ZDHC



ZDHC's position on PFAS





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PART I

ZDHC’s position on PFAS

This section sets out, in clear language, ZDHC’s stance on PFAS, why it matters for our organisation and the industry, how we intend to close the gap between our ambition and what we think current science and testing can deliver. Part II, further down in this document, provides the detailed ZDHC technical guidance behind this position.

1.1

Our position on PFAS

ZDHC does not permit the intentional use of any PFAS anywhere in the textile, apparel, leather and footwear supply chain.

What this means in practice:

- Every chemical formulation containing intentionally added PFAS is non-conformant to the ZDHC Manufacturing Restricted Substances List (MRSL), with no exceptions for the formulation itself.
- This applies even where a specific end use is legally or contractually required to meet performance requirements that have historically relied on PFAS, such as military equipment, technical textiles, medical products, protective clothing, transport applications or workwear. These uses may fall outside the scope of ZDHC's MRSL, but the formulations used to achieve them still do not conform to the ZDHC MRSL.
- ZDHC uses the OECD (2021) definition of PFAS so brands, suppliers, chemical formulators, and certifiers assess the same substances the same way, wherever they operate.
- Traces of unintentional PFAS contamination are treated differently from intentional use. It is managed by aligning the list of PFAS for targeted analysis with AFIRM RSL testing requirements, since PFAS can enter the supply chain from sources a formulator does not control, such as legacy contamination, recycled feedstocks, or shared production equipment.
- Conformance is verified independently. ZDHC Certifiers review supporting documentation and, when the risk profile requires it, conduct laboratory testing before confirming a formulation as conformant.

No chemical management system, testing method, or regulation, including the ZDHC MRSL, can guarantee the absence of detectable trace PFAS from every possible source across a global supply chain today. That is a limitation of current analytical science, shared across the industry, not a gap specific to ZDHC.

We aim to close that gap as responsibly, transparently, and quickly as science and industry capabilities allow, through the ZDHC MRSL V4.0 and closer collaboration with chemical formulators, certifiers, and testing laboratories.

1.2

Why PFAS matter and its relation to ZDHC MRSL

Per- and polyfluoroalkyl substances, or PFAS, are a large and diverse group of fluorinated substances. They share a very strong carbon-fluorine bond, which makes them extremely resistant to degradation. That's why PFAS are widely known as “forever chemicals”: once released, some of them tend to stay in the environment for a long time, and some accumulate in humans, animals, and ecosystems.

This persistence, combined with growing evidence of potential health and environmental impacts for certain PFAS, makes the transition to safer chemistries an important part of ZDHC's mission. To provide a consistent and transparent basis for formulation assessment, the current ZDHC Manufacturing Restricted Substances List (MRSL) adopts the OECD (2021) definition of PFAS. Under this definition, **PFAS are defined as fluorinated substances containing at least one fully fluorinated methyl (–CF_3) or methylene (–CF_2–) carbon atom, subject to the specific exclusions identified by the OECD.**

The ZDHC MRSL gives the industry one clear, harmonised answer to which substances are restricted, rather than leaving brands, suppliers, chemical formulators and solution providers to reconcile a patchwork of regional rules on their own. This document explains how the harmonised approach applies specifically to PFAS and enables consistent interpretation across the ZDHC Roadmap to Zero Programme, while recognising that regulatory definitions may vary across jurisdictions.

1.3

Today’s status and future industry challenges

We believe an honest, confident conversation about PFAS serves our stakeholders better than an overly cautious one. We want to be direct about both what our current approach reliably achieves, and where genuine, industry-wide limitations remain.

What works today

Our combined approach of document review, formulator disclosure and independent, risk-based laboratory testing is designed to identify and eliminate the large majority of intentional PFAS use in supply chain formulations. For most formulation types, this approach gives brands, suppliers and formulators a clear, workable route to conformance.

Where challenges remain

A smaller number of cases remain genuinely difficult to resolve with today's tools. Distinguishing legacy contamination carried in recycled feedstocks from newly added PFAS, for example, or interpreting a trace fluorine result that sits at the outer limits of what current laboratory methods can reliably measure, are real technical challenges. They are shared by regulators, testing laboratories and every organisation working on PFAS, and not a shortcoming unique to the ZDHC MRSL.

We do not see these challenges as a reason to pause or soften our position. They are precisely why we are investing in ZDHC MRSL V4.0, and why we continue to work closely with formulators, certifiers and testing laboratories to close the remaining gap as quickly and transparently as the science allows.

1.4

How the industry should talk about PFAS conformance

Language matters, especially when a claim is difficult to fully verify. Claims such as “PFAS-free” imply the complete absence of every PFAS substance, which cannot realistically be demonstrated given how many PFAS exist and the limit of detections of current analytical techniques.

For that reason, ZDHC encourages the industry to use language that reflects verified, testable information rather than absolute claims. Terms such as ‘no intentionally added PFAS’ or ‘PFAS not detected’, used only where supported by analytical evidence and clearly linked to the test method and limit of detection applied, give stakeholders an accurate and defensible picture.

PART II

Technical guidance for ZDHC MRSL conformance

This section outlines the detailed technical basis for PFAS conformance under the ZDHC MRSL. It is intended for suppliers, chemical formulators, certifiers and technical stakeholders who need to apply the position described in Part I in practice.

2.1

Intentional use versus unintentional contamination

ZDHC POSITION

ZDHC distinguishes between intentional use and unintentional contamination, as these require fundamentally different management approaches. The intentional use of PFAS in a chemical formulation is not permitted under the ZDHC MRSL. However, PFAS are widely distributed in industrial environments due to decades of historical production and use. As a result, trace contamination may occur in processes, articles and raw materials despite the use of formulations conformant to the ZDHC MRSL for PFAS. Therefore, the control of PFAS risks is not limited to ZDHC MRSL conformant formulations but extends to responsible chemical management across the supply chain.

Potential sources of contamination include:

- **Raw materials**
- **Manufacturing equipment**
- **Processing aids**
- **Process water**
- **Packaging materials**
- **Recycled feedstocks**
- **Environmental background contamination**

To control unintentional contamination in formulations, the ZDHC MRSL V4.0 establishes the following limits:

- **Individual PFAS: below 25 µg/kg**
- **Sum of all PFAS: below 250 µg/kg**
- **Total Fluorine content: below 50 mg/kg**

ZDHC aligns with the AFIRM list of PFAS for target PFAS testing.

ZDHC PRACTICAL INTERPRETATION

The presence of trace PFAS in a formulation does not automatically indicate intentional use. Appropriate technical investigation is necessary to determine the likely source before conclusions regarding conformance are reached.

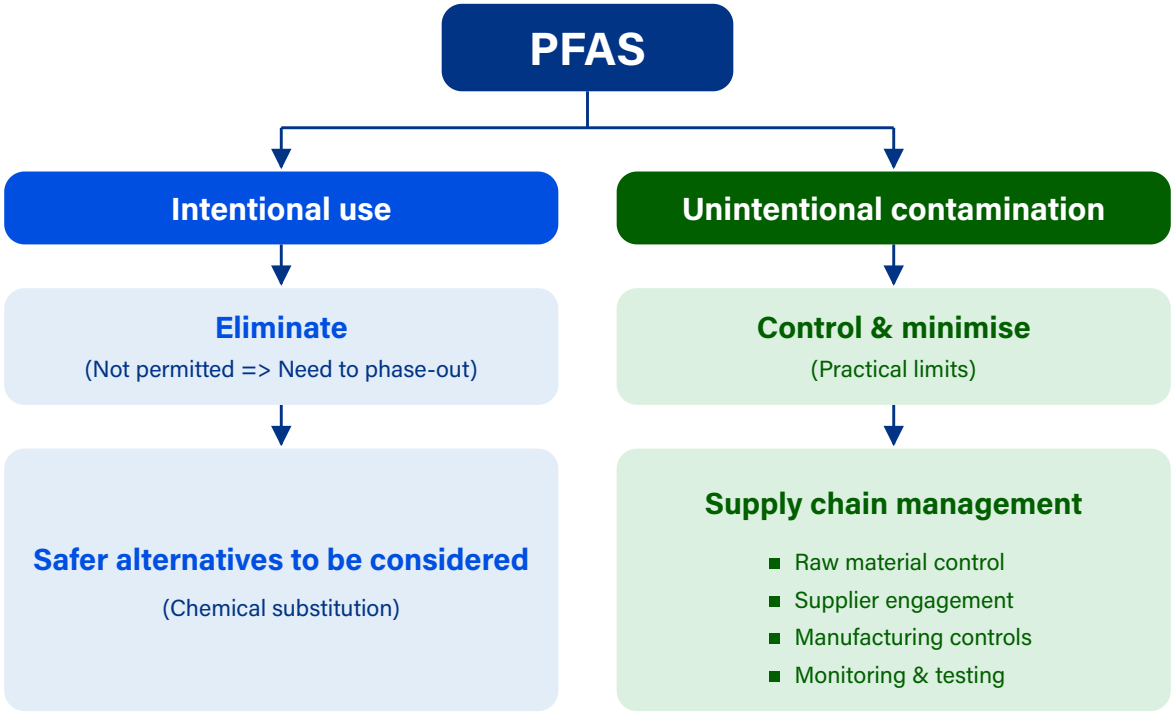


Fig 1 Practical implementation of PFAS control

2.2

PFAS and ZDHC MRSL V4.0 conformance

ZDHC POSITION

ZDHC MRSL V4.0 conformance for PFAS is designed as a risk-based methodology that integrates document review, formulation information and analytical testing. This reflects both the intentional ban and the unintentional contaminations of PFAS in formulations. The risk-based approach allows recognition of the legitimate use of Fluorine-based chemistry that is not classified as PFAS under the OECD definition.

ZDHC PRACTICAL INTERPRETATION

PFAS conformance under the ZDHC MRSL is assessed through the following steps:

- The Certifier conducts a comprehensive review of product documentation and application information to assess the risk that a formulation may fall under the OECD PFAS definition.
- Based on this review, the Certifier classifies the formulation as “high risk” or “low risk”, according to the transparency and quality of the supporting documentary evidence. The final classification decision rests with the Certifier.

High-risk formulations

A formulation is classified as high risk when sufficient information from the formulator (in the safety data sheet, other supply chain documentation, or ancillary documents) is not available to determine whether the product contains components that may fall under the OECD definition. In these cases, all sources of fluorine, PFAS and non-PFAS alike should be identified and disclosed.

This classification typically applies, but is not limited to:

Water, stain and oil repellents

Soil release agents

Soil repellents

Coating and laminating agents

Dyes and pigments classified as PFAS under the OECD definition

Low-risk formulations

A formulation is classified as low risk when it is a non-repellent type without full supporting documentation, for which deliberate PFAS use is generally not expected, although certain applications have been reported, for example for:

- **Lubricants**
- **Defoaming agents for solvent applications**
- **Synthetic printing thickeners**
- **Polymeric softeners**
- **Handle modifiers**

Testing and conformance outcomes

High-risk formulations are tested for both Total Fluorine and Targeted PFAS. Based on the results:

- ZDHC MRSL non-conformant, if Total F is above 50 ppm and Target PFAS exceeds ZDHC MRSL limits.
- ZDHC MRSL non-conformant, if Total F is below 50 ppm but Target PFAS exceeds ZDHC MRSL limits.
- ZDHC MRSL conformant, if Total F is below 50 ppm and Target PFAS is within ZDHC MRSL limits.
- Where Total F exceeds 50 ppm, but Target PFAS is within ZDHC MRSL limits, the Certifier initiates further investigation to confirm the source of fluorine and its conformance to the OECD definition before certifying the formulation as conformant.

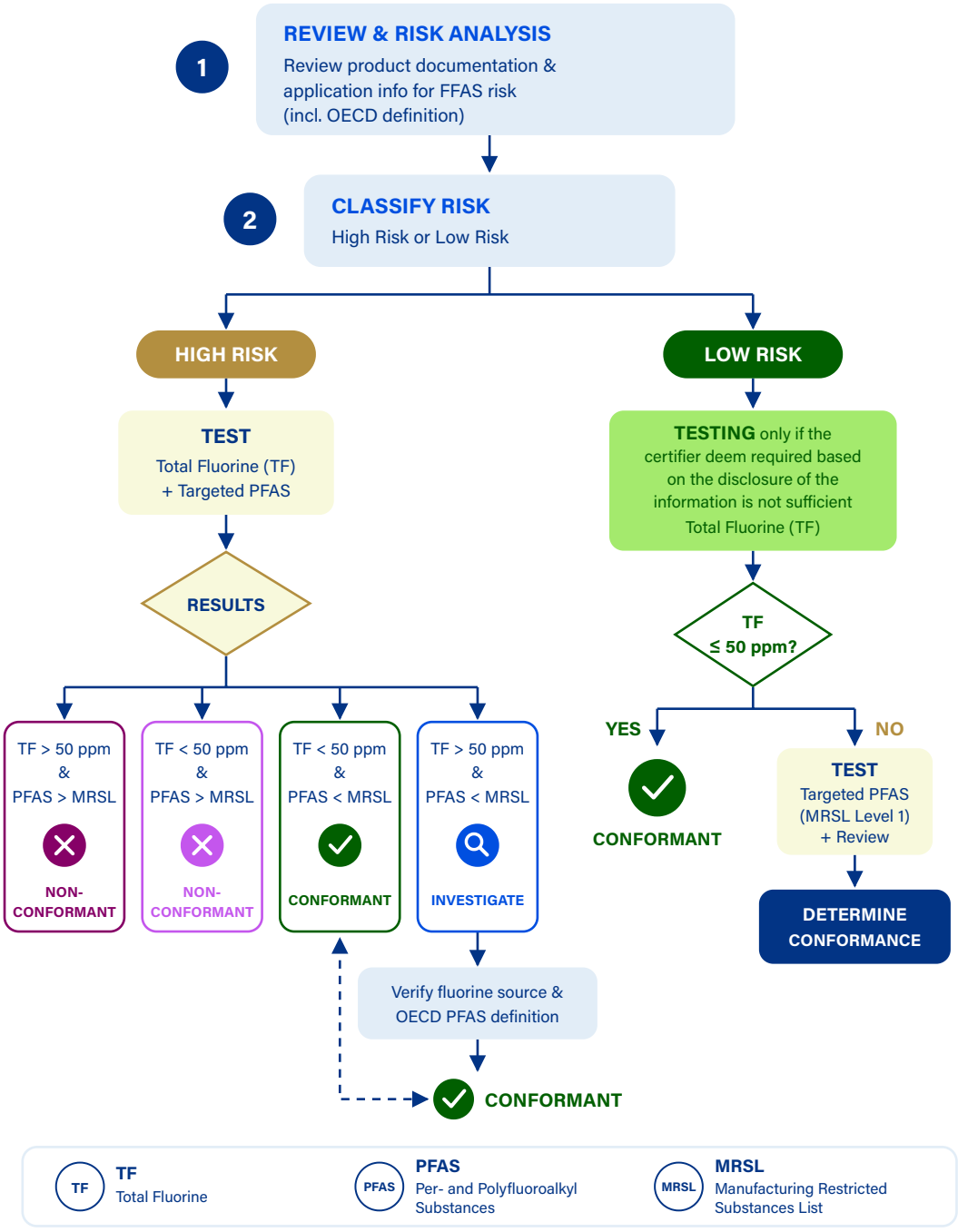
Low-risk formulations are tested for Total Fluorine. Based on the results:

- **Conformant** if Total F is below 50 ppm.

If Total F exceeds 50 ppm, a Targeted PFAS Analysis is conducted at ZDHC MRSL Level 1 to confirm conformance, alongside a document review and an investigation with the formulator.

Total Fluorine testing combined with Targeted PFAS testing is mandatory for ZDHC MRSL Level 1 conformance. The same testing principles also apply to evaluating formulations at ZDHC MRSL Levels 2 and 3.

ZDHC MRSL – PFAS RISK-BASED CONFORMANCE ASSESSMENT FLOW



2.3

Special Cases and Emerging Questions

The questions below come up often in practice. Each is addressed using the same OECD-based logic set out above.

2.3.1

PTFE is it conformant or not?

ZDHC POSITION

PTFE meets the OECD (2021) definition of PFAS and is therefore considered a PFAS within the current ZDHC MRSL.

ZDHC PRACTICAL INTERPRETATION

Polytetrafluoroethylene (PTFE) is a fluoropolymer containing fully fluorinated carbon atoms and therefore falls within the OECD (2021) PFAS definition adopted by the ZDHC MRSL.

Accordingly, formulations containing intentionally added PTFE do not conform to the ZDHC MRSL.

PTFE should be evaluated in the same manner as any other intentionally added PFAS during formulation assessment.

2.3.2

Fluorinated dyes

ZDHC POSITION

Certain fluorinated reactive dyes contain fluorine within their reactive group. During dye fixation, this fluorine is displaced as part of the intended chemical reaction. The presence of fluorine within a chemical structure does not necessarily indicate that the substance is a PFAS.

ZDHC PRACTICAL INTERPRETATION

Such substances do not meet the OECD (2021) PFAS definition and therefore should not be automatically interpreted as PFAS. However, formulators are expected to provide detailed structural information (under an NDA, if required) to the certifier as a source of Fluorine in case the certifier detects Total Fluorine exceeding 50 ppm or the risk analysis suggests the use of fluorine chemistries in the formulations. Chemical structure and the OECD definition should always be considered before classifying fluorinated substances as PFAS.

2.3.3

Recycled Materials and Recovered Chemical Ingredients

ZDHC POSITION

Recycled materials and recovered chemical ingredients may introduce legacy PFAS contamination even when no intentional PFAS have been added during current manufacturing. As circular material and chemical streams continue to develop, PFAS may potentially be reintroduced into the supply chain through two distinct routes.

Recycled materials: Recycled feedstocks, including recycled textiles, leather, and other materials, may retain PFAS originating from substances used in previous manufacturing processes or product life cycles. These legacy PFAS may therefore be carried into the new material through the recycling process.

Recovered or recycled chemical ingredients: Chemical substances or ingredients recovered from materials or other secondary streams may also contain PFAS originating from their previous use or from the source material. Where such recovered ingredients are subsequently used in chemical formulations, PFAS may potentially be introduced into the formulation and, through its application, into newly manufactured materials.

ZDHC PRACTICAL INTERPRETATION

In both cases, the presence of PFAS does not necessarily indicate intentional use in the current manufacturing process. Rather, it highlights a potential consequence of circular material and chemical flows that requires appropriate consideration. ZDHC does not discourage material recycling or the recovery and reuse of chemical ingredients. On the contrary, these practices are important to advancing circularity. However, increasing circularity also requires robust evaluation and chemical management systems capable of identifying and managing the potential reintroduction of legacy PFAS through secondary material and chemical streams.

The use of recycled materials and recovered or recycled chemical ingredients should be supported by appropriate risk assessment, traceability and supplier engagement. The objective is to enable circularity while minimising the risk that legacy PFAS are unintentionally carried into new products or formulations.

ZDHC



PFAS and the ZDHC MRSL

ZDHC's position and practical interpretations

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