PFAS

What are Perfluoroalkyl and Polyfluoroalkyl substances (PFAS)

What are PFAS substances?

- Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are a large family of fluorocarbon chemicals
- PFAS substances are used due to their technical properties which include:
 - Chemically inert and biocompatible, non-stick and slippery (low-friction), high temperature stability, electrically insulating, and flame retardant, etc...
- The tight carbon-fluorine bonds which provide the desirable physical properties also make them difficult to breakdown giving them the nickname '**forever chemicals**'
- Since their introduction in the 1940s they have been used widely. The abundance of their use combined with their slow breakdown means they are **ubiquitous in the environment** all over the world.





Where and why PFAS substances are used?

- Due to the functional properties of PFAS they are used in a wide variety of products, including in food wrappers, waterproof clothing, coated paper, pesticides & herbicides, non-stick cookware, cosmetic & sunscreens, medicine, and many others.
- In turf TenCate Grass use them in the extrusion process of our fibres. They help to **increase production speed, decrease waste and reduce energy consumption** (see images next page).
- There are thousands of different PFAS substances. At TenCate Grass we use ones made of long carbon chains (which do not dissolve in water). PFAS substances that are short chain (and soluble in water) are already heavily restricted (USA and EU) and known to cause negative health impacts.
- Long carbon chain PFAS substances are very stable and do not degrade easily this means they accumulate in the environment (similar to microplastics) and humans.

Item
Medication (tablets) e.g. Prozac
Scotchgard
Toothbrushes
Foundation (make-up)
Fast Food Wrappers
Food Packaging
TenCate Grass Slit Film
TenCate Grass Mono Filament

PPM
20,000 to 50,000
5,000
1,000 to 2000
2,000 to 6,000
350 to 800
300 to 800
< 250
< 100

Levels of PFAS in common products (PPM) and turf



The PFAS problem is not exclusive to turf with many different sectors working on alternatives including food packing and medication



What are Perfluoroalkyl and Polyfluoroalkyl substances (PFAS)

No Processing Aid

Processing Aid









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PFAS

Legislative Process & Communication Plan

Legislative Process

- The legislative process for a restriction has started in the EU with a final opinion due March 2024. In late 2023 a direction of outcome will become clear including the transition phase typically several years.
- In the USA the legislative process is more fragmented with state-by-state / regional bans and restrictions. However, a more wide ranging restriction consultation is anticipated.

Non Regulatory Drivers

- Public Opinion / NGO lobby
- Supplier discontinuation of PFAS production
- Investor / Insurer pressure
- Competitor early elimination of PFAS

The non-regulatory drivers will speed up the transition away from PFAS and require solutions before legislation is passed

Based on current production trials of alternative processing aids we are confident the elimination of PFAS from TenCate Grass operations is possible in the short-term (see detailed plan)

Communication Plan

- Short statement for key customers supported by facts, reinforce compliance with legislation in all regions in which we operate.
- Non-dissemination of plan or progress on the transition. Keep below the radar, no claims made publicly.
- Make the transition away from PFAS within our products without external communication.
- If competitor(s) starts to make early claims on elimination of PFAS have statements prepared as to our status "why so late we have been doing this for X period of time"
- Taskforce to include engagement with legislative process. This will be around the baseline impacts of PFAS – wording to include 'zero intentionally added' PFAS rather than 'zero' PFAS.
- Once the transition has started in late 2023 review communications at this time.

PFAS

TenCate Grass Strategy / Phase Out Plan

Aim: Phase out of intentionally added PFAS process aids by the end of 2023 and fully remove their use by end of 2024

< 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023	> 2024	
Background	Formation Task Force	Test Alternatives: Production	Validate Validate Alternatives: Quality, Supply and Commercial	Begin Phase Out	Removal of PFAS from all Product	
 PFAS raised as a concern. Initial testing on quantities in turf Investigation on alternative processing aid started Reactive communication and client engagement (USA focus) Increasing external drivers 	Establishment of internal task force Biweekly updates Accelerated alternative options under review Share expertise between 4 extrusion locations Successful long production runs in Dayton	Sourcing and testing of a wide range of alternatives Collective knowledge shared via task force Updated communication strategy Review of legislative impacts Initial cost impact analysis	Short-list of most viable alternatives Procurement establishes preferred suppliers with muti-source options Detailed cost impact for the transition (\$Δ/kg yarn) Production optimisation External verification / testing	Start to offer a wide range of systems without intentionally added PFAS Updated review impact on production / costs Ongoing review of supply chain / cost options Comprehensive assessment on turf quality impacts	Extend transition away from PFAS to remove from all product by end of 2024 (latest) Ongoing review of impacts Disbanding of task force and form into routine production process	