FRISTADS AB

Restricted Substances List (RSL) - Supplier commitment

CONTRACT

The Fristads AB Restricted Substances List (RSL)

Fristads AB is a member of The Swedish Chemicals Group and has therefore incorporated the limit values of the Chemicals Group's document: *Chemicals Guidance; Information on authorization and restrictions of substances used in textile and leather processes and products*, into this Restricted Substances List (RSL). The ***Chemicals Guidance*** document is found as **Appendix 1** and is continuously updated to reflect changes coming from the EU Harmonized Legislation. Fristads AB requires that **all products**, i.e., textile and/or leather, fabrics, garments, including accessories and packaging materials, delivered by the supplier, must be in compliance with the restrictions listed in Appendix 1. In addition to the restrictions listed in Appendix 1, all products shall at least meet the criteria specified, and limit values listed, in the **OEKO-TEX® Standard 100 Product Class II**, Appendix 4. Limit values for the product related chemicals in Appendix 1 overrule the limit values of the OEKO-TEX® Standard 100 Product Class II unless the limit values of the OEKO-TEX® Standard 100 Product Class II are stricter. The values specified in the Fristads AB Restricted Substances List (RSL) Appendix 1 should be considered as a **maximum** and may never be exceeded.

Due to EU Harmonized Legislation, for Fristads AB, any parent company, sister company, subsidiaries and affiliates of any such company and subsidiary - it is of critical importance to make sure that none of the materials used in our products violates the EU Harmonized Legislation or contains residues of substances that might be harmful to the customer under any circumstances. Fristads AB is also openly committed to ensuring that we as far as technically possible avoid materials that contain substances with known negative consequences for the natural environment.

The specifications on the chemical content in textiles, e.g., fabrics, garments, leather products e.g., gloves, and shoes comprise a part of our company's buying terms. The same applies for the specific requirements regarding content of hazardous chemicals in packaging materials.

It is the responsibility of the supplier to inform subcontractors, dyeing and finishing mills and other parties involved in the production process, of these terms.

Goods containing harmful substances exceeding the maximum values specified in the Appendix 1 and in OEKO-TEX® Standard 100 Product Class II are deemed to be defective. They thereby fail to fulfill the requirements in our buying terms, and we therefore reserve the right to cancel the orders in question, demand damages, or take other action in accordance with the Fristads AB general terms of purchase.

Fristads AB, as the buyer, reserve the right to conduct inspections and tests on ordered lots at any time and at any stage of production. Fristads AB also retains the right to require the supplier to perform specific tests for specific orders, on the suppliers' own expense, to ensure that the requirements are being complied with.

Fristads AB requires that the supplier sign the contract of compliance with Fristads AB Restricted substances list (RSL). By signing this contract of compliance, the supplier agrees that they will be held liable for all losses and damages suffered by any entity in the Fristads AB. The supplier acknowledge that it is a material breach of contract in case a harmful substance, as stipulated in the RSL are being found in any of the materials, components, or products with actual values above the mentioned maximum value which are stated in this document effective from the date of the signature. This material breach of contract gives Fristads AB the right to terminate all contracts with the supplier immediately and without any notice.

Fristads AB requires that the supplier secure the general restriction of 0.1% (w/w) concentration for all Substances of Very High Concern (SVHC) from the Candidate list and Annex XIV. If specified elsewhere in Fristads AB Chemical Restrictions, as in Appendix 1, stricter limits apply.

All our products and packaging materials used for Fristads AB orders must be in compliance with EU harmonized legislation and their amendments for all Fristads AB orders. The latest updates are available for access through the following link:
https://echa.europa.eu/legislation

Legal background

The regulatory framework for EU/EEA is directed by EU/EEA harmonized legislation that includes European Commission (EC) regulations that are immediately enforced in all EU/EEA countries and EU directives that are implemented in EU/EEA national legislation over a certain period of time.

Current EU/EEA regulations with a certain focus on hazardous chemicals in articles that are the overall legal framework in EU/EEA:

- REACH (EC Regulation 1907/2006 with amendments, incl. SVHC Candidate list)
- POPs regulation (EC Regulation No 2019/1021 with amendments)
- Biocide regulation (EC Regulation 538/2012 with amendments)
- EU Waste Legislation (Directive 94/62/EC with amendments)
- EC Product safety regulations (Directive 2001/95/EC)

REACH

Fristads AB is required to comply with the European Chemicals legislation called REACH that is in force since 1st of June 2007. REACH is an abbreviation for Registration, Evaluation, Authorization and restrictions of Chemicals. The essence of REACH is to ensure a high level of safety for human health and environment, focused on substances in general and hazardous substances in particular, that are manufactured in EU, imported into EU and used within EU. It is the responsibility of all manufacturers, importers and users of substances within EU to ensure that the substances they manufacture, import or use do not pose any risk to human health and environment. REACH affects all EU-actors that professionally manufacture, import, sell, buy, distribute or use chemicals as such and in articles. All Fristads AB suppliers are required to follow updated information on the website of the European Chemicals Agency (ECHA), https://ECHA.europa.eu, that is the European Authority for REACH on behalf of the European Commission.

Registration

One of the requirements of REACH is that manufactures of chemicals and importers of chemicals and articles have a duty to register substances. For importers of articles registration requirements apply to substances intentionally released from articles.

Duty to inform your customer on substances for authorization

All EU-actors that professionally manufacture, import, sell or distribute articles are legally obliged to inform their customer about the presence of Substances of Very high Concern (SVHC), (also called candidate substances) in articles they sell. The latest list of SVHC is found on ECHA:s website, https://echa.europa.eu/web/guest/candidate-list-table

It is the responsibility of each supplier to keep updated on:

- The Candidate list of authorization
- Annex XIV of authorization substances
- Annex XVII of restricted substances

By signing this contract of compliance, you are required to secure that Fristads AB products do not contain substances of very high concern (SVHC) from the Candidate list and Annex XIV in a concentration above the limits specified in the Appendix 1. Minimum requirement is to secure that articles do not contain a concentration above 0.1% (w/w).

The full legal text of REACH is enclosed in the link below that include the current text of annex XIV and XVII, see link below, REACH legislation,
https://echa.europa.eu/regulations/reach/legislation

Annex XIV (authorization list),
https://echa.europa.eu/sv/authorisation-list

Annex XVII (restricted substances)
https://echa.europa.eu/sv/substances-restricted-under-reach

Stockholm Convention on Persistent Organic Pollutants (POPs)

Stockholm Convention on Persistent Organic Pollutants, http://chm.pops.int, is an international environmental treaty, that aims to eliminate or restrict the production and use of persistent organic pollutants (POPs), addressed as the Stockholm Convention, Regulation (EU) 2019/1021,
https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32019R1021

Biocidal Product Regulation

The Biocidal Product Regulation (BPR, Regulation (EU) 528/2012),
https://echa.europa.eu/regulations/biocidal-products-regulation/legislation concerns the placing on the market and use of biocidal products, which are used to protect humans, animals, materials or articles against harmful organisms, like pests or bacteria, by the action of the active substances contained in the biocidal product. The Biocidal Products Regulation (BPR) also sets rules for the use of articles treated with, or intentionally incorporating, one or more biocidal products.

EU Waste Legislation on Packaging and Packaging Waste

Directive on Packaging and Packaging Waste 94/62/EC,
https://ec.europa.eu/environment/waste/packaging/legis.htm concerns the management of packaging and packaging waste. The directive includes demands on weight and volume of packaging, content of hazardous substances and materials in the packaging material and its components and the design of reusable or recoverable packaging.

EC Product safety regulations

EU rules on product safety ensure that only safe products are sold on the market.
https://ec.europa.eu/info/business-economy-euro/product-safety-and-requirements/product-safety_en
Directive on general product safety 2001/95/EC,
https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32001L0095 with the purpose to ensure that products placed on the market are safe.

Compliance commitment with the Fristads AB RSL

By signing this contract, the supplier certifies that all articles delivered by the supplier to Fristads AB are produced in compliance with the OEKO-TEX® Standard 100 Product Class II and all additional restrictions related to residues of harmful substances listed in Appendix 1 of the Fristads AB Restricted Substances List (RSL). The supplier accepts to be held liable for all losses and damages suffered by Fristads AB, in case harmful substances, as stipulated in the Appendix 1 enclosed to this contract, are being found in any of the materials, components, products or packing materials with actual values above the mentioned maximum values which are stated in the STANDARD 100 by OEKO-TEX®, Appendix 4, Product Class II, and the Appendix 1 included in the Fristads AB Restricted Substances List, RSL, effective from the date of signature.

By signing this contract, the supplier commits to:

1) communicating the Fristads AB Restricted Substances List with Appendix 1 to all of its subcontractors as well as accessory and chemicals suppliers, and ensure that they are in compliance with the Fristads AB RSL, Restricted Substance List,

2) at own cost conduct relevant lab tests to verify compliance with the Fristads AB RSL and upon request send Fristads AB a copy of the test report,

3) stay continuously updated with latest version of the Appendix 1 and Fristads AB RSL, available for download at Fristads AB web site https://www.fristads.com/en/about-us/sustainability-at-fristads/our-responsibility By effect, this means that the supplier also must comply with restrictions on substances added to the Fristads AB RSL after the date of supplier signing the contract.

4) stay continuously updated with the EU Harmonized legislation and additionally with REACH Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH): https://echa.europa.eu/candidate-list-table

5) secure that no substances of concern from the Candidate list and Annex XIV are present in Fristads AB products over the limits specified in the Appendix 1.

Fristads AB reserves the right to, at any time, conduct its own random tests to ensure that articles produced for Fristads AB are in compliance with the Restricted Substances List, RSL.

Liquidated damages clause regarding violations of the Fristads AB RSL

If articles produced for Fristads AB are found to contain prohibited amounts of substances specified in the Fristads AB Restricted Substances List after shipment and payment to supplier has taken place already, supplier shall pay a fine of minimum the amount Fristads AB was invoiced by the supplier for the damaged goods. If Fristads AB can document that losses are larger than the amount invoiced by the supplier, the fine shall be adjusted accordingly. Supplier will also have to ensure that **a)** articles remaining to be produced for Fristads AB no longer exceed the restricted substance's limit values, and **b)** the goods are approved by Fristads AB prior to next shipping/transportation.

Supplier: ……..
Address: ……..
……..
……..
Phone: ……..
Email: ……..
Date: ……..

On behalf of the Supplier: Company Stamp/Seal

Signature: ……..

Name in print: ……

Position: ……..

This document must be signed by a duly authorized representative of the company and returned:

By email to compliance.documents.hk@fristadskansas.com

By mail to:
FRISTADS AB
Att: Sourcing Department
Prognosgatan 24, SE-501 11 Borås, Sweden

Appendix 1

See document *'Chemicals Guidance; Information on authorization and restrictions of substances used in textile and leather processes and products'* in next pages.

CHEMICALS GUIDANCE

Information on authorization and restrictions of substances used in textile and leather processes and products

Edition: August 2022

The Swedish Chemicals Group, RISE

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PREFACE

This guide is developed to facilitate for importing companies to comply with the chemical legislation and recommendations in force in the fields of textiles, clothes, leather goods, shoes and packaging material. By requiring that their suppliers follow these guidelines, and thereby avoiding importing products containing unwanted substances, human health and the environment are protected in producing, supplying and importing countries. Import of the mentioned products from, in particular, developing countries to the European Union (EU) and EEA is also facilitated and promoted by this guide.

The guide covers all harmonized chemicals EU-regulation affecting textile and leather products. The distinguishing properties of the chemicals and the processes in which they are used are described in the guide.

The stipulated test equipment is commonly occurring, and the quantification limits (LOQ) are generally accepted. Please note that when limit values are given, possible contamination by the external environment and inaccuracy in the measurement of very low concentration must be taken into consideration.

Recommended substitutes are less harmful while providing the desired effect or property.

The guide exists in several languages. To facilitate communication, the contents on each page are identical in each linguistic version. The English version of this guide is preferential for interpretation.

EXPLANATORY SECTION
Word list

Required limit value:	Limit value as agreed in business sector and or by legal requirements. Note that limit value is measured in products. Weight percent shall be calculated from the weight of the whole product if nothing else is stated.
CAS RN:	Chemical abstract services registration number. CAS RN are given for specific defined substances.
Properties:	Human toxicological and Eco toxicological properties.
Use:	Identified uses on the market.
Comments:	Information on known alternatives and recommendations on how to avoid unwanted chemicals.
Detection limit:	Limit of detection (LOD). Lowest concentration the test equipment is able to detect. This can vary between different test laboratories. Note that detection limit is not relevant as required limit values for all substances as the background concentrations can be notably higher.
Legal background:	Current legal international and national framework and requirements. Substances listed on Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH) leads to information duty if the concentration is above 0.1 weight-% (1000 mg/kg).
MADL:	Maximum Allowable Dose Levels. Safe harbor levels for chemicals causing reproductive toxicity in Proposition 65.
NSRL:	No Significant Risk Levels. Safe harbor levels for cancer-causing chemicals in Proposition 65.
Quantification limit:	Limit of quantification (LOQ). The smallest concentration of an analyte that can be reliably measured by an analytical procedure.
Test method:	Standardized test method if such exists. ISO/EN standards are prioritized over national or commercial standards. Test equipment if no standardized test method exists. Abbreviations of recommended test equipment are explained below. All substances in a chemical group may not be legally regulated, but still included as a chemical group in this guide. As it can distinguish between different laboratories which substances besides the legal restricted, they offer test for, this should be confirmed before ordering.
Packaging material:	According to Directive (EC) No 94/62/EC of 20 December 1994 on packaging and packaging waste. The directive regulates substances in packaging material; meaning all products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer.

Test equipment abbreviations

ANALYSIS OF ORGANIC COMPOUNDS

• **Gas chromatography: GC** Detectors used together with GC:
- MS: Mass selective detector: GC-MS
- DAD: Diode array detector: GC-DAD
- ECD: Electron capture detector: GC-ECD

• **Liquid chromatography: LC**

Note: Sometimes the abbreviation HPLC is used.
It stands for High Performance Liquid Chromatography. Detectors used together with LC:
- MS: Mass selective detector: LC-MS
- DAD: Diode array detector: LC-DAD
- ECD: Electron capture detector: LC-ECD
- UV/VIS: Ultraviolet/visible spectrophotometric detector: LC-UV/VIS

ANALYSES OF METALS

• **Inductively Coupled Plasma Spectrometry: ICP** Detectors together with ICP:
- OES: Optical emission spectrometer: ICP-OES
- MS: Mass selective detector: ICP-MS

• **Atomic absorption spectrophotometer: AAS**

SCREENING ANALYSES OF ELEMENTS

• **X-ray fluorescence, XRF**

Relationship between units used in the guide

1000	mg/kg	equals	1000	ppm	(parts per million)
			1 000 000	ppb	(parts per billion)
			1 000 000	µg/kg	(microgram per kilogram)
			0.1	% (by weight)	
			x	µg/m²	x depends on the thickness of the fabric (kg/m²)
			x	µg/cm² /week	x is a measure of the release of a substance from a surface, and is only partially dependent on the concentration of the substance

Relationship between surface concentration and total concentration (relevant for PFAS restrictions for example)

Substance [µg/m²]	Surface weight [g/m²]		Substance [ppb = µg/kg]
1	40	equals	25
2.5	100	equals	25
5	200	equals	25

Substance [ppb = µg/kg]	Surface weight [g/m²]		Substance [µg/m²]
25	40	equals	1
25	100	equals	2.5
25	300	equals	7.5

Product and material categories concerned

All chemicals are not used in all materials. A general division into the categories listed below has therefore been made that may be applicable to several kinds of articles due to their material composition.

Textile Textile material, both natural and synthetic fibres	**Leather** Leather, both natural and leather imitation	**Accessories** Metal, plastics, rubber etc. used in e.g. buckles, buttons, jewellery and zippers.	**Packaging** Packaging material in accordance with the Packaging Directive 94/62/EC. Paper cardboard, plastic bags, tags, labels, plastic sleeves etc.

PROCESS CHEMICALS

Process chemicals are used in the manufacturing process of the textile and leather goods but have no function in the finished product. Remains of the process chemicals may however be found in the finished product and cause health or environmental problems.

Alkylphenol ethoxylates (APEO) and derivatives

The most common APEOs are Nonylphenol ethoxylates (NPEO) and Octylphenol ethoxylates (OPEO).

Required limit value:

Should not be used in processes. Occurrence in products below 100 mg/kg (0.01%) for total APEO is regarded as unintended residues (contaminants) which cannot be controlled.

CAS RN:

Various

Properties:

Irritating to skin. The metabolites affect the respiratory system, have endocrine disruptive effect (hormones) and are dangerous for the environment. Nonylphenol ethoxylates are rapidly degraded to 4-nonylphenol, which is even more dangerous for the environment. A similar environmental danger is the degradation of octylphenol ethoxylate into 4-octylphenol.

Use:

Dispersing and emulsifying agents in textile chemicals as well as impregnation agents in printing pastes. Occurs in leather lubricants. Manufacturing of coatings.

Comments:

The main alternatives for NPEOs include aliphatic alcohol ethoxylates, both linear and branched, and glucose-based carbohydrate derivatives such as alkylpolyglucoside, glucamides, and glucamine oxides.

Legal background:

Legal limit: 0.1% by weight for nonylphenol ethoxylate (NPEO) as a substance or constituent of preparations (closed systems exempted), entry 46. NPEOs shall not be placed on the market in textile articles, in concentrations equal to or greater than 0.01% by weight of that textile article or of each part of the textile article. Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 46a.
Norway restricts manufacture, import, export, sale and use of octylphenol and octylphenol ethoxylates, and mixtures containing these substances, FOR 2004-06-01-922.
4-Nonylphenol, branched and linear (4-NP, various CAS RN), 4-Nonylphenol, branched and linear, ethoxylated (4-NPnEO, various CAS RN), 4-(1,1,3,3-tetramethylbutyl)phenol (4-tert-OP, CAS RN 140-66-9), 4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated (4-tert-OPnEO, UVCB substance, no CAS RN), 4-tert-butylphenol (CAS RN 98-54-4) and tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with = 0.1% w/w of 4-nonylphenol, branched and linear (4-NP) (no CAS RN) are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).
4-NPnEO and 4-tert-OPnEO are also included in Annex XIV to REACH.
Prop 65: APEOs are not listed under Proposition 65.

Test method:

ISO 18254 (textile), APEO
EN ISO 21084 (textile), AP
ISO 18218-1 (leather)

LOQ: 10 mg/kg

Arsenic compounds

Required limit value	Should not be present in products.
CAS RN:	Various
Properties:	May cause cancer. Toxic by inhalation and toxic if swallowed. Persistent, bioaccumulative and toxic.
Use:	Fining agent in glass, pigment in metal alloy, preservative.
Comments:	Apply arsenic free compounds.
Legal limit:	Diarsenic Pentoxide; 1303-28-2 Diarsenic Trioxide; 1327-53-3 Triethyl arsenate; 15606-95-8 Arsenic acid; 7778-39-4 Calcium arsenate; 7778-44-1 are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH). As wood preservatives regulated in Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 19 (limit level; no intentionally added content). Arsenic and its compounds have a restriction limit of 1 mg/kg (extractable content) in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). Prop 65: Inorganic arsenic compounds are known to the State of California to cause cancer. Safe Harbor Limit: NSRL 0.06 µg/day (inhalation), 10 µg/day (except inhalation). No information on settlements. Inorganic arsenic oxides are known to the State of California to cause birth defects or other reproductive harm. Safe Harbor Limit: None. No information on settlements.
Test method:	EN 16711-1 (total content in textiles). EN 16711-2 (extractable content in textiles). (Coated fabrics and garment components (e.g. buttons, zips, etc.) can also be tested by these method.) LOQ: 0.1 mg/kg (extractable content)

Bisphenols

Required limit value:	Should not be present in products.
CAS RN:	Bisphenol A; BPA (4,4’-isopropylidenediphenol): 80-05-7 2,2-bis(4'-hydroxyphenyl)-4-methylpentane: 6807-17-6 Bisphenol B; (4,4'-(1-methylpropylidene)bisphenol): 77-40-7
Properties:	Toxic for reproduction. Endocrine disrupting properties.
Use:	Mainly used in manufacture of polycarbonate epoxy resins and chemicals; hardener in epoxy resins and in thermal prints. May be used as catalyst and antioxidant for processing PVC. Different bisphenols occur as impurities in leather processing.
Comments:	Left as residues in polycarbonate and epoxy. Can be found in products with material based on plastic and paper.
Legal background:	BPA, Bisphenol B and 2,2-bis(4'-hydroxyphenyl)-4-methylpentane are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH). Bisphenol A (BPA) content in thermal paper (0.02% by weight), is restricted from January 2020 according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 66. In California: BPA is listed in Proposition 65. Safe Harbor Limit: MADL 3 µg/day (dermal exposure from solid materials). There are settlements at 3 ppm, 20 ppm or zero limit. Note that the settlements apply only for the specific article in that settlement
Test method:	No standardised test method available. Test equipment LC-MS, GC-MS. LOQ: 10 mg/kg

C,C’-azodi(formamide) (ADCA)

Required limit value:	Should not be used in processes or present in products.
CAS RN:	123-77-3
Properties:	Respiratory sensitizer.
Use:	Azodicarbonamide, or azodiformamide is mainly used as a chemical blowing agent in the rubber and plastics industry. Blowing agent in especially EVA and PVC.
Comments:	Can leave residues of formamide in the material. ADCA may decompose into semicarbazide, a suspected carcinogen. Use physical blowing agents such as carbondioxide, hydrocarbons or nitrogen as alternative to chemical blowing agents when possible.
Legal background:	ADCA is listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).
Test method:	No standardised test method available for textiles. Test equipment: GC-MS, LC-MS LOQ: 200 mg/kg

Ethylenediamine (EDA)

Required limit value:	Should not be used in processes or present in products.
CAS RN:	107-15-3
Properties:	Respiratory and skin sensitizer.
Use:	Used in the production of many industrial chemicals. Used in the production of polyurethane fibres.
Legal background:	Ethylenediamine is listed on the Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH).
Test method:	No standardised test method available. Test equipment: LC-MS, GC-MS LOQ: 100 mg/kg

Ethylenethiourea

Required limit value: Should not be present in products.

CAS RN: Imidazolidine-2-thione (2-imidazoline-2-thiol) also called ethylenethiourea: 96-45-7

Properties: Toxic for reproduction.

Use: Used primarily as an accelerator for vulcanizing rubber.

Legal background: Ethylenethiourea is listed on the Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH).

Prop 65: Ethylenethiourea is known to the State of California to cause cancer and birth defects or other reproductive harm Safe Harbor Limit: NSRL 20 µg/day. None for reproductive harm.
No information on settlements.

Test method: No standardised test method available.

Test equipment: LC-MS
LOQ: 20 mg/kg

Formamide

Required limit value:	Should not be present in products.
CAS RN:	75-12-7
Properties:	Toxic for reproduction.
Use:	Formamide is used as solvent for example in the production of synthetic leather and inks. Furthermore, formamide is used as a solvent and plasticizer in consumer products. It can be an ingredient as softener for paper, water soluble glues and wood stains. During processing of foam, formamide is formed as a by-product at higher temperatures. Especially tosylsemicarbazide and azodicarbonamide (see headline ADCA above) are responsible for the presence of formamide in EVA-consumer products.
Comments:	For the application as solvent, formamide might be replaced by other solvents like dipropylene glycol. Potential alternatives as N,N-dimethylformamide, N-methylformamide or ethylene glycol ethers are not considered to be adequate substitutes due their similar toxicity to reproduction.
Legal background:	Formamide is listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH). Formamide is restricted in puzzle mats in Belgium and France and is included in the Toy Safety Directive (limit value 200 mg/kg).
Test method:	No standardised test method available. Solvent extraction. Test equipment: GC-MS or LC-MS LOQ: 50 mg/kg

Hydrazine

Required limit value:	Should not be used in processes or present in products.
CAS RN:	302-01-2, 7803-57-8
Properties:	Carcinogenic, allergenic, toxic.
Use:	Mainly used as a chemical blowing agent in preparing polymer foams.
Comments:	Use physical blowing agents such as carbondioxide, hydrocarbons or nitrogen as alternative to chemical blowing agents when possible
Legal background:	Hydrazine is listed on the Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH). Prop 65: Hydrazine is known to the State of California to cause cancer. Safe Harbor Limit: NSRL 0.04 µg/day. No information on settlements.
Test method:	No standardised test method available for textiles. Test equipment: UV-VIS Spectrometer. Detection limit: There is no standard international detection limit yet. Test equipment: GC-MS LOQ: 200 mg/kg

Hydroxymethyl acrylamide

Required limit value:	Should not be used in processes or present in products.
CAS RN:	N-(hydroxymethyl)acrylamide: 213-103-2
Properties:	Mutagenic, Carcinogenic, Allergenic (skin sensitizing)
Use:	Used as a monomer in various applications in textiles and paper. In adhesives, as binders as well as in surface coatings and resins for varnishes, films and sizing agents. It is used in textile finishing for crease resistance, in antistatic agents and to increase the wet strength of paper.
Comments:	Residues of this monomer can be left in low concentrations in textile and paper products. Decomposition can cause the formation of formaldehyde.
Legal background:	Included in the Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 of the European Parliament of the Council (REACH).
Test method:	No standardised test method available. Test equipment LC-MS, GC-MS. LOQ: 500 ppm

PAH - Polycyclic aromatic hydrocarbons

Required limit value:
Should not be used in processes or present in products.

CAS RN:
Various, regulated PAHs are listed in Appendix 9.

Properties:
Carcinogenic, allergenic, toxic. Several are persistent, bioaccumu lative and toxic in the environment.

Use:
PAHs are not synthesized chemically for industrial purposes.
The major source of PAHs is the incomplete combustion of organic material such as coal, oil and wood.

They are used as intermediaries in pharmaceuticals, agricultural products, photographic products, thermosetting plastics, lubricating materials, and other chemical industries. May be found as impurities in rubber materials, soft plastics, leather, and colored plastics containing carbon black.

Comments:
Avoid critical sources for PAH such as Carbon Black and contaminated mineral oil-based lubricants (extender oil) in rubber.

Legal background:
Regulated PAHs are listed in Appendix 9.

Eight PAHs are listed in annex XVII, entry 50 of the Regulation (EC) No 1907/2006 (REACH). Rubber and plastic materials in skin contact shall not include any of those eight PAHs in amounts higher than 1 mg/kg. For materials in toys or childcare articles the limit value is 0.5 mg/kg.

Eight PAHs are listed in annex XVII, entry 72 (CMR fast track) of the Regulation (EC) No 1907/2006 (REACH), with a restriction limit of 1 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear.
The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE).

Ten PAHs are included in the Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH).

The voluntary German GS standard that most products in the German market follows, has requirements for 16 PAHs.

Prop 65: Several PAH are known to the State of California to cause cancer. Safe Harbor Limit: NSRL 0.033-0.35 µg/day. No information on settlements.

Test method:
AfPS GS 2019-01 PAK
ISO/TS 16190 (footwear)
EN 17132 (textile)
LOQ: 0.2 mg/kg

Quinoline

Required limit value:	Should not be present in products.
CAS RN:	91-22-5
Properties:	Carcinogenic and mutagenic.
Use:	Quinoline is used mainly as an intermediate in the manufacture of other products. Quinoline is also used as a catalyst or vulcanisation accelerator in rubber, a corrosion inhibitor, in metallurgical processes, in the manufacture of dyes, in polymers, and as a solvent for resins and terpenes. Many disperse and vat dyes may contain quinoline as a contaminate in their dispersing agents.
Comments:	Isoquinoline (CAS RN 119-65-3) with similar structure (and con cerns) as quinoline, and other quinoline derivates have similar area of use.
Legal background:	Quinoline have a restriction limit of 50 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). Prop 65: Quinoline is known to the State of California to cause cancer. Safe Harbor Limit: None. No information on settlements.
Test method:	No standardised test method available for textiles or leather. Test equipment: GC-MS, LC-MS. LOQ: 10 mg/kg

Solvents - Aliphatic organic solvents

Required limit value:	No odour.
CAS RN:	Various
Properties:	Liquids or gases. Inhalation can affect the nervous system and cause headache, fatigue and nausea , as well as chronic effects. Cause irritation on skin, eyes and mucous membranes.
Use:	Solvents for dyeing and printing. Solvents that have been used for cleaning of spinning oils from textiles are often found in amounts of 10-20 mg/kg. The limit for humans to sense a smell lies around 100 mg/kg for most substances.
Comments:	If possible, chose water-based systems based on easily degradable surfactants. If not possible to switch over to water basedwater-based systems, there are statutory hygienic limit values for employees in many countries for strict compliance to maintain workers safety
Legal background:	2-methoxyethyl acetate, CAS RN 110-49-6, and formamide, CAS RN 75-12-7, are two aliphatic solvents listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).
Test method:	SNV 195 651, screening method. Panel odour test. Detection limit: No odour. No standardized quantitative test method available. Test equipment: GC-MS

Solvents - Aromatic organic solvents

Required limit value: Should not be present in products.

CAS RN: Various

Properties: Liquids or gases. Inhalation can affect the nervous system and cause headache, fatigue and nausea , as well as chronic effects. Cause irritation on skin, eyes and mucous membranes. Kerosene and diesel odour in finished products. Some aromatic organic compounds are carcinogenic.

Use: Solvents for dyeing and printing. Stain removal. Coatings and binders.

Comments: To avoid problems with organic solvents, switching to water based dyeing and printing processes, based on easily degradable surfactants, is recommended. Many but not all. Aaromatic organic solvents are volatile organic compounds (VOC). If not possible to switch over to water based systems, there are statutory hygienic limit values for employees in many countries for strict compliance to maintain workers safety. Replace simple aromatic hydrocarbons (petrol) with low-molecularweight aliphatic hydrocarbons. To avoid problems with organic solvents, switching to water-based dyeing and printing processes is recommended.

Legal background: Benzene (CAS RN 71-43-2) have a restriction limit of 5 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE).

Manufacturers in the EU are required to follow the Industry Emissions Directive “IED”, 2010/75/EU.

Prop 65: Benzene is known to the State of California to cause cancer and birth defects or other reproductive harm. Safe Harbor Limit: NSRL 6.4 µg/day (oral), 13 µg/day (inhalation). MADL: 24 µg/day (oral), 49 µg/day (inhalation). No information on settlements.

Test method: SNV 195 651, screening method. Panel odour test.
Detection limit: No odour. No standardised quantitative test method available.
Test equipment: GC-MS
(EN 17137 (textile) can be used as reference for in-house methods though it only applies to chlorobenzenes and chlorotoluenes)
LOQ: 0.5 mg/kg

Solvents - Chlorinated organic solvents

Required limit value: Should not be used in processes or present in products.

CAS RN: Various

Properties: Liquid or gas. Affect the nervous system. Irritating to skin and mucous membranes. Many chlorinated organic solvents are dangerous for the environment.

Use: Solvents used in the manufacture of rubber, metal paint and fur industry used for grease and oil, e.g. in stain removers. Also used in cleaning agents and detergents. Solvents in lubricating oils. Solvents in dyeing of synthetic fibres (carriers) at atmospheric pressure. Solvents in printing. Finishing agents. Fabric softeners. Also used as moth-proofing agent in textiles and for the manufacture of silk and pearls.

See also under heading “Flame retardants”.

Comments: Where possible, apply water-based emulsions based on easily degradable surfactants. Alternative products are available or under development for all uses.

Carriers do not need to be used for dyeing in high-pressure machinery.

Categories of carriers also recommended not to be used: Chloronaphthalenes, which are toxic and cause liver damage, chlorobenzenes and chlorotoluenes, which are toxic and can cause liver and kidney damage and irritate eyes and airways.

Legal background: Manufacturers in EU are required to follow the Industry Emissions Directive (IED), 2010/75/EU.
Prop 65: Several chlorinated solvents are known to the State of California to cause cancer and/or birth defects or other reproductive harm. Safe Harbor Limit: NSRL 3-50 µg/day. No information on settlements

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Solvent	CAS-RN	Legal framework	Legal requirement
Chloroform 1,1,2-trichloroethane 1,1,2,2-tetrachloroethane 1,1,1,2-tetrachloroethane Pentachloroethane 1,1-dichloroethylene 1,4-dichlorobenzene	67-66-3 79-00-5 79-34-5 630-20-6 76-01-7 75-35-4 106-46-7	Annex XVII of Regulation (EC) No 1907/2006 (REACH).	Shall not be placed on the market, or used as substances, as constituents of other substances or in mixtures in concentrations equal to or greater than 0.1% by weight.
Carbon tetrachloride 1,1,1-trichloroethane	56-23-5 71-55-6	Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer.	Shall not be produced, placed on the market, or used.
α,α,α-trichlorotoluene p-chlorobenzotrichloride α,α,α,4tetrachlorotoluene; benzotrichloride α-chlorotoluene; benzyl chloride	5216-25-1 98-07-7 100-44-7	Annex XVII of Regulation (EC) No 1907/2006 (REACH).	1 mg/kg[1]
Trichloroethylene	79-01-6	Listed in both annex XIV and in the Candidate List of Substances of Very High Concern for authorization and annex XIV in Regulation (EC) No 1907/2006 (REACH).	0.1% by weight in articles for information duty.
1,2,3-trichloropropane	96-18-4	Candidate List of Substances of Very High Concern for authorization in Regulation(EC) No 1907/2006 (REACH).	0.1% by weight in articles for information duty.

[1] *The named solvents have a restriction limit of 1 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE).*

Test method:

No standardised test method for all substances available.
Test equipment: GC-MS, GC-ECD
EN 17137 (textile) for chlorotoluenes and chlorobenzenes.
LOQ: 0.5 mg/kg

Solvents - DMFa (N,N-dimethylformamide)

Required limit value:	Should not be present in products in concentrations above 500 mg/kg (sum of DFMa, DMAC and NMP).
CAS RN:	N,N-dimethylformamide (DMFa): 68-12-2
Properties:	Toxic to reproduction. It may have a faint amine odour in finished products.
Use:	Good solvency properties for polymers. Used as solvent in textile coating processes and in production of leather imitations, acrylic fibers, aramide fibers and elastomers such as PU. Can also be used for resins, metal coated plastics and as a paint stripper.
Comments:	Use “water-borne” PU, if possible, which contain less DMFa.
Legal background:	Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH). DMFa have a restriction limit of 3000 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). The standard for protective gloves (PPE) limits DMFa (1000 ppm) in gloves containing PU. Restricted in polyurethane-coated work gloves in Germany. The maximum DMFa content must be less than 10 mg/kg glove material (TRGS 401). Prop 65: DMFa is known to the State of California to cause cancer. Safe Harbor Limit: None. No information on settlements.
Test method:	EN 16178 (footwear and footwear components) EN 16778 (protective gloves) CEN ISO/TS 16189 (footwear and footwear components) EN 17131 (textile) Test equipment: GC-MS LOQ: 10 mg/kg

Solvents - DMAC (N,N-dimethylacetamide)

Required limit value:	Should not be present in products in concentrations above 500 mg/kg (sum of DFMa, DMAC and NMP).
CAS RN:	N,N-dimethylacetamide (DMAC): 127-19-5
Properties:	Toxic to reproduction, irritating.
Use:	Good solvency properties for polymers. Used as solvent in textile coating processes and in production of leather imitations, acrylic fibers, aramide fibers and elastomers such as PU. Can also be used for resins, metal coated plastics and as a paint stripper.
Comments:	Use “water-borne” systems if possible.
Legal background:	Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH). DMAC have a restriction limit of 3000 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). In California: DMAC is listed in Proposition 65.
Test method:	EN ISO 19070 (leather) No standardised quantitative test method available for textiles. (EN 17131 can be used as reference for in-house methods though it only applies to DMFa) Test equipment: GC-MS, LC-MS LOQ: 10 mg/kg

Solvents - NMP (N-methyl-2-pyrrolidone)

Required limit value:

Should not be present in products in concentrations above 500 mg/kg (sum of DFMa, DMAC and NMP).

CAS RN:

N-methyl-2-pyrrolidone (NMP): 872-50-4

Properties:

Toxic to reproduction, irritating.

Use:

Good solvency properties for polymers. Used as solvent in textile coating processes and in production of leather imitations, acrylic fibers, aramide fibers and elastomers such as PU. Can also be used for resins, metal coated plastics and as a paint stripper.

Polyamide precursor. SBR (styrene-butadiene) latex production.

Comments:

Use “water-borne” systems if possible. Note that NEP (1-ethylpyrrolidin-2-one), CAS 2687-91-4 is not a suitable alternative to NMP since it is Reproduction Toxic 1B (a CMR substance) and ongoing regulation of a limit value for working environment

Legal background:

Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH) NMP have a restriction limit of 3000 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). NMP has also a limit value for working environment under Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 71.

In California: NMP is listed in Proposition 65. Safe Harbor Limit: MADL 3200 µg/day (inhalation), 17000 µg/day (dermal).

Test method:

EN ISO 19070 (leather)

No standardised quantitative test method available for textiles. (EN 17131 can be used as reference for in-house methods though it only applies to DMFa)

Test equipment: GC-MS, LC-MS
LOQ: 25 mg/kg

Tin organic compounds (Organostannic compounds)

Required limit value: Should not be present in products.

CAS RN: Various

Properties: Tributyltin, dibutyltin and dioctyltin compounds are different chemical substances that are toxic and dangerous for the environment. Bioaccumulative and persistent.

Use: Dibutyltin compounds (DBT) and dioctyltin compounds (DOT) are used in consumer products as stabilizers (mainly PVC) or catalysts (PU and PVC). Organotin catalysts are used in a wide variety of polyurethane applications, aiding formation of the urethane bond and generally functioning as Lewis acid catalysts.

Comments: Alternative stabilizers are barium/zinc, potassium/zinc, calcium, calcium/zinc organic or methyltin stabilisers. Alternative catalysts can be zirconate compounds (e.g. titanium 2-ethylhexanoate) or amines such as bis- (dimethyl-aminoethyl) ether (BDMAEE) and triethylenediamine (TEDA) along with organometallic compounds such as potassium acetate. Dialkyl tin compounds represents a large family of substances that consist of the following common constituents, see list of DBTs in Annex 4. Trialkyltin compounds are biocides, see also the section regarding Biocidal agent.

Legal background: Legal Limit: 0.1% by weight Dioctyltin (DOT), dibutyltin (DBT) compounds and tri-substituted organostannic compounds such as tributyltin (TBT) shall not be used in articles. Annex XVII of the Regulation (EC) No 1907/2006 (REACH), entry 20. Tributyltin oxide (TBTO), 56-35-9, Dibutyltin dichloride (DBTC),
683-18-1, 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia4-stannatetradecanoate (DOTE), 15571-58-1 and reaction mass of DOTE and MOTE [2], Dibutylbis(pentane-2,4-dionato-O,O')tin, 22673-19-4 and Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).

Test method: EN ISO 22744-1, -2 (textile) CEN ISO/TS 16179 (footwear).

Test equipment: GC-MS.
LOQ: 0.2 mg/kg

[2] *reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate*

Allergenic dyes

21 dyes are listed in Appendix 1

Required limit value:	Should not be present in products.
CAS RN:	Various
Properties:	Highly allergenic (strong sensitizers). They may also have other hazardous properties.
Use:	Dyeing of textile and leather imitation goods.
Comments:	Use other feasible dyes that are not hazard classified as skin sensitizers (skin allergens).
Legal background:	Legal limit: 0.1% by weight for Navy Blue, EC# 405-665-4 in chemical preparations used for colouring textile and leather articles in Annex XVII (entry 43) of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH). Eight disperse dyestuffs are banned in Germany, see Appendix 1.
Test method:	EN ISO 16373 (extractable dyestuffs). DIN 54231 for textiles (qualitative and not recommended). LOQ: 50 mg/kg

Banned arylamines related to azo dyes

Substances are listed in Appendix 2

Required limit value:
Azo dyes that are degradable to carcinogenic arylamines should not be present in products.

CAS RN:
Various

Properties:
Carcinogenic. Some are allergenic. Arylamines can form part of the molecular structure of a dye. Certain azo dyes can form the listed banned arylamines.

Use:
Constituent of dyes. Dyeing and printing.

Comments:
Dyes that can release one of the banned aromatic amines may not be used. See Appendix 2 for a description of banned arylamines.

Legal background:
Legal limit in textile and leather articles: 0.003% by weight(30 mg/kg) per each of the arylamine breakdown products in the dyed parts of the article, which may come into direct and prolonged contact with the human skin or oral cavity.
Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 43. 4-chloro-o-toluidinium chloride, 2-Naphthylammoniumacetate, 4-methoxy-m-phenylene diammonium sulphate, 2,4-diaminoanisole sulphate and 2,4,5-trimethylaniline hydrochloride have a restriction limit of 30 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). Several arylamines are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).

The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). Azo colorants that may release carcinogenic amines mentioned in REACH, entry 43 are limited in PPE clothing and protective gloves.

Prop 65: Several arylamines are known to the State of California to cause cancer. Safe Harbor Limit: NSRL 0.001-110 µg/day. No information on settlements.

Test method:
EN ISO 14362-1, -3 (textile)
EN ISO 17234-1, -2 (leather)
(methods specified in REACH Annex XVII, Appendix 10)

LOQ: 20 mg/kg (per each of the arylamine breakdown products).

Benzotriazols (UV-320, UV-327, UV-328 and UV-350)

Required limit value:	Should not be present in products.
CAS RN:	2-benzotriazol-2-yl-4,6-di-tert-butylphenol 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-320); 3846-71-7 (UV-327); 3864-99-1 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328); 25973-55-1 2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350); 36437-37-3
Properties:	Persistent, Bioaccumulative and Toxic. Very Persistent and very Bioaccumulative.
Use:	UV-stabilizer for plastics, polyurethanes and rubber and constituent in formulations used for coating of surfaces, e.g. cars or special industrial wood coatings. Also used in dishwasher detergents, dry cleaning equipment, and de-icing/anti-icing fluids.
Legal background:	UV-320, UV-327, UV-328 and UV-350 are listed in the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).
Test method:	ISO 24040:2022 Test equipment: GC-MS, LC-MS, GC-ECD LOQ: 50 mg/kg

3-benzylidene camphor

Required limit value:	Should not be present in products.
CAS RN:	BC (1,7,7-trimethyl-3-(phenylmethylene)bicyclo[2.2.1] heptan-2-one); 15087-24-8
Properties:	Endocrine disrupting properties.
Use:	UV-stabilizer for cosmetics, but possibly also for polymeric materials such as plastics, polyurethanes and rubber.
Legal background:	1,7,7-trimethyl-3-(phenylmethylene)bicyclo[2.2.1]heptan-2-one (3-BC) is listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).
Test method:	No standardised test method available. Test equipment: LC-MS, GC-MS LOQ: 100 mg/kg

Cadmium (Cd) and cadmium salts

Required limit value:	Should not be present in products.
CAS RN:	Cadmium (metal): 7440-43-9
Properties:	Heavy metal that occurs naturally in small quantities in nature. Toxic to aquatic organisms. Non-biodegradable. Dangerous for the environment. Can cause kidney damage.
Use in textile and leather:	Can occur in pigmented plastisol(rubber prints.
Use in accessories and packaging:	Surface treatment. Pigment in colouring agent. Also in plastics as stabilizers and pigment. Cadmium-based stabilizers to increase the endurance of the material. For recycled packaging cadmium may have had a different original use.
Comments:	Alternatives are available, such as calcium-zinc based stabilizers. Order cadmium-free processes and materials. Occurrence in materials below 0.5 mg/kg is generally regarded as contaminations which cannot be controlled.

Legal background:

Legal limit: 0.01% by weight (100 mg/kg) in articles produced from plastic material and in the paint of painted articles.
Shall not be used in brazing fillers or in jewellery. Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 23.

Cadmium, Cadmium oxide (1306-19-0), Cadmium sulphide (1306-23-6), Cadmium chloride (10108-64-2), Cadmium fluoride (7790-79-6), Cadmium sulphate (10124-36-4, 31119-53-6), Cadmium nitrate (10325-94-7), Cadmium carbonate (513-78-0) and Cadmium hydroxide (21041-95-2) are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).

The sum of concentration levels of lead, cadmium, mercury and hexavalent chromium present in packaging or packaging components shall not exceed 100 ppm by weight.

Directive (EC) No 94/62/EC of 20 December 1994 on packaging and packaging waste.

Cadmium and its compounds have a restriction limit of 1 mg/kg (extractable content) in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE).

Prop 65: Cadmium and cadmium compounds are known to the State of California to cause cancer and birth defects or other reproductive harm Safe Harbor Limit: MADL cadmium 4.1 µg/day (oral). None for cancer effects. No information on settlements.

Cadmium is restricted in Denmark. Danish legal limits: 75 mg/kg. (Bekendgørelse nr. 858 af 5. September 2009 om forbud mod import salg og fremstilling af cadmiumholdige varer).

Test method:

EN 16711-1 (total content in textiles).
EN 16711-2 (extractable content in textiles).
(Coated fabrics and garment components (e.g. buttons, zips, etc.) can also be tested by the methods above.)

EN ISO 17072-1 (extractable content in leather). EN ISO 17072-2 (total content in leather).

LOQ: 10 mg/kg (total content), (0.1 mg/kg (extractable content).

Test equipment: XRF screening for metal cadmium. LOQ: 50 mg/kg

CMR, Carcinogenic, Mutagenic, Reproductive toxic dyestuffs

15 substances are listed in Appendix 3

Required limit value:	Should not be present in products.
CAS RN:	Various
Properties:	Carcinogenic, mutagenic or reproductive toxic. Characteristics: Dyestuffs that are classified as carcinogens, mutagenic, reproductive toxic according to CLP not including class 2 (only cat. 1A and 1B are CMR).
Use:	Dyeing of textile and leather goods.
Comments:	Alternatives: Use other dyestuff than the substances in Appendix 3.
Legal background:	C.I. Solvent Blue 4, C.I. Basic Blue 26, C.I. Basic Violet 3, Michler's base (101-61-1), 4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol (561-41-1), C.I. Direct Black 38 (1937-37-7) and C.I. Direct Red 28 (573-58-0) are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH). Restrictions for use of substances, harmonised classified as carcinogens, mutagenic, reproductive toxic according to CLP including class 2 (only 1A and 1B are CMR), as substances, as constituents of other substances or in mixtures. These are found in REACH annex XVII, entry 28-30. C.I. Disperse Blue 1, C.I. Basic Red 9 and C.I. Basic Violet 3 with ≥ 0,1 % of Michler's ketone have a restriction limit of 50 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). Prop 65: Several dyestuffs are known to the State of California to cause cancer. Safe Harbor Limit: NSRL 0.09-300 µg/day. No information on settlements.
Test method:	EN ISO 16373 (extractable dyestuffs) LOQ: 50 mg/kg

Chromium VI

Required limit value: Should not be present in products.

CAS RN: Chromium VI (Cr+6, hexavalent chromium): 18540-29-9

Use: Metal plated metal parts. Chromic acid is used as wood preservative. Some dyes may contain chromium.

Comments: Chromium III is an alternative in surface treatment of metal but only for decorative metal plating and not hard metal plating. Other metals such as tin and zinc may be used for metal plating instead of chromium VI. Chromium III is an alternative as fixing agent in mordant dyeing. Use acid dyes with high colourfastness to avoid use of chromium salts for dyeing of polyamide, silk, wool and leather. Use hydrogen peroxide and other per-salts to avoid the use of chromium VI-based salts. In leather tanning chromium III is used, but can oxidize to chromium VI under uncontrolled conditions. Vegetable tanning agents are alternatives for leather if these tanning agents are formaldehyde free. Tanning with titanium is an emerging technology. Common chromium VI substances are listed in Appendix 5.

Legal background: Legal limit: 0.0003% by weight (3 mg/kg) for leather in direct skin contact. Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 47.

Chromium (VI) compounds listed on the Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH) are listed in Appendix 5. Several Chromium compounds are also included in REACH Annex XIV.

Chromium VI compounds have a restriction limit of 1 mg/kg (extractable chromium VI content) in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE).

The sum of concentration levels of lead, cadmium, mercury and chromium VI present in packaging or packaging components shall not exceed 100 ppm by weight.

Directive (EC) No 94/62/EC of 20 December 1994 on packaging and packaging waste.

Prop 65: Chromium VI is known to the State of California to cause cancer and birth defects or other reproductive harm. Safe Harbor Limit: NSRL 0.001 µg/day (inhalation), MADL 8.2 µg/day (oral).
No information on settlements.

Test method:	ISO 17075 (leather). EN ISO 10195 (pre-aged leather) No standardised test method available for textiles. Test equipment: UV-VIS Spectrometer. LOQ: 0.5 mg/kg Metal chromium (Cr) may be analysed by EN 16711-1 (total content in textiles) EN 16711-2 (extractable content in textile) (Coated fabrics and garment components (e.g. buttons, zips, etc.) can also be tested by the methods above.) ISO 17072-1 (extractable content in leather) ISO 17072-2 (total content in leather). LOQ: 10 mg/kg (total content), 0.1 mg/kg (extractable content).XRF screening for metal chromium. LOQ: 50 mg/kg

6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol (DBMC)

Required limit value:	Should not be present in products.
CAS RN:	119-47-1
Properties:	Toxic to reproduction.
Use:	Antioxidant and/or stabilizer in plastic and rubber
Legal limit:	6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol is listed on the Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 of the European Parliament of the Council (REACH).
Test method:	No standardised test method available. Test equipment LC and GC-MS. LOQ: 100 mg/kg

Flame retardants/Biocides - Boric acid, borate compounds

Required limit value:	Should not be present in products.
CAS RN:	Boric acid; 10043-35-3 and 11113-50-1 Disodium tetraborate anhydrous; 1303-96-4, 12179-04-3 and 1330-43-4 Tetraboron disodium heptaoxid, hydrate; 12267-73-1 Sodium perborate; perboric acid, sodium salt, 234-390-0 Sodium peroxometaborate, 7632-04-04 Disodium octaborate, 12008-41-2 Orthoboric acid, sodium salt, e.g. 13840-56-7
Properties:	Toxic to reproduction.
Use:	Wood veneers/pressed wooden panels and boards. Boric acid and other boron compounds may be used as flame retardant in cellulosic materials, mainly wood, and biocidal agent in boards. Borate compounds may be used as bleaching agents in chemical preparations.
Legal limit:	Boric acid, Disodium tetraborate anhydrous, Disodium octaborate, Tetraboron disodium heptaoxid, hydrate, Sodium perborate; Perboric acid, sodium salt, Sodium peroxometaborate and Orthoboric acid, sodium salt are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).
Test method:	Test equipment: AAS, ICP-MS and ICP-OES. LOQ: 25 mg/kg for individual compounds (10 mg/kg for total Boron content).

Flame retardants/Plasticizer - Chloroparaffins

Required limit value:	Should not be present in products.
CAS RN:	Short-chain chloroparaffins (C10-C13, SCCP): e.g. 8553584-8 Medium-chain chloroparaffins (C14-C17, MCCP): e.g. 85535-859, 198840-65 2, 1372804-76-6. Long-chain chloroparaffins (C18-, LCCP): 85535-86-0
Properties:	Persistent, bioaccumulative and toxic. Dangerous for the environment. Carcinogenic. Allergenic. Toxic.
Use in textile:	Plasticizers and flame retardant in plastic material. Plasticizers in coatings and synthetic leather.
Use in leather:	Fat liquoring agent in leather production.
Use in accessories and packaging:	Plasticizers and flame retardant in plastic material and rubber.
Comments:	Alternative plasticizers and flame retardants are available but must be evaluated. Halogen-free alternatives include phosphorus- and nitrogen-based organic chemical flame retardants and non-chemical barrier technologies.
Legal background:	Legal limit: Shall not occur. Short-chain chloroparaffins are listed as POP in the Stockholm Convention on Persistent Organic Pollutants (POPs) and banned in EU by Regulation (EU) No 2019/1021. Residues below 0.15 % SCCP by weight in articles are allowed to be placed on the market and used, as this is the amount of SCCP that may be present as an impurity in an article produced with MCCP. Short-chain chloroparaffins (C10-C13) and Medium-chain chloroparaffins (C14-C17) are listed on the Candidate list of Substances of Very High Concern (SVHC) for the authorization of the Regulation (EC) No 1907/2006 (REACH). Prop 65: Chloroparaffins are known to the State of California to cause cancer. Safe Harbor Limit: NSRL 8 µg/day. No information on settlements.
Test method:	EN ISO 22818 (textiles). ISO 18219-1,-2 (leather). LOQ: 100 mg/kg(textiles)

Flame retardants - Dechlorane™ Plus

(1,6,7,8,9,14,15,16,17,17,18,18 Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10] octadeca-7,15-diene)

Required limit value:	Should not be present in products.
CAS RN:	13560-89-9; 135821-74-8; 135821-03-3
Properties:	Persistent and bioaccumulative.
Use:	Flame retardant for plastics. Use in adhesives and sealants. Use in binding agents.
Legal background:	Dechlorane™ Plus is listed in the Candidate List of Substances of Very High Concern for authorization of Regulation (EC) No 1907/2006 (REACH).
Test method:	No standardised test method available. Test equipment: GC-MS, LC-MS, GC-ECD, (XRF to detect chlorine) LOQ: 100 mg/kg

Flame retardants - Hexabromocyclododecan (HBCDD)

Required limit value:

Should not be present in products.

CAS RN:

Hexabromocyclododecane (HBCD, HBCDD): 25637-99-4, 3194-55-6134237-50-6,134237-51-7 and 134237-52-8

Properties:

Persistent, bioaccumulative and toxic. Halogenated organic additives in polymers may leach out and have a negative impact on health and environment.

Halogen containing polymers may form highly corrosive substances and an undefined range of halogenated substances that may be PBT or CMR when incinerated.

Use:

Flame retardant treatment of products, (i.e upholstery and interior textiles), where fire protection is required. Also used in packaging flakes made of polystyrene (PS).

Comments:

Alternative plasticizers and flame retardants are available but must be evaluated. Halogen-free alternatives include phosphorus- and nitrogen-based flame retardants and non-chemical barrier technologies such as blends of natural and synthetic fibres used in furniture and mattresses and high performance synthetic materials used in firefighter uniforms and other protective clothing.

Textile goods for private use are basically never flame-retardanttreated. The only case when textile goods are treated with flame retardant is if the end customer orders this property. Usually it is done to satisfy regulatory requirements of fire protection.

Legal background:

Legal limit: Shall not occur.

Hexabromocyclododecane is listed as POP in the Stockholm Convention on Persistent Organic Pollutants (POPs) and is banned in EU by Regulation (EU) No 2019/1021. Residues below 100 ppm by weight are allowed in articles, as this amount may be present as an impurity.

Hexabromocyclododecane (HBCDD) and all major isomers are listed in both annex XIV and in the Candidate List of Substances of Very High Concern for authorization of Regulation (EC) No 1907/2006 (REACH).

Test method:

EN ISO 17881-1 (textiles).
Test equipment: GC-MS, LC-MS, GC-ECD
LOQ: 20 mg/kg

Flame retardants - Polybrominated biphenyls (PBB) and Polybrominated diphenyl ethers (PBDE)

Required limit value: Should not be present in products.

CAS RN: Polybrominated biphenyls: 59536-65-1 (mix) Hexabromobiphenyl: 36355-01-8. Tetrabromodiphenyl ether (TetraBDE): 5436-43-1, Pentabromodiphenyl ether (PentaBDE): 32534-81-9, 60348-60-9, Hexabromodiphenyl ether (HexaBDE): 68631-49-2, 207122-15-4, Heptabromodiphenyl ether (HeptaBDE): 207122-16-5, 446255-227, Octabromodiphenyl ether (OctaBDE): 32536-52-0, Decabromodiphenyl ether (DecaBDE): 1163-19-5

Properties: Persistant, bioaccumulative and toxic. Halogenated organic additives in polymers may leach out and have a negative impact on health and environment.Halogen containing polymers may form highly corrosive substances and undefined range of halogenated substances that may be PBT or CMR when incinerated.

Use: Flame-retardant treatment of products where fire protection is required.

Comments: Alternative plasticizers and flame retardants are available but must be evaluated. Halogen-free alternatives include phosphorus- and nitrogen-based flame retardants and non-chemical barrier technologies such as blends of natural and synthetic fibers used in furniture and mattresses and high performance synthetic materials used in firefighter uniforms and other protective clothing.

Textile goods for private use are basically never flame-retardant-treated. The only case when textile goods are treated with flame retardant is if the end customer orders this property. Usually it is done to satisfy regulatory requirements of fire protection.

Legal background: Legal limit: Shall not occur.
TetraBDE, PentaBDE, HexaBDE, HeptaBDE, DecaBDE and Hexabromobiphenyl are listed as POP in the Stockholm Convention on Persistent Organic Pollutants (POPs) and are banned in EU by the POPs regulation (EU) No 2019/1021. Residues of TetraBDE, PentaBDE, HexaBDE, HeptaBDE, DecaBDE in mixtures and articles are considered as impurities if the sum of them is below 500 ppm. In substances, residues below 10 mg/kg by weight of each brominated diphenylether is considered as impurities. Hexabromobiphenyl is banned in detectable content.
OctaBDE, and polybrominated biphenyls (PBBs), are restricted in Entry 45 and Entry 8 of Annex XVII to Regulation (EC) No 1907/2006 (REACH).
-The legal limit for PBBs in textile articles with skin contact is detection limit.
-The legal limit for OctaBDE in articles or in flame-retardant parts of articles is 0.1 % by weight.

DecaBDE is listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 of the

European Parliament and of the Council (REACH).
PBBs are listed in the Rotterdam Convention.

Prop 65: Pentabromodiphenyl ether mixture [DE-71 (technical grade)] is known to the State of California to cause cancer. Safe Harbor Limit: None. No information on settlements.
Polybrominated and polychlorinated biphenyls are known to the State of California to cause cancer and birth defects or other reproductive harm Safe Harbor Limit: NSRL PBB 0.02 µg/day, PCB 0.09 µg/day. None for reproductive harm. No information on settlements.

Test method:

EN ISO 17881-1 (textiles)
EN 16377 for PBB (plastics) Test equipment:
GC-MS, LC MS, GC-ECD. LOQ: 10 mg/kg

Flame retardants – TCEP

Required limit value: Should not be present in products.

CAS RN: Tris(2-chlorethyl)phosphate (TCEP): 115-96-8

Properties: Persistent, bioaccumulative and toxic. Halogenated organic additives in polymers may leach out and have a negative impact on health and environment.
Halogen containing polymers may form highly corrosive substances and undefined range of halogenated substances that may be PBT or CMR when incinerated.

Use: Flame-retardant treatment of products (i.e. coated textiles) where fire protection is required. Plasticizers.

Comments: Alternative plasticizers and flame retardants are available but must be evaluated. Halogen-free alternatives include phosphorus- and nitrogen-based flame retardants and non-chemical barrier technologies such as blends of natural and synthetic fibres used in furniture and mattresses and high per-formance synthetic materials used in firefighter uniforms and other protective clothing.

Textile goods for private use are basically never flame-retardanttreated. The only case when textile goods are treated with flame retardant is if the end customer orders this property. Usually it is done to satisfy regulatory requirements of fire protection.

Legal background: Tris(2-chlorethyl) phosphate (TCEP) is listed in the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).

Prop 65: TCEP is known to the State of California to cause cancer. Safe Harbor Limit: None. Settlements agreed at 25 ppm TCEP for PVC rainwear.

Test method: EN ISO 17881-2 (textiles) Test equipment (for non-textile materials): GC-MS, LC-MS,
GC-ECD

LOQ: 5 mg/kg

Flame retardants - Trisubstituted phosphates

Required limit value: Should not be present in products.

CAS RN: Trixylyl phosphate: 25155-23-1

Phenol, isopropylated, phosphate (3:1), 68937-41-7

Properties: Toxic for reproduction.

Use: Mainly used as functional fluid. Plasticizer of vinylite (a copolymer of vinyl chloride and vinyl acetate), cellulosic resins and natural and synthetic rubber.

Plasticizer and flame retardant of PVC and PU.

Legal limit: Trixylyl phosphate: 25155-23-1 and Phenol, isopropylated, phosphate (3:1), 68937-41-7 are listed in the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).

Test method: EN ISO 17881-2 (textiles)
Test equipment (for non-textile materials): GC-MS, LC MS, GC-ECD
LOQ: 5 mg/kg

Formaldehyde

Required limit value: 20 mg/kg for textiles and leather goods for children under the age of two. 75 mg/kg for all clothing and related accessories, as well as textiles and leather goods that under normal or reasonably foreseeable conditions of use, come into direct contact with the human skin to an extent similar to clothing.

CAS RN: 50-00-0

Properties: Formaldehyde is a volatile colourless gas that is CMR classified according to Regulation (EC) No 1272/2008 (CLP). Occurs naturally in small quantities in the atmosphere and in nature. Formaldehyde is a human carcinogen that also can cause skin irritation and allergy.

Use: Shrinkage-resistant treatment. Wrinkle-resistant treatment. Dirt-repellent treatment. Dye fixing agent. Preservative.

Organic cross linkers are used in synthetic tanning of leather (“synthans”) and may release formaldehyde.

Comments:

Use products without formaldehyde or with very low concentrations of formaldehyde.

Due to its volatility, formaldehyde is “contagious”. If a garment containing formaldehyde is placed on top of a garment without formaldehyde, the latter garment will be “infected”.

Fabric samples for testing must be packed in air dense plastic bags (polyethylene, PE, or polypropylene, PP).

Legal background:

Formaldehyde have a restriction limit of 75 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear[1] (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE).

Several national legislations, see Appendix 7. The EU countries’ national legislations for textile in skin contact will be redrawn when the CMR fast track enters into force. For other products, they will continue to be valid.

German law (Bedarfsgegenständeverordnung and ChemikalienVerbotsverordnung); Products with formaldehyde content shall be labelled. Wooden products shall not release formaldehyde. Cleaning and finishing agents shall not contain formaldehyde above 0.2%.

Japanese law 112 requires under detection limit for products for infants (less than 5 absorbance units).

Prop 65: Formaldehyde (gas) is known to the State of California to cause cancer. Safe Harbor Limit: NSRL 40 µg/day. No information on settlements.

For several national legislations worldwide, see Appendix 7.

Test method:

EN ISO 14184-1(textiles)

ISO 17226-1 (leather, HPLC analysis)

ISO 17226-2 (leather, colorimetric analysis)

ISO 17226-3 (leather, VOC analysis) ISO 27587 (leather, process auxiliaries)

Test method specified in Japan law 112

LOQ: 16 mg/kg

[4] *During a transition period of 3 years, jackets, coats or upholstery will have a restriction limit of 300 mg/kg for formaldehyde.*

Lead (Pb) and lead salts

Required limit value:

Should not be present in textiles.

100 mg/kg for lead as a metal in plastic and metallic accessories.

CAS RN:

Lead (metal): 7439-92-1

Properties:

Lead exposure can give rise to a number of negative health effects, including damage to liver, nervous system and foetuses. Lead is mainly accumulated in bone tissue. It has a very long half-life in the human body. Use of lead in plastics has not been deemed to cause any significant environmental or health effects in the short term, but in the long term such use increases lead concentrations in the environment.

Use:

Lead salts are additives in plastics as stabilizers to increase the service of life of the material. May be used as pigment in paint and in coloured plastic material. Metallic surface coating of buttons and accessories. For recycled packaging material lead may have had a different original use. Lead metal can also be used to increase ductility of other metals.

Comments:

Alternative stabilizers are barium/zinc, potassium/zinc, calcium or calcium/zinc organic stabilizers. Alternative catalysts can be organotitanate or zirconate compounds (e.g. titanium 2-ethylhexanoate) or amines such as bis- (dimethylaminoethyl) ether (BDMAEE) and triethylenediamine (TEDA) along with organometallic compounds such as potassium acetate.

Legal background:

Lead and lead salts are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH). SVHC lead compounds are listed in Appendix 6.

The sum of concentration levels of lead, cadmium, mercury and hexavalent chromium present in packaging or packaging components shall not exceed 100 ppm by weight

Directive (EC) No 94/62/EC of 20 December 1994 on packaging and packaging waste.Lead salts are restricted in paint products (no restriction on painted articles) within the EU, entry 16 (lead carbonates) and 17 (lead sulphates). Lead and its compounds are restricted in jewellery articles and hair accessories within EU with a legal limit: 500 mg/kg (0.05%), entry 63. Lead and its compounds are restricted in articles that may be placed in the mouth by children with the legal limit 500 mg/kg (0.05%)[5], entry 63. Annex XVII of Regulation (EC) No 1907/2006 (REACH).
Lead and its compounds have a restriction limit of 1 mg/kg (extractable content) in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE).
Lead is restricted in Denmark. Danish legal limits: 100 mg/kg. *(Bekendgørelse nr. 856 af 5. September 2009 om forbud mod import og salg af produkter, der indeholder bly).*

Prop 65: Lead and lead compounds are known to the State of California to cause cancer and birth defects or other reproductive harm. Safe Harbor Limit: NRSL lead acetate 23 µg/day (oral), lead 15 µg/day (oral), lead phosphate 58 µg/day (oral), lead subacetate 41 µg/day (oral), MADL lead 0.5 µg/day. Settlements agreed at 50, 90 or 100 ppm for various products.

Test method:

EN 16711-1 (total content in textiles) EN 16711-2 (extractable content in textile)
(Coated fabrics and garment components (e.g. buttons, zips, etc.) can also be tested by the methods above.)

ISO 17072-1 (extractable content in leather) ISO 17072-2 (total content in leather)

LOQ: 10 mg/kg (total content), 0.1 mg/kg (extractable content).

Test equipment: XRF screening for metal lead LOQ: 50 mg/kg

[5] *That limit shall not apply where it can be demonstrated that the rate of lead release from such an article or any such accessible part of an article, whether coated or uncoated, does not exceed 0.05 µg/cm² per hour (equivalent to 0.05 µg/g/h), and, for coated articles, that the coating is sufficient to ensure that this release rate is not exceeded for a period of at least two years of normal or reasonably foreseeable conditions of use of the article.*

Mercury

Required limit value: Should not be present in products.

CAS RN: Mercury (metal): 7439-97-6
Phenylmercury neodecanoat: 26545-49-3
Phenylmercury octanoate: 13864-38-5
Phenylmercury 2-ethylhexanoate: 13302-00-6
Phenylmercury propionate: 103-27-5
Phenylmercury acetate: 62-38-4

Properties: Heavy metal that occurs naturally in small quantities in nature. Toxic to aquatic organisms and non-biodegradable. Dangerous for the environment. Can cause kidney damage.

Use: Phenylmercury compound are used as catalysts in the production of polyurethane coatings, adhesives, sealants and elastomers. For recycled packaging mercury may have had a different original use as e.g. pesticide in woods.

Legal background: Mercury compounds are restricted in impregnation of heavy-duty industrial textiles and yarn intended for their manufacture in Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 18. Phenyl mercury compounds are also restricted in entry 62 with a restriction limit of 0.01% = 100 mg/kg.

Article 1 of the European Parliament and Council Regulation (EC) No 1102/2008 of 22 October 2008 ban the exports of metallic mercury and certain mercury compounds and mixtures.

Products containing mercury may not be placed on the Swedish market. Norway prohibits the manufacture, import, export and sale of articles that contain mercury or mercury compounds (0.001% (10 ppm). Denmark prohibits the import, export and sale of articles and part of articles that contain mercury or mercury compounds (0.01% (100 ppm). Mercury is under restriction globally through the Minamata Convention.

The sum of concentration levels of lead, cadmium, mercury and hexavalent chromium present in packaging or packaging components shall not exceed 100 ppm by weight. Directive (EC) No 94/62/EC of 20 December 1994 on packaging and packaging waste.
Mercury and its compounds are listed in the Rotterdam convention.

Prop 65: Mercury is known to the State of California to cause birth defects or other reproductive harm. No Safe Harbor Limit.
No information on settlements.

Test method:

EN 16711-1 (total content in textiles) EN 16711-2 (extractable content in textiles)
ISO 17072-1 (extractable content in leather) ISO 17072-2 (total content in leather)

LOQ: 10 mg/kg (total content), 0.02 mg/kg (extractable content).
Test equipment: XRF screening for metal mercury.
LOQ: 50 mg/kg

Nickel (Ni), in accessories

Required limit value:

0.5 µg per cm² and week for products intended to come into direct and prolonged contact with the skin. 0.2 µg per cm² and week for piercing items.

CAS RN:

Nickel (metal): 7440-02-0

Properties:

Nickel is one of the most common substances that cause contact dermatitis. Highly allergenic (strong sensitizer).

Use:

Nickel is often used in stainless steel and other alloys used in clothing accessories such as zippers, buttons and rivets.

Comments:

Refrain from using nickel-treated metals or nickel-containing metal coatings.

Legal background:

Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH, entry 27).
0.5 µg per cm² and week for products intended to come into direct and prolonged contact with the skin.
0.2 µg per cm² and week for piercing items.
Nickel release is limited (0.5 µg/cm2 per week) in PPE standard for metallic material in skin contact.
Prop 65: Metallic nickel is known to the State of California to cause cancer.
Safe Harbor Limit: None. No information on settlements.

Test method:

Test method I: EN 12472:2005+A1:2009 and EN 1811:2011+A1:2015 (for coated items) EN 1811:2011+A1:2015 (for non-coated item).
(CEN methods specified in REACH Annex XVII, entry 27)

LOQ: 0.02 µg/cm² /week

Test method II (not for testing legal compliance): Screening test for nickel emission. Swedish pharmacies sell a test kit.

Detection limit II: Qualitative indication only = no occurrence. (This screening method can also give a reading for other metals than Ni.)

PFAS - Highly fluorinated carboxylic acids (PFOA and related substances)

Required limit value: Should not be present in products.

CAS RN: Example: 335-67-1

Properties: Highly fluorinated carboxylic acids (PFCAs) such as PFOA are persistent, bioaccumulative and toxic (PBT) substances. Due to their extreme stability these chemicals will not degrade but will accumulate due to their persistency in the environment. PFCAs are water soluble and can contaminate drinking water. As a result of their long-range transport potential and mobility they can be found even in remote regions (e.g. the Artic). PFOA can cause cancer (testicular and kidney cancer), liver damage and changes in immune- and endocrine system (e.g. cholesterol levels). Exposure to PFOA effects the foetus development during pregnancy and has adverse effects on breastfed infants (e.g. low birth weight). Other long chain fluorinated carboxylic acids are also classified as PBT substances. They can be as present as pure substances in products or as precursor chemicals (e.g. polymers) that form PFOA and other PFCAs due to transformation processes

Use: PFOA-related substances (e.g. side-chain fluorinated polymers) are used in water oil repellent textile finishes as well as impregnation agents in leather. PFOA and other PFCAs are used as an emulsifier in the production of fluoropolymers such as polytetrafluoroethylene (PTFE) etc

Comments: Alternatives are technologies based on short chain fluorotelomer chemistry (< C7) and may only be used in applications where oil and stain repellent properties are essential such as protective occupational textiles when no other feasible alternatives are available.

Where oil repellent properties are not essential and just water repellence is required, non-fluorinated chemistries (C0) such as waxes and paraffins but not silicones are recommended.

Legal background: Legal limit: Shall not occur.

PFOA, its salts and related compounds are listed in the Stockholm Convention on Persistent Organic Pollutants (POPs) and banned in EU by the POPs Regulation (EU) No 2019/1021. Residues below 0.025 mg/kg of each substance, and 1 mg/ kg of a combination of PFOA-related substances in substances, mixtures, and articles are allowed to be placed on the market and used, as these are amounts that may be present as impurities. From 4 July 2023 the restriction applies to textiles for the protection of workers from dangerous liquids.

C9-C14 linear and/or branched perfluorocarboxylic acids (C9- C14 PFCAs), their salts and C9-C14 PFCAs-related substances, are restricted in articles

(25 ppb) annex XVII Regulation (EC) No 1907/2006 (REACH), entry 68.

Long chain PFCAs (C8-C14) including their salts (sodium and ammonium) and precursors are listed as a group in the Candidate List of Substances of Very High Concern for authorization of Regulation (EC) No 1907/2006 (REACH). Listed below:

(C8) Pentadecafluorooctanoic acid (PFOA) and its ammonium salt (APFO), 335-67-1,3825-26-1,
(C9) Perfluorononan-1-oic-acid (PFNA) and its sodium and ammonium salts, 375-95-1, 21049-39-8, 4149-60-4,
(C10) Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts, 335-76-2, 3108-42-7, 3830-45-3,
(C11) Henicosafluoroundecanoic acid (PFUnA), 2058-94-8,
(C12) Tricosafluorododecanoic acid (PFDoA), 307-55-1,
(C13) Pentacosafluorotridecanoic acid (PFTrDA), 72629-94-8, (C14) Heptacosafluorotetradecanoic acid (PFTA), 376-06-7,

(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl) silanetriol is restricted in spray products (2 ppb) annex XVII Regulation (EC) No 1907/2006 (REACH), entry 73.

Declaration duty in Sweden to the Swedish Chemicals Agency for PFAS in chemical products that are deliberately added. Composition needs not to be specified but the information duty applies without any concentration limit.

In California: PFOA and perfluorononanoic acid (PFNA) and its salts are listed in Proposition 65

Test method:

EN 17681-1, 2 (textile and textile products)

ISO 23702-1 (leather)

Test equipment: LC-MS

LOQ: 10 µg/kg

PFAS - Highly fluorinated sulfonic acids (PFOS and related substances)

Required limit value:	Should not be present in products.
CAS RN:	Example: 1763-23-1, 355-46-4, 29420-49-3, 220689-12-3
Properties:	Highly fluorinated carboxylic acids (PFSAs) such as PFOS are persistent, bioaccumulative and toxic (PBT) substances. Due to their extreme stability these chemicals will not degrade but will accumulate due to their persistency in the environment. PFSAs are water soluble and can contaminate drinking water. As a result of their long-range transport potential and mobility they can be found even in remote regions (e.g. the Artic). PFOS can cause cancer (testicular and kidney cancer), liver damage and changes in immune- and endocrine system (e.g. cholesterol levels). Exposure to PFOS effects the foetus development during pregnancy and has adverse effects on breastfed infants (e.g. low birth weight). Other long chain fluorinated carboxylic acids (see legal background) are also classified as PBT substances. Also PFBS (a short chain PFSAs) has been recently identified as a substance of concern. They can be as present as pure substances in products or as precursor chemicals (e.g. polymers) that form PFOS and other PFSAs due to transformation processes.
Use:	PFOS-related substances (e.g. side-chain fluorinated polymers) are used in water oil repellent textile finishes as well as impregnation agents in leather. PFOS other PFSAs are used as an emulsifier in the production of fluoropolymers such as polytetrafluoroethylene (PTFE) etc.
Comments:	Alternatives are technologies based on short chain fluorotelomer chemistry (< C7) and should be used in applications where oil and stain repellent properties are essential such as protective occupational textiles. Where oil repellent properties are not essential and just water repellency is required, non-fluorinated chemistries (C0) such as waxes and paraffins but not silicones are requested.
Legal background:	Legal limit: Shall not occur

PFOS and its derivatives are listed in the Stockholm Convention on Persistent Organic Pollutants (POPs) and banned in EU by the POPs Regulation (EU) No 2019/1021. Residues below the following limits are allowed to be placed on the market and used, as these are the amounts that may be present as impurity[2]:
1 µg/m2 applies to coated textiles and leather products.
0.1% by weight applies to articles or part of articles.

Perfluorobutane sulfonic acid (PFBS) and its salts, Perfluorohexane-1-sulphonic acid and its salts (PFHxS), are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).

Declaration duty in Sweden from 1 January 2019 to the Swedish Chemicals Agency for PFAS in chemical products that are deliberately added. Composition needs not to be specified but the information duty applies without any concentration limit.

In California: Perfluorooctane sulfonic acid (PFOS) and its salts and transformation and degradation precursors are listed in Proposition 65..

Test method:

EN/TS 15968
EN 17681-1, 2 (textile and textile products)
Test equipment: LC-MS

LOQ: 0.1 µg/m2.

ıces counted as PFOS, see test method CEN/TS 15968:2009.

PFAS - Highly fluorinated ethers

Required limit value: Should not be present in products.

CAS RN: 13252-13-6

Properties: Highly fluorinated ethers (PFPEs) such as HFPO-DA (2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionic acid) were developed as replacements for PFAO and PFOS. They are watersoluble and mobile surfactants that are under suspicion to be equally persistent as other PFASs. While the bioaccumulation potential of HFPO-DA is still uncertain, this substance has showed adverse effects on kidney, immune- and haematological system, as well as effects on foetus development in animal studies. Other PFPEs are likely to be equally stable and mobile.

Use: PFPEs are used as emulsifiers in the production of fluoropolymers such as polytetrafluoroethylene (PTFE) etc.

Comments: Non-fluorinated emulsifiers such as hydrocarbons should be preferred to produce fluoropolymers. Fluorinated emulsifiers may only be applied for essential uses.

Legal background: HFPO-DA, its salts and its acyl halides (CAS 13252-13-6, 67118-55-2, 2062-98-8 and 62037-80-3) are listed in the Candidate List of Substances of Very High Concern for authorization of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).

Declaration duty in Sweden from 1 January 2019 to the Swedish Chemicals Agency for PFAS in chemical products that are deliberately added. Composition needs not to be specified but the information duty applies without any concentration limit.

Prop 65: Highly fluorinated ethers are not listed under Proposition 65.

Test method: EN 17681-1, 2 (textile and textile products)
Test equipment: LC-MS

LOQ: -

Phthalate esters

Required limit value:	0.1% by weight (1000 mg/kg) for regulated phthalates (sum of) in the material of interest (e.g. a print).
CAS RN:	Regulated phthalates are found in Appendix 8.
Properties:	Many phthalates are classified as toxic for reproduction. DIDP is of concern in connection with hepatic toxicity. Many phthalates are suspected endocrine disrupters
Use:	Phthalates may be used as plasticizers in polymers. Additives in adhesives, paints, lacquers, varnishes and solvents.
Comments:	Alternative plasticizers include citrates, sebacates, adipates, and phosphates etc. The terephthalate, DEHT and the cyclohexane DINCH are example of commercially available alternatives with low human and environmental toxicity. There are also polymers that do not require plasticizers. However, each application needs to be individually assessed for each best specific technical performance.
Legal background:	Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH) addresses the following legal limits: 0.1% by weight of the plasticized material in all articles for the sum of DEHP, DBP, BBP and DIBP, entry 51. 0.1% by weight in toys and childcare articles which can be placed in the mouth for DINP, DIDP and DNOP, entry 52. DIHP, DMEP, DIPP, DPP and DnHP have a restriction limit of 1000 mg/kg in clothing, related accessories, textiles other than clothing in skin contact, or footwear (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 72. This limit applies to each substance individually or in combination with other phthalates that are classifies as CMR substances. The CMR fast track restriction does not apply to clothing, related accessories, textiles other than clothing, or footwear within the scope of Regulation (EU) 2016/425 (PPE). Phthalate ester substances listed in both Annex XIV and/ or the Candidate List of Substances of Very High Concern for authorization of Regulation (EC) No 1907/2006 (REACH) is found in Appendix 8. All phthalates in toys and childcare articles for children aged 0-3 years are restricted (0.05%) in Denmark (BEK nr 855).

Prop 65: BBP and DINP are known to the State of California to cause cancer. Safe Harbor Limit: NSRL BBP 1200 µg/day (oral), DINP 146 µg/ day. DEHP is known to the State of California to cause cancer and birth defects or other reproductive harm. Safe Harbor Limit: NSRL 310 µg/ day (oral). None for reproductive harm. DBP, DnHP and DIDP are known to the State of California to cause birth defects or other reproductive harm. Safe Harbor Limit: MADL DBP 8.7 µg/day, DnHP 2200 µg/day (oral), DIDP 2200 µg/day. Settlements agreed at 1000 ppm for various products for DBP, DEHP, DIDP, DINP and DnHP.

Test equipment:

EN-ISO 14389
SO 16181-2 (footwear)

GC-MS, LC-MS
LOQ: 100 mg/kg

Siloxanes

Required limit value:

1000 mg/kg (0.1% by weight).

CAS RN:

556-67-2 Octamethylcyclotetrasiloxane (D4)
541-02-6 Decamethylcyclopentasiloxane (D5) 540-97-6 Dodecamethylcyclohexasiloxane (D6)

Properties:

Reproduction toxic. Toxic to aquatic life with long lasting effects.

Use:

Used in washing and cleaning products such as softeners, polishes and waxes, cosmetics and personal care products, textile treatment products and dyes, paper and cardboard products. Precursors in the production of polymers such as silicone rubbers.

Legal limit:

D4, D5 and D6 are listed in the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).

Test method:

No standardised test methods.
Test equipment: GC-MS.
LOQ: 100 mg/kg

BIOCIDAL AGENTS

General information

Biocidal agents are both used as **process chemicals** to prohibit growth of microbes during production and as **product related chemicals** to render biocidal property to the article.
The use of biocidal products in articles should be kept limited, for instance to avoid the increase of resistant bacteria. If the use of biocidal agents is essential, there are biocidal agents approved for PT9 (product type 9, that includes textiles, polymers and leather) according to the Biocidal Product Regulation (EU 528/2012).

Cu-HDO (Bis-(N-cyclohexyldiazeniumdioxy) –copper)

Required limit value:	Should not be present in products.
CAS RN:	312600-89-8
Properties:	Fungicide. Cu-HDO is classified as very toxic to aquatic organisms.
Use:	Fungicide mainly as wood preservatives, but may occur in fungicidal coating of textile-polymeric materials.
Comments:	The alternative to biocidal agents during storage and transport is a cool and dry environment. If use of biocidal agents is essential, folpet, chlorocresol. propiconazole, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).
Legal background:	Cu-HDO is banned within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation (EU 528/2012)
Test method:	No standardised test method available. Test equipment: ICP-AES LOQ: 50 mg/kg

Carbendazim

Required limit value:	Should not be present in products.
CAS RN:	10605-21-7
Properties:	Fungicide. Reproduction toxic, mutagenic and toxic to aquatic life with long lasting effects and processes.
Use:	To counteract fungus growth in clothes, shoes and other leather items.
Comments:	The alternative to biocidal agents during storage and transport is cool and dry environment. If use of biocidal agents is essential, folpet, chlorocresol, propiconazole, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).
Legal background:	Carbendazim is banned within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation (EU 528/2012).
Test method:	No standardised test method available. Test equipment: GC-MS, LC-MS. LOQ: -

Dimetylfumarate (DMFu)

Required limit value:	Should not be present in products.
CAS RN:	624-49-7
Properties:	Fungicide. DMFu is harmful to skin and a strongly allergenic substance.
Use:	To counteract fungus growth in clothes, shoes and other leather items. DMFu can e.g. be found in silica gel bags, but is also applied on the product both as a powder and in tablet form.
Comments:	The alternative to biocidal agents during storage and transport is cool and dry environment. If use of biocidal agents is essential, folpet, chlorocresol, propiconazole, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).
Legal background:	Legal limit: 0.00001% by weight (0.1 mg/kg) in articles or any parts thereof. Annex XVII of Regulation (EC) No 1907/2006 (REACH), entry 61.
Test method:	ISO/TS 16186 (footwear) SS-EN 17130 (textile and textile material) Test equipment: GC-MS, LC-MS LOQ: 0.1 mg/kg.

Glutaral

Required limit value:	Should not be present in products.
CAS RN:	111-30-8
Properties:	Respiratory sensitising properties, skin sensitising and toxic.
Use:	Biocide used in leather tanning. Also, a crosslinker for cellulosic material.
Comments:	The alternative to biocidal agents during storage and transport is cool and dry environment. Make sure that residues levels from production is kept as low as possible.
Legal background:	Glutaral is listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH).
Test method:	No standardised test method available. Test equipment: LC-UV, GC-UV LOQ: -

Guanidine, N,N'''-1,6-hexanediylbis[N'-cyano-, polymer with (1,6-hexanediamine, hydrochloride (PHMB 1600; 1.8)

Required limit value:	Should not be present in products.
CAS RN:	27083-27-8, 32289-58-0
Properties:	Bactericide. PHMB is very toxic to aquatic life, is suspected of causing cancer and may cause an allergic skin reaction.
Use:	Biocide, bactericide in textiles.
Comments:	The alternative to biocidal agents during storage and transport is a cool and dry environment.
Legal background:	PHMB is banned within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation (EU 528/2012).
Test method:	No standardised test method available. Test equipment: LC-M LOQ: -

Parabenes

Required limit value:	Should not be used in processes or present in products.
CAS RN:	Various, including: Butyl 4-hydroxybenzoate (Butylparaben), 94-26-8
Properties:	Toxic for reproduction.
Use:	Bactericide. Used in cosmetic products and detergents. The alternative to biocidal agents during storage and transport is a cool and dry environment.
Legal background:	Butyl 4-hydroxybenzoate (Butylparaben) is listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH). Butyl 4-hydroxybenzoate (Butylparaben) is an allowed preservative under the Regulation (EC) No 1223/2009 (cosmetic products).
Test method:	No standardised test method available for textiles or leather. Test equipment: GC-MS, LC-MS. LOQ: 100 mg/kg

Pentachlorophenol (PCP) and all isomers of Tetrachlorphenols (TeCP)

Required limit value:	Should not be present in products.
CAS RN:	87-86-5 (PCP), 131-52-2 (PCP sodium salt), TeCP; 935-95-5, 4901-51-3, 58-90-2 (isomers of TeCP)
Properties:	Fungicide. Organic compounds. Toxic and dangerous for the environment. On combustion, PCP emits dioxins, which are extremely toxic to humans.
Use:	Fungicide for preservative treatment of goods prior to storage and transport. Preservative in sizing agents and adhesives. Component in printing pastes (thickener).
Comments:	The alternative to biocidal agents during storage and transport is cool and dry environment. If use of biocidal agents is essential, folpet, chlorocresol, propiconazole, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).
Legal background:	Legal limit: PCP and its salts and esters shall not occur. Pentachlorophenol and its salts and esters are listed in the Stockholm Convention on Persistent Organic Pollutants (POPs) and banned in EU by the POPs Regulation (EU) No 2019/1021. Residues below 5 mg/kg in substances, mixtures, and articles are allowed to be placed on the market and used, as this is the amount that may be present as an impurity in an article. Pentachlorophenol (and its salts and esters) is banned in Norway in textiles and leather. Legal limit 5 ppm, (FOR-2004-06-01-922). Pentachlorophenol is listed in the Rotterdam convention. Prop 65: PCP is known to the State of California to cause cancer. Safe Harbor Limit: NRSL 40 µg/day. No information on settlements.
Test method:	ISO 17070 (leather) XP G 08-015 (French standard method for PCP in textiles). LOQ: 0.1 mg/kg CEN/TR 14823 (wood). Detection limit 25 mg/kg EN ISO 15320 (Pulp, paper and board)

Permethrin

Required limit value:	Should not be present in products.
CAS RN:	52645-53-1
Properties:	Insecticide. Permethrin is like all synthetic pyrethroids a neurotoxin. It is considered more acutely toxic to children than to adults.
Use:	Permethrin is a biocide in textiles. It is also used for home pest control, forestry, and in public health programs, including head lice control.
Comments:	The alternative to biocidal agents during storage and transport is cool and dry environment.
Legal background:	Permethrin is on the list of temporarily permitted existing biocides within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation (EU 528/2012).
Test method:	No standardised test method available. EN ISO 22517 (pesticide residues in leather) Test equipment: GC-MS, LC-MS LOQ: 5 mg/kg

Silver and its compounds

Required limit value:	Should not be present in products.
CAS RN:	Silver (metal): 7440-22-4
Properties:	Bactericide. Slight skin and eye irritant. Disturb denitrification processes in nature that is vital for provision of nutrients to plants. Dissolved (free) silver ions are very toxic to aquatic organisms.
Use:	Silver nano particle complexes are antibiotic additives in plastics and fibres.
Comments:	The alternative to antibacterial agents during use is satisfactory washing.
Legal background:	Legal limit: No legal limits for silver compounds exist in textiles and leather. Some silver compounds are on the list of temporarily permitted existing biocides within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation (EU 528/2012). Silver as such is not allowed as a biocidal active substance.
Test method:	No standardised test method available. Test equipment: ICP-MS, ICP-OES or AAS. LOQ: 10 mg/kg

Trisubstituted tin organic compounds

Required limit value:

Should not be present in products.

CAS RN:

Tributyltin chloride:1461-22-9
Tributyltin fluoride: 1983-10-4
Tributyltin methacrylate: 2155-70-6
Tributyltin benzoate: 4342-36-3
Tributyltin linoleate: 24124-25-2 Tributyltin naphthenate: 85409-17-2

Properties:

Bactericides. Tributyltin compounds are different chemical substances that are toxic and dangerous for the environment. Bioaccumulative and persistent.

Use in textile and leather:

Antibacterial agent to counteract noxious odours in clothes and shoes. Preservative, fungicide and antifouling agent.

Comments:

The alternative to antibacterial agents during use is satisfactory washing.

If use of biocidal agents is essential, folpet, chlorocresol, propiconazole, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).

Legal background:

Legal Limit: 0.1% by weight.

All tri-substituted organostannic compounds such as tributyltin (TBT) are restricted in articles in annex XVII of the Regulation (EC) No 1907/2006 (REACH), entry 20.

The seven TBT compounds listed above are also included in the Rotterdam convention.

Tributyltin oxide (TBTO) 56-35-9 and Dibutyltin dichloride (DBTC), 683-18-1 are listed on the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).

Test method:

EN ISO 22744-1, -2 (textiles)
Test equipment: GC-MS.
EN ISO 17353 (water and sediment).
LOQ: 0.2 mg/kg

Triclosan and Triclocarban

Required limit value:	Should not be present in products.
CAS RN:	Triclosan: 3380-34-5, Triclocarban: 101-20-2
Properties:	Bactericides. Triclosan is classified as a probable human carcinogen and bio accumulative.
Use:	Antibacterial agent in clothes and other commodities.
Comments:	The alternative to antibacterial agents during use is satisfactory washing.
Legal background:	Triclosan is banned within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation 528/2012. Triclocarban is not on the active substance list for PT9 and thus not allowed to use in textiles, polymers and leather.
Test method:	EN 17134 (textile). Test equipment: GC-MS, LC-MS. LOQ: 10 mg/kg

Zincpyrithion

Required limit value:	Should not be present in products.
CAS RN:	13463-41-7
Properties:	Bactericide, fungicide and algicide.
Use:	Antibacterial and fungicide agent in articles. Commonly used in schampoo and previously in antifouling paint. May be used in plastic articles
Comments:	The alternative to antibacterial agents during use is satisfactory washing. If use of biocidal agents is essential, folpet, chlorocresol, propiconazole, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).
Legal background:	Zincpyrithion is on the list of temporarily permitted existing biocides within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation (EU 528/2012).
Test method:	No standardised test method available. Test equipment: GC-MS, LC-MS. LOQ: 1000 mg/kg (100 mg/kg via Zinc)

MISCELLANEOUS

pH

Limit value textiles:	4.0 – 8.5 Protective clothing material (PPE) standard limits the pH value to greater than pH=3,5 and less than pH=9.5
Limit value leather:	3.5 – 7.0Protective clothing material (PPE) standard limits the pH value to greater than pH=3,5 and less than pH=9.5
Properties:	A pH higher than 10 or lower than 3 can cause skin irritation.
Comments textiles:	The pH value can easily be corrected by washing.
Legal background:	None
Test method textiles:	ISO 3071
Test equipment:	pH meter. Accuracy: 0.2 pH units.
Test method leather:	EN ISO 4045
Test equipment:	pH meter. Accuracy: 0.2 pH units.

Proposition 65: Other chemicals listed with relevance to the materials referred to in this guidance document

Chemicals related to dyestuffs Substance name	CAS RN	Comment
Aniline	62-53-3	NSRL: 100 µg/day
Benzyl violet 4B	1694-09-3	NSRL: 30 µg/day
Carbon black (airborne, unbound particles of respirable size)	1333-86-4	No Safe Harbor Limit
C.I. Acid Red 114	6459-94-5	No Safe Harbor Limit
C.I. Direct Blue 15	2429-74-5	No Safe Harbor Limit
Cobalt sulfate	10124-43-3	No Safe Harbor Limit
Ethylene dichloride (1,2-Dichloroethane)	107-06-2	NSRL: 10 µg/day
Ethylene oxide	75-21-8	NSRL: 2 µg/day MADL: 20 µg/day
Michler's ketone	90-94-8	NSRL: 0.8 µg/day
Naphthalene	91-20-3	NSRL: 5.8 µg/day
1,3-Propane sultone	1120-71-4	NSRL: 0.3 µg/day
Trypan blue (commercial grade)	72-57-1	No Safe Harbor Limit
Hexachlorobenzene	118-74-1	NSRL: 0.4 µg/day
Chemicals related to materials **Substance name**	**CAS RN**	**Comment**
Antimony oxide (Antimony trioxide)	1309-64-4	Polyester catalyst No Safe Harbor Limit
Dichloromethane (Methylene chloride)	75-09-2	Triacetate (NSRL): 50 µg/day NSRL-Inhalation: 200 µg/day
N-Nitrosodimethylamine	62-75-9	Rubber NSRL: 0.04 µg/day
Biocides **Substance name**	**CAS RN**	**Comment**
Metham sodium	137-42-8	No Safe Harbor Limit
o-Phenylphenate, sodium	132-27-4	NSRL: 200 µg/day
o-Phenylphenol	90-43-7	No Safe Harbor Limit
2,4,6-Trichlorophenol	88-06-2	NSRL: 10 µg/day
Methyl bromide, as a structural fumigant	74-83-9	MADL - Inhalation: 810 µg/day
Flame retardants **Substance name**	**CAS RN**	**Comment**
Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)	13674-87-8	NSRL: 5.4 µg/day
Vinyl bromide	593-60-2	No Safe Harbor Limit

Obsolete substances: Historically relevant substances, no longer in use.

Flame retardants Substance name	CAS RN	Comment
Tris(1-aziridinyl)-phosphine oxide (TEPA)	545-55-1	Legal limit: Shall not be used Test method: GC-MS
Tris(2,3-dibromopropyl)phosphate (TBPP)	126-72-7	Legal limit: Shall not be used Test method: EN ISO 17881-2 (textile); GC-MS, LC-MS, GC-ECD, LOQ: 5 mg/kg (non-textile)

APPENDICES

Appendix 1
Allergenic dye stuffs and Navy Blue (banned mordant dye)

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Banned arylamines

Appendix 3
Carcinogenic dye stuffs

Appendix 4
DBTs

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Chromium (VI) SVHC compounds

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Appendix 8
Phthalate esters

Appendix 9
PAH - Polycyclic aromatic hydrocarbons

Appendix 1 - Allergenic dyestuffs and Navy Blue (banned mordant dye)

CI Name	CAS RN
C.I. Disperse Yellow 1	119-15-3
C.I. Disperse Blue 35	12222-75-2*
C.I. Disperse Blue 102	12222-97-8
C.I. Disperse Blue 106	12223-01-7*, 68516-81-4
C.I. Disperse Yellow 39	12236-29-2
C.I. Disperse Orange 37/59/76	13301-61-6*
C.I. Disperse Brown 1	23355-64-8
C.I. Disperse Blue 3	2475-46-9
C.I. Disperse Orange 1	2581-69-3
C.I. Disperse Yellow 3	2832-40-8*
C.I. Disperse Red 11	2872-48-2
C.I. Disperse Red 1	2872-52-8*
C.I. Disperse Red 17	3179-89-3
C.I. Disperse Blue 7	3179-90-6
C.I. Disperse Blue 26	3860-63-7
C.I. Disperse Yellow 49	54824-37-2
C.I. Disperse Blue 124	61951-51-7*
C.I. Disperse Yellow 9	6373-73-5
C.I. Disperse Orange 3	730-40-5*
Navy Blue	405-665-4 (EC #)
C.I Disperse Blue 1	2475-45-8*

**Disperse dyes banned in Germany*

Appendix 2 - Banned arylamines

Arylamines listed in Annex XVII and/or the Candidate List of Substances of Very High Concern for authorization of Regulation (EC) No 1907/2006 (REACH)

Name	CAS RN	Candidate list	Annex XVII, Entry 43	Annex XVII, Entry 72
4,4-Methylene-bis[2-chloro-aniline]	101-14-4	x	x	
4,4-Methylenedianiline	101-77-9	x	x	
4,4'-oxydianiline	101-80-4	x	x	
4-chloroaniline	106-47-8		x	
o-Dianisidine	119-90-4		x	
4,4'-bi-o-toluidine	119-93-7		x	
p-Cresidine	120-71-8	x	x	
2,4,5-trimethylaniline	137-17-7		x	
4,4'-thiodianiline	139-65-1		x	
4-Aminoazobenzene	60-09-3	x	x	
4-methoxy-m-phenylenediamine	615-05-4		x	
4,4-Methylenedi-o-toluidine	838-88-0	x	x	
o-Anisidine	90-04-0	x	x	
2-Naphthylamine	91-59-8		x	
3,3-Dichlorobenzidine	91-94-1		x	
Biphenyl-4-ylamine	92-67-1	x	x	
Benzidine	92-87-5		x	
o-Toluidine	95-53-4	x	x	
4-Chloro-o-toluidine	95-69-2		x	
4-methyl-m-phenylenediamine	95-80-7	x	x	
o-Aminoazotoluene	97-56-3	x	x	
5-Nitro-o-toluidine	99-55-8		x	
4-chloro-o-toluidinium chloride	3165-93-3			x
2-Naphthylammoniumacetate	553-00-4			x
4-methoxy-m-phenylene diammonium sulphate; 2,4-diaminoanisole sulphate	39156-41-7			x
2,4,5-trimethylaniline hydrochloride	21436-97-5		x	

Appendix 3 - Carcinogenic dye stuffs

CI Name	CAS RN
C.I. Direct Brown 95	16071-86-6
C.I. Direct Black 38	1937-37-7*
C.I. Disperse Blue 1	2475-45-8**
C.I. Direct Blue 6	2602-46-2
C.I. Acid Red 26	3761-53-3
C.I. Basic Red 9	569-61-9**
C.I. Direct Red 28	573-58-0*
C.I. Basic Violet 14	632-99-5
C.I. Disperse Orange 11	82-28-0
C.I. Disperse Orange 149	85136-74-9
C.I. Solvent Blue 4	6786-83-0*
C.I. Basic Blue 26,	2580-56-5*
C.I. Basic Violet 3	548-62-9*, **
Michler's base	101-61-1*
4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol	561-41-1*
C.I. Disperse Yellow 3	2832-40-8

** SVHC substances*

*** CMR fast track substances*

Appendix 4 - Non exhaustive list of DBTs (dibutyl tin substances)

Constituent	CAS RN	No of carbons
R = oxide (DBTO)	818-08-6	0
R = acetate	1067-33-0	2
R = butoxide	3349-36-8	4
R = metylmaleate	15546-11-9	5
R = octanoate	4731-77-5	8
R = isoocanoate	85702-74-5	8
R = (monobutyl)maleate	15546-16-4	8
R = 2-etylhexanoate	2781-10-4	8
R = laurate	77-58-7	12
R = palmitate	13323-63-2	16
R = stearate	5847-55-2	18
R = oleate	13323-62-1	18
R = linoleate	85391-79-3	18
R = linolenate	95873-60-2	18

Appendix 5 - Chromium (VI) SVHC compounds

Chromium (VI) substances listed in Annex XIV and the Candidate List of Substances of Very High Concern for authorization of Regulation (EC) No 1907/2006 (REACH)

Name	CAS RN
Ammonium dichromate	7789-09-5
Potassium chromate	7789-00-6
Potassium dichromate	7778-50-9
Sodium chromate	7775-11-3
Sodium dichromate dehydrate	7789-12-0, 10588-01-9
Strontium chromate	7789-06-2
Chromium trioxide	1333-82-0
Chromic acid	7738-94-5
Dichromic acid	13530-68-2
Lead chromate	7758-97-6
Lead sulfochromate	1344-37-2
Lead chromate molybdate sulphate	12656-85-8
Dichromium tris(chromate)	24613-89-6
Potassium hydroxyoctaoxodizincatedichromate	11103-86-9
Pentazinc chromate octahydroxide	49663-84-5

Appendix 6 - SVHC lead metal and its compounds

Name	CAS RN
Lead (metal)	7439-92-1
Lead chromate	7758-97-6
Lead sulfochromate	1344-37-2
Lead chromate molybdate sulphate	12656-85-8
Lead dipicrate	6477-64-1
Lead styphnate	15245-44-0
Lead diazide	13424-46-9
Lead hydrogen arsenate	7784-40-9
Lead monoxide (Lead oxide)	1317-36-8
Orange lead (Lead tetroxide)	1314-41-6
Lead bis(tetrafluoroborate)	13814-96-5
Trilead bis(carbonate)dihydroxide	1319-46-6
Lead titanium trioxide	12060-00-3
Lead titanium zirconium oxide	12626-81-2
Lead(II) bis(methanesulfonate)	17570-76-2
Silicic acid, lead salt	11120-22-2
Silicic acid (H2Si2O5), barium salt (1:1), lead-doped	68784-75-8
Acetic acid, lead salt, basic	51404-69-4
Lead oxide sulfate	12036-76-9
[Phthalato(2-)]dioxotrilead	69011-06-9
Dioxobis(stearato)trilead	12578-12-0
Fatty acids, C16-18, lead salts	91031-62-8
Lead cynamidate	20837-86-9
Lead dinitrate	10099-74-8
Pentalead tetraoxide sulphate	12065-90-6
Pyrochlore, antimony lead yellow	8012-00-8
Sulfurous acid, lead salt, dibasic	62229-08-7
Tetraethyllead	78-00-2
Tetralead trioxide sulphate	12202-17-4
Trilead dioxide phosphonate	12141-20-7
Lead di(acetate)	301-04-2

Appendix 7 - Regulations and limit values of formaldehyde

Country	Regulations/Requirements	Objection Limit / Limit
France	Official Gazette of the French Republic, Notification 97/0141/F	Textiles not in direct skin contact: 400ppm
Finland	Decree on Maximum Amounts of Formaldehyde in Certain Textiles products (Decree 210/1988)	Textiles not in direct skin contact: 300ppm
China	Limits of Formaldehyde Contents in Textiles GB18401-2003	Textiles for infants and babies ≤ 20ppm Textiles in direct skin contact ≤ 75ppm Textiles not in direct skin contact ≤ 300ppm
Japan	Japanese Law 112	Textiles for infants: not detectable Textiles in direct skin contact: 75ppm
Vietnam	Circular no 23/2016/TT-BCT	Textiles for babies under 36 months: 30 mg/kg. Textiles in direct skin contact: 75 mg/kg. Textiles not in direct skin contact: 300 mg/kg
USA	Federal Hazardous Substances Act (FHSA)	Consumer products containing more than 1% formaldehyde must be labelled with a warning.
Eurasian Customs Union	P TC 007/2011 On "Safety of Products intended for children and adolescents"	Mass fraction of free Formaldehyde babies up to36 months: 20 mg/kg for 1st and 2nd layer of products and 300 mg/kg for 3rd layer
(Armenia, Belarus, Kazakhstan Kyrgyzstan and Russia)	P TC 007/2011 On "Safety of Products intended for children and adolescents"	Mass fraction of free Formaldehyde babies up to36 months: 20 mg/kg for 1st and 2nd layer of products and 300 mg/kg for 3rd lay
	TP TC 017/2011 On Safety of Light Industry Products	Mass fraction of free Formaldehyde for children and adolescents: 75 mg/kg for 1st and 2nd layer of products and 300 mg/kg for 3rd layer
	GOST 50729-95 (Textiles. Limit permissible concentration of free formaldehyde)	Apply less than 20 mg free formaldehyde/kg as a customs requirement.

Appendix 8 - Phthalate esters

Substances listed in Annex XIV, Annex XVII and/or the Candidate List of Substances of Very High Concern for authorization of Regulation (EC) No 1907/2006 (REACH)

Name	CAS RN	Candidate list	Annex XIV	Annex XVII
Bis (2-ethylhexyl) phthalate) (DEHP)	117-81-7	x	x	x (entry 51)
Dibutyl phthalate (DBP)	84-74-2	x	x	x (entry 51)
Benzyl butyl phthalate (BBP)	85-68-7	x	x	x (entry 51)
Diisobutyl phthalate (DIBP)	84-69-5	x	x	x (entry 51)
Di-isononyl phthalate (DINP)	28553-12-0 68515-48-0			x (entry 52)
Di-isodecyl phthalate (DIDP)	26761-40-0 68515-49-1			x (entry 52)
Di-n-octyl phthalate (DNOP)	117-84-0			x (entry 52)
1,2-benzenedicarboxylic acid, di-C6-8-branched alkylesters, C7- rich	71888-89-6	x	x	x (entry 72)
Di-n-pentyl phthalate (DPP)	131-18-0	x	x	x (entry 72)
Di-n-hexyl phthalate (DnHP)	84-75-3	x	x	x (entry 72)
Diisopentyl phthalate	605-50-5	x	x	x (entry 72)
Bis (2-methoxyethyl) phthalate	117-82-8	x	x	x (entry 72)
1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	x	x	
n-pentyl-isopentyl phthalate	776297-69-9	x	x	
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4	x	x	
1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	x	x	
1,2-Benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters, with ≥ 0.3% of dihexyl phthalate	68648-93-1	x	x	
1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters, with ≥ 0.3% of dihexyl phthalate	68515-51-5	x	x	
Dicyclohexyl phthalate (DCHP)	84-61-7	x		
Diisohexyl phthalate	71850-09-4	x		

Appendix 9 - PAH - Polycyclic aromatic hydrocarbons

PAH substances listed in Annex XVII and/or the Candidate List of Substances of Very High Concern for authorization of the Regulation (EC) No 1907/2006 (REACH). The German GS standard is not legally binding.

Name	CAS RN	Candidate list	Annex XVII, Entry 50	Annex XVII, Entry 72	German GS standard
Benzo(a)anthracene	56-55-3	x	x	x	x
Benzo(a)phenanthrene (chrysene)	218-01-9	x	x	x	x
Benzo(a)pyrene	50-32-8	x	x	x	x
Benzo(b)fluoranthene	205-99-2		x	x	x
Benzo(j)fluoranthene	205-82-3		x	x	x
Benzo(k)fluoranthene	207-08-9	x	x	x	x
Dibenzo(a,h)anthracene	53-70-3		x	x	x
Benzo[e]pyrene	192-97-2		x	x	x
Benzo[ghi]perylene	191-24-2	x			x
Anthracene	120-12-7	x			x
Anthracene oil distillation fractions		x			
Fluoranthene	206-44-0	x			x
Phenanthrene	85-01-8	x			x
Pyrene	129-00-0	x			x
Naphthalene	91-20-3				x
Indeno[1,2,3-cd]pyrene	193-39-5				x

TEXTILIMPORTÖRERNA
Address: Kronhusgatan 11, SE-411 05 Göteborg, Sweden
Phone: +46 31 724 28 70
E-mail: louise.winter@textileimporters.se

SWEDISH CHEMICALS GROUP - RISE IVF
Address: Argongatan 30, SE-431 53 Mölndal, Sweden
Phone: +46 10 516 50 00
E-mail: kemikaliegruppen@ri.se

FRISTADS AB
PROGNOSGATAN 24 | BOX 1102 | SE-501 11 | BORÅS | +46 (0)33 20 22 00 | FRISTADS.COM