1 mg/kg per individual PAH or 8 mg/kg for the sum of eight PAHs;
- RO2: The limit value for granules is set at a level at which risks are controlled. For non-threshold carcinogens this would normally be a level where the risk would be considered negligible. The level will be determined by the outcome of the risk assessment. It is

anticipated that the proposed limit value will not be higher than 20 mg/kg, which is the maximum value of the sum of the 8 ECHA PAHs (i.e. the one currently included in entry 50) found on sampled pitches that was used in estimating the risks for players by RIVM in the 2016 report. Based on current adjustments in the risk assessment (e.g. new information on exposure scenarios) and due to necessary translation from the newly estimated risk level to an acceptable risk (e.g. 1 additional cancer case per million exposed individuals), the proposed limit value is likely to be lower. For the purpose of the workshop a potential sum limit value of 15 mg/kg for eight PAH will be discussed.

The setting of the limit value may also be influenced by socio-economic arguments such as the impacts on actors in the supply chain. This will play a role in the socio-economic assessment of the RO's that are analysed in the restriction dossier and will be evaluated by SEAC.

Another issue to be discussed within this discussion topic is the difference between limit values for individual PAHs and a sum limit value for the total PAH content in the granules. REACH Annex XVII entry 50.5 and 50.6 restricting the PAH content of articles contains a limit value per individual PAH in its scope and also the limit value that applies to mixtures supplied to the general public. REACH Annex XVII entry 28 restricting the PAH content of mixtures contains limit values for individual PAHs. It should be kept in mind that the starting point of the restriction proposal will be the risk assessment performed on a group of (eight or more) PAHs and hence we apply the total exposure to this group as a starting point for estimating risk. From a risk-perspective hence, it could be logical approach to work towards establishing a sum limit value rather than limit values per individual PAH. Furthermore the application of a sum limit value may also have practical advantages such as the ease of interpretation. However, in proposing a sum limit value it would need to be accounted for the fact that within the group of eight PAHs two substances, Dibenzo[a,h]anthracene and Benzo[a]pyrene, have a limit value for supply in mixtures to general public that is a factor of 10 lower than for the other PAHs, based on differences in carcinogenic potential. These are all factors that need to be considered in the establishment of (an) appropriate limit value(s) in the scope of the restriction proposal for granules.

Date
17 November 2017

Theme 3: Alternatives

Information on alternatives is requested for the restriction dossier because implementation of the restriction measure could result in a shift to alternative infill materials used in artificial turf pitches or in alternative turf pitches to be installed. Whether such a shift will occur in practice, of course largely depends on the level at which the limit value will be set and how various market actors respond to that. For the scope of this Annex XV dossier we define an alternative as follows:

Alternative to the placing on the market and use of rubber and plastic granules on synthetic turf pitches containing PAHs above the set limit value.

Hence, an alternative in the scope of the restriction should meet the following requirements:

- It should be complying with the proposed PAH limit value;
- It should be an alternative for the technical functions (uses) associated with the use of infill granules in synthetic turf pitches (sports and leisure, etc.). It is possible that an alternative (such as natural grass) provides a technical alternative for the full artificial turf system. It is also possible that an alternative (such as alternative infill) only replaces the specific function performed by infill material with high PAH-content, hence allowing a synthetic turf pitch to be used for its intended function;
- An alternative should not give rise to concerns for human health similar to those for ELT granules with high PAH levels.

As a consequence alternatives are defined more broadly than only alternative infill materials. A range of alternatives are available on the market but information on composition, origin of feedstock, durability, technical performance characteristics and market factors is still scarce. It appears also that these alternative infill materials are not as extensively studied as rubber granules from end-of-life tires, e.g. when it comes to potential human health and environmental effects. Currently, the following three groups of alternatives are considered in the draft Annex XV dossier:

<u>Group 1. Artificial turf with an alternative infill</u>

- synthetic material (rubber and plastics):
  - ELT granules with PAHs concentration below the proposed limit value;
  - EPDM (Ethylene-Propylene-Diene Monomer);
  - TPE (Thermoplastic Elastomer);
  - PE (polyethylene);
- Natural materials:
  - Cork;
  - a mixture of natural fibres (e.g. coconut, vegetable fibres) and cork.

Group 2: alternative types of pitches
- Natural grass pitch;
- Artificial turf pitch without an infill;
- Artificial turf pitch filled with grass seed (a hybrid pitch).

Group 3: Technical measures to reduce PAHs content in ELT infill material
Measures in this group are in fact resulting in compliant ELT granules as included in group 1 but are considered separately for the discussion in the workshop. It is yet to be decided if and how these measures will be included in the Annex XV dossier:
- Physical, mechanical and organisational measures to separate end of life tires (ELT) with high PAHs content from ELT with lower PAHs content before the rubber scrub is produced. Same may apply to separation of other rubber materials/articles with high PAH content from the rubber waste stream that may be used for granule manufacture;
- Further reduction of PAH levels in feedstock of tire production to make sure that in the longer term infill granules made of end of life tires for turf pitches PAH levels in infill are further reduced. In practice this could mean that the PAH levels in carbon black, which is used up to 30% as filling material in manufacture of tires is limited on top of already ongoing industry initiatives to reduce PAH levels in this feedstock. This is in fact another risk management option that could be considered next to the already existing extender oil restriction.

Within Theme 3 the following topics will be discussed during the workshop:
- Discussion topic 3A: Potential human health and environmental hazard and risk of alternatives.
- Discussion topic 3B: Technical properties related to performance of the alternative materials and alternative fields, including availability and costs

Discussion topic 3A: Potential human health and environmental risk of alternatives
Starting point of this discussion is the question whether alternatives could give human health and/or environmental hazard/risks.
Various elements are of importance in this discussion:
- Chemical composition of alternatives and the question whether or not these may contain hazardous substances, including PAHs and other substances of concern.
- The question whether alternatives/fields are treated with biocides/pesticides/fungicides before use and/or during maintenance.
- The question whether alternatives are made of recycled or virgin feedstock and whether alternatives are recyclable.

Discussion topic 3B: Properties of the alternative materials
Properties of alternative infill materials and alternative sport fields may

have different properties compared to artificial turf pitches with high PAH content infill. In comparing the various alternatives, it is important to attain an overview of the key characteristics of various alternatives in terms of:

- Sport technical performance
- Intensity of use of the pitch
- Characteristics in extreme climates (sun, rain, frost)
- Required maintenance
- Life time of the alternative/system
- Availability of the alternatives
- Costs of the alternative

Theme 4: Socio-economic impacts of a restriction

The Annex XV dossier will contain a socio-economic analysis (SEA) in which the costs and benefits of the restriction options are analysed and compared to the business as usual scenario (baseline). The SEA aims to provide information to conclude upon the proportionality of the proposed restriction by comparing societal benefits and societal costs of the measure(s). Depending on the scope of the restriction, the level at which the limit value is set, possible exemptions, a transition period and any conditions imposed, the restriction will have a certain impact on stakeholders in the supply chain. The costs incurred by parties in the supply chain and possible benefits (e.g. for alternative manufacturers, human health and the environment) will be analysed.
For the discussion on market consequences of the policy scenario's we distinguish the following actors: tire producers, tire recyclers/infill producers, artificial turf producers, alternative infill producers, and municipalities/sports clubs.

Within Theme 4 the following topics will be discussed during the workshop:

- <u>Discussion topic 4A:</u> What are the expected baseline developments in the EU synthetic turf and infill markets and in the car and truck tire market and life cycle?
- <u>Discussion topic 4B:</u> What would be the impact of the proposed restriction lowering the PAH limit to a level close to the level applicable to articles supplied to the general public?

<u>Discussion topic 4A:</u> Expected baseline developments
To be able to estimate potential/expected impacts of the proposed restriction, it is important to have a good impression of the baseline scenario, also called 'the business as usual scenario'. This is the current situation and the expected autonomous developments (trends) without introduction of any new policy measure. In defining the baseline scenario, it is important to get an impression of both the life cycle of tires and of the life cycle of artificial turf. Both sectors are of relevance for this dossier as the infill made of end of life tires connects the two markets by recycling the rubber material. Key aspects in looking at trends on these markets related to this restriction proposal are the changes in PAHs concentrations in infill material made of end of life tires over the years in the EU and the use of artificial grass using end of life tire infill material (and alternative infill) over the years. As a dossier submitter we will have to make estimations of these trends in the baseline situation for the period 2010-2035, as that will be the starting point when estimating the expected impacts of the restriction proposal.

Developments that have an effect on trends on these markets are:

- EU extender oil restriction banning the use of high aromatic oil in tire production (2010) affecting the PAH concentration in tires over the years;
- EU goals/regulation related to dump and incineration of tires;
- EU recycling goals;
- Growing use of synthetic grass on sport fields in EU, including the

use of end of life tire infill and alternatives;
- Trends in imports of infill material;
- Societal concern on the use of end of life tire infill on artificial grass (mainly in the Netherlands) and the (potential) shift to alternative grass systems and alternative infill;
- Trend related to synthetic turf pitch renovation after end of service life (10-15 years) and related responsibilities related to the handling of old synthetic turf and infill material. Role of sports clubs and local communities or producer responsibility system? Discuss also differences between EU countries in this respect.

In the workshop, we want to discuss the main elements affecting trends on the markets relevant for this dossier as described above. We want to know whether participants recognise the elements described above and whether important elements affecting trends are missed. Furthermore we would like to discuss the overall effects on the PAHs concentrations and the use of end of life tire infill for the coming years in the business as usual scenario. We would like to get an impression whether actors have a common view or not on the baseline developments.

<u>Discussion topic 4B:</u> Impacts of the proposed restriction
The Annex XV dossier needs to include an analysis of expected impacts due to implementation of the proposed restriction and other potential risk management options. Within this analysis both positive and negative impacts of RO's are compared to the baseline (business as usual scenario) are investigated. The type and extent of the impacts to expect largely depends on the value at which the limit value is set (see discussion theme 2). The restriction dossier divides various main categories of impacts:
- Human health impacts
- Environmental impacts
- Market impacts for various actors
- Other impacts, including:
  - Social impacts
  - Wider economic impacts
  - Distributional impacts
- Practicality and monitorability.

Within discussion topic 4B we want to focus on the expected <u>market impacts</u> of 2 restriction scenarios:

A. Introduction of a limit value comparable to the current entry 50 for articles of 1 mg/kg per individual PAH or 8 mg/kg for the sum of eight PAHs (See theme 2 for explanation on RO1).
B. Introduction of a sum limit value of 15 mg/kg for eight PAHs, a level (See theme 2 for explanation on RO2).

Note that these are potential limit values used to get an idea of the socio-economic consequences of various policy scenarios. The limit value proposed depends on the outcomes of the risk assessment (that is currently still under development).

Doc. 21.a.7

European Tyre Recycling Association

Workshop 24-11-2017, REACH Annex XV restriction plastic and rubber granules used as infill material in synthetic turf pitches

ETRA Policy statement

The concentration of PAHs in rubber granulate for infill material has been taken into consideration in terms of quantity contained in the rubber but not as an impact on the environment and/or human health. There is no scientific proof that there is a migration of PAHs from the granulate to the environment or human bodies.

It is difficult to demand the reduction of a specific ingredient that appears in a secondary raw material without its prior reduction in the original product (raw material). Any reduction in PAHs in recycled tyre materials (infill) are due to the reductions of ingredient levels used in the 'raw material' (the tyre).

There is already an established trend to reduce PAHs in rubber granulate determined by the reduction of PAHs in tyre production. It is not clear how the PAH concentration in rubber granulate can be further reduced without further reducing the content in manufacture of new tyres.

We may seek to minimize the amount of hazardous substances in infill materials, but the level considered safe has not been scientifically determined over time and could be cause for costly and unproductive activities.

Thus, it could be inadvisable to make additional reductions not based on verifiable scientific evidence which could create fear and reluctance to use these products. People could believe that a reduction was made because the material is dangerous. What would be the option for existing fields whose PAH content does not comply with the new limits? What would be the consequence for the environment and human health from the impact of removal and disposal of "hazardous" fields? And what would be the impact on the tyre recycling industry based upon a hasty decision based upon "uncertainties"?

The tyre recycling industry is under pressure and in competition with traditional industries for competitive outputs. Recycled outputs are prized because of their high performance but they are also valued for their cost-effective pricing. The decision to reduce the concentration of PAHs in rubber granulate is premature and based on too many scientific "uncertainties"

EUROPEAN
TYRE & RUBBER
manufacturers'
association

November 2017

Subject: ETRMA position on the Restriction of PAH in synthetic turf pitches

- **The scope of the restriction should target all infill materials used in STP. Including all types of crumb rubber, plastic granulates and any other material used as infill materials in synthetic turf pitches – and not only End-of-Life tyres derived crumb rubber.**

- **ETRMA supports a restriction to control the risk of high PAH levels in rubber infill that targets *"rubber granulates used as infill material in synthetic turf pitches "* and sets thresholds, on PAH content and / or migration of PAH from rubber infill, that guarantee safe use conditions.**

- **The PAH content in ELT derived rubber poses a very low risk on human health as stated at the ECHA report *An evaluation of health risk of recycled rubber granulates used as infill in synthetic turf sport fields asses the risk for the human health of users of STP Version 1.01.***

- **In absence of a normalized method to measure PAH content, the best concentration estimate is 20 ppm (sum of the 8 PAH of the REACH entry 50)**

- **Setting a restriction based on a PAH content threshold below 20 ppm of ELT derived rubber used as infill material in synthetic turf fields will de-facto exclude ELT-derived rubber from the infill market**

Discussion

ETRMA members are producers of tyres that, after their service life, are used to produce crumb rubber (ELT derived rubber). The content of the following polycyclic aromatic hydrocarbons (PAH): *Benzo[a]pyrene (BaP) - CAS No 50-32-8; Benzo[e]pyrene (BeP) - CAS No 192-97-2; Benzo[a]anthracene (BaA) CAS No 56-55-3; Chrysen (CHR) CAS No 218-01-9; Benzo[b]fluoranthene (BbFA) CAS No 205-99-2; Benzo[j]fluoranthene (BjFA) CAS No 205-82-3; Benzo[k]fluoranthene (BkFA) CAS No 207-08-9; Dibenzo[a,h]anthracene (DBAhA) CAS No 53-70-3* in the oils used in the production of tyres is strictly regulated under entry 50 paragraph 1 of the REACH regulation. This measure guarantees safe conditions for the expected use of tyres for the human health and the environment as far as the PAH is concerned.

End of life tyres (ELT) are the main source of raw material for recycled crumb rubber. It has proven to be a reliable material able to reply to the demanding technical requirements of infill of synthetic turf pitches (STP), to mention, STP represent approximately 30% of the ELT derived rubber market. Using ELT for infill of STP closes the recycling loop of tyres and helps Europe to meet its circular economy targets. Figure 1, hereunder, shows how ELT derive rubber is used as infill materials in a standard synthetic turf pitch

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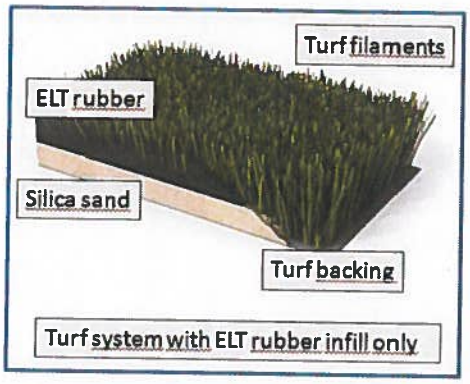


Currently ELT derived rubber is considered a mixture under the REACH[1]. When ELT derived rubber is available to the general publics, such as when used as infill material in STP, REACH entry 28, 29 and 30, defining the maximum content of Carcinogen, Mutagenic and Reprotoxic (CMR) substances applies. It means that the content of each individual PAH classified as CMR should not exceed 100 mg/kg or 1000 mg/kg - as defined by CLP (classification, labelling and packaging).

ELT derived rubber has levels of PAH[2] content- in the range of 20 ppm[3] - that do not pose a risk for the human health for all users of Synthetic Turf Pitches (players, workers, installers). ECHA report *An evaluation of health risk of recycled rubber granulates used as infill in synthetic turf sport fields asses the risk for the human health of users of STP Version 1.01;* assesses the risk for different users of STP defining the following scenarios. Children from 3 to 6 years, from 6 to 11 years, from 6 to 11 years – goalkeepers, from 11 to 18 years, adult active players but non-professionals, adults – professionals and adults - professional goalkeepers. ECHA report concludes page 57 ' *that based on the available information, with the concentrations of polycyclic aromatic hydrocarbons (PAHs) found to be typically present in rubber crumb recycled from ELTs used as infill in synthetic sports fields), the concern for excess lifetime cancer risk for players and workers is very low.'*

However It is recognised the need to restrict the maximum content of PAH in infill materials for STP, as current allowed PAH levels – regulated under entry 28-30 of REACH - may create an eventual risk. Therefore, the Netherlands Authorities have filed an intention of submitting an Annex XVII dossier under REACH – restriction – for infill material used in STP.

ETRMA supports a restriction to control the risk of high PAH levels in rubber infill that targets *"rubber granulates used as infill material in synthetic turf pitches "* and sets thresholds, on PAH content and / or migration of PAH from rubber infill, that guarantee safe use conditions.

The restriction should target the risk identified, in this case rubber infill used in synthetic turf pitches that contains PAH levels higher than current levels. A restriction shall not regulate a non-existing risk such as infill material with current PAH levels.

Scope of the restriction

The scope of the restriction should target all infill materials used in STP. Including all types of crumb rubber, plastic granulates and any other material used as infill material in synthetic turf pitches – and not only End-of-Life tyres derived crumb.

---

[1] CARACAL, March 2016

[2] PAH content refers to the sum of the following 8 substances: Benzo[a]pyrene (BaP) - CAS No 50-32-8; Benzo[e]pyrene (BeP) - CAS No 192-97-2; Benzo[a]anthracene (BaA) CAS No 56-55-3; Chrysen (CHR) CAS No 218-01-9; Benzo[b]fluoranthene (BbFA) CAS No 205-99-2; Benzo[j]fluoranthene (BjFA) CAS No 205-82-3; Benzo[k]fluoranthene (BkFA) CAS No 207-08-9; Dibenzo[a,h]anthracene (DBAhA) CAS No 53-70-3

[3] ETRMA references, discussed later in the document

End of life tyres (ELT) are the main source of raw material for recycled crumb rubber. However some other materials that are suspected to be the source of impurities and high PAH content might be added in crumb rubber beyond ELT. Often this is neglected by researchers and has a tremendous impact on the final crumb rubber composition. Those non-suitable sources are for instance - rubber from other applications than tyres or post-consumer rubber scrap containing rubber from other applications than tyres.

Considerations to set up a restriction threshold

ELT derived rubber current and lowest feasible concentration is in the range of 20 ppm. A lower content of PAH will not be achievable using exclusively ELT as raw material and will compromise the current ELT recycling chain. Setting a restriction based on a PAH content threshold below 20 ppm of ELT-derived rubber used as infill material in synthetic turf fields will *de-facto* exclude ELT-derived rubber from the infill market, currently the first source of raw material for infill, and unavoidably, it will distort the current infill market for STF. It will also affect ELT-derived rubber producers, as infill for STF represents 30% of the overall market of ELT-derived rubber, and alike applications, such as sport or shock adsorbing pavements that might also be indirectly impacted by the restriction, representing 24% of the share, altogether adding up to 54% of the overall ELT – derived rubber market.

Furthermore, a restriction requires comparable results on the content of PAH in crumb rubber with an established and accepted method of measurement. Currently, no established and accepted method of measurement of the content of PAH is available, the DIN ISO 12884 standard with elution with Cyclohexane/Toluene is usually applied for the determination of the content of PAH in ELT derived rubber, but ETRMA experience using the method shows large discrepancies among laboratories when testing ELT derived rubber samples. **The restriction proposal should indicate the PAH test method to be used for the measurement of the PAH content, and in parallel, authorities should work towards introducing an internationally harmonized standard for measuring PAH.**

Including more substances under the restriction scope

There is a gap in knowledge on the risk of other substances present in rubber infill may cause. ETRMA is committed to increase knowledge on the content and the risk for the human health of PAH and other substances in ELT derived rubber. **However, we propose to delay this consideration until the results of the study *Assessment of exposure and potential risks to human health associated with the use of ELT recycled rubber crumb in synthetic turf pitches* are available.**

The study, done in partnership with FoBIG – an expert risk characterization consultant –and CRIP (*Crumb Rubber Industry Platform)* will test more than 50 samples of recycled crumb rubber from end-of-life tyres , including samples of crumb rubber from recycling plants and directly from fields with STP from outdoor and indoor facilities.

The study will characterize the content of the eight PAHs referred to in entry 50 of the REACH legislation and other substances that are suspected to be present in STF from literature review. As non-established and accepted method of measurement of the content of PAH is available, the DIN ISO 12884 standard with elution with Cyclohexane/Toluene will be applied for the determination of the content of PAH in ELT – derived rubber. The first results on PAH content from the study are expected by February 2018.

Currently, and until the study is ready, ETRMA estimates that the content of PAH in ELT-derived rubber may be in a range of up to 20 ppm, slightly varying between the origin of tyres, as seen is the table hereunder.

Table 1 – PAHs* in ELT-derived rubber granulates

ppm		Mean	Min	Max
sum of 8 restricted PAHs*	**Total**	**12**	**4**	**20**
	T&B	11	4	18
	Mix	12	4	20
	OLD	12	4	20
	NEW	11	4	19

***PAH:** *(a) Benzo[a]pyrene (BaP) CAS No 50-32-8 (b) Benzo[e]pyrene (BeP) CAS No 192-97-2 (c) Benzo[a]anthracene (BaA) CAS No 56-55-3 (d) Chrysen (CHR) CAS No 218-01-9 (e) Benzo[b]fluoranthene (BbFA) CAS No 205-99-2 (f) Benzo[j]fluoranthene (BjFA) CAS No 205-82-3, (g) Benzo[k]fluoranthene (BkFA) CAS No 207-08-9 (h) Dibenzo[a,h]anthracene (DBAhA) CAS No 53-70-3*

***Source:** Andrea Re Depaolini, Giancarlo Bianchi, Daniele Fornai, Angela Cardelli, Marco Badalassi, Camillo Cardelli, Enrico Davoli, Physical and chemical characterization of representative samples of recycled rubber from end-of-life tires, In Chemosphere, Volume 184, 2017, Pages 1320-1326, ISSN 0045-6535, https://doi.org/10.1016/j.chemosphere.2017.06.093. (http://www.sciencedirect.com/science/article/pii/S0045653517309967)*

***Legend:** T&B= 100% truck and bus tyres, Mix: from 8:92 to 70:30 mixes of T&B/PCT, PCT: Passenger Car tyres*
Old= Production ante 2010, New= Production post 2010, Total: 25 samples, Unsorted= crumb rubber from 5 recycling facilities

The study will perform on several samples weathering experiments that aim to identify the potential effects of time and weather on the composition and on the generated substances. The results are expected not earlier than December 2018.

Further regulatory measures to control risk of high PAH content in synthetic turf pitches:

ETRMA has received the discussion document *PAHs in synthetic turf infill granules workshop* distributed on Friday the 17 of November of 2017 to the participants of the *Workshop 24-11-2017, REACH Annex XV restriction plastic and rubber granules used as infill material in synthetic turf pitches.*

Under point *3 - Technical measures to reduce PAHs content in ELT infill material* - it is suggested as risk management option to control the content of PAH in granulated rubber to reduce the PAH levels in carbon black, used as infilling material in tyres. Proposing this option for consideration next to the already existing extender oil restriction.

There is no role for the proposed workshops to consider measures that target tyres production nor specifications. Tyres are a highly technical and strictly regulated product that need to meet specific requirements for their performances.

- *Establishing a clear end of waste criteria at EU level*

ELT derived rubber is currently considered as waste by a majority of Member States. If a restriction is introduced, its efficiency will be put into question as waste is outside of the scope of REACH. We strongly recommend that clearly defined end of waste criteria are introduced at EU level to ensure consistent interpretation of the scope of the restriction and guarantee legal certainty. The end of waste criteria should include chemical criteria reflecting the current regulatory requirements on the presence of chemicals and their concentration limits. ETRMA is willing to work with the institutions and contribute to the preparation of the end of waste criteria

- *Strong market surveillance across the EU*

ECHA report acknowledges that some imported tyres entering the EU or other rubber material with unknown composition can be converted at the end of their life cycle into rubber granulates and may have different concentrations of substances than those produced from EU ELT. Indeed rubber granulates themselves may be imported, and the composition of such granulates is not known.

ETRMA reminds that the efficient implementation of the restriction depends essentially on a clear definition of the scope and consistent interpretation, but also on strong market surveillance, which is critical for guaranteeing protection to consumers and level playing field for industry.

ETRMA, European Tyre and Rubber Manufacturers' Association, represents more than 6000 companies in EU28, employing 360.000 individuals and supports another 800000 jobs in related sectors. The product range of its members is extensive from tyres to pharmaceutical, baby care, construction and automotive rubber goods and many more applications. ETRMA members' turnover in 2016 is estimated at € 73 b, of which up to 5% continues to be invested in R&D, annually.

ETRMA's membership include the following tyre manufacturers: APOLLO VREDESTEIN, BRIDGESTONE EUROPE, BRISA, COOPER TIRES, CONTINENTAL, GOODYEAR DUNLOP TIRES EUROPE, HANKOOK, MARANGONI, MICHELIN, NOKIAN TYRES, PIRELLI, PROMETEON AND TRELLEBORG WHEEL SYSTEMS. Furthermore, members include Associations in the following countries: Belgium, Finland, France, Germany, Hungary, Italy, the Netherlands, Poland, Spain and the UK.

European Synthetic Turf Organisation

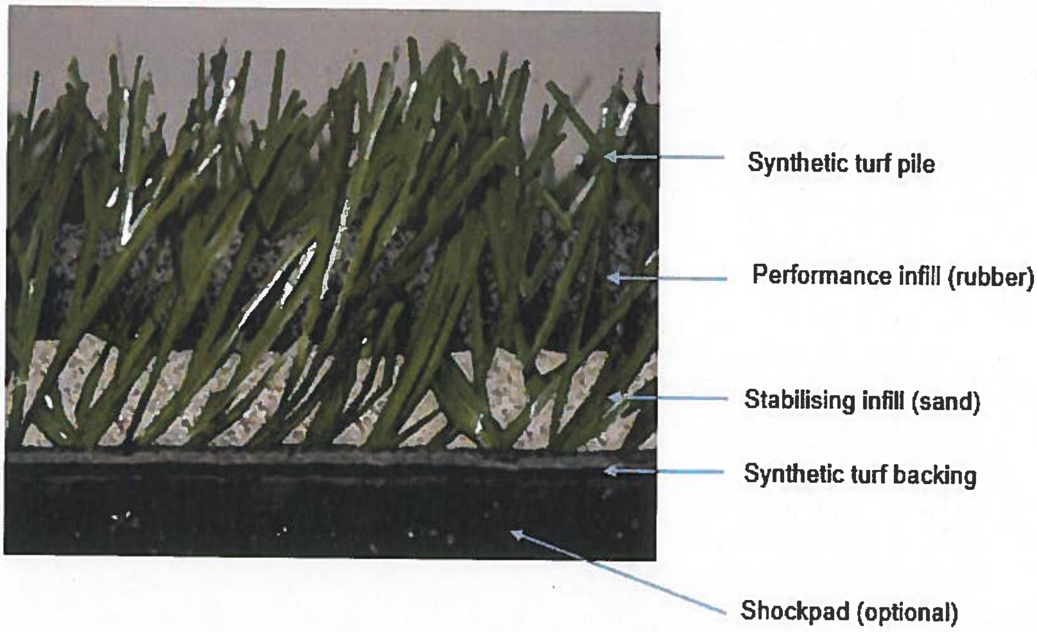
ESTO position on the Restriction of PAH in infill used in synthetic turf sports pitches

ESTO is the European Synthetic Turf Organisation. It members are companies involved in the manufacturing, installation and maintenance of synthetic turf sports fields.

ESTO and its' members believe synthetic turf pitches have a very important role to play in helping ensure the health and fitness of communities throughout Europe. With increasing limited availability of land in many urban areas, increasing demand for recreational facilities and the limitations the climate can bring, synthetic turf pitches are often the only viable solution for those wishing to provide sports facilities. The recent concerns about synthetic turf pitches have done nothing to aid those catering for this demand.

ESTO and its members are committed to ensuring that synthetic turf pitches do not constitute a risk to human health or the environment. ESTO supports the work of ECHA and welcomes the specific inclusion of appropriate and realistic requirements for infill within the REACH Regulations; these will bring reassurance and certainty to the market.

ESTO members use a range of infill materials. Those derived from end of life tyres (ELT) have proven to provide very good sports performance, have excellent durability and are cost effective compared to other forms of infill. ELT is by far the most commonly used form of infill throughout Europe. In many countries it is used in over 90% of all pitches. A typical pitch construction is show in the figure below.



When ELT infill is being used, ESTO advocates its members use infill produced from REACH compliant tyres by granulators with traceable sources. Based on the scientific information available ESTO believes this ensures safe conditions for uses or sports fields and the environment.

Currently ELT derived rubber infill is considered a mixture under REACH entry 28 Annex XVII, meaning the content of each individual PAH classified as (Carcinogen, Mutagenic and Reprotoxic) should not exceed 0.01 % by weight (100 mg/kg) for benzo[a]pyrene and dibenz[a,h]anthracene or 0.1 % by weight (1000 mg/kg) for the other six carcinogenic PAHs with harmonised classifications.

ELT derived infill from REACH compliant tyres typically has levels of PAH content in the range of 20 ppm, and based on the scientific studies published to date ESTO, believes such infills do not pose a risk for human health for all users of synthetic turf pitches (players, workers, installers to name some). This view was endorsed by the ECHA report *'An evaluation of health risk of recycled rubber granulates used as infill in synthetic turf sport fields'*. This report assessed the risk for different users of synthetic turf pitches and concluded on page 57 *"that based on the available information, with the concentrations of polycyclic aromatic hydrocarbons (PAHs) found to be typically present in rubber crumb recycled from ELTs used as infill in synthetic sports fields), the concern for excess lifetime cancer risk for players and workers is very low."*

ESTO therefore believes any new the restriction should target the risk identified, in this case rubber infill used in synthetic turf pitches that contains PAH levels higher than current levels. A restriction should not regulate a non-exiting risk such as infill material with current PAH levels.

ELT derived rubber current, and lowest feasible, concentration is in the range of 20 ppm. Based on discussion with ETRMA, ESTO understand a lower content of PAH will not be achievable using exclusively ELT as raw material and will compromise the current ELT recycling chain. Setting a restriction based on a PAH content threshold below 20 ppm of ELT derived rubber used as infill material in synthetic turf fields will *de-facto* exclude ELT-derived rubber from the infill market. It will also affect ELT-derived rubber producers, as infill for synthetic turf pitches represents approximately 30% of the overall market of ELT-derived rubber, and similar applications, such as shockpads, athletics surfacing, etc might also be indirectly affected by the restriction, representing 24% of the share, altogether adding up to 54% of the overall ELT – derived rubber market.

Establishing a threshold that excludes ELT will also create a major issue with existing fields. If the public perceived them to by a risk there will be enormous pressure to replace the infill, which in many cases would require the synthetic turf carpet to also be replaced. This typically costs in the order of €175,000 per field and would place significant pressure on local municipality or central government funding, not to mention capacity issues in the supply chain.

Furthermore, a restriction requires comparable results on the content of PAH in crumb rubber with an established and accepted method of measurement. Currently, there are no established and accepted methods of measurement of the content of PAH is available, the ISO 12884 standard with elution with Cyclohexane/Toluene is usually applied for the determination of the content of PAH in ELT derived rubber, but experience using the method shows large discrepancies among laboratories when testing ELT derived rubber samples. **The restriction proposal should indicate the PAH test method to be used for the measurement of the PAH content, and in parallel, authorities should work towards introducing an internationally harmonized standard for measuring PAH.**

ESTO members are also unclear about the classification of infill materials as a mixture. The infill material is supplied to those that build the fields in its finished state and is installed directly into the synthetic turf carpet as part of the sports surfacing system. No physical or chemical changes are made to the infill. Many within the industry believe, through their understanding of the REACH regulations, that infill meets the criteria of an article and would be better classified accordingly.

Working with ETRMA, ESTO is committed to increasing knowledge on the content and the risk for the human health of PAH and other substances in ELT. In partnership with FoBig – an expert risk characterization consultant – the CRIP (*Crumb Rubber Industry Platform)* launched a project on the *"Assessment of exposure and potential risks to human health associated with the use of ELT recycled rubber crumb in synthetic turf fields (STF)"* (called hereunder FoBig study) earlier this year. More than 50 samples of *recycled crumb rubber from end-of-life tyres* will be collected, including samples of crumb rubber from recycling plants and directly from fields with STF from outdoor and indoor facilities. The study will characterize the content of the eight PAHs referred to in entry 50 of the REACH legislation and other substances that are suspected to be present in STF from literature review. As non-established and accepted methods of measurement of the content of PAH are available, the DIN ISO 12884 standard with elution with Cyclohexane/Toluene will be applied for the determination of the content of PAH in ELT – derived rubber. The first results on PAH content from the FoBig study are expected by February 2018.

The study will perform on several samples weathering experiments that aim to identify the potential effects of time and weather on the composition and on the generated substances. The results are expected not earlier than December 2018.

ESTO proposal for additional further regulatory measures to successfully control risk:

<u>Establishing of clear end of waste criteria at EU level</u>

ELT derived rubber is currently considered as waste by most Member States. If a restriction is introduced, its efficiency will be put into question as waste is outside of the scope of REACH. We strongly recommend that clearly defined end of waste criteria is introduced at EU level to ensure consistent interpretation of the scope of the restriction and guarantee legal certainty. The end of waste criteria should include chemical criteria reflecting the current regulatory requirements on the presence of chemicals and their concentration limits. ETRMA is willing to work with the institutions and contribute to the preparation of the end of waste criteria

<u>Strong market surveillance across the EU</u>

ECHA report acknowledges that some imported tyres entering the EU or other rubber material with unknown composition can be converted at the end of their life cycle into rubber granulates and may have different concentrations of substances than those produced from EU ELT. Indeed, rubber granulates themselves may be imported, and the composition of such granulates is not known.

ESTO reminds that the efficient implementation of the restriction depends essentially on a clear definition of the scope and consistent interpretation, but also on strong market surveillance, which is critical for guaranteeing protection to consumers and a level playing field for the industry.

ESTO 22/11/2017

Policy statement [redacted], Celanese

Celanese Corporation is a global technology leader in the production of differentiated chemistry solutions and specialty materials used in most major industries and consumer applications.

With the global headquarter located in Dallas, TX, Celanese employs approximately 7,500 employees worldwide and operates 41 global manufacturing facilities.

Through the acquisition of the Italy-based company So.F.teR. in 2016, Celanese's product portfolio includes Thermoplastic Elastomer (TPE) granules for the infill of artificial turf systems for both indoor and outdoor use in different climate zones. PAH-free infill product made from virgin raw materials is manufactured on industrial scale.

In the assessment which forms the basis for a restriction, all materials and alternatives should be assessed in the same way, considering their life cycle of use, including the assessment of human health and environmental effects. Such assessment should also include a possible need of remediation as part of the life cycle, regardless of the source of the infill material.

Celanese believes that the most efficient approach to the development of a restriction under REACH would be the introduction of a restriction which is not linked to the source of the material, but focusses on the substances present in the final product to which consumers and especially sensitive populations are exposed (e.g. on playgrounds and sportsgrounds).

This approach would avoid exposure of the general population to PAHs (Polycyclic Aromatic Hydrocarbons) and other hazardous substances in concentrations above levels acceptable for human health, irrespective of the origin of the starting material.

Policy Statement Terra Sports Technology BV

Terra Sports Technology BV (TST) was established back in 2004 in Sittard The Netherlands.

The company is specialised in the system development and marketing and sale of TPE infill materials used in artificial turf systems. With the specific knowledge on AT systems TST supports Celanese Softer in the development and sale of Durable, Health and Environment Safe infill materials with outstanding performance for all users.

In April 2015, TST and Softer informed the AT market on the EU Regulation 1272/2013 modifying Annex XVII of the REACH regulation (EC n 1907/2006), posing stricter limitations to the presence of 8 specific PAH substances. The concentration limits were set to 1 mg/kg for each PAH. The AT market was at that time informed that the Softer infill materials already fulfilled these new REACH requirements because they do not contain PAHs. *1

We consider our TPE Infill products to be articles as defined by the REACH regulation, as the shape, surface, and design determine the main function of the product to a greater degree than the chemical composition.

TST believes that the concentration limit for the 8 PAHs listed in REACH Annex XVII, No 50, should be lowered. This would better ensure the protection of sensitive populations, regardless of whether the substances are placed on the market as "mixture" or as "article".

In our opinion vulnerable and high risk groups including children should be especially protected and therefore conclude a limit value of 0,5 mg/kg should be used for the 8 PAHs. This value is already mandatory if the substances are provided as components in toys.

*1 http://www.tpeinfill.com/viewdoc.asp?co_id=157

Weigeringsgrond 10.2.e

Doc. 21.a.12

Fw: Finale programme workshop 24.11.2017

[redacted] to: [redacted]

12/06/2017 10:50 AM

statement Recybem

[redacted]

[redacted]

+31.[redacted]

[redacted]rivm.nl

RIVM, Centre for Safety of Substances and Products
Antonie van Leeuwenhoeklaan 9 | 3721 MA Bilthoven | The Netherlands
P.O. Box 1 | 3720 BA Bilthoven | www.rivm.nl/en
www.chemischestoffengoedgeregeld.nl

----- Forwarded by [redacted]RIVM/NL on 12/06/2017 10:50 AM -----

From:	bureau-reach
To:	[redacted]RIVM/NL@RIVM,
Date:	12/06/2017 08:03 AM
Subject:	Fw: Finale programme workshop 24.11.2017
Sent by:	[redacted]

----- Forwarded by [redacted]/RIVM/NL on 06-12-2017 08:02 -----

From:	[redacted] <[redacted]recybem.nl>
To:	"bureau-reach@rivm.nl" <bureau-reach@rivm.nl>,
Date:	05-12-2017 18:35
Subject:	Re: Finale programme workshop 24.11.2017

Geachte heer/mevrouw,

Tijdens de workshop ten aanzien van het restrictievoorstel voor granulaat gebruikt als infill hebben we het volgende statement gemaakt namens de NVR/RecyBEM. Deze stuur ik u hierbij toe ten bate van het verslag van de workshop

SBR infill of tyres is the best example of recycling of products in terms of contribution to the targets of the circular economy. Reusable as infill with a lifespan of 10-15 years. Reusable and recyclable in a valuable way after this 10-15 years. High levels of savings in terms of CO2. High level of cost savings in virgin materials and in terms of total ownership of artificial turf fields. And the highest level of technical sport characteristics.

All tyres available in the EU are produced within the legal framework of REACH, both related to safety in health and environment. The same goes for SBR infill as recycled material of used tyres. Both the tyre and recycling/processing industry care a lot about achieving the highest possible standards. Tyres are designed and made to help people drive and live safe, as is ELT recycled material.

Met vriendelijke groet,

[redacted]

Doc. 21.a.12

RecyBEM B.V.

BAND & MILIEU

RecyBEM B.V. / Vereniging Band en Milieu
Loire 150, 2491 AK Den Haag
Postbus 418, 2260 AK Leidschendam
Telefoon: (070) 444 06 32
KvK-nummer: 27264616 / 40413488
E-mail: bem@recybem.nl
Website: www.recybem.nl

Op 21 nov. 2017, om 19:20 heeft bureau-reach@rivm.nl het volgende geschreven:

Dear participant,

Attached you will find the final programme of the workshop, including a list of participants and the workshop location.
We are looking forward to a fruitful meeting based on the discussion document sent last Friday.
This document is also attached to this email, the document has not been changed.

Kind regards,

[redacted]

Bureau REACH (bureau-reach@rivm.nl)
Centre for Safety of Substances and Products (RIVM/VSP)
RIVM (http://www.rivm.nl)
P.O. Box 1, 3720 BA Bilthoven, The Netherlands

<Final programme workshop restriction rubber granules.pdf><discussion doc workshop Rest PAHs rubber infill_final.pdf>

Weigeringsgrond 10.2.e

Doc. 21.a

FYI REACH restriction dossier PAHs in granules and mulches published
bureau-reach to: bureau-reach 08/16/2018 09:01 AM
Sent by: [redacted]
Bcc: [redacted]

Dear all,

For your information:
As planned the restriction dossier has been submitted to ECHA on July 20th.
Today, ECHA has published the dossier on the website, see:
https://echa.europa.eu/-/lower-concentration-limit-proposed-for-pahs-found-in-granules-and-mulches

Kind regards,
[redacted]

Bureau REACH (bureau-reach@rivm.nl)
Centre for Safety of Substances and Products (RIVM/VSP)
RIVM (http://www.rivm.nl)
P.O. Box 1, 3720 BA Bilthoven, The Netherlands

----- Forwarded by [redacted] RIVM/NL on 08/15/2018 01:19 PM -----

From: bureau-reach
To: bureau-reach@RIVM,
Date: 03/23/2018 08:29 AM
Subject: Fw: Chairman summary and policy statements workshop 24.11.17
Sent by: [redacted]

Dear all,

With this email, I would like to inform you that the planned submission date of the restriction dossier is now scheduled for July, 20th.
The scope of the restriction is changed to: "Restricting placing on the market of plastic, rubber and other granules containing PAHs above a set concentration limit for use as infill material on synthetic turf pitches or for use as loose granules or mulch on playgrounds and sport applications."

Kind regards,
[redacted]

Bureau REACH (bureau-reach@rivm.nl)
Centre for Safety of Substances and Products (RIVM/VSP)
RIVM (http://www.rivm.nl)
P.O. Box 1, 3720 BA Bilthoven, The Netherlands

----- Forwarded by [redacted] RIVM/NL on 03/22/2018 12:02 PM -----

From: bureau-reach
To: bureau-reach@RIVM,
Date: 12/08/2017 03:04 PM
Subject: Chairman summary and policy statements workshop 24.11.17
Sent by: [redacted]

Dear all,

We very much appreciated your attendence and contributions to our workshop on infillmaterial. The discussions during the workshop and the information provided after the workshops by several participants will help us in drafting the restriction dossier. Attached you will find the Chairman summary, the presentations and the policy statements by several stakeholders.

Kind regards,
[redacted]

[attachment "PAHRest_WS_20171124_CMSUM_def.pdf" deleted by [redacted] RIVM/NL] [attachment "Policy Statement Sekisui Alveo.pdf" deleted by [redacted] RIVM/NL] [attachment "Policy statement RecyBEM.pdf" deleted by [redacted] RIVM/NL] [attachment "Policy statement ETRA.pdf" deleted by [redacted] RIVM/NL] [attachment "Policy statement ESTO.pdf" deleted by [redacted] RIVM/NL] [attachment "Policy statement ETRMA.pdf" deleted by [redacted] RIVM/NL] [attachment "Policy statement Celanese.pdf" deleted by [redacted] RIVM/NL] [attachment "Policy Statement TST.pdf" deleted by [redacted] RIVM/NL] [attachment "PAHRest_WS_20171124_Pres_Intro_def.pdf" deleted by [redacted] RIVM/NL] [attachment "PAHRest_WS_20171124_Pres_themes_def.pdf" deleted by [redacted] RIVM/NL]

Bureau REACH (bureau-reach@rivm.nl)
Centre for Safety of Substances and Products (RIVM/VSP)
RIVM (http://www.rivm.nl)
P.O. Box 1, 3720 BA Bilthoven, The Netherlands

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www.rivm.nl *De zorg voor morgen* begint vandaag

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Weigeringsgrond 10.2.e

Doc. 22.a.1

PAHs in granules REACH Annex XV dossier

Summary of action points of project meeting of RIVM ([redacted], [redacted], [redacted], [redacted], [redacted]), Ministry of Infrastructure and Water management [redacted], Ministry of Public Health, Welfare and Sports [redacted]), Ministry of Social Affairs ([redacted], absent with notice).

Date 08-02-2018, RIVM, room W030

The following has been discussed in the project meeting:

- RIVM proceeds with performing realistic worst case risk assessment for risk of PAHs for football players (including other sports), children playing on synthetic turf pitches using granules as infill material and workers installing and maintaining the fields. Due to the lack of granule specific data, there is a need to make assumptions based on studies with soil or other types of turf to assess the contact with rubber granules from sports and playing. In doing this, RIVM refers to sources such as the US-EPA exposure handbook and RIVM will seek with ECHA as far as possible a commonly understood and supported approach.
- RIVM has sufficient data to estimate the worst case situation, but does not have the information for further refinements or to create a probabilistic assessment. Therefore it will be important to provide the perspective of the assessment, where we will explain that we aim for a risk assessment in which at least an approximate of 95% of the entire (exposed) population is protected. This perspective will be considered when moving on to the impact assessment part of the restriction dossier. RIVM will reflect in the dossier on the population at risk in relation to the impact on all actors that may come into contact with granules and the proposal for a limit value.
- PAH exposure in the dossier will be placed in perspective of other human exposures to PAHs, either quantitatively as far as possible, or qualitatively.
- For the impact assessment RIVM will consider three scenarios:
  - Concentration as it is now, at the situation of a limit value of 100-1000 mg/kg per PAH. This is the business as usual scenario.
  - Concentration limit set at the limit value that is derived on the basis of realistic worst case risk assessment resulting in a 1×10^{-6} risk level. Based on the draft version of the risk assessment and the data of the PAH levels in the granules, this would be comparable to the 25 percentile of the distribution of PAH concentrations in recycled rubber granules that are currently found on the pitches and in production batches. This concentration limit would thus affect an estimated 75% of the recycled rubber granules on the market. This would effectively mean a non-use scenario for the use of recycled rubber granules.
  - Concentration limit set at a level where it corresponds with the xx percentile (e.g. 95%) of the current PAH concentrations in recycled rubber granules. Such a scenario would be expected to affect a relatively small proportion (e.g. 5%) of the granules made of recycled rubber that are currently found on pitches and in production batches. This will be the proposed scenario. Details and justification how to arrive at this scenario will be worked out by RIVM in the coming weeks.
- Possible use of rubber mulch (flakes) should be included in the scope of the restriction. This means a need to change the initial wording of the Registry of Intentions entry at the ECHA

website. Based on this extension of the scope and other factors listed below RIVM will request 3 additional months to work on the dossier. The other factors contributing to the need for a later submission date are, e.g.:

- Essential information from the Risk Assessment Committee needed for the PAH inhalation hazard assessment arrives 3 months later than foreseen initially
- The discussion on unexpected large variability in the methods of extraction and analysis causes additional work in the baseline section and uncertainty analysis
- RIVM capacity on socio-economic part of the dossier was increased compared to initial plans, which was necessary to take control in streamlining the content of the dossier and properly discuss RIVM ideas with ECHA

- RIVM will write a memo to the Ministries of Infrastructure and Water management to be issued by 22 February for a decision by end of February on delaying the submission date from April to July 2018. The memo will include a justification for the need for more time and a renewed planning.
- In addition, RIVM will issue a communication plan around submission of the dossier and beyond.

Project meeting: PAHs in granules REACH Annex XV dossier

Summary of action points of project meeting of RIVM ([redacted], [redacted], [redacted]), Ministry of Infrastructure and Water management ([redacted]), Ministry of Public Health, Welfare and Sports [redacted]), Ministry of Social Affairs ([redacted], absent with notice).

Date: 19-04-2018, RIVM, room G22.021

The following has been discussed in the project meeting:

- Progress made on the dossier so far: draft risk assessment, baseline, risk management options analysis, analysis of alternatives finished for current review. Impact assessment ongoing
- Impact assessment is made for both scenarios in the dossier. Choices still to be made on the presentation of the outcome of the impact assessment and risk assessment.
- Next project meeting is scheduled on May 24 13:00-15:00 pm at RIVM. RIVM will prepare a presentation on the final draft results of all sections that will be finished by then.

Project meeting: PAHs in granules REACH Annex XV dossier

Summary of action points of project meeting of RIVM [redacted], [redacted], [redacted]), Ministry of Infrastructure and Water management ([redacted]), Ministry of Public Health, Welfare and Sports [redacted]).

Date: 24-05-2018, RIVM, room W 3.31

The following has been discussed in the project meeting:

- Progress made on the dossier so far;
    - Annex A, B, C, D, E1 and E2 are reviewed and (almost) finalized and will be shared with the Ministries by June 1.
    - Work on Annex E3-E11, F, G and the summary reports is on-going.
    - Ministries will receive consolidated dossier for review by June 22.
- Impact assessment is made for both scenarios (RO1 and RO2) in the dossier; results of the assessment (costs and benefits) are shown and discussed. It is concluded that RO2 will be presented as proposed restriction option.

Aanvulling op Appendix B1 Restrictie dossier:

Table: overview of sources of PAH concentrations in rubber granules.

Source	**Number of samples**
Branche	15
Branche	4
Branche	8
Branche	4
Branche	1
Branche	1
Branche	5
Overheid	4
Branche	2
Branche	4
Overheid	91
Branche	100
Overheid	2
Branche	15
Branche	159
Branche	26
Branche	932
TOTAL	1373

Weigeringsgrond 10.2.e, tenzij anders is vermeld

Doc. 24

RE: PAHs rubber granules -data from ETRA

[redacted] to [redacted] 06/20/2018 04:09 PM

Cc: [redacted]

Dear [redacted],

Thanks for your email and for the final clarifications made by phone. It has been very useful.
We are always happy to provide explanations on our processes and how the dossier are developed.
Please feel free to make any additional questions or suggestions, in the coming months.

I can confirm that there will be no confusion among the different sources of the information.
When referring to an [redacted] 10.2.g it will be clear in the confidential annex, whom we are referring to.
Your data will not be associated by mistake to anyone else.
All sources are equally valuable to us and it is perfectly ok that different organisations provide different values, if based on their own specific data.

Thanks for your feedback. Having received your final ok, our RIVM colleagues will use the draft they had shared with you, in the dossier.

Kind Regards

[redacted]

From: [redacted] 10.2.g
Sent: 19 June 2018 17:54
To: [redacted]@echa.europa.eu>
Cc: [redacted] <[redacted]rivm.nl>; [redacted] <[redacted]rivm.nl>; [redacted]@echa.europa.eu>; [redacted]@echa.europa.eu>; [redacted]@yahoo.com>
Subject: Re: PAHs rubber granules - your feedback by Wednesday 20

Dear [redacted],

The formulation adopted is fine to us.

We wish however to make two suggestions:
a) If it is possible to use some kind of 'blind' means of identifying each of the associations that the document mention in this manner so you can trace it back if necessary
b) Considering the difference in the figures from the various sources, avoid the risk that some organisations or data could be 'mis-credited'.

Thanks for the cooperation.
Best regards.

[redacted]

Doc. 24

10. [redacted] @echa.europa.eu>
1 [redacted] 10.2.g
10: [redacted] < [redacted] rivm.nl>; [redacted] < [redacted] rivm.nl>; [redacted]
[redacted] @echa.europa. [redacted]
[redacted] @echa.europa.eu>
[redacted] 10.2.g [redacted] 2018 9:26
10.2.g PAHs rubber granules - your feedback by Wednesday 20

Dear [redacted]
The colleagues from RIVM have kindly provided this summary (attached) of the text where your data are used, respecting the confidentiality of your submission.
We (ECHA) think that it may be a good solution, in line with other dossiers where we had to deal with similar situations.
This would allow your data to be used in a valuable way, without mentioning your association.
As we discussed, instead of your name, there is now only: [redacted] 10.2.g [redacted]
This is quite generic now. Considering that we have been in touch with many associations for this dossier, we believe this is not suggesting any specific one.
We would appreciate your final feedback/suggestions by tomorrow, due to the strict deadlines of RIVM.
Thanks a lot for your cooperation.
Kind Regards

[redacted]

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European Chemicals Agency
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