



**New for 2023!**

**Full PFAS Restriction**  
See pages 32 and 39 for important updates regarding this class of chemicals.

Apparel and Footwear International RSL Management Group



# RESTRICTED SUBSTANCES LIST

Version 08 | 2023



# Table of Contents

- AFIRM Mission & Vision .....3
- Legal Statement .....3
- Policy Statement .....3
  
- Scope of the AFIRM RSL .....4
  
- Uses of the AFIRM RSL.....6
- Links and References.....6
  
- Additional Substances and Parameters to Consider.....7
  
- AFIRM Chemical Information Sheets .....8
- Definition of “Ages” .....8
- Definition of “Child Care Article” .....8
- Definition of “Limit” .....8
  
- Definition of Reporting Limits.....9
- Definition of Material Types.....9
  
- Change Log for the 2023 AFIRM RSL ..... 11
  
- AFIRM RSL Testing Matrix ..... 13
  
- AFIRM Restricted Substances List ..... 16
  
- Appendix A. South Korea KC Mark Soluble Heavy Metal Requirements .....38
- Appendix B. Per- and Polyfluoroalkyl Substances (PFAS).....39
- Appendix C. Pesticides and Herbicides, Agricultural .....40

Apparel and Footwear International RSL Management (AFIRM) Group is the author of this work.

You may reuse or adapt this work, with or without attribution to AFIRM Group.



For more information about AFIRM, visit [www.afirm-group.com](http://www.afirm-group.com).



## AFIRM Mission & Vision

### Mission

**AFIRM Group (Apparel and Footwear International RSL Management Working Group, established in 2004) is on a mission to reduce the use and impact of harmful substances in the apparel and footwear supply chains.**

Our purpose is to provide a forum to advance the global management of restricted substances in apparel and footwear, communicate information about chemicals management to the supply chain, discuss concerns, and exchange ideas for improving chemicals management.

### Vision

**AFIRM is recognized as a global center of excellence, providing resources to enable continuous advancement of chemicals management best practices.**

We do this based on transparency, science, and collaboration with relevant industries and experts to build safer and more sustainable chemistry within the apparel and footwear supply chains.

As we implement this vision, AFIRM's mission, objectives, and projects will remain product-focused or RSL-related.

## Legal Statement

**The AFIRM RSL constitutes information from AFIRM only and does not represent any individual AFIRM member. Individual brand RSLs may differ in specific parameters.**

The AFIRM RSL is not intended to and does not establish any industry standard of care. The AFIRM RSL may not always provide the most appropriate approach for any individual company's chemical management program. Many brands have implementation guidelines, and suppliers must follow those guidelines where required.

The AFIRM RSL does not constitute legal advice and is not a substitute for legal advice. There is no warranty, express or implied, as to the completeness or utility of the information contained in this AFIRM RSL, including, without limitation, that the information is current and error-free. AFIRM disclaims liability of any kind whatsoever resulting from any use of or reliance on the AFIRM RSL.

## Policy Statement

**AFIRM has created the following Restricted Substances List ("AFIRM RSL") to assist supply chain participants seeking to increase product quality and safety, or to reduce their environmental impact by limiting the use of certain substances in apparel and footwear.**

AFIRM acknowledges that a brand's offerings may include closely related products utilizing the same or similar materials, such as accessories, jewelry, sporting good equipment, wearables, and home textiles. The AFIRM RSL may be applied to these additional product types, and examples are included in the scope of this document for guidance; however, the primary focus of the AFIRM RSL remains apparel and footwear. AFIRM recommends that suppliers check with their brand customers for specific requirements regarding additional product categories.

## Scope of the AFIRM RSL

Per the Policy Statement on the previous page, the primary focus of the AFIRM Group and the AFIRM RSL is apparel and footwear.

However, the AFIRM RSL may also be applied to accessories, jewelry, sporting good equipment, wearables, and home textiles.

- **Apparel.** Any garment worn on the body intended to protect, cover, or adorn.
- **Footwear.** Any durable covering for the feet intended to protect, cover, or comfort.
- **Accessories.** Any product intended to complement apparel, both carried and worn.
- **Jewelry.** Small decorative items worn for personal adornment such as rings, necklaces, earrings, pendants, bracelets and cufflinks. Jewelry may be attached to the body or clothing.

- **Sporting Good Equipment.** Any product intended for use in sport or exercise, including protective equipment.
- **Wearables.** Battery-powered electronic devices intended to be worn on the body during normal use. The AFIRM RSL covers components used on the external portion (i.e. skin contact) of the wearable product. Please note that certain wearable products, such as fitness trackers worn on the wrist, could also be classified as jewelry. AFIRM recommends that suppliers check with their brand customers regarding specific testing requirements for wearable components.

- **Home Textiles.** Any product intended for functional or decorative purposes in the home.

For guidance purposes, AFIRM provides examples of products to which the AFIRM RSL may be applied, including but not limited to those listed in Table 1.

**Table 1. Examples of Products within the Scope of the AFIRM RSL**

Apparel	Footwear	Accessories	Equipment	Wearables	Home Textiles
<ul style="list-style-type: none"> <li>• Shirts</li> <li>• Pants/trousers</li> <li>• Shorts</li> <li>• Skirts</li> <li>• Dresses</li> <li>• Swimwear</li> <li>• Socks</li> <li>• Jackets</li> <li>• Vests</li> <li>• Sweatshirts and hoodies</li> <li>• Sweaters</li> <li>• Underwear</li> <li>• Sleepwear and loungewear</li> </ul>	<ul style="list-style-type: none"> <li>• Lifestyle</li> <li>• Athletic (e.g. running, training)</li> <li>• Sports (e.g. basketball, soccer, football, baseball)</li> <li>• Sandals</li> <li>• Flip flops</li> <li>• Boots</li> <li>• Slippers</li> </ul>	<ul style="list-style-type: none"> <li>• Hats</li> <li>• Headbands</li> <li>• Scarves</li> <li>• Handbags</li> <li>• Backpacks</li> <li>• Sunglasses</li> <li>• Shoelaces</li> <li>• Belts</li> <li>• Hair clips</li> <li>• Gloves (e.g. winter)</li> <li>• Jewelry</li> </ul>	<ul style="list-style-type: none"> <li>• Shin and leg guards</li> <li>• Gloves (e.g. baseball, football, golf)</li> <li>• Chest protectors</li> <li>• Balls (e.g. basketball, football, soccer)</li> <li>• Helmets</li> <li>• Shoulder, knee, and elbow pads</li> <li>• Yoga mats and blocks</li> <li>• Rackets (e.g. tennis, racquetball, badminton)</li> <li>• Fitness equipment (e.g. treadmills)</li> <li>• Bicycles</li> </ul>	<ul style="list-style-type: none"> <li>• Fitness trackers (worn on wrist, chest, finger, ear, etc.)</li> <li>• Heart-rate monitors</li> <li>• Digital watches</li> <li>• Smart watches</li> <li>• Smart apparel and footwear</li> <li>• Wireless headphones and earbuds</li> </ul>	<ul style="list-style-type: none"> <li>• Towels</li> <li>• Bathrobes</li> <li>• Bed linens (e.g. sheets, pillowcases, duvets)</li> <li>• Blankets</li> </ul>

## Additional Product-specific Regulatory Requirements

Please note that the following items have additional product-specific regulatory requirements that fall outside the scope of the AFIRM RSL.

Suppliers must take additional steps to ensure products produced in their facilities comply with all such requirements—which include safety, flammability, and more.

- **Toys.** These products have regulatory and specific chemical requirements.
- **Sunglasses and Children's Jewelry.** These types of accessories have non-chemical safety requirements.

- **Protective Equipment.** These products have non-chemical safety and performance standards (e.g. NOCSAE).
- **Food-contact Materials.** These products have regulatory and specific chemical requirements.
- **Electrical and Electronic Components.** Components of products that do not come into contact with the skin are subject to other regulatory requirements (e.g. RoHS, EU Battery Directive).

Because AFIRM member brands may differ on the types of products classified under each of these categories, suppliers are advised to check with their customers regarding brand-specific definitions, requirements, and product applicability.

## Uses of the AFIRM RSL

AFIRM member brands may differ on individual parameters; suppliers are advised to check with the customer regarding brand-specific requirements.

The AFIRM RSL leverages AFIRM's mission — to reduce the use and impact of harmful substances in the apparel and footwear supply chain — by providing a single set of information for maximum and in-depth implementation within the supply chain.

Some examples of uses for the AFIRM RSL, depending on the objectives of the user, include:

- Providing a tool for vendors to establish chemical management knowledge and processes.
- Building full or base compliance with AFIRM member chemical restrictions.

- Providing a common base for testing, which may be accepted by multiple AFIRM brands. AFIRM member companies determine and communicate to their vendors their testing requirements and acceptance of test reports.

## Links and References

Be proactive! These links provide additional important information regarding chemical management and should be visited on a regular basis.

### AFIRM Packaging Restricted Substances List

[www.afirm-group.com/packaging-restricted-substance-list](http://www.afirm-group.com/packaging-restricted-substance-list)

- English, Chinese, Vietnamese, Japanese, Indonesian, and Spanish versions

### AFIRM Chemistry Toolkit

[www.afirm-group.com/toolkit](http://www.afirm-group.com/toolkit)

- English, Chinese, Vietnamese, Japanese, Indonesian, and Spanish versions

### AFIRM Explainer Videos

<https://afirm-group.com/start-here/>

- English available, with translations forthcoming

### AFIRM Chemical Information Sheets

[www.afirm-group.com/chemical-information-sheets](http://www.afirm-group.com/chemical-information-sheets)

- English, Chinese, Vietnamese, Japanese, Indonesian, and Spanish versions

### Overview of legal chemical limits and country of origin

[https://www.aafaglobal.org/AAFA/Solutions\\_Pages/Restricted\\_Substance\\_List](https://www.aafaglobal.org/AAFA/Solutions_Pages/Restricted_Substance_List)

### Regulated fluorinated greenhouse gases; Regulation (EU) No 517/2014

[https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L\\_.2014.150.01.0195.01.ENG&toc=OJ:L:2014:150:FULL](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.150.01.0195.01.ENG&toc=OJ:L:2014:150:FULL)

### Regulated substances that deplete the ozone layer; EC 1005/2009

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:286:0001:0030:EN:PDF>

### Zero Discharge of Hazardous Chemicals (ZDHC) Foundation — Manufacturing Restricted Substances List (MRSL)

<https://mrsl.roadmaptozero.com/>

## Additional Substances and Parameters to Consider

### EU REACH Substances of Very High Concern

Based on scientific evidence indicating potential hazards to human health or the environment, the European Commission (EC) and European Union (EU) member states propose substances of very high concern (SVHCs) for placement on the European Chemicals Agency (ECHA) “Candidate List of Substances of Very High Concern for Authorisation.”

Placing a substance on the Candidate List triggers specific obligations for importers, producers, and suppliers of any article that contains one or more of these substances above 0.1 percent by weight per component. The obligations include providing sufficient information to allow safe use of the article to brand and retail customers or, upon request, to a consumer within 45 days of receipt of the request.

In addition, ECHA must be notified if the substance(s) are present in article components above 0.1 percent in quantities totaling over one ton per producer or importer per year. Notification is not required if the substance has already been registered for that use or when the producer or importer of an article can exclude exposure of humans and the environment during the use and disposal of the article. In such cases, the producer or importer must supply appropriate instructions to the recipient of the article.

ECHA periodically updates the Candidate List; find the most current version at <https://www.echa.europa.eu/candidate-list-table>.

AFIRM member brands may differ on how they address SVHCs as well as the legal obligations. AFIRM advises suppliers to consult with their customers regarding brand-specific requirements for SVHCs.

### California Proposition 65 Substances

Each year, California publishes a list of chemicals known to the state to cause cancer or reproductive toxicity.

Businesses that expose individuals to one or more of these chemicals must provide a clear and reasonable warning before the exposure occurs. For consumer products, this is typically through warning labels on the products or retail signage. Note that this warning is not the same as a regulatory requirement indicating that the product is “unsafe” if a specific concentration is exceeded. Enforcement is carried out through civil lawsuits brought by the California attorney general, district attorneys, or private parties acting in the public interest.

Additional information can be found at <https://oehha.ca.gov/proposition-65>.

AFIRM member brands may differ on how they address warning-label requirements. AFIRM advises suppliers to consult with their customers regarding brand-specific requirements for Proposition 65 substances.

### Specific In-country Testing and Certification Requirements

Some countries—such as Korea, Russia, and Saudi Arabia—have specific requirements for certain products.

This includes requiring that testing be performed at an approved laboratory in-country, special certification marks, and even unique testing not required by any other country. The AFIRM RSL covers these substance limit requirements, but test methods may vary, and AFIRM member brands may differ on how they address these legal obligations. AFIRM advises suppliers to consult with their customers regarding brand-specific requirements for countries which may have specific testing and/or certification requirements.

### Biocides, Nanoparticles, Sensitizers, Endocrine Disruptors, Etc.

Some brands may have specific requirements regarding the use of substances of concern such as biocides, nanoparticles, sensitizers, and endocrine disruptors.

AFIRM recommends checking with your customers regarding individual policies or requirements.

# AFIRM Chemical Information Sheets

AFIRM member brands have produced a comprehensive set of educational materials advising suppliers about best practices for chemicals management.

Each chemical information sheet covers a chemical or class of chemicals, giving an overview of the substance(s), where they are likely to be found in the material manufacturing process, and how to maintain compliance with the AFIRM RSL.

The sheets contain some information relevant to packaging, and future revisions will include more specific information.

The complete library of chemical information sheets is available on the AFIRM website at <http://afirm-group.com/information-sheets>; additionally, links to individual information sheets are embedded in the pages that follow.

The download icon next to a chemical or class of chemicals in the AFIRM RSL indicates that an information sheet is available.



Click on the icon or chemical name, and your web browser will open and download a PDF of the information sheet for that substance.



Chemical Information Sheet  
Version 2.0 | March 2021

FORMALDEHYDE

<b>Other Names</b>	Formalin, Methanol, Oxyethylene, Methylaldehyde, Chormethane, Methyl aldehyde, Methylene glycol, Methylene oxide, Formal, Carbonyl hydride	<p><b>Formaldehyde is a chemical with widespread use, occurring naturally at low levels in foods and used in a variety of synthetic preparations. At room temperature, formaldehyde is a colorless, flammable gas that has a distinct, pungent smell. Small amounts of formaldehyde are naturally produced by plants, animals, and humans.<sup>1</sup></b></p> <p><b>Uses in the Supply Chain</b></p> <p>Formaldehyde may be used in the production of fertilizer, paper, plywood, and urea-formaldehyde resins. It is also used as a preservative in some foods and in many home-held products, such as antiseptics, medicines, and cosmetics.<sup>1</sup></p> <p>Formaldehyde can be used as one of the starting materials in auxiliaries imparting textile performance features such as wrinkle free, dimensional stability, and stain resistant characteristics to cotton and cotton blend fabrics. Formaldehyde can be found in resins, binders, and fixing agents for dyes and pigments (especially those with fluorescent effects). It can also be used as a catalyst in certain printing, adhesive and heat transfer processes.</p>
<b>CAS Number</b>	<b>Substance</b>	
<b>30-00-0</b>	Formaldehyde	

**Why Formaldehyde is Restricted**

- Legislation in major markets around the world restricts the presence of formaldehyde in finished products.
- Formaldehyde is classified as a probable human carcinogen and is an irritant which can affect the eyes, nose, and throat. In high concentrations formaldehyde can cause severe pain, gastrointestinal effects, vomiting, coma or death.

**Sourcing Compliant Materials from Your Suppliers**

- Contact your suppliers and explain that you require materials to be compliant with the current AFIRM RSL limits.<sup>2</sup>
- Materials should have no intentionally added formaldehyde, in the processing or as residues for the following:
  - Heat transfer
  - Prints (such as flock and discharge)
  - Adhesives or glue
  - Finishing agents
- Require suppliers to submit a confirmation of material compliance or a test report from a third-party laboratory.
- When materials are received, consider performing risk-based testing to ensure the current AFIRM RSL limits are met.<sup>2</sup>
- Check the Safety Data Sheets (SDS) of adhesives and glues to ensure formaldehyde is not listed as an ingredient.

1

## Definitions of Ages

Various countries define the terms “babies,” “children,” and “adults” differently.

Based on legislation, the age ranges listed in Table 2 satisfy the most restrictive global requirements.

**Table 2. Definition of Ages**

	Age Range
Babies	0 to 36 months
Children	36 months to 14 years
Adults	14 years and older

## Definition of “Child Care Article”

Various countries define the term “child care article” differently.

The most restrictive definition (based on global chemical legislation) includes articles designed or intended by the manufacturer to facilitate sleeping, relaxation, hygiene, feeding, sucking, or teething for children three years of age or younger.

## Definition of “Limit”

Some restrictions require that substance limits not be exceeded while others require that substance concentrations be below designated limits.

For example, chromium VI must be below 3 ppm to be compliant with EU law. Test results should always be below designated limits to ensure compliance with all market requirements.

## Definition of “Reporting Limits”

Values above which labs should report substances detected for purposes of data capture and harmonization.

By reporting these values, instead of a simple PASS/FAIL, the supply chain can capture information regarding the presence of substances below the RSL limit. The reporting limits also allow data to be

harmonized between various testing labs. Reporting limits are values at or above the method Practical Quantification Limit (PQL). The PQL represents the lowest level at which accurate, precise, and

robust data can be reported. AFIRM RSL reporting limits are widely achievable by laboratories across the global analytical testing industry and allow for combined (composite) testing where applicable.

## Definitions of Material Types

For the purpose of this RSL, AFIRM offers these definitions of material types and provides examples of materials in Table 3, on the next page.

**Natural fibers.** Animal or vegetable fibers (including semi-synthetics).

**Blended fibers.** Woven or knitted materials created by blending two or more fiber types. For the purpose of this RSL, a blended fiber consists of a natural and a synthetic fiber.

**Synthetic fibers.** Human-made fibers based on synthetic chemicals (often from petroleum sources) such as polymers and extruded fibers.

**Synthetic coated fabrics.** Leather-like materials composed of a textile backing and, typically, a PU or PVC coating. May be referred to as artificial, imitation, vegan, or synthetic leather, or pleather.

**Natural leather.** Created by tanning animal rawhides.

**Coating.** A fluid, semi-fluid, or other material, with or without a suspension of finely divided coloring matter, which changes to a solid film when a thin layer is applied to a metal, wood, stone, paper, leather, cloth, plastic, or other surface.

Coatings do not include printing inks or those materials which actually become a part of the substrate, such as the pigment in a plastic article or those materials which are actually bonded to the substrate, such as by electroplating or ceramic

glazing. See “synthetic coated fabrics” for leather-like materials where the coating becomes part of the substrate.

**Printing.** The process of applying color to a fabric in definite patterns or designs.

**Natural materials.** Material derived from animals or plants that have undergone very little modification. Includes horn, bone, cork, wood, paper, and straw. Excludes natural fibers, natural leather, feathers, down, and metals.

**Crystal.** In this variety of glass, also known as lead glass, lead replaces calcium content of a typical potash glass. The addition of lead oxide gives crystal a much higher index of refraction than normal glass, and consequently much greater sparkle. Crystal typically contains at least 24% lead and is therefore exempt from many regulatory requirements for jewelry. In the European Union, labeling of crystal products is regulated by Council Directive 69/493/EEC, which defines four categories based on the chemical composition and properties of the material.

**Polymers and plastics.** Plastics are composed of various polymers (typically from petroleum sources) usually mixed with additives including colorants, plasticizers, stabilizers, and fillers. These additives affect the chemical composition, chemical properties, and mechanical properties of the plastic.

**Natural rubber.** Elastic material made from latex sap or trees that can be vulcanized.

**Synthetic rubber.** Material made from petroleum-based monomers with properties similar to natural rubber.

**Foam.** Spongy material made by trapping air bubbles in a solid. These can be open cell or closed cell.

**Metals.** Chemical elements that can be lustrous, ductile, malleable, and good conductors of heat and electricity. Includes metals deposited by physical vapor deposition (PVD), chemical vapor deposition (CVD), or electroplating.

**Feathers and down.** Includes the smaller down feathers as well as the larger contour and flight feathers. See the International Down and Feather Bureau for specific down and feather definitions.

**Glue.** A substance capable of holding materials together by surface attachment.

**Table 3. Examples of Materials within the Scope of the AFIRM RSL**

**NOTE:** This list provides examples of materials within each category but is not exhaustive.

Natural Fibers <small>Including semi-synthetics</small>	Blended Fibers	Synthetic Fibers	Synthetic Coated Fabrics	Natural Leather & Fur Skin	Coatings & Prints	Natural Materials	Other Materials	Polymers, Plastics, Foams, Natural Rubber & Synthetic Rubber	Metal	Feathers & Down	Glue
<ul style="list-style-type: none"> <li>• Cotton</li> <li>• Wool</li> <li>• Silk</li> <li>• Hemp</li> <li>• Cashmere</li> <li>• Linen</li> <li>• Fur hair</li> <li>• Rayon (semi-synthetic)</li> <li>• Lyocell (semi-synthetic)</li> </ul>	<ul style="list-style-type: none"> <li>• Cotton-Polyester</li> <li>• Wool-Nylon</li> <li>• Ramie-Polyester</li> </ul>	<ul style="list-style-type: none"> <li>• Polyester</li> <li>• Acrylic</li> <li>• Nylon</li> <li>• Polyamide</li> </ul>	<p>Textiles with:</p> <ul style="list-style-type: none"> <li>• Polyurethane (PU) coating</li> <li>• Polyvinyl Chloride (PVC) coating</li> <li>• Other Polymeric coatings</li> </ul>	<ul style="list-style-type: none"> <li>• Leather</li> <li>• Fur skin</li> <li>• Bonded/ recycled leather</li> </ul>	<p>Printing techniques such as:</p> <ul style="list-style-type: none"> <li>• Heat transfers</li> <li>• Dye sublimation printing</li> <li>• Screen printing</li> <li>• Direct-to-garment printing</li> <li>• Discharge printing</li> <li>• Plastisol transfers</li> </ul> <p>Coatings such as:</p> <ul style="list-style-type: none"> <li>• Polyvinyl chloride (PVC)</li> <li>• Polyurethane (PU)</li> <li>• UV-cured</li> </ul>	<ul style="list-style-type: none"> <li>• Horn</li> <li>• Bone</li> <li>• Cork</li> <li>• Wood</li> <li>• Paper</li> <li>• Straw</li> <li>• Stone</li> <li>• Shell (e.g. coconut or mother of pearl)</li> </ul>	<ul style="list-style-type: none"> <li>• Glass</li> <li>• Synthetic stone</li> <li>• Porcelain</li> <li>• Ceramic</li> <li>• Crystal</li> </ul>	<ul style="list-style-type: none"> <li>• Ethylene vinyl acetate (EVA)</li> <li>• Polystyrene (PS)</li> <li>• Polyethylene (PE)</li> <li>• Acrylonitrile butadiene styrene (ABS)</li> <li>• Neoprene</li> <li>• Polypropylene (PP)</li> <li>• Polycarbonate (PC)</li> <li>• Polyamide (PA)</li> <li>• Polyurethane (PU)</li> <li>• Polyvinyl chloride (PVC)</li> <li>• Thermoplastic polyurethane (TPU)</li> <li>• Thermoplastic elastomer (TPE)</li> <li>• Styrene ethylene butylene styrene (SEBS)</li> </ul>	<ul style="list-style-type: none"> <li>• Stainless steel</li> <li>• Brass</li> <li>• Copper</li> <li>• Gold</li> <li>• Silver</li> <li>• Aluminum</li> </ul>	<ul style="list-style-type: none"> <li>• Feathers</li> <li>• Down</li> </ul>	<ul style="list-style-type: none"> <li>• Hot melt adhesive</li> <li>• Powdered adhesive</li> <li>• Flock adhesive</li> <li>• Contact adhesive</li> <li>• Latex glue</li> <li>• Polyurethane glue</li> <li>• Neoprene cement</li> <li>• Epoxies</li> <li>• Silicone adhesive</li> <li>• UV-cured adhesive</li> </ul>



## Change Log for the 2023 AFIRM RSL

CAS No.	Substance / Material	Modification	Page
N/A	AFIRM RSL Testing Matrix	<ul style="list-style-type: none"> <li>See Testing Matrix for various changes, including clarification that testing for Azo-amines and Aryl Amine salts is necessary for dyed/colored (non-white) materials only.</li> </ul>	13–14
N/A	Acidic and Alkaline Substances	<ul style="list-style-type: none"> <li>Added pH range of 3.5 – 7.0 for non-chrome-tanned leather.</li> </ul>	15
Various	Azo-Amines and Arylamine Salts	<ul style="list-style-type: none"> <li>Updated method EN ISO 17234-1 for leather from 2015 to 2020 version.</li> </ul>	17
Various	Bisphenols	<ul style="list-style-type: none"> <li>Clarified that 1 ppm BPA limit is for items intended to come in contact with the mouth only.</li> <li>Added information about proposed restriction in the European Union (EU) including Bisphenol B (BPB).</li> <li>Level 1 Testing for Bisphenols is recommended in multiple materials to educate suppliers and advise them to begin seeking alternatives from their chemical suppliers.</li> </ul>	18
85535-84-8 85535-85-9	Chlorinated Paraffins	<ul style="list-style-type: none"> <li>Clarified that ISO 22818 applies to textiles and all other materials.</li> </ul>	18
Various	Dyes (Forbidden, Disperse, and Navy Blue) and Quinoline	<ul style="list-style-type: none"> <li>Updated method to DIN 54231:2022.</li> </ul>	21–23, 35
Various	Flame Retardants	<ul style="list-style-type: none"> <li>Clarified that flame-retardant restrictions apply to other potential uses as well.</li> </ul>	23
Various	Heavy Metals (Jewelry)	<ul style="list-style-type: none"> <li>Specified method ASTM F963-17 as referenced in ASTM F2923:2020.</li> </ul>	28–29
Various	N-Nitrosamines	<ul style="list-style-type: none"> <li>Specified method ISO 19577:2019 with LC/MS/MS verification only for testing.</li> </ul>	30
Various	Per- and Polyfluoroalkyl Substances (PFAS)	<ul style="list-style-type: none"> <li>Added restriction on total organic fluorine with method EN 14582:2016 or ASTM D7359:2018 based on new legislation in California.</li> <li>Added methods EN 17681-1:2022 and EN 17681-2:2022 for testing specific substances.</li> <li>Added new restrictions on PFAS subgroups: PFHxS and its salts and related substances as well as C9 - C14 PFCAs and their salts and related substances.</li> </ul>	32, 39
Various	Phthalates	<ul style="list-style-type: none"> <li>Updated test method to GC/MS, EN ISO 14389:2022; updated section numbers accordingly.</li> </ul>	33
Various	Polycyclic Aromatic Hydrocarbons (PAHs)	<ul style="list-style-type: none"> <li>Added methods EN 17132 and EN 16190.</li> </ul>	34
Various	Solvents and Residuals	<ul style="list-style-type: none"> <li>Method DIN CEN ISO/TS 16189:2013 updated to ISO 16189:2021 for all other materials.</li> </ul>	35
75-12-7	Formamide	<ul style="list-style-type: none"> <li>Added a note about Taiwan BSMI enforcement of a 200-ppm limit in yoga mats under the Consumer Protection Act.</li> </ul>	35
Various	UV Stabilizers	<ul style="list-style-type: none"> <li>Updated method to ISO 24040 with extraction in THF, analysis by GC/MS.</li> </ul>	36

# AFIRM RSL Testing Matrix

In 2020, AFIRM redefined the recommended testing approach included in the RSL.

In previous years, AFIRM published a Risk Matrix, which gave guidance on risks for each listed substance or class of substances in different materials.

The Testing Matrix is a more prescriptive approach to help brands and suppliers effectively manage chemical risks by adopting a common testing approach for use and acceptance across different brands. Chemicals assigned a Level 1 in materials should be viewed as the minimum amount of testing required to satisfy AFIRM member requirements, and chemicals assigned a Level 2 are recommended for additional testing and may be required at brand discretion. Regular and self-governed testing of all relevant substances by suppliers will help to ensure the widest acceptance of third-party test reports by international brands.

The Testing Matrix was developed by AFIRM brands utilizing multiple sources of information, including industry RSL testing information, a broad understanding of global supply chain operations, and from nearly two decades of managing restricted substances across a wide range of materials.

The Testing Matrix uses the following color codes:

- 1** Red = Higher risk. Testing required.
- 2** Orange = Lower risk. Testing recommended and may be required at brand discretion.
- Blank = Lowest risk. Not anticipated in material.

Refer to footnotes for material-specific testing recommendations and exceptions.

Suppliers must check with their brand customers to understand if they will accept test reports according to this AFIRM Testing Matrix. Individual brand testing programs, to the extent they are different, supersede the AFIRM RSL Testing Matrix unless a brand indicates otherwise.

It is a goal of the AFIRM Group to reduce the testing burden on suppliers and streamline the RSL testing approach, while further reducing risk of restricted substances in materials and products. As brands adopt the AFIRM Testing Matrix into their RSL process, suppliers and AFIRM brands will be able to share test reports and data more easily, reducing the need for multiple RSL test submissions to satisfy different RSL requirements.

## Determining Test Methods Using the AFIRM RSL Testing Matrix

The test methods listed in the RSL for specific materials correspond to the AFIRM RSL Testing Matrix.

A blank color code for any material will not have a corresponding test method.

For example, Metal has a blank color code for APEOs and therefore no test method is listed for APEOs for Metal in the RSL.

If the RSL states “All Materials” or “All Materials Except,” this means the test method is applicable to all materials listed with a color of 1 or 2 that do not have a specific test method listed.

AFIRM recommends consulting your testing laboratory to determine the best test method for any material not currently listed in this document.



**Table 4. AFIRM RSL Testing Matrix**

**NOTE:** For recycled materials, additional testing may be required at Level 1; check with each brand on requirements.

Substance	Natural Fibers	Synthetic Fibers	Natural & Synthetic Blends	Synthetic Coated Fabrics	Natural Leather & Fur Skin	Natural Materials	Metals	Other: Porcelain, Ceramic, Glass, Crystal, Etc.	Feathers & Down	Polymers								Coatings & Prints	Glue	
										EVA	PU Foams	All other PU & TPU	Rubber <small>Excludes Latex and Silicon Rubbers</small>	Polycarbonate	ABS	PVC	All Other Foams, Plastics & Polymers			
Acetophenone and 2-Phenyl-2-Propanol										2										
Acidic and Alkaline Substances (pH)	1	1	1	1	1															
Alkylphenol (AP) and Alkylphenol Ethoxylates (APEOs), including all isomers	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	
Azo-amines and Aryl Amine salts	1A	1A	1A	1A	1A	1A			1A									1		
Bisphenols		1	1	1	1					2	2	2	2	1	2	2	2			
Chlorinated Paraffins				2J	1					2	2	1	1	2	2	1	2			
Chlorophenols	2	2	2		2															
Chlorinated Benzenes and Toluenes		2	2	2																
Dimethylfumarate (DMFu)					2															
Dyes, Forbidden and Disperse		1A	1A	1A														2		
Dyes, Navy Blue		2	2																	
Flame Retardants	2B																			
Fluorinated Greenhouse Gases																				
Formaldehyde	1	1	1	2	1	1C							2						1	1

**A** Level 1 for dyed/colored materials (non-white) only.  
**B** Level 2 only if Flame Retardant use or contamination is suspected.  
**C** Level 1 for Wood, Paper, and Straw materials only.

**D** Level 2 for Wool materials only.  
**E** Level 2 if extractable Chrome above 1 ppm only.  
**F** Copper is exempt from restriction limits in Metal parts.  
**G** Level 2 for plant-based fibers only; N/A for animal-based fibers.

**H** Level 1 for Cadmium and Lead only; Crystal is exempt for Lead.  
**J** Level 1 for PVC materials only. Otherwise, Level 2.  
**K** Level 2 for Styrene/Butadiene Rubbers (SBRs) only.

**L** Level 1 if PFAS use or contamination is suspected.  
**M** Level 1 if Rubber or black Polymeric materials, otherwise Level 2.  
**N** Level 1 for PU and PVC- based materials only.

**Table 4. AFIRM RSL Testing Matrix**

Substance	Natural Fibers	Synthetic Fibers	Natural & Synthetic Blends	Synthetic Coated Fabrics	Natural Leather & Fur Skin	Natural Materials	Metals	Other: Porcelain, Ceramic, Glass, Crystal, Etc.	Feathers & Down	Polymers								Coatings & Prints	Glue
										EVA	PU Foams	All other PU & TPU	Rubber <small>Excludes Latex and Silicon Rubbers</small>	Polycarbonate	ABS	PVC	All Other Foams, Plastics & Polymers		
Heavy Metals, Chromium VI	2D	2E			1														
Heavy Metals, Extractable	1	1	1	2	1		2F			2	2	2	2	2	2	2	2	2	
Heavy Metals, Nickel Release							1												
Heavy Metals, Total	2G		2G	1	2		1	1H		1	1	1	1	1	1	1	1	2	
Monomers: Styrene & Vinyl Chloride				1J								2K		2	1		1J		
N-Nitrosamines												2							
Organotin Compounds		2	2	1	2						1	1	1		1	1	1	1	
Ortho-phenylphenol (OPP)	2	2	2	2	2												2		
Ozone-depleting Substances																			
Per- and Polyfluoroalkyl Substances (PFAS)	1L																		
Pesticides, Agricultural																			
Phthalates				1						1	1	1	1	2	2	1	1	1	1
Polycyclic Aromatic Hydrocarbons (PAHs)				2						1M	1M	1M	1			1M	1M	1M	1M
Quinoline		2	2																
Solvents / Residuals, DMFa				1							1	1						1N	1N
Solvents / Residuals, DMAC and NMP				1							2	2				2	2	2	
Solvents / Residuals, Formamide										2								2	
UV Absorbers / Stabilizers										2	2	2	2	2	2	2	2		
Volatile Organic Compounds (VOCs)				2						2	2	2	2	2	2	2	2	2	1

**A** Level 1 for dyed/colored materials (non-white) only.  
**B** Level 2 only if Flame Retardant use or contamination is suspected.  
**C** Level 1 for Wood, Paper, and Straw materials only.

**D** Level 2 for Wool materials only.  
**E** Level 2 if extractable Chrome above 1 ppm only.  
**F** Copper is exempt from restriction limits in Metal parts.  
**G** Level 2 for plant-based fibers only; N/A for animal-based fibers.

**H** Level 1 for Cadmium and Lead only; Crystal is exempt for Lead.  
**J** Level 1 for PVC materials only. Otherwise, Level 2.  
**K** Level 2 for Styrene/Butadiene Rubbers (SBRs) only.

**L** Level 1 if PFAS use or contamination is suspected.  
**M** Level 1 if Rubber or black Polymeric materials, otherwise Level 2.  
**N** Level 1 for PU and PVC- based materials only.

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Acetophenone and 2-Phenyl-2-Propanol</b> 				
98-86-2	Acetophenone	50 ppm each	Potential breakdown products in EVA foam when using certain cross-linking agents, including Dicumyl Peroxide.	Extraction in acetone or methanol GC/MS, sonication for 30 minutes at 60° C	25 ppm each
617-94-7	2-Phenyl-2-Propanol				
	<b>Acidic and Alkaline Substances</b>				
N/A	pH value	<p>Textiles: 4.0 – 7.5</p> <p>Leather: Chrome-tanned: 3.2 – 4.5</p> <p>Other: 3.5 – 7.0</p>	<p>pH value is a characteristic number, ranging from pH 0 to pH 14, which indirectly shows the content of acidic or alkaline substances in a product.</p> <p>pH values less than 7 indicate sources of acidic substances, and values greater than 7 indicate sources of alkaline substances. To avoid irritation or chemical burns to the skin, the pH value of products must be in the range of human skin—approximately pH 5.5.</p> <p>AFIRM recommends the limits cited to comply with global regulations and to minimize the chances of Chromium VI formation during tanning and processing of leather.</p> <p>Important: Egypt, Morocco, and the Gulf Cooperation Council (GCC) require pH for leather not lower than 3.5.</p>	<p>Textiles and synthetic coated fabrics: EN ISO 3071:2020</p> <p>Leather: EN ISO 4045:2018</p>	N/A

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported	
	<b>Alkylphenols (APs)</b>  <b>Alkylphenol Ethoxylates (APEOs)</b>  <b>including all isomers</b>					
Various	Nonylphenol (NP), mixed isomers	Total APs: 10 ppm  Total APs + APEOs: 100 ppm	<p>APEOs can be used as or found in detergents, scouring agents, spinning oils, wetting agents, softeners, emulsifying/dispersing agents for dyes and prints, impregnating agents, de-gumming for silk production, dyes and pigment preparations, polyester padding and down/feather fillings.</p> <p>APs are used as intermediaries in the manufacture of APEOs and antioxidants used to protect or stabilize polymers. Biodegradation of APEOs into APs is the main source of APs in the environment.</p> <p>APEOs and formulations containing APEOs are prohibited from use throughout supply chain and manufacturing processes. We acknowledge that residual or trace concentrations of APEOs may still be found at levels exceeding 100 ppm and that more time is necessary for the supply chain to phase them out completely.</p> <p>Recycled products: Contact your brand customer for information about potential exemptions from the limit on NPEOs in recycled textile products.</p>	<p>Textiles and Leather: EN ISO 21084:2019</p> <p>Polymers and all other materials: 1 g sample/20 mL THF, sonication for 60 minutes at 70° C, analysis according to EN ISO 21084:2019</p>	Total of NP + OP: 3 ppm	
Various	Octylphenol (OP), mixed isomers					
Various	Nonylphenol ethoxylates (NPEOs)			<p>All materials except Leather: EN ISO 18254-1:2016 with determination of APEO using LC/MS or LC/MS/MS</p> <p>Leather: Sample prep and analysis using EN ISO 18218-1:2015 with quantification according to EN ISO 18254-1:2016</p>		Total of NPEOs + OPEOs: 20 ppm
Various	Octylphenol ethoxylates (OPEOs)					

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Azo-amines and Arylamine Salts</b> 				
92-67-1	4-Aminobiphenyl	20 ppm each	<p>Azo dyes and pigments are colorants that incorporate one or several azo groups (-N=N-) bound with aromatic compounds.</p> <p>Thousands of azo dyes exist, but only those which degrade to form the listed cleaved amines are restricted.</p> <p>Azo dyes that release these amines are regulated and should no longer be used for dyeing textiles.</p>	<p>All materials except leather: EN ISO 14362-1:2017</p> <p>Leather: EN ISO 17234-1:2020</p> <p>p-Aminoazobenzene: All materials except leather: EN ISO 14362-3:2017</p> <p>Leather: EN ISO 17234-2:2011</p>	5 ppm each
92-87-5	Benzidine				
95-69-2	4-Chloro-o-toluidine				
91-59-8	2-Naphthylamine				
97-56-3	o-Aminoazotoluene				
99-55-8	2-Amino-4-nitrotoluene				
106-47-8	p-Chloraniline				
615-05-4	2,4-Diaminoanisole				
101-77-9	4,4'-Diaminodiphenylmethane				
91-94-1	3,3'-Dichlorobenzidine				
119-90-4	3,3'-Dimethoxybenzidine				
119-93-7	3,3'-Dimethylbenzidine				
838-88-0	3,3'-dimethyl-4,4'-diaminodiphenylmethane				
120-71-8	p-Cresidine				
101-14-4	4,4'-Methylen-bis(2-chloraniline)				
101-80-4	4,4'-Oxydianiline				
139-65-1	4,4'-Thiodianiline				
95-53-4	o-Toluidine				
95-80-7	2,4-Toluediamine				
137-17-7	2,4,5-Trimethylaniline				
95-68-1	2,4 Xylidine				
87-62-7	2,6 Xylidine				
90-04-0	2-Methoxyaniline (= o-Anisidine)				
60-09-3	p-Aminoazobenzene				
3165-93-3	4-Chloro-o-toluidinium chloride				
553-00-4	2-Naphthylammoniumacetate				
39156-41-7	4-Methoxy-m-phenylene diammonium sulphate				
21436-97-5	2,4,5-Trimethylaniline hydrochloride				

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Bisphenols</b> 				
80-05-7	Bisphenol-A (BPA)	1 ppm Limit is applicable to items intended to come in contact with the mouth; however, see Potential Uses & Additional Information.	BPA may be used in the production of epoxy resins, polycarbonate plastics, flame retardants, and PVC. BPS may be used as a substitute for BPA and can be found along with BPF in polyamide dye-fixing agents and sulfone- and phenol-based leather tanning agents.  BPA and BPS can be found in recycled polymeric and paper materials due to polycarbonate plastic and thermal receipt paper made with bisphenols entering waste streams.	All materials: Extraction: 1 g sample/20 ml THF, sonication for 60 minutes at 60° C, analysis with LC/MS	0.1 ppm for individual samples 1 ppm for composite samples
80-09-1	Bisphenol S (BPS)	In preparation for forthcoming restrictions, safer alternatives should be substituted for BPA and other listed bisphenols in all applicable materials.	BPS was added to the REACH SVHC list and may need to be notified to ECHA in leather goods if found above 0.1%. Additional restrictions on the entire class of bisphenols are forthcoming with a <a href="#">new restriction proposal</a> pending in the European Union.  AFIRM recommends testing relevant materials for bisphenols according to the Testing Matrix and to begin working with suppliers to replace bisphenols with suitable alternatives in all products.		1 ppm each
77-40-7	Bisphenol B (BPB)				
620-92-8	Bisphenol F (BPF)				
1478-61-1	Bisphenol AF (BPAF)				
	<b>Chlorinated Paraffins</b> 				
85535-84-8	Short-chain Chlorinated Paraffins (SCCPs) (C10-C13)	1000 ppm	May be used as softeners, flame retardants, or fat-liquoring agents in leather production; also as a plasticizer in polymer production.	Leather: ISO 18219-1:2021 (SCCP) ISO 18219-2:2021 (MCCP)	100 ppm
85535-85-9	Medium-chain Chlorinated Paraffins (MCCPs) (C14-C17)	1000 ppm		Textiles and all other materials: ISO 22818:2021 (SCCP + MCCP)	100 ppm

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Chlorophenols</b> 				
15950-66-0	2,3,4-Trichlorophenol (TriCP)	0.5 ppm each	<p>Chlorophenols are polychlorinated compounds used as preservatives or pesticides.</p> <p>Pentachlorophenol (PCP), Tetrachlorophenol (TeCP), and Trichlorophenols (TriCP) are sometimes used to prevent mold and kill insects when growing cotton and when storing/transporting fabrics.</p> <p>PCP, TeCP, and TriCP can also be used as in-can preservatives in print pastes and other chemical mixtures.</p>	All materials: DIN 50009:2021	0.5 ppm each
933-78-8	2,3,5-Trichlorophenol (TriCP)				
933-75-5	2,3,6-Trichlorophenol (TriCP)				
95-95-4	2,4,5-Trichlorophenol (TriCP)				
88-06-2	2,4,6-Trichlorophenol (TriCP)				
609-19-8	3,4,5-Trichlorophenol (TriCP)				
4901-51-3	2,3,4,5-Tetrachlorophenol (TeCP)				
58-90-2	2,3,4,6-Tetrachlorophenol (TeCP)				
935-95-5	2,3,5,6-Tetrachlorophenol (TeCP)				
87-86-5	Pentachlorophenol (PCP) and its salts and esters				

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Chlorinated Benzenes and Toluenes</b> 				
95-49-8	2-Chlorotoluene	Total: 1 ppm	Chlorobenzenes and Chlorotoluenes (Chlorinated Aromatic Hydrocarbons) can be used as carriers in the dyeing process of polyester or wool/ polyester fibers. They can also be used as solvents.  Cross-contamination from anti-moth agents and poly shipping bags may cause failures.  Important: The Gulf Cooperation Council (GCC) maintains a limit of 1 ppm for 1,2-Dichlorobenzene in textiles.	All materials: EN 17137:2018	0.2 ppm each
108-41-8	3-Chlorotoluene				
106-43-4	4-Chlorotoluene				
32768-54-0	2,3-Dichlorotoluene				
95-73-8	2,4-Dichlorotoluene				
19398-61-9	2,5-Dichlorotoluene				
118-69-4	2,6-Dichlorotoluene				
95-75-0	3,4-Dichlorotoluene				
2077-46-5	2,3,6-Trichlorotoluene				
6639-30-1	2,4,5-Trichlorotoluene				
76057-12-0	2,3,4,5-Tetrachlorotoluene				
875-40-1	2,3,4,6-Tetrachlorotoluene				
1006-31-1	2,3,5,6-Tetrachlorotoluene				
877-11-2	Pentachlorotoluene				
541-73-1	1,3-Dichlorobenzene				
106-46-7	1,4-Dichlorobenzene				
87-61-6	1,2,3-Trichlorobenzene				
120-82-1	1,2,4-Trichlorobenzene				
108-70-3	1,3,5-Trichlorobenzene				
634-66-2	1,2,3,4-Tetrachlorobenzene				
634-90-2	1,2,3,5-Tetrachlorobenzene				
95-94-3	1,2,4,5-Tetrachlorobenzene				
608-93-5	Pentachlorobenzene				
118-74-1	Hexachlorobenzene				
5216-25-1	p-Chlorobenzotrichloride				
98-07-7	Benzotrichloride				
100-44-7	Benzyl Chloride				
95-50-1	1,2-Dichlorobenzene	10 ppm			1 ppm

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Dimethylfumarate</b> 				
624-49-7	Dimethylfumarate (DMFu)	0.1 ppm	DMFu is an anti-mold agent that may be used in sachets in packaging to prevent the buildup of mold, especially during shipping.	All materials: ISO 16186:2021	0.05 ppm
	<b>Dyes (Forbidden  and Disperse  )</b>				
2475-45-8	C.I. Disperse Blue 1	30 ppm each	Disperse dyes are a class of water-insoluble dyes that penetrate the fiber system of synthetic or manufactured fibers and are held in place by physical forces without forming chemical bonds. Disperse dyes are used in synthetic fiber (e.g., polyester, acetate, polyamide).  Restricted disperse dyes are suspected of causing allergic reactions and are prohibited from use for dyeing of textiles.	All materials: DIN 54231:2022	15 ppm each
2475-46-9	C.I. Disperse Blue 3				
3179-90-6	C.I. Disperse Blue 7				
3860-63-7	C.I. Disperse Blue 26				
56524-77-7	C.I. Disperse Blue 35A				
56524-76-6	C.I. Disperse Blue 35B				
12222-97-8	C.I. Disperse Blue 102				
12223-01-7	C.I. Disperse Blue 106				
61951-51-7	C.I. Disperse Blue 124				
23355-64-8	C.I. Disperse Brown 1				
2581-69-3	C.I. Disperse Orange 1				
730-40-5	C.I. Disperse Orange 3				
82-28-0	C.I. Disperse Orange 11				
12223-33-5	C.I. Disperse Orange 37/76/59				
13301-61-6					
51811-42-8					
85136-74-9	C.I. Disperse Orange 149				
2872-52-8	C.I. Disperse Red 1				
2872-48-2	C.I. Disperse Red 11				

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Dyes, continued</b>				
3179-89-3	C.I. Disperse Red 17	30 ppm each	Disperse dyes are a class of water-insoluble dyes that penetrate the fiber system of synthetic or manufactured fibers and are held in place by physical forces without forming chemical bonds. Disperse dyes are used in synthetic fiber (e.g., polyester, acetate, polyamide).  Restricted disperse dyes are suspected of causing allergic reactions and are prohibited from use for dyeing of textiles.	All materials: DIN 54231:2022	15 ppm each
61968-47-6	C.I. Disperse Red 151				
119-15-3	C.I. Disperse Yellow 1				
2832-40-8	C.I. Disperse Yellow 3				
6300-37-4	C.I. Disperse Yellow 7				
6373-73-5	C.I. Disperse Yellow 9				
6250-23-3	C.I. Disperse Yellow 23				
12236-29-2	C.I. Disperse Yellow 39				
54824-37-2	C.I. Disperse Yellow 49				
54077-16-6	C.I. Disperse Yellow 56				
3761-53-3	C.I. Acid Red 26				
569-61-9	C.I. Basic Red 9				
569-64-2	C.I. Basic Green 4				
2437-29-8					
10309-95-2					
548-62-9	C.I. Basic Violet 3				
632-99-5	C.I. Basic Violet 14				
2580-56-5	C.I. Basic Blue 26				
1937-37-7	C.I. Direct Black 38				
2602-46-2	C.I. Direct Blue 6				
573-58-0	C.I. Direct Red 28				
16071-86-6	C.I. Direct Brown 95				
60-11-7	4-Dimethylaminoazobenzene (Solvent Yellow 2)				
6786-83-0	C.I. Solvent Blue 4				
561-41-1	4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol				

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Dyes, Navy Blue</b> 				
118685-33-9	Component 1: C39H23ClCrN7O12S·2Na	30 ppm each	Navy blue colorants are regulated and prohibited from use for dyeing of textiles. Index 611-070-00-2	All materials: DIN 54231:2022	15 ppm each
Not allocated	Component 2: C46H30CrN10O20S2·3Na				
	<b>Flame Retardants</b> 				
84852-53-9	Decabromodiphenyl ethane (DBDPE)	10 ppm each	<p>With very limited exceptions, flame-retardant substances, including the entire class of organohalogen flame retardants, should no longer be applied to materials during production.</p> <p>Listed here are examples of flame-retardant substances used historically across the apparel and footwear industry. It is not intended to be a complete list. Other flame retardants not applicable to this industry are regulated worldwide by the Stockholm Convention and the Aarhus Protocol, which have been implemented in the European Union under the POPs Regulation.</p> <p>The 10 ppm limit is established to account for incidental impurities, byproducts, and contaminants. Flame retardants should not be used for any other purpose, e.g., as softeners or plasticizers.</p>	All materials: EN ISO 17881-1:2016	5 ppm each
32534-81-9	Pentabromodiphenyl ether (PentaBDE)				
32536-52-0	Octabromodiphenyl ether (OctaBDE)				
1163-19-5	Decabromodiphenyl ether (DecaBDE)				
Various	All other Polybrominated diphenyl ethers (PBDEs)				
79-94-7	Tetrabromobisphenol A (TBBP A)				
59536-65-1	Polybromobiphenyls (PBB)				
3194-55-6	Hexabromocyclododecane (HBCDD)				
3296-90-0	2,2-bis(bromomethyl)-1,3-propanediol (BBMP)				
13674-87-8	Tris(1,3-dichloro-isopropyl) phosphate (TDCPP)				
25155-23-1	Trixylyl phosphate (TXP)				
126-72-7	Tris(2,3-dibromopropyl) phosphate (TRIS)				
545-55-1	Tris(1-aziridinyl)phosphine oxide (TEPA)				
115-96-8	Tris(2-chloroethyl)phosphate (TCEP)				
5412-25-9	Bis(2,3-dibromopropyl) phosphate (BDBPP)			All materials: EN ISO 17881-2:2016	

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Fluorinated Greenhouse Gases</b> 				
Various	See Regulation (EU) No 517/2014 for a complete list.	0.1 ppm each	Prohibited from use. May be used as foam blowing agents, solvents, fire retardants, and aerosol propellants.	Sample preparation: Purge and trap — thermal desorption or SPME  Measurement: GC/MS	0.1 ppm each
	<b>Formaldehyde</b> 				
50-00-0	Formaldehyde	Adults and children: 75 ppm  Babies: 16 ppm	Used in textiles as an anti-creasing and anti-shrinking agent. It is also often used in polymeric resins.  Although very rare in Apparel and Footwear, composite wood materials (such as particle board and plywood) must comply with existing California and U.S. Formaldehyde emission requirements (40 CFR 770).  Suppliers are advised to refer to brand-specific requirements for these materials.  Important: United Arab Emirates Cabinet Resolution No. (54) restricts Formaldehyde in children's textiles to 20 ppm.  Indonesia Ministerial Regulation No. 18 limits Formaldehyde to "not detected" (16 ppm) in the following products: towels, bedding, and handkerchiefs.	All materials except leather: JIS L 1041-2011 A (Japan Law 112) or EN ISO 14184-1:2011  Leather: EN ISO 17226-2:2019 with EN ISO 17226-1:2021 confirmation method in case of interferences.  Alternatively, EN ISO 17226-1:2021 can be used on its own.	16 ppm

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit  Limits above which test results should be reported
	<b>Heavy Metals (Non-Jewelry) Extractable  and Total Content </b>		See Appendix A for separate South Korea KC Mark soluble Heavy Metal requirements.		
7440-36-0	Antimony (Sb)	Extractable: 30 ppm	Found in or used as a catalyst in polymerization of polyester, flame retardants, fixing agents, pigments, and alloys.	All materials except leather: DIN EN 16711-2:2016  Leather: DIN EN ISO 17072-1:2019	Extractable: 3 ppm
7440-38-2	Arsenic (As)	Extractable: 0.2 ppm  Total: 100 ppm	Arsenic and its compounds can be used in preservatives, pesticides, and defoliants for cotton, synthetic fibers, paints, inks, trims, and plastics.	Extractable: All materials except leather: DIN EN 16711-2:2016  Leather: DIN EN ISO 17072-1:2019  Total: All materials except leather: DIN EN 16711-1:2016  Leather: DIN EN ISO 17072-2:2019	Extractable: 0.1 ppm  Total: 10 ppm
7440-39-3	Barium (Ba)	Extractable: 1000 ppm	Barium and its compounds can be used in pigments for inks, plastics, and surface coatings, as well as in dyeing, mordants, filler in plastics, textile finishes, and leather tanning.	All materials except leather: DIN EN 16711-2:2016  Leather: DIN EN ISO 17072-1:2019	Extractable: 100 ppm
7440-43-9	Cadmium (Cd)	Extractable: 0.1 ppm  Total: 40 ppm	Cadmium compounds may be used as pigments (especially in red, orange, yellow and green); as a stabilizer for PVC; and in fertilizers, biocides, and paints.	Extractable: All materials except leather: DIN EN 16711-2:2016 Leather: DIN EN ISO 17072-1:2019  Total: All materials except leather: DIN EN 16711-1:2016 Leather: DIN EN ISO 17072-2:2019	Extractable: 0.05 ppm  Total: 5 ppm

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Heavy Metals (Non-Jewelry), continued</b>		See Appendix A for separate South Korea KC Mark soluble Heavy Metal requirements.		
7440-47-3	Chromium (Cr)	Extractable: Textiles: Babies: 1 ppm Adults and children: 2 ppm	Chromium compounds can be used as dyeing additives; dye-fixing agents; colorfastness after-treatments; dyes for wool, silk, and polyamide (especially dark shades); and leather tanning.  Important: Egypt restricts extractable Chromium to 2 ppm in leather products for babies and 200 ppm in leather products for other ages.	Textiles: DIN EN 16711-2:2016  Leather: EN ISO 17072-1:2019	Extractable: 0.5 ppm
18540-29-9	Chromium VI 	Extractable: Leather: 3 ppm Textiles: 1 ppm	Though typically associated with leather tanning, Chromium VI also may be used in the "after-chroming" process for wool dyeing (Chrome salts applied to acid-dyed wool to improve fastness).	Textiles: DIN EN 16711-2:2016 with EN ISO 17075-1:2017 if Cr is detected  Leather: EN ISO 17075-1:2017 and EN ISO 17075-2:2017 for confirmation in case the extract causes interference. Alternatively, EN ISO 17075-2:2017 may be used on its own.  Ageing test: ISO 10195:2018 Method A2 is used at brand discretion.	Extractable: Leather: 3 ppm Textiles: 0.5 ppm
7440-48-4	Cobalt (Co)	Extractable: Adults: 4 ppm Children and babies: 1 ppm	Cobalt and its compounds can be used in alloys, pigments, dyestuff, and the production of plastic buttons.	All materials except leather: DIN EN 16711-2:2016  Leather: DIN EN ISO 17072-1:2019	Extractable: 0.5 ppm
7440-50-8	Copper (Cu)	Extractable: Adults: 50 ppm Children and babies: 25 ppm	Copper and its compounds can be found in alloys and pigments, and in textiles as an antimicrobial agent.  Copper is exempt from restriction limits in Metal parts.  Indonesia Ministerial Regulation No. 18 limits copper to 25 ppm the following products: towels, bedding, and handkerchiefs.	All materials except leather: DIN EN 16711-2:2016  Leather: DIN EN ISO 17072-1:2019	Extractable: 5 ppm

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Heavy Metals (Non-Jewelry), continued</b>		See Appendix A for separate South Korea KC Mark soluble Heavy Metal requirements.		
7439-92-1	Lead (Pb)	Extractable: Adults: 1 ppm Children and babies: 0.2 ppm Total: 90 ppm	May be associated with alloys, plastics, paints, inks, pigments and surface coatings. Crystal or "lead glass" is exempt from total Lead restrictions. Indonesia Ministerial Regulation No. 18 limits extractable Lead to 0.2 ppm in towels, bedding, and handkerchiefs.	Extractable: All materials except leather: DIN EN 16711-2:2016 Leather: DIN EN ISO 17072-1:2019 Total: Non-metal: CPSC-CH-E1002-08.3 Metal: CPSC-CH-E1001-08.3 Lead in paint and surface coatings: CPSC-CH-E1003-09.1	Extractable: 0.2 ppm Total: 10 ppm
7439-97-6	Mercury (Hg)	Extractable: 0.02 ppm Total: 0.5 ppm	Mercury compounds can be present in pesticides and as contaminants in caustic soda (NaOH). They may also be used in paints and as catalysts in the manufacture of PU and vinyl chloride for use in PVC.	Extractable: All materials except leather: DIN EN 16711-2:2016 Leather: DIN EN ISO 17072-1:2019 Total: All materials except leather: DIN EN 16711-1:2016 Leather: DIN EN ISO 17072-2:2019	Extractable: 0.02 ppm Total: 0.1 ppm
7440-02-0	Nickel (Ni) 	Extractable: 1 ppm Release (metal parts): Prolonged skin contact: 0.5 µg/cm <sup>2</sup> /week Eyewear frames: 0.5 µg/cm <sup>2</sup> /week	Nickel and its compounds can be used for plating alloys and improving corrosion-resistance and hardness of alloys. They can also occur as impurities in pigments and alloys.	Extractable: All materials except leather: DIN EN 16711-2:2016 Leather: DIN EN ISO 17072-1:2019 Release: EN 12472:2020 and EN 1811:2011+A1:2015 Release (eyewear frames): EN 16128:2015	Extractable: 0.1 ppm Release: 0.5 µg/cm <sup>2</sup> /week
7782-49-2	Selenium (Se)	Extractable: 500 ppm	May be found in synthetic fibers, paints, inks, plastics and metal trims.	All materials except leather: DIN EN 16711-2:2016 Leather: DIN EN ISO 17072-1:2019	Extractable: 50 ppm

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Heavy Metals (Jewelry)</b>			Sample preparation for jewelry and wearables: Wax areas not intended for skin-contact: EN 1811:2011+A1:2015	
7440-36-0	Antimony (Sb)	Paints & Coatings: Extractable: 60 ppm	Antimony and its compounds can be used as a Flame Retardant in paints, as well as a colorant in pigments.	ASTM F963-17 as referenced in ASTM F2923:2020	Extractable: 5 ppm
7440-38-2	Arsenic (As)	Paints & Coatings: Extractable: 25 ppm	Arsenic and its compounds can be used in paints and inks.	ASTM F963-17 as referenced in ASTM F2923:2020	Extractable: 5 ppm
7440-39-3	Barium (Ba)	Paints & Coatings: Extractable 1000 ppm	Barium and its compounds can be used in pigments for inks	ASTM F963-17 as referenced in ASTM F2923:2020	Extractable: 100 ppm
7440-43-9	Cadmium (Cd)	Substrates, Paints & Coatings: Total: Adults: 75 ppm Children: 40 ppm	Cadmium and its compounds are used as pigments (especially in red, orange, yellow, and green). It can also be used in alloys to improve hardness or be found as a contaminant	ASTM F963-17 as referenced in ASTM F2923:2020	Total: 5 ppm
7440-47-3	Chromium (Cr)	Paints & Coatings: Extractable: 60 ppm	Chromium and its compounds can be used as pigments in paints. It can also be used as part of alloys such as stainless steel.	ASTM F963-17 as referenced in ASTM F2923:2020	Extractable: 5 ppm
7439-92-1	Lead (Pb)	Substrates, Paints & Coatings: Total: 90 ppm	Lead and its compounds may be associated with plastics, paints, inks, pigments, and surface coatings. It can also be found in metals as a contaminant.  Crystal or "lead glass" is exempt from total Lead restrictions.	ASTM F963-17 as referenced in ASTM F2923:2020	Total: 10 ppm

# AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
7439-97-6	Mercury (Hg)	Paints & Coatings: Extractable: 60 ppm	Mercury and its compounds may be used in paints and can be found as a contaminant in alloys and in gold due to its use during the extraction process.	ASTM F963-17 as referenced in ASTM F2923:2020	Extractable: 5 ppm
7440-02-0	Nickel (Ni) 	Release (metal parts): Prolonged skin contact: 0.5 µg/cm <sup>2</sup> /week Pierced part: 0.2 µg/cm <sup>2</sup> /week	Nickel and its compounds can be used for plating alloys and improving the corrosion-resistance and hardness of alloys. They can also occur as impurities in pigments and alloys.	EN 12472:2020 and EN 1811:2011+A1:2015	Release: Prolonged skin contact: 0.5 µg/cm <sup>2</sup> /week Pierced part: 0.2 µg/cm <sup>2</sup> /week
7782-49-2	Selenium (Se)	Paints & Coatings: Extractable: 500 ppm	Selenium and its compounds may be found in paints and inks.	ASTM F963-17 as referenced in ASTM F2923:2020	Extractable: 50 ppm
	<b>Monomers</b> 				
100-42-5	Styrene, Free	500 ppm	Styrene is a precursor for polymerization and may be present in various Styrene copolymers like plastic buttons. Free styrene is restricted, but total styrene is not.	Extraction in Methanol GC/MS, sonication at 60° C for 60 minutes	50 ppm
75-01-4	Vinyl Chloride	1 ppm	Vinyl Chloride is a precursor for polymerization and may be present in various PVC materials like prints, coatings, flip flops, and synthetic leather.	EN ISO 6401:2008	1 ppm

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>N-Nitrosamines</b> 				
62-75-9	N-nitrosodimethylamine (NDMA)	0.5 ppm each	Can be formed as by-product in the production of rubber.	EN ISO 19577:2019 with LC/MS/MS verification if positive	0.5 ppm each
55-18-5	N-nitrosodiethylamine (NDEA)				
621-64-7	N-nitrosodipropylamine (NDPA)				
924-16-3	N-nitrosodibutylamine (NDBA)				
100-75-4	N-nitrosopiperidine (NPIP)				
930-55-2	N-nitrosopyrrolidine (NPYR)				
59-89-2	N-nitrosomorpholine (NMOR)				
614-00-6	N-nitroso N-methyl N-phenylamine (NMPPhA)				
612-64-6	N-nitroso N-ethyl N-phenylamine (NEPhA)				

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Organotin Compounds</b> 				
Various	Dibutyltin (DBT)	1 ppm each	<p>Class of chemicals combining tin and organics such as butyl and phenyl groups.</p> <p>Organotins are predominantly found in the environment as antifoulants in marine paints, but they can also be used as biocides (e.g., antibacterials), catalysts in plastic and glue production, and heat stabilizers in plastics/rubber.</p> <p>In textiles and apparel, organotins are associated with plastics/rubber, inks, paints, metallic glitter, polyurethane products and heat transfer material.</p>	<p>All materials: CEN ISO/TS 16179:2012 or EN ISO 22744-1:2020</p>	0.1 ppm each
Various	Diocetyl tin (DOT)				
Various	Monobutyltin (MBT)				
Various	Tricyclohexyltin (TCyHT)				
Various	Trimethyltin (TMT)				
Various	Triocetyl tin (TOT)				
Various	Tripropyltin (TPT)				
Various	Tributyltin (TBT)	0.5 ppm each			
Various	Triphenyltin (TPhT)				
	<b>Ortho-phenylphenol</b> 				
90-43-7	Ortho-phenylphenol (OPP)	1000 ppm	OPP is used for its preservative properties in leather or as a carrier in polyester dyeing processes.	All materials: DIN 50009:2021	100 ppm
	<b>Ozone-depleting Substances</b> 				
Various	See Regulation (EC) No 1005/2009 for a complete list.	5 ppm	<p><b>Prohibited from use.</b></p> <p>Ozone-depleting substances have been used as a foaming agent in PU foams as well as a dry-cleaning agent.</p>	All materials: GC/MS headspace 120° C for 45 minutes	5 ppm

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Per- and Polyfluoroalkyl Substances (PFAS)</b> 				
Various	All PFAS as measured by total organic fluorine	100 ppm by 2025 50 ppm by 2027	<p>Regulations around the world ban the use of PFAS in apparel and footwear, with partial or full exemptions for personal protective equipment and outdoor apparel for severe wet conditions. See <a href="#">California AB 1817</a> and check with your brand customer for their exemption policy, which may depend on the market.</p> <p>PFAS may be used in commercial water-, oil-, and stain-repellent agents as well as in breathable membranes that remove moisture, e.g., PTFE.</p> <p>Refer to Appendix B for a list of PFAS substances and CAS Numbers for which testing can be conducted to indicate whether PFAS chemistry is present above restricted levels due to intended use or unintended contamination.</p> <p>An update to AFIRM's PFAS Chemical Information Sheet will include guidance for phasing out the entire class of PFAS, with a recommended testing approach to ensure compliance with all global regulations using the methods included in this section.</p>	EN 14582:2016 or ASTM D7359:2018	50 ppm total
Various	Perfluorooctane Sulfonate (PFOS) and related substances	1 µg/m <sup>2</sup> total		1 µg/m <sup>2</sup> total	
Various	Perfluorooctanoic Acid (PFOA) and its salts	25 ppb total		25 ppb total	
Various	PFOA-related substances	1000 ppb total		1000 ppb total	
Various	Perfluorohexane-1-sulphonic acid (PFHxS) and its salts	25 ppb total		25 ppb total	
Various	PFHxS-related substances	1000 ppb total		1000 ppb total	
Various	C9-C14 Perfluorocarboxylic acids (PFCAs) and their salts	25 ppb total		25 ppb total	
Various	C9-C14 PFCA-related substances	260 ppb total		260 ppb total	
Various	Other Perfluoroalkyl Carboxylic Acids (PFCAs)	For information purposes only. AFIRM recommends testing to assess content levels.		100 ppb total	
	<b>Pesticides and Herbicides, Agricultural</b> 				
Various	See Appendix C for a complete list.	0.5 ppm each	May be found in natural fibers, primarily cotton.	All materials: ISO 15913/DIN 38407 F2 or EPA 8081/EPA 8151A or BVL L 00.00-34:2010-09	0.5 ppm each

# AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Phthalates</b> 				
28553-12-0	Di-Iso-nonylphthalate (DINP)	500 ppm each Total: 1000 ppm	<p>Esters of ortho-phthalic acid (Phthalates) are a class of organic compound commonly added to plastics to increase flexibility. They are sometimes used to facilitate the molding of plastic by decreasing its melting temperature.</p> <p>Phthalates can be found in:</p> <ul style="list-style-type: none"> <li>• Flexible plastic components (e.g., PVC)</li> <li>• Print pastes</li> <li>• Adhesives</li> <li>• Plastic buttons</li> <li>• Plastic sleeveings</li> <li>• Polymeric coatings</li> </ul> <p>Listed here are all legally restricted phthalates as well as those included on the REACH substances of very high concern (SVHC) candidate list at the time of publication. Suppliers should assume that the AFIRM RSL includes all phthalates on the SVHC list—whether itemized here or not—since the list is updated frequently.</p>	<p>Sample preparation for all materials: CPSC-CH-C1001-09.4</p> <p>Measurement:</p> <p>Textiles: GC/MS, EN ISO 14389:2022 (8.1 Calculation based on weight of print only; 8.2 Calculation based on weight of print and textile if print cannot be removed).</p> <p>All materials except textiles: GC/MS</p>	50 ppm each
117-84-0	Di-n-octylphthalate (DNOP)				
117-81-7	Di(2-ethylhexyl)-phthalate (DEHP)				
26761-40-0	Diisodecylphthalate (DIDP)				
85-68-7	Butylbenzylphthalate (BBP)				
84-74-2	Dibutylphthalate (DBP)				
84-69-5	Diisobutylphthalate (DIBP)				
84-75-3	Di-n-hexylphthalate (DnHP)				
84-66-2	Diethylphthalate (DEP)				
131-11-3	Dimethylphthalate (DMP)				
131-18-0	Di-n-pentyl phthalate (DPENP)				
84-61-7	Dicyclohexyl phthalate (DCHP)				
71888-89-6	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich				
117-82-8	Bis(2-methoxyethyl) phthalate				
605-50-5	Diisopentyl phthalate (DIPP)				
131-16-8	Dipropyl phthalate (DPRP)				
27554-26-3	Diisooctyl phthalate (DIOP)				
68515-50-4	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear				
71850-09-4	Diisohexyl phthalate (DIHxP)				
68515-42-4	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)				
84777-06-0	1,2-Benzenedicarboxylic acid Dipentyl ester, branched and linear				
68648-93-1	1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters or mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate; 1,2-Benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters;				
68515-51-5	1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters				
776297-69-9	n-Pentyl-isopentylphthalate (nPIPP)				

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b> 				
83-32-9	Acenaphthene	No individual restriction	PAHs are natural components of crude oil and are common residues from oil refining. PAHs have a characteristic smell similar to that of car tires or asphalt.  Oil residues containing PAHs are added to rubber and plastics as a softener or extender and may be found in rubber, plastics, lacquers and coatings. PAHs are often found in the outsoles of footwear and in printing pastes for screen prints. PAHs can be present as impurities in Carbon Black. They also may be formed from thermal decomposition of recycled materials during reprocessing	All materials: AFPS GS 2019 or EN 17132 or ISO 16190	0.2 ppm each
208-96-8	Acenaphthylene				
120-12-7	Anthracene				
191-24-2	Benzo(g,h,i)perylene				
86-73-7	Fluorene				
206-44-0	Fluoranthene				
193-39-5	Indeno(1,2,3-cd)pyrene				
91-20-3	Naphthalene**				
85-01-8	Phenanthrene				
129-00-0	Pyrene				
56-55-3	Benzo(a)anthracene	1 ppm each  Child care articles: 0.5 ppm each	Naphthalene:  Dispersing agents for textile dyes may contain high residual Naphthalene concentrations due to the use of low-quality Naphthalene derivatives (e.g., poor-quality Naphthalene Sulphonate Formaldehyde condensation products).		
50-32-8	Benzo(a)pyrene				
205-99-2	Benzo(b)fluoranthene				
192-97-2	Benzo[e]pyrene				
205-82-3	Benzo[j]fluoranthene				
207-08-9	Benzo(k)fluoranthene				
218-01-9	Chrysene				
53-70-3	Dibenzo(a,h)anthracene				

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Quinoline</b> 				
91-22-5	Quinoline	50 ppm	Found as an impurity in polyester and some dyestuffs. Quinoline can be included with disperse dye testing, as the same method is used for both.	All materials: DIN 54231:2022 with methanol extraction at 70° C	10 ppm
	<b>Solvents and Residuals</b> 				
68-12-2	Dimethylformamide (DMFa)	500 ppm	Solvent used in plastics, rubber, and polyurethane (PU) coating. Water-based PU does not contain DMFa and is therefore preferable.	Textiles: EN 17131:2019 All other materials: ISO 16189:2021	50 ppm each
75-12-7	Formamide	1000 ppm each	Byproduct in the production of EVA foams. Taiwan CNS 15493: BSMI may enforce a limit of 200 ppm in yoga mats under authority of the Consumer Protection Act.		
127-19-5	Dimethylacetamide (DMAC)		Solvent used in the production of elastane fibers and sometimes as substitute for DMFa.		
872-50-4	N-Methyl-2-pyrrolidone (NMP)		Industrial solvent used in production of water-based polyurethanes and other polymeric materials. May also be used as a surface treatment for textiles, resins, and metal-coated plastics, or as a paint stripper.		

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>UV Absorbers / Stabilizers</b> 				
3846-71-7	UV 320	1000 ppm each	PU foam materials such as open cell foams for padding. Used as UV Absorbers for plastics (PVC, PET, PC, PA, ABS, and other polymers), rubber, polyurethane.	ISO 24040 with extraction in THF, analysis by GC/MS	100 ppm each
3864-99-1	UV 327				
25973-55-1	UV 328				
36437-37-3	UV 350				
2440-22-4	Drometrizole	For informational purposes only. AFIRM recommends testing to assess content levels.	Used as UV Absorbers for plastics (PVC, PET, PC, PA, ABS, and other polymers), rubber, and polyurethane.		

## AFIRM Restricted Substances List

CAS No.	Substance	Limits Component Materials in Finished Product	Potential Uses & Additional Information	Suitable Test Method Sample Preparation & Measurement	Reporting Limit Limits above which test results should be reported
	<b>Volatile Organic Compounds (VOCs)</b> 				
71-43-2	Benzene	5 ppm	<p>These VOCs should not be used in textile auxiliary chemical preparations.</p> <p>They are associated with solvent-based processes such as solvent-based polyurethane coatings and glues/adhesives.</p> <p>They should not be used for any kind of facility cleaning or spot cleaning.</p>	<p>For general VOC screening: GC/MS headspace 45 minutes at 120° C</p>	<p>Benzene: 5 ppm Other: 20 ppm each</p>
75-15-0	Carbon Disulfide	Total: 1000 ppm			
56-23-5	Carbon Tetrachloride				
67-66-3	Chloroform				
108-94-1	Cyclohexanone				
107-06-2	1,2-Dichloroethane				
75-35-4	1,1-Dichloroethylene				
100-41-4	Ethylbenzene				
76-01-7	Pentachloroethane				
630-20-6	1,1,1,2- Tetrachloroethane				
79-34-5	1,1,2,2- Tetrachloroethane				
127-18-4	Tetrachloroethylene (PERC)				
108-88-3	Toluene				
71-55-6	1,1,1- Trichloroethane				
79-00-5	1,1,2- Trichloroethane				
79-01-6	Trichloroethylene				
1330-20-7	Xylenes (meta-, ortho-, para-)				
108-38-3					
95-47-6					
106-42-3					

## Appendix A. South Korea KC Mark Soluble Heavy Metal Requirements

**NOTE:** South Korea KC Mark requirements apply to the migration of Heavy Metals from surface coatings/paints, synthetic resins, and paper materials in products intended to be placed in the mouth of children and products intended for infants.

CAS No.	Substance	Limits	Suitable Test Method
7440-36-0	Antimony (Sb)	60 ppm	ISO 8124-3:2010
7440-38-2	Arsenic (As)	25 ppm	
7440-39-3	Barium (Ba)	1000 ppm	
7440-43-9	Cadmium (Cd)	75 ppm	
7440-47-3	Chromium (Cr)	60 ppm	
7439-92-1	Lead (Pb)	90 ppm	
7439-97-6	Mercury (Hg)	60 ppm	
7782-49-2	Selenium (Se)	500 ppm	

# Appendix B. Per- and Polyfluoroalkyl Substances (PFAS)

**NOTE:** This list is a subset of PFAS and is not exhaustive. Findings would indicate intentional use or significant contamination.

CAS No.	PFC (PFAS) Name	CAS No.	PFC (PFAS) Name
	<b>PFOS and Related Substances</b>		<b>PFHxS and Its Salts</b>
1763-23-1	Perfluorooctanesulfonic acid (PFOS)	355-46-4	Perfluorohexane Sulfonic acid (PFHxS)
2795-39-3	Perfluorooctanesulfonic acid, potassium salt (PFOS-K)	3871-99-6	Perfluorohexane Sulfonic acid, potassium salt (PFHxS-K)
29457-72-5	Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	55120-77-9	Perfluorohexane Sulfonic acid, lithium salt (PFHxS-Li)
29081-56-9	Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH <sub>4</sub> )	68259-08-5	Perfluorohexane Sulfonic acid, ammonium salt (PFHxS-NH <sub>4</sub> )
70225-14-8	Perfluorooctane sulfonate diethanolamine salt (PFOS-NH(OH) <sub>2</sub> )	82382-12-5	Perfluorohexane Sulfonic acid, sodium salt (PFHxS-Na)
56773-42-3	Perfluorooctanesulfonic acid, tetraethylammonium salt (PFOS-N(C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> )		<b>PFHxS-related Substances</b>
251099-16-8	Didecyldimethyl ammonium perfluorooctane sulfonate (PFOS-N(C <sub>10</sub> H <sub>21</sub> ) <sub>2</sub> (CH <sub>3</sub> ) <sub>2</sub> )		
4151-50-2	N-Ethylperfluoro-1-octanesulfonamide (N-Et-FOSA)	68259-15-4	N-Methylperfluoro-1-hexanesulfonamide (N-Me-FHxSA)
31506-32-8	N-Methylperfluoro-1-octanesulfonamide (N-Me-FOSA)	41997-13-1	Perfluorohexane sulfonamide (PFHxSA)
1691-99-2	2-(N-Ethylperfluoro-1-octanesulfonamido)-ethanol (N-Et-FOSE)		<b>C9 – C14 PFCAs and Their Salts</b>
24448-09-7	2-(N-Methylperfluoro-1-octanesulfonamido)-ethanol (N-Me-FOSE)		
307-35-7	Perfluoro-1-octanesulfonyl fluoride (POSF)	375-95-1	Perfluorononanoic Acid (PFNA, C9-PFCA)
754-91-6	Perfluorooctane sulfonamide (PFOSA)	335-76-2	Perfluorodecanoic Acid (PFDA, C10-PFCA)
	<b>PFOA and Its Salts</b>	2058-94-8	Perfluoroundecanoic Acid (PFUnA, C11-PFCA)
335-67-1	Perfluorooctanoic acid (PFOA)	307-55-1	Perfluorododecanoic Acid (PFDoA, C12-PFCA)
335-95-5	Sodium perfluorooctanoate (PFOA-Na)	72629-94-8	Perfluorotridecanoic Acid (PFTrDA, C13-PFCA)
2395-00-8	Potassium perfluorooctanoate (PFOA-K)	376-06-7	Perfluorotetradecanoic Acid (PFTeDA, C14-PFCA)
335-93-3	Silver perfluorooctanoate (PFOA-Ag)	172155-07-6	Perfluoro-3-7-dimethyloctanecarboxylate (PF-3,7-DMOA)
335-66-0	Perfluorooctanoyl fluoride (PFOA-F)		<b>C9 – C14 PFCA-related Substances</b>
3825-26-1	Ammonium pentadecafluorooctanoate (APFO)	17741-60-5	1H,1H,2H,2H-Perfluorododecyl acrylate (10:2 FTA)
	<b>PFOA-related Substances</b>	2144-54-9	1H,1H,2H,2H-Perfluorododecyl methacrylate (10:2 FTMA)
39108-34-4	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	865-86-1	1H,1H,2H,2H-Perfluorododecanol (10:2 FTOH)
376-27-2	Methyl perfluorooctanoate (Me-PFOA)	34598-33-9	2H,2H,3H,3H-Perfluoroundecanoic acid (H4PFUnA)
3108-24-5	Ethyl perfluorooctanoate (Et-PFOA)	678-39-7	Perfluorocyclohexanol 8:2 (8:2 FTOH)
678-39-7	Perfluorocyclohexanol 8:2 (8:2 FTOH)	39239-77-5	1H,1H,2H,2H-perfluorotetradecan-1-ol (12:2 FTOH)
27905-45-9	1H,1H,2H,2H-Perfluorodecyl acrylate (8:2 FTA)	120226-60-0	1H,1H,2H,2H-Perfluorodecanesulphonic acid (10:2 FTS)
1996-88-9	1H,1H,2H,2H-Perfluorodecyl methacrylate (8:2 FTMA)	2043-54-1	1H,1H,2H,2H-Perfluorododecyl iodide (10:2 FTI)
27854-31-5	2H,2H-Perfluorodecanoic acid (H2PFDA)	30046-31-2	1H,1H,2H,2H-Perfluorotetradecyl iodide (12:2 FTI)
			<b>Other Perfluoroalkyl Carboxylic Acids (PFCAs)</b>
		307-24-4	Perfluorohexanoic Acid (PFHxA, C6-PFCA)

## Appendix C. Pesticides and Herbicides, Agricultural

CAS No.	Pesticide Name	CAS No.	Pesticide Name	CAS No.	Pesticide Name
93-72-1	2-(2,4,5-trichlorophenoxy) propionic acid, its salts and compounds; 2,4,5-TP	333-41-5	Diazinone	118-74-1	Hexachlorobenzene
		1085-98-9	Dichlofluanide	465-73-6	Isodrine
93-76-5	2,4,5-T	120-36-5	Dichloroprop	4234-79-1	Kelevane
94-75-7	2,4-D	115-32-2	Dicofol	143-50-0	Kepone
309-00-2	Aldrine	141-66-2	Dicrotophos	58-89-9	Lindane
86-50-0	Azinophosmethyl	60-57-1	Dieldrine	121-75-5	Malathione
2642-71-9	Azinophosethyl	60-51-5	Dimethoate	94-74-6	MCPA
4824-78-6	Bromophos-ethyl	88-85-7	Dinoseb, its salts and acetate	94-81-5	MCPB
2425-06-1	Captafol	63405-99-2	DTTB (4, 6-Dichloro-7 (2,4,5-trichloro-phenoxy)-2-Trifluoro methyl benz imidazole)	93-65-2	Mecoprop
63-25-2	Carbaryl			10265-92-6	Metamidophos
510-15-6	Chlorbenzilat	115-29-7	Endosulfan	72-43-5	Methoxychlor
57-74-9	Chlordane	959-98-8	Endosulfan I (alpha)	2385-85-5	Mirex
6164-98-3	Chlordimeform	33213-65-9	Endosulfan II (beta)	6923-22-4	Monocrotophos
470-90-6	Chlorfenvinphos	72-20-8	Endrine	298-00-0	Parathion-methyl
1897-45-6	Chlorthalonil	66230-04-4	Esfenvalerate	1825-21-4	Pentachloroanisole
56-72-4	Coumaphos	106-93-4	Ethylendibromid	7786-34-7	Phosdrin/Mevinphos
68359-37-5	Cyfluthrin	56-38-2	Ethylparathione; Parathion	72-56-0	Perthane
91465-08-6	Cyhalothrin	51630-58-1	Fenvalerate	31218-83-4	Propethamphos
52315-07-8	Cypermethrin	Various	Halogenated naphthalenes, including polychlorinated naphthalenes (PCNs)	41198-08-7	Profenophos
78-48-8	S,S,S-Tributyl phosphorotrithioate (Tribufos)			13593-03-8	Quinalphos
52918-63-5	Deltamethrin	76-44-8	Heptachlor	82-68-8	Quintozene
53-19-0	DDD	1024-57-3	Heptachloroepoxide	8001-50-1	Strobane
72-54-8		319-84-6	a-Hexachlorocyclohexane with & without Lindane	297-78-9	Telodrine
3424-82-6	DDE	319-85-7	b-Hexachlorocyclohexane with & without Lindane	8001-35-2	Toxaphene
72-55-9				731-27-1	Tolyfluanide
50-29-3	DDT	319-86-8	g-Hexachlorocyclohexane with & without Lindane	1582-09-8	Trifluraline
789-02-6					



[www.afirm-group.com](http://www.afirm-group.com)