

# CHEMICALS GUIDANCE

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

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**TEXTILIMPORTÖRERNA**  
The Textile Importers' Association in Sweden





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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 and shoes. This guide also includes recommendations regarding 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 detection limits 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

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<b>Limit value:</b>	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.
<b>CAS RN:</b>	Chemical abstract services registration number. CAS RN are given for specific defined substances.
<b>Properties:</b>	Human toxicological and Eco toxicological properties.
<b>Use:</b>	Identified uses on the market.
<b>Comments:</b>	Information on known alternatives and recommendations on how to avoid unwanted chemicals.
<b>Detection limit:</b>	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.
<b>Legal background:</b>	Current legal international and national frame work and requirements.
<b>Test method:</b>	Standardized test method if such exists. Test equipment if no standardized test method exists. Abbreviations of recommended test equipment are explained below.
<b>Packaging material:</b>	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

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### 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	µg/kg	(microgram per kilogram)
			0.1	% (by weight)	
			x	µg/m <sup>2</sup>	x depends on the thickness of the fabric (kg/m <sup>2</sup> )
			x	µg/cm <sup>2</sup> /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

## 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.

			
<b>Textile</b> Textile material, both natural and synthetic fibres	<b>Leather</b> Leather, both natural and leather imitation	<b>Accessories</b> Metal, plastics, rubber etc. used in e.g. buckles, buttons, jewellery and zippers.	<b>Packaging</b> 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

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

<b>Limit value:</b>	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.
<b>Properties:</b>	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.
<b>Use:</b>	Dispersing and emulsifying agents in textile chemicals as well as impregnation agents in printing pastes. Occurs in leather lubricants. Manufacturing of coatings.
<b>Comments:</b>	The main alternatives for NPEOs also include alcohol ethoxylates, both linear and branched, and glucose-based carbohydrate derivatives such as alkylpolyglucoside, glucamides, and glucamine oxides.
<b>Legal background:</b>	<p>Legal limit: 0.1% by weight for nonylphenol ethoxylate (NPEO) as a substance or constituent of preparations (closed systems exempted).</p> <p>NPEOs shall not be placed on the market after 3 February 2021 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.</p> <p>Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p>



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), 4-Nonylphenol, branched and linear, ethoxylated (4-NPnEO), 4-(1,1,3,3-tetramethylbutyl)phenol, (4-tert-OP) and 4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated (4-tert-OPnEO) 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).

4-Nonylphenol, branched and linear, ethoxylated and 4-tert-OPnEO is also included in Annex XIV to REACH.

**Test method:**

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ISO 18254 (textile)  
ISO 18218-1 (leather)

Detection limit: 10 mg/kg

## Arsenic compounds

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<b>Limit value:</b>	Should not be present in products.
<b>Properties:</b>	May cause cancer. Toxic by inhalation and toxic if swallowed. Persistent, bioaccumulative and toxic.
<b>Use:</b>	In glass, in metal alloy, preservative.
<b>Comments:</b>	Apply arsenic free compounds.
<b>Legal limit:</b>	0.1% by weight 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 of the European Parliament and of the Council (REACH). As wood preservatives regulated in Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH) (limit level; no intentionally added content). From 2020, arsenic and its compounds will have a restriction limit of 1 mg/kg (extractable content) in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).
<b>Test method:</b>	EN 16711-1 (total content in textiles). EN 16711-2 (extractable content in textiles).

## Bisphenol A; BPA (4,4'-isopropylidenediphenol)

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<b>Limit value:</b> _____	Should not be present in products.
<b>CAS RN:</b> _____	80-05-7
<b>Properties:</b> _____	Toxic for reproduction. Endocrine disrupting properties.
<b>Use:</b> _____	Mainly used in manufacture of polycarbonate epoxy resins and chemicals; hardener in epoxy resins and in thermal prints. May be used as catalyst and anti-oxidant for processing PVC.
<b>Comments:</b> _____	Left as residues in polycarbonate and epoxy. This substance can be found in products with material based on plastic and paper. BPA is part of a large family of chemicals called bisphenols.
<b>Legal background:</b> _____	<p>BPA 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).</p> <p>Bisphenol A (BPA) contained in thermal paper (0,02v%), is restricted from January 2020 (entry 66, annex XVII REACH).</p>
<b>Test method:</b> _____	Test equipment LC-MS, GC-MS.

## C,C'-azodi(formamide) (ADCA)

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<b>Limit value:</b> _____	Should not be used in processes or present in products.
<b>CAS RN:</b> _____	123-77-3
<b>Properties:</b> _____	Respiratory sensitizer.
<b>Use:</b> _____	Mainly as blowing agent in the rubber and plastics industry. Foaming agent in especially EVA and PVC.
<b>Comments:</b> _____	Can leave residues of formamide in the material. ADCA may decompose into semicarbazide a suspected carcinogen.
<b>Legal background:</b> _____	ADCA 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).
<b>Test method:</b> _____	No standardised test method available for textiles. Test equipment: GC-MS.

## Chromium VI (Cr +6)

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<b>Limit value:</b>	Should not be used in processes or present in products.
<b>CAS RN:</b>	Chromium VI (Cr+6) 18540-29-9
<b>Properties:</b>	Dangerous for the environment. Carcinogenic. Allergenic. Toxic.
<b>Use for textiles:</b>	Oxidation agent. Fixing chemical. Used for finishing of direct dyes to improve their wash fastness. Potassium dichromate is used for oxidation of vat and sulphur dyes. Chromium salts are used for preparation and finishing of acid dyes on silk and wool.
<b>Use for leather:</b>	Tanning with basic chromium salts is the most widely used method where chromium VI may occur as an impurity. Etching of artificial leather and rubber.
<b>Comments:</b>	<p>Chrome (III) is an alternative as fixing agent in mordant dyeing.</p> <p>Use direct dyes or 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.</p> <p>Vegetable tanning agents are alternatives for leather. Tanning with titanium is an emerging technology.</p> <p>Chromium VI substances are listed in annex 5.</p>
<b>Legal background:</b>	<p>Legal limit: 0.0003% by weight (3 mg/kg) for leather in direct skin contact.</p> <p>Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p> <p>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 of the European Parliament and of the Council (REACH) are listed in Appendix 5. Several Chromium compounds are also included in REACH Annex XIV.</p> <p>From 2020, chromium VI compounds will have a restriction limit of 1 mg/kg (extractable Cr VI content) in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p>
<b>Test method:</b>	<p>EN ISO 17075-1, (Colorimetric method), -2 (Chromatographic method) for leather. Detection limit: 3 mg/kg. ISO 19071 (in chromium tanning agents).</p> <p>No standardised test method available for textiles. Test equipment: UV-VIS Spectrometer, ICP-MS. Detection limit: 0.5 mg/kg.</p>

## Ethylenediamine (EDA)

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<b>Limit value:</b> _____	Should not be present in products.
<b>CAS RN:</b> _____	107-15-3
<b>Properties:</b> _____	Respiratory and skin sensitizer.
<b>Use:</b> _____	Used in the production of many industrial chemicals. Used in the production of polyurethane fibres.
<b>Legal background:</b> _____	Ethylenediamine 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).
<b>Test method:</b> _____	No standardised test method available.  Test equipment: GC-MS.

## Ethylenethiourea

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	Imidazolidine-2-thione (2-imidazoline-2-thiol) also called ethylenethiourea: 96-45-7
<b>Properties:</b>	Toxic for reproduction.
<b>Use:</b>	Used primarily as an accelerator for vulcanizing rubber.
<b>Legal background:</b>	Ethylenethiourea 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).
<b>Test method:</b>	No standardised test method available.  Test equipment: LC-MS.

## Formamide

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	75-12-7
<b>Properties:</b>	Toxic for reproduction.
<b>Use:</b>	<p>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 azodi-carbonamide (see headline ADCA above) are responsible for the presence of formamide in EVA-consumer products.</p>
<b>Comments:</b>	<p>For the application as solvent, formamide might be replaced by other solvents like dipropylene glycol.</p> <p>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.</p>
<b>Legal background:</b>	<p>Formamide 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).</p> <p>Formamide is restricted in puzzle mats in Belgium and France and is included in the Toy Safety Directive (limit value 200 mg/kg).</p>
<b>Test method:</b>	<p>Solvent extraction.</p> <p>Test equipment: GC-MS or LC-MS.</p>



## Hydrazine

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<b>Limit value:</b> _____	Should not be used in processes or present in products.
<b>CAS RN:</b> _____	Hydrazine: 302-01-2,7803-57-8
<b>Properties:</b> _____	Carcinogenic, allergenic, toxic.
<b>Use:</b> _____	Mainly used as a foaming agent in preparing polymer foams.
<b>Legal background:</b> _____	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).
<b>Test method:</b> _____	No standardised test method available for textiles.  Test equipment: UV-VIS Spectrometer. Detection limit: There is no standard international detection limit as yet.  Test equipment: GC-MS.

## PAH - Polycyclic aromatic hydrocarbons

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**Limit value:** \_\_\_\_\_ Should not be used in processes or present in products.

**CAS RN:** \_\_\_\_\_ Benzo(a)anthracene, 56-55-3  
Benzo(a)phenanthrene (chrysene), 218-01-9  
Benzo(a)pyrene, 50-32-8  
Benzo(b)fluoranthene, 205-99-2  
Benzo(j)fluoranthene, 205-82-3  
Benzo(k)fluoranthene, 207-08-9  
Dibenzo(a,h)anthracene, 53-70-3  
Benzo(e)pyrene 192-97-2  
Benzo(ghi)perylene 191-24-2

**Properties:** \_\_\_\_\_ Carcinogenic, allergenic, toxic.

**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 mostly 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 and leather.

**Legal background:**

Materials in toys or childcare articles that come into direct contact with the human skin shall not include any of the listed PAHs in amounts more than 0.5 mg/kg. For materials in other product categories the limit value is 1 mg/kg.

The above mentioned PAHs are listed in annex XVII of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH) from 27 December 2015. The voluntary German GS standard has requirements for the sum of 18 PAH (the 16 U.S. EPA listed compounds) and also specifically benzo(a)pyrene, that most products in the German market follows.

Benzo(a)anthracene, (56-55-3), Chrysene, (218-01-9), Benzo(a)pyrene, (50-32-8), Anthracene (120-12-7), anthracene oil distillation fractions and Benzo(ghi)perylene (191-24-2) are 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).

From 2020, the following PAHs will have a restriction limit of 1 mg/kg in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH):

Benzo(a)anthracene, 56-55-3  
Benzo(a)phenanthrene (chrysene), 218-01-9  
Benzo(a)pyrene, 50-32-8  
Benzo(b)fluoranthene (benz(e)acephenanthrylene) 205-99-2  
Benzo(j)fluoranthene, 205-82-3  
Benzo(k)fluoranthene, 207-08-9  
Dibenzo(a,h)anthracene, 53-70-3  
Benzo(e)pyrene 192-97-2

**Test method:**

ISO 21461 (NMR).

AfPS GS 2014-01 PAK  
ISO/TS 16190 (footwear)  
Detection limit: 0.2 mg/kg

## Quinoline

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<b>Limit value:</b>	Should not be used in processes or present in products.
<b>CAS RN:</b>	91-22-5
<b>Properties:</b>	Carcinogenic and mutagenic.
<b>Use:</b>	Quinoline is used mainly as an intermediate in the manufacture of other products. Quinoline is also used as a catalyst, a corrosion inhibitor, in metallurgical processes, in the manufacture of dyes, in polymers, and as a solvent for resins and terpenes.
<b>Legal background:</b>	From 2020, quinoline will have a restriction limit of 50 mg/kg in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).
<b>Test method:</b>	No standardised test method available for textiles.  Test equipment: GC-MS, LC-MS.

## Solvents - Aliphatic organic solvents

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<b>Limit value:</b>	No odour.
<b>Properties:</b>	Liquids or gases. Inhalation can affect the nervous system and cause headache, fatigue and nausea. Cause irritation on skin, eyes and mucous membranes.
<b>Use:</b>	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.
<b>Comments:</b>	Aliphatic organic solvents are volatile organic compounds (VOC). There are statutory hygienic limit values for employees in many countries.
<b>Legal background:</b>	Manufacturers in EU are required to follow the "IED", 2010/75/EU.
<b>Test method:</b>	SNV 195 651, screening method. Panel odour test.  Detection limit: No odour.

## Solvents - Chlorinated organic solvents

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<b>Limit value:</b> _____	Should not be used in processes or present in products.
<b>Properties:</b> _____	Liquid or gas. Affect the nervous system. Irritating to skin and mucous membranes. Many chlorinated organic solvents are dangerous for the environment.
<b>Use:</b> _____	<p>Solvent 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). Solvents in printing. Finishing agents. Fabric softeners. Also used as moth-proofing agent in textiles and for the manufacture of silk and pearls.</p> <p>See also under heading "Flame retardants".</p>
<b>Comments:</b> _____	<p>Alternatives: water-based emulsions. Alternative products are available or under development for all uses.</p> <p>Carriers do not need to be used for dyeing in high-pressure machinery.</p> <p>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.</p>

Legal background:	Solvent	CAS-RN	Legal framework	Legal requirement
	Chloroform	67-66-3	Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (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.
	1,1,2-trichloroethane	79-00-5		
	1,1,2,2-tetrachloroethane	79-34-5		
	1,1,1,2-tetrachloroethane	630-20-6		
	Pentachloroethane	76-01-7		
	1,1-dichloroethylene	75-35-4		
	1,4-dichlorobenzene	106-46-7		
	Carbon tetrachloride	56-23-5	Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer.	Shall not be produced, placed on the market, or used.
	1,1,1-trichloroethane	71-55-6		
	$\alpha,\alpha,\alpha,4$ -tetrachlorotoluene; p-chlorobenzotrichloride	5216-25-1	Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).	1 mg/kg in textiles (CMR fast track).
	$\alpha,\alpha,\alpha$ -trichlorotoluene; benzotrichloride	98-07-7		
	$\alpha$ -chlorotoluene; benzyl chloride	100-44-7		
	Trichloroethylene	79-01-6	Candidate List of Substances of Very High Concern for authorization and annex XIV in Regulation (EC) No 1907/2006 of the European Parliament and of the Council (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 of the European Parliament and of the Council (REACH).	0.1% by weight in articles for information duty.

Manufacturers in EU are required to follow the "IED", 2010/75/EU.

**Test method:**

No standardised test method available.

Test equipment: GC-MS, GC-ECD.

Detection limit: There is no standard international detection limit as yet.

For GC-MS 0.1 mg/kg.

## Solvents - Aromatic organic solvents

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<b>Limit value:</b> _____	Should not be present in products.
<b>Properties:</b> _____	Liquids or gases. Inhalation can affect the nervous system and cause headache, fatigue and nausea. Cause irritation on skin, eyes and mucous membranes. Kerosene and diesel odour in finished products. Some aromatic organic compounds are carcinogenic.
<b>Use:</b> _____	Solvents for dyeing and printing. Stain removal. Coatings and binders.
<b>Comments:</b> _____	<p>Aromatic organic solvents are volatile organic compounds (VOC). Use solvents of higher quality with lower levels of aromatic hydrocarbons or synthetic thickeners based on polycarboxylic acids.</p> <p>Replace simple aromatic hydrocarbons (petrol) with low-molecular-weight aliphatic hydrocarbons. To avoid problems with organic solvents, switching to water-based dyeing and printing processes is recommended. There are statutory hygienic limit values for employees in many countries.</p>
<b>Legal background:</b> _____	<p>From 2020, benzene (CAS-RN 71-43-2) will have a restriction limit of 5 mg/kg in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p> <p>Manufacturers in EU are required to follow the "IED", 2010/75/EU.</p>
<b>Test method:</b> _____	<p>SNV 195 651, screening method. Panel odour test.</p> <p>Detection limit: No odour.</p>



## Other Organic solvents - DMFa (N,N-dimethylformamide)

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<b>Limit value:</b>	Should not be used in processes or present in products.
<b>CAS RN:</b>	N,N-dimethylformamide (DMFa): 68-12-2
<b>Properties:</b>	Toxic to reproduction.
<b>Use:</b>	Used as solvent and in production of leather imitation (PU). An intermediate for paper finishing. It may have a faint amine odour in finished products.
<b>Comments:</b>	Use “water-bourne” PU which does not contain DMFa.
<b>Legal background:</b>	<p>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).</p> <p>Restricted in polyurethane-coated work gloves in Germany. The maximum DMFa content must be less than 10 mg/kg glove material (TRGS 401).</p> <p>From 2020, DMFa will have a restriction limit of 3000 mg/kg in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p>
<b>Test method:</b>	<p>EN 16778 (protective gloves) GEN ISO/TS 16189 (footwear and footwear components).</p> <p>No standardised test method available for textiles.</p> <p>Test equipment: GC-MS. Detection limit: There is no standard international detection limit as yet. For GC-MS 1 mg/kg can be expected.</p>

## Other Organic solvents - DMAC (N,N-dimethylacetamide)

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<b>Limit value:</b> _____	Should not be used in processes or present in products.
<b>CAS RN:</b> _____	N,N-dimethylacetamide (DMAC): 127-19-5
<b>Properties:</b> _____	Toxic to reproduction, irritating.
<b>Use:</b> _____	Used as solvent and in industrial coatings, polyimide films, paint strippers and ink removers.
<b>Legal background:</b> _____	<p>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).</p> <p>From 2020, DMAC will have a restriction limit of 3000 mg/kg in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p>
<b>Test method:</b> _____	<p>No standardised test method available for textiles.</p> <p>Test equipment: GC-MS, LC-MS.</p> <p>Detection limit: There is no standard international detection limit as yet. For LC-MS 1 mg/kg can be expected.</p>

## Other Organic solvents - NMP (N-methyl-2-pyrrolidone)

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<b>Limit value:</b>	Should not be used in processes or present in products.
<b>CAS RN:</b>	N-methyl-2-pyrrolidone (NMP): 872-50-4
<b>Properties:</b>	Toxic to reproduction, irritating.
<b>Use:</b>	<p>Good solvency properties for polymers. Surface treatment of textiles (synthetic leather), resins and metal coated plastics or as a paint stripper. Intermediates for textile auxiliaries, plasticizers, stabilizers and specialty inks.</p> <p>Polyamide precursor. SBR (styrene-butadiene) latex production.</p>
<b>Comments:</b>	Note that NEP (1-ethylpyrrolidin-2-one), CAS 2687-91-4 is not a suitable alternative to NMP since it is Repr. Tox. 1B.
<b>Legal background:</b>	<p>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).</p> <p>From 2020, NMP will have a restriction limit of 3000 mg/kg in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p>
<b>Test method:</b>	<p>ISO 19070 (leather).</p> <p>No standardised test method available for textiles.</p> <p>Test equipment: GC-MS, LC-MS. Detection limit: There is no standard international detection limit as yet. For LC-MS 1 mg/kg can be expected.</p>

## Tin organic compounds (Organostannic compounds)

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<b>Limit value:</b>	Should not be present in products.
<b>Properties:</b>	Tributyltin, dibutyltin and dioctyltin compounds are different chemical substances that are toxic and dangerous for the environment. Bioaccumulative and persistent.
<b>Use:</b>	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.
<b>Comments:</b>	<p>Alternative stabilizers are barium/zinc, potassium/zinc, calcium, calcium/zinc organic or methyltin stabilisers.</p> <p>Alternative catalysts can be organotitanate or 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.</p> <p>Dialkyl tin compounds represents a large family of substances that consist of the following common constituents, see list of DBTs in Annex 4.</p> <p>Trialkyltin compounds are biocides, see also the section regarding Biocidal agent.</p>
<b>Legal background:</b>	<p>Legal Limit: 0.1% by weight</p> <p>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 of the European Parliament and of the Council (REACH).</p> <p>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-dithia-4-stannatetradecanoate (DOTE), 15571-58-1 and reaction mass of DOTE and MOTE <sup>1</sup> 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).</p>
<b>Test method:</b>	<p>No standardised test method for textile available.</p> <p>CEN ISO/TS 16179 (footwear).</p> <p>Test equipment: GC-MS.</p> <p>Detection limit: 0.015 mg/kg.</p> <p>EN ISO17353 (water and sediment).</p>

<sup>1</sup> 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

# PRODUCT-RELATED (PROPERTY-LENDING) CHEMICALS

## Allergenic dyes

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21 listed in Appendix 1

<b>Limit value:</b>	Should not be present in textiles or leather imitation.
<b>Properties:</b>	Highly allergenic (strong sensitizers). They may also have other hazardous properties.
<b>Use:</b>	Dyeing of textile and leather imitation goods.
<b>Comments:</b>	Alternatives: Use other dyes that do not cause allergies.
<b>Legal background:</b>	<p>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).</p> <p>Eight disperse dyestuffs are banned in Germany, Appendix 1.</p>
<b>Test method:</b>	<p>DIN 54231 for textiles (qualitative). Detection limit: 50 mg/kg (per substance).</p> <p>EN ISO 16373 (extractable dyestuffs).</p>

## Banned arylamines derived from azo dyes

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24 substances listed in Appendix 2

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

**Properties:** Carcinogenic. Some are allergenic. Arylamines can form part of the molecular structure of a dye. Certain azo dyes can form the 24 listed banned arylamines.

**Use:** Constituent of dyes. Dyeing and printing.

**Comments:** Dyes that can release one of the 24 aromatic amines may not be used. See Appendix 2 for a description and listing of banned arylamines.

This regulation applies to azo colorants which also covers azo dye stuffs and azo pigments.

**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 of the European Parliament and of the Council (REACH).

Several arylamines 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 14362-1, -3 (textile)  
EN ISO 17234-1, -2 (leather)

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

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

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320); 3846-71-7 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (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
<b>Properties:</b>	Persistent, Bioaccumulative and Toxic. Very Persistent and very Bioaccumulative.
<b>Use:</b>	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.
<b>Legal background:</b>	Legal limit: 0.1% by weight.  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 of the European Parliament and of the Council (REACH).
<b>Test method:</b>	No standardised test method available.  Test equipment: GC-MS, LC-MS, GC-ECD

## Boric acid, borate compounds

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	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
<b>Properties:</b>	Toxic. May impair fertility and cause harm to unborn child.
<b>Use:</b>	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.
<b>Legal limit:</b>	0.1% by weight Boric acid, disodium tetraborate anhydrous, disodium octaborate, tetraboron disodium heptaoxid, hydrate, sodium perborate; perboric acid, sodium salt and sodium peroxometaborate 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).
<b>Test method:</b>	Test equipment: 1) AAS. 2) ICP-MS and ICP-OES.  Detection limit: 1) 1000 µg/kg as Boron. 2) 100 µg/kg as Boron.



## Cadmium (Cd) and cadmium salts

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<b>Limit value:</b>	Should not be present in products. Occurrence in materials below 0.5 mg/kg is regarded as contaminations which cannot be controlled.
<b>CAS RN:</b>	Cadmium (metal): 7440-43-9
<b>Properties:</b>	Heavy metal that occurs naturally in small quantities in nature. Toxic to aquatic organisms. Non-biodegradable. Dangerous for the environment. Can cause kidney damage.
<b>Use in textile and leather:</b>	Can occur in pigmented plastisol prints.
<b>Use in accessories and packaging:</b>	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.
<b>Comments:</b>	Alternatives are available, such as calcium-zinc based stabilizers. Order cadmium-free processes and materials.
<b>Legal background:</b>	<p>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.</p> <p>Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p> <p>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 of the European Parliament and of the Council (REACH).</p> <p>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.</p> <p>Directive (EC) No 94/62/EC of 20 December 1994 on packaging and packaging waste.</p> <p>From 2020, cadmium and its compounds will have a restriction limit of 1 mg/kg (extractable content) in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p>
<b>Test method:</b>	EN 16711-1 (total content in textiles). EN 16711-2 (extractable content in textiles) EN ISO 17072-1 (extractable content in leather) EN ISO 17072-2 (total content in leather)

## CMR, Carcinogenic, Mutagenic, Reproductive toxic dyestuffs

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15 substances listed in Appendix 3

<b>Limit value:</b> _____	Should not be present in products.
<b>Properties:</b> _____	Carcinogenic, mutagenic or reproductive toxic. Characteristics: Dyestuffs that are classified as carcinogens, mutagenic, reproductive toxic according to CLP including class 2 (only 1A and 1B are CMR).
<b>Use:</b> _____	Dyeing of textile and leather goods.
<b>Comments:</b> _____	Alternatives: Use other dyestuff than the substances in Appendix 3.
<b>Legal background:</b> _____	<p>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).</p> <p>Restrictions for use of substances, harmonised classified as CMR according to CLP, as substances, as constituents of other substances or in mixtures. These are found in REACH annex XVII, entry 28-30.</p> <p>From 2020, C.I. Disperse Blue 1, C.I. Basic Red 9 and C.I. Basic Violet 3 with <math>\geq 0,1\%</math> of Michler's ketone will have a restriction limit of 50 mg/kg in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p>
<b>Test method:</b> _____	Extractable dyestuffs will be tested by EN ISO 16373.

## Chloroparaffins

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	Short-chain chloroparaffins (C10-C13): 85535-84-8 Medium-chain chloroparaffins (C14-C17): 85535-85-9 Long-chain chloroparaffins (C18-): 85535-86-0
<b>Properties:</b>	Dangerous for the environment, allergenic, toxic.
<b>Use in textile:</b>	Plasticizers and flame retardant in plastic material.
<b>Use in leather:</b>	Plasticizers in coated synthetic or fake leather. Fat liquoring agent in leather production.
<b>Use in accessories and packaging:</b>	Plasticizers and flame retardant in plastic material and rubber.
<b>Comments:</b>	Replace chloroorganic chemical flame retardants with phosphorus- and/or nitrogen-based organic chemical flame retardants or non chemical barrier technologies.  Alternative plasticizers are available but must be evaluated.
<b>Legal background:</b>	Legal limit: Shall not occur, meaning below the detection limit according to best laboratory practice.  Short-chain chloroparaffins are listed as proposed POP <sup>2</sup> in the Stockholm Convention on Persistent Organic Pollutants (POPs) and banned by Regulation (EC) No 850/2004. 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) are 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).
<b>Test method:</b>	No standardised test method available for textiles. ISO 18219 (leather).  Test equipment: GC-MS, LC-MS. Detection limit: There is no standard international detection limit as yet.

<sup>2</sup> Persistent Organic Pollutants (POPs) are organic chemical substances, which remain intact for exceptionally long periods of time, become widely distributed in the environment, accumulate in the fatty tissue of living organisms and toxic to both humans and wildlife.

## Chromium VI (Cr +6)

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	Chromium VI (Cr+6): 18540-29-9
<b>Properties:</b>	Dangerous for the environment. Carcinogenic. Allergenic. Toxic.
<b>Use:</b>	Metal plated metal parts. Chromic acid is used as wood preservative. Some dyes may contain chromium.
<b>Comments:</b>	Chrome (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 chrome VI.
<b>Legal background:</b>	<p>Legal limit: 0.0003% by weight (3 mg/kg) for leather in direct skin contact.</p> <p>Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p> <p>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 of the European Parliament of the Council (REACH) are listed in Appendix 5. Several Chromium compounds are also included in REACH Annex XIV.</p> <p>From 2020, chromium VI compounds will have a restriction limit of 1 mg/kg (extractable Cr VI content) in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).</p> <p>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.</p> <p>Directive (EC) No 94/62/EC of 20 December 1994 on packaging and packaging waste.</p>
<b>Test method:</b>	<p>Test equipment: XRF screening for metal chromium. ISO 17075 (leather).</p> <p>Detection limit: 3 mg/kg.</p> <p>No standardised test method available for textiles. Test equipment: UV-VIS Spectrometer. Detection limit: 0.5 mg/kg</p>

## Dechlorane™ Plus

(1,6,7,8,9,14,15,16,17,17,18 Dodecachloropentacyclo[12.2.1.1.6,9.02,13.05,10] octadeca-7,15-diene)



<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	13560-89-9; 135821-74-8; 135821-03-3
<b>Properties:</b>	Persistent and bioaccumulative.
<b>Use:</b>	Flame retardant for plastics. Use in adhesives and sealants. Use in binding agents.
<b>Legal background:</b>	0.1% by weight.  Dechlorane™ Plus is 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).
<b>Test method:</b>	Test equipment: GC-MS, LC-MS, GC-ECD, (XRF to detect chlorine).  Detection limit: There is no standard international detection limit as yet. For LC-MS 1 mg/kg can be expected.

## Formaldehyde



<b>Limit value:</b>	20 mg/kg for textiles and leather goods for children under the age of two.  75 mg/kg for all textiles and leather goods that come into direct contact with the skin during normal use. 300 mg/kg for all other textiles and leather goods. Japanese law 112 requires under detection limit for products for infants (less than 5 absorbance units).
<b>CAS RN:</b>	50-00-0

<b>Properties:</b>	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.
<b>Use:</b>	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.
<b>Comments:</b>	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).
<b>Legal background:</b>	From 2015-05-01 classified as CMR substance. Restrictions for use of substances, as constituents of other substances or in mixtures. These are found in REACH annex XVII, entry 28-30. Several national legislations, see Appendix 7.  German law (Bedarfsgegenständeverordnung and Chemikalien-Verbotsverordnung); Products with formaldehyde content shall be labeled. Wooden products shall not release formaldehyde. Cleaning and finishing agents shall not contain formaldehyde above 0,2%.  From 2020, formaldehyde will have a restriction limit of 75 mg/kg in textiles <sup>3</sup> (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).
<b>Test method:</b>	EN ISO 141 84-1 (textiles) ISO 17226 (leather) Test method specified in Japan law 112  Detection limit: 16 mg/kg

<sup>3</sup> During a transition period, jackets, coats or upholstery will have a restriction limit of 300 mg/kg.

## Hexabromocyclododecan (HBCDD)

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	Hexabromocyclododecane (HBCDD): 25637-99-4, 3194-55-6, 134237-50-6, 134237-51-7 and 134237-52-8
<b>Properties:</b>	<p>Persistent, bioaccumulative and toxic. Halogenated organic additives in polymers may leach out and have a negative impact on health and environment.</p> <p>Halogen containing polymers may form highly corrosive substances and an undefined range of halogenated substances that may be PBT or CMR when incinerated.</p>
<b>Use:</b>	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).
<b>Comments:</b>	<p>Replace bromoorganic chemical flame retardants with phosphorus- and/or nitrogen-based organic chemical flame retardants or 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.</p> <p>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.</p>
<b>Legal background:</b>	<p>Legal limit: 100 ppm.</p> <p>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 of the European Parliament and of the Council (REACH).</p> <p>Hexabromocyclododecane (HBCDD, CAS 25637-99-4 and 3194-55-6) are listed in the Stockholm Convention on Persistent Organic Pollutants (POPs) and banned by Regulation (EC) No 850/2004.</p>
<b>Test method:</b>	<p>EN ISO 17881-1 (textiles).</p> <p>Test equipment: GC-MS, LC-MS, GC-ECD Detection limit: There is no standard international detection limit as yet. For LC-MS 1 mg/kg can be expected.</p>

## Lead (Pb) and lead salts

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<b>Limit value:</b>	Should not be present in textiles.  100 mg/kg for lead as a metal in plastic and metallic accessories.
<b>CAS RN:</b>	Lead (metal): 7439-92-1
<b>Properties:</b>	Lead exposure can give rise to a number of negative health effects, including damage to liver, nervous system and fetuses. Lead is mainly accumulated in bone tissue. It has a very long half-life. 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.
<b>Use:</b>	Lead salts are additives in plastics as stabilizers to increase the service of life of the material. May be used 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.
<b>Comments:</b>	Alternative stabilizers are barium/zinc, potassium/zinc, calcium, calcium/zinc organic or methyltin 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.
<b>Legal background:</b>	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 of the European Parliament and of the Council (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. Lead and its compounds are restricted in jewellery articles and hair accessories within EU with a legal limit: 500 mg/kg (0.05%). 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%)<sup>4</sup>. Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).

From 2020, lead and its compounds will have a restriction limit of 1 mg/kg (extractable content) in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).

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.*)

**Test method:**

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

<sup>4</sup> 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/cm<sup>2</sup> 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

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	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
<b>Properties:</b>	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.
<b>Use:</b>	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.
<b>Legal background:</b>	0.01%. Phenylmercury compound are restricted in articles in Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH). 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.
<b>Test method:</b>	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)  Test equipment: 1) XRF. 2) AAS. 3) ICP-MS and ICP-OES Detection limit: 1) 50 mg/kg. 2) 100 µg/kg. 3) 10 µg/kg

## Nickel (Ni), in accessories

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<b>Limit value:</b>	0.5 µg per cm <sup>2</sup> and week for products intended to come into direct and prolonged contact with the skin.  0.2 µg per cm <sup>2</sup> and week for piercing items.
<b>CAS RN:</b>	Nickel (metal): 7440-02-0
<b>Properties:</b>	Nickel is one of the most common substances that cause contact dermatitis. Highly allergenic (strong sensitizer).
<b>Use:</b>	Nickel is often used to improve alloys used in clothing accessories such as zippers, buttons and rivets.
<b>Comments:</b>	Refrain from using nickel-treated metals or nickel-containing metal coatings.
<b>Legal background:</b>	0.5 µg per cm <sup>2</sup> and week for products intended to come into direct and prolonged contact with the skin. 0.2 µg per cm <sup>2</sup> and week for piercing items.  Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).
<b>Test method:</b>	Test method I: EN 12472:2005+A1:2009 and EN 1811:2011+A1:2015 (for coated items) 1811:2011+A1:2015 (for non-coated item)  Detection limit I: 0.01 µg/cm <sup>2</sup> /week  Test method II: 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.)

## Perfluoro octane carboxylic acid (PFOA) and related substances



<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	335-67-1
<b>Properties:</b>	Per and polyfluorinated chemicals are surfactant, stable, temperature-resistant and water- and grease-repellent substance. PFOA is a potential carcinogen.
<b>Use:</b>	Degradation products from additives in cleaning agents, fire extinguishing agents metal plating and impregnation agents in leather and textiles. PFOA is used as an emulsifier in the production of fluoropolymers such as polytetrafluoroethylene (PTFE) etc.
<b>Comments:</b>	<p>Alternatives are technologies based on short chain fluorotelomers (&lt; C7) and short chain perfluorosulfonic compounds (&lt; C5) where oil repellent properties are essential such as protective gear.</p> <p>Where oil repellent properties are not essential non fluoro-based chemistries such as waxes and paraffins but not silicones are recommended.</p>
<b>Legal background:</b>	<ul style="list-style-type: none"><li>- Pentacosafuorotridecanoic acid (PFTrDA), 72629-94-8</li><li>- Tricosafuorododecanoic acid (PFDoA), 307-55-1</li><li>- Henicosafuoroundecanoic acid (PFUnA), 2058-94-8</li><li>- Heptacosafuorotetradecanoic acid (PFTA), 376-06-7</li><li>- Pentadecafluorooctanoic acid (PFOA), 335-67-1</li><li>- Ammonium pentadecafluorooctanoate (APFO), 3825-26-1</li><li>- Perfluorononan-1-oic-acid (PFNA) and its sodium ammonium salts, 375-95-1, 21049-39-8, 4149-60-4</li><li>- Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts, 335-76-2, 3108-42-7, 3830-45-3</li></ul> <p>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).</p> <p>Restricted in Norway from 1 June 2014 with the following legal limits: 0.001 % in chemical products 0.1 % (1000 ppm) in articles and parts thereof. 1 µg/m<sup>2</sup> in textile consumer products.</p>
<b>Test method:</b>	No standardised test method available.  Test equipment: LC-MS/MS Detection limit: 0.005 mg/kg.

## Perfluoro octane sulfonate (PFOS) and related substances

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<b>Limit value:</b>	1 µg/m <sup>2</sup> applies to fluoro coated textiles and leather products.  0.1% by weight applies to fluoro impregnated textiles and leather products.
<b>CAS RN:</b>	1763-23-1
<b>Properties:</b>	Polyfluorocarbons are surfactant, stable, temperature-resistant and water- and grease-repellent substance. PFOS is dangerous for the environment. PFOS hardly degrades (persistent) and is bio accumulative.
<b>Use:</b>	Degradation product from additives in cleaning agents, ant pesticide bait, fire extinguishing agents, metal plating and impregnation agents in leather and textiles etc.
<b>Comments:</b>	Alternatives are technologies based on short chain fluorotelomers (< C7) and short chain perfluorosulfonic compounds (< C5) where oil repellent properties are essential such as protective gear. Where oil repellent properties are not essential non fluoro based chemistries such as waxes and paraffins but not silicones are requested.
<b>Legal background:</b>	Legal limit: 1 µg/m <sup>2</sup> applies to fluoro coated textiles and leather products.  0.1% by weight applies to articles or part of articles.  PFOS is listed in the Stockholm Convention on Persistent Organic Pollutants (POPs) and banned by Regulation (EC) No 850/2004 <sup>5</sup> .  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 of the European Parliament and of the Council (REACH).
<b>Test method:</b>	EN/TS 15968  Test equipment: LC-MS/MS. Detection limit: 0.1 µg/m <sup>2</sup> .

<sup>5</sup> The total amount of PFOS and PFOS related substances counted as PFOS, see test method EN/TS 15968:2009.

## Phthalate esters

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<b>Limit value:</b>	0.1% by weight (1000 mg/kg) for regulated phthalates in the material of interest (e.g. a print).
<b>CAS RN:</b>	DEHP: 117-81-7 DBP: 84-74-2 BBP: 85-68-7 DINP: 28553-12-0, 68515-48-0 DIDP: 26761-40-0, 68515-49-1 DNOP: 117-84-0 DiBP: 84-69-5 DIHP: 71888-89-6 DHNUP: 68515-42-4 DMEP: 117-82-8 1,2-Benzenedicarboxylic acid, dipentylester, branched and linear: 84777-06-0 DIPP: 605-50-5 N-pentyl-isopentylphthalate: 776297-69-9 Dipentyl phthalate (DPP): 131-18-0 Dihexyl phthalate: 84-75-3 1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear: 68515-50-4 1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters with $\geq 0.3\%$ of dihexyl phthalate (84-75-3): 68515-51-5 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with $\geq 0.3\%$ of dihexyl phthalate (84-75-3): 68648-93-1 DCHP (dicyclohexyl phthalate): 84-61-7
<b>Properties:</b>	DEHP and DiBP are classified as hazardous to health. DBP is classified as having health and environmental effects. BBP is classified as having health and environmental effects. DIDP shows concerns for hepatic toxicity. Many phthalates are suspected endocrine disrupters.
<b>Use:</b>	Phthalates may be used as plasticizers in polymers. Additives in adhesives, paints, lacquers, varnishes and solvents.
<b>Comments:</b>	Alternative plasticizers include citrates, sebacates, adipates, and phosphates etc. The terephthalate, DEHT and the cyclohexane DINCH are example of commercial available alternatives with low human and environmental toxicity. There are also plastics that do not require phthalates. 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 in toys and childcare articles for DEHP, DBP and BBP.

0.1% by weight in toys and childcare articles which can be placed in the mouth for DEHP, DBP, BBP, DINP, DIDP and DNOP.

DEHP, DBP, BBP and DIBP, DIHP, DHNUP, DMEP, 1,2-Benzenedicarboxylic acid, dipentylester, branched and linear, DIPP, N-pentyl-isopentylphthalate and DPP 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 of the European Parliament and of the Council (REACH).

Dihexyl phthalate, 1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear, 1,2-benzenedicarboxylic acid, mixed and even numbered di-C6-10-alkyl esters with  $\geq 0.3\%$  of dihexyl phthalate and DCHP are listed in the Candidate List of Substances of Very High Concern for authorisation of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).

From 2020, DIHP, DMEP, DIPP, DPP and DnHP will have a restriction limit of 1000 mg/kg in textiles (CMR fast track) according to Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH). This limit applies to each substance individually or in combination with other phthalates that are classified as CMR substances.

All phthalates in toys and childcare articles for children aged 0-3 years are restricted (0.05%) in Denmark (BEK nr 855).

**Test method:**

EN-ISO 14389

Test equipment: GC-MS, LC-MS.

Detection limit: 100 mg/kg.

## Polybrominated biphenyls (PBB) and Polybrominated diphenyl ethers (PBDE)



<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	Polybrominated biphenyls: 59536-65-1 (mix) Hexabromobiphenyl: 36355-01-8 Pentabromodiphenyl ether (PentaBDE): 32534-81-9, 60348-60-9 Octabromodiphenyl ether (OctaBDE): 32536-52-0 Decabromodiphenyl ether (DecaBDE): 1163-19-5 Tetrabromodiphenyl ether (TetraBDE): 5436-43-1 Heptabromodiphenyl ether (HeptaBDE): 207122-16-5, 446255-22-7 Hexabromodiphenyl ether (HexaBDE): 68631-49-2, 207122-15-4
<b>Properties:</b>	<p>Persistent, bioaccumulative and toxic. Halogenated organic additives in polymers may leach out and have a negative impact on health and environment.</p> <p>Halogen containing polymers may form highly corrosive substances and undefined range of halogenated substances that may be PBT or CMR when incinerated.</p>
<b>Use:</b>	Flame-retardant treatment of products where fire protection is required.
<b>Comments:</b>	<p>Replace bromoorganic chemical flame retardants with phosphorus- and/or nitrogen-based organic chemical flame retardants or 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.</p> <p>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.</p>
<b>Legal background:</b>	<p>10 mg/kg for several PBDEs as POPs.</p> <p>Commercial TetraBDE, PentaBDE, HexaBDE, HeptaBDE and Hexabromobiphenyl are listed in the Stockholm Convention on Persistent Organic Pollutants (POPs) and banned by Regulation (EC) No 850/2004.</p> <p>Commercial OctaBDE (0.1% by weight) and Polybrominated biphenyls (PBBs) are banned in Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH). The legal limit for PBBs in textile articles with skin contact is detection limit. OctaBDE is suggested as a POP according to the Stockholm Convention.</p>



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).

Decabromo diphenylether is banned in all products in Norway since 2008, legal limit 0.1 w%.

PBBs are listed in the Rotterdam Convention.

Chlorinated phosphate esters are, together with several other halogenated flame retardants, under scientific review in several countries and regions worldwide.

**Test method:**

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EN ISO 17881-1 (textiles)  
EN 16377 for PBB (plastics)

Test equipment: GC-MS, LC-MS, GC-ECD.  
Detection limit: There is no standard international detection limit as yet. For LC-MS 1 mg/kg can be expected.

## Siloxanes

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<b>Limit value:</b>	0.1% by weight.
<b>CAS RN:</b>	556-67-2 Octamethylcyclotetrasiloxane (D4) 541-02-6 Decamethylcyclopentasiloxane (D5) 540-97-6 Dodecamethylcyclohexasiloxane (D6)
<b>Properties:</b>	Suspected of damaging fertility. Toxic to aquatic life with long lasting effects.
<b>Use:</b>	Used in washing and cleaning products, polishes and waxes, cosmetics and personal care products, textile treatment products and dyes, paper and cardboard products. Precursors in the production of polymers.
<b>Legal limit:</b>	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).
<b>Test method:</b>	No standardised test methods.  Test equipment: GC-MS.

## TCEP

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	Tris(2-chlorethyl)phosphate (TCEP): 115-96-8
<b>Properties:</b>	<p>Persistent, bioaccumulative and toxic. Halogenated organic additives in polymers may leach out and have a negative impact on health and environment.</p> <p>Halogen containing polymers may form highly corrosive substances and undefined range of halogenated substances that may be PBT or CMR when incinerated.</p>
<b>Use:</b>	Flame-retardant treatment of products (i.e. coated textiles) where fire protection is required. Plasticizers.
<b>Comments:</b>	<p>Replace chloroorganic chemical flame retardants with phosphorus- and/or nitrogen-based organic chemical flame retardants or 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.</p> <p>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.</p>
<b>Legal background:</b>	<p>Legal limit: 0.1% by weight.</p> <p>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).</p>
<b>Test method:</b>	<p>EN ISO 17881-2</p> <p>Test equipment: GC-MS, LC-MS, GC-ECD Detection limit: There is no standard international detection limit as yet. For LC-MS 1 mg/kg can be expected.</p>

## Trixylyl phosphate

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<b>Limit value:</b> _____	Should not be present in products.
<b>CAS RN:</b> _____	Trixylyl phosphate: 25155-23-1
<b>Properties:</b> _____	Toxic for reproduction.
<b>Use:</b> _____	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.
<b>Legal limit:</b> _____	Legal limit: 0.1% by weight  Trixylyl phosphate: 25155-23-1 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).
<b>Test method:</b> _____	EN ISO 17881-2 (textiles)  Test equipment: GC-MS, LC-MS, GC-ECD

# BIOCIDAL AGENTS

## General information

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Biocidal agents are both used as **process chemicals** to prohibit growth of microbes and **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 vital, 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-cyclohexyldiazaniumdioxy) –copper)

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

## Dimetylfumarate (DMFu)

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	624-49-7
<b>Properties:</b>	Fungicide. DMFu is harmful to skin and a strongly allergenic substance.
<b>Use:</b>	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.
<b>Comments:</b>	<p>The alternative to biocidal agents during storage and transport is cool and dry environment.</p> <p>If use of biocidal agents is vital, folpet, chlorocresol, propiconazol, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).</p>
<b>Legal background:</b>	Legal limit: 0.00001% by weight (0.1 mg/kg) in articles or any parts thereof. Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).
<b>Test method:</b>	ISO/TS 16186  Test equipment: GC-MS, LC-MS. Detection limit: 0.1 mg/kg.

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

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<b>Limit value:</b> _____	Should not be present in products.
<b>CAS RN:</b> _____	27083-27-8, 32289-58-0
<b>Properties:</b> _____	PHMB is very toxic to aquatic life, is suspected of causing cancer and may cause an allergic skin reaction.
<b>Use:</b> _____	Biocide, bactericide in textiles.
<b>Comments:</b> _____	<p>The alternative to biocidal agents during storage and transport is a cool and dry environment.</p> <p>If use of biocidal agents is vital, folpet, chlorocresol, propiconazol, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).</p>
<b>Legal background:</b> _____	PHMB is banned within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation (EU 528/2012).
<b>Test method:</b> _____	No standardised test method available.

## Pentachlorophenol (PCP) and all isomers of Tetrachlorophenols (TeCP)



<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	87-86-5, 131-52-2 (PCP)
<b>Properties:</b>	Organic compounds. Toxic and dangerous for the environment. On combustion, PCP emits dioxins, which are extremely toxic to humans.
<b>Use:</b>	Fungicide for preservative treatment of goods prior to storage and transport.  Preservative in sizing agents and adhesives. Component in printing pastes (thickener).
<b>Comments:</b>	The alternative to biocidal agents during storage and transport is cool and dry environment.  If use of biocidal agents is vital, folpet, chlorocresol, propiconazol, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).
<b>Legal background:</b>	Legal limit: 0.1% by weight in mixture. Annex XVII of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH).  Pentachlorophenol (and its salts and esters) is banned in Norway in textiles and leather. Legal limit 5 ppm, (FOR-2004-06-01-922).  Pentachlorophenol and its salts and esters in articles, are banned in Germany (Chemikalien-Verbotsverordnung section 15), Denmark (BEK nr 854) and Austria (477.ChemVerbotsV 2003). Legal limit 5 ppm.  Pentachlorophenol is listed in the Rotterdam convention.
<b>Test method:</b>	ISO 17070 (leather) XP G 08-015 (French standard method for PCP in textiles).  Detection limit: 0.05 mg/kg (for individual chlorophenols).  CEN/TR 14823 (wood). Detection limit 25 mg/kg EN ISO 15320 (Pulp, paper and board)



## Permethrin

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	52645-53-1
<b>Properties:</b>	Insecticide. Permethrin is like all synthetic pyrethroids a neurotoxin. It is considered more acutely toxic to children than to adults.
<b>Use:</b>	Permethrin is a biocide in textiles. It is also used for home pest control, forestry, and in public health programs, including head lice control.
<b>Comments:</b>	<p>The alternative to biocidal agents during production is satisfactory washing.</p> <p>The alternative to biocidal agents during storage and transport is cool and dry environment.</p> <p>If use of biocidal agents is vital, folpet, chlorocresol, propiconazol, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).</p>
<b>Legal background:</b>	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 Products Directive (98/8/EC).
<b>Test method:</b>	<p>No standardised test method available.</p> <p>Test equipment: GC-MS, LC-MS. Detection limit: 0.1 mg/kg.</p>

## Silver and its compounds

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<b>Limit value:</b> _____	Should not be present in products.
<b>Properties:</b> _____	Slight skin and eye irritant. Disturb denitrification processes in nature that is vital for provision of nutrition's to plants.  Dissolved (free) silver ions are very toxic to aquatic organisms.
<b>Use:</b> _____	Silver nano particle complexes are antibiotic additives in plastics and fibres.
<b>Comments:</b> _____	The alternative to antibacterial agents during use is satisfactory washing.
<b>Legal background:</b> _____	Legal limit: No legal limits for silver compounds exist in textiles and leather.  Silver and 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 Products Directive (98/8/EC)
<b>Test method:</b> _____	No standardised test method available.  Test equipment: ICP-MS, ICP-OES or AAS. Detection limit: 0.1 mg/kg.

## Tributyltin compounds

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	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
<b>Properties:</b>	Antibacterial agent. Tributyltin compounds are different chemical substances that are toxic and dangerous for the environment. Bioaccumulative and persistent.
<b>Use in textile and leather:</b>	To counteract noxious odours in clothes and shoes. Preservative, fungicide and antifouling agent.
<b>Comments:</b>	<p>The alternative to antibacterial agents during use is satisfactory washing.</p> <p>If use of biocidal agents is vital, folpet, chlorocresol, propiconazol, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).</p>
<b>Legal background:</b>	<p>Legal Limit: 0.1% by weight.</p> <p>All tri-substituted organostannic compounds such as tributyltin (TBT) are restricted in articles in annex XVII of the Regulation (EC) No 1907/2006 of the European Parliament and of the Council (REACH). The seven TBT compounds listed above are also included in the Rotterdam convention.</p> <p>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).</p>
<b>Test method:</b>	<p>No standardised test method available.</p> <p>Test equipment: GC-MS. Detection limit: 0.015 mg/kg. EN ISO17353 (water and sediment).</p>

## Triclosan

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	3380-34-5
<b>Properties:</b>	Antibacterial agent. Triclosan is classified as a probable human carcinogen and bio accumulative.
<b>Use:</b>	Antibacterial agent in clothes and other commodities.
<b>Comments:</b>	<p>The alternative to antibacterial agents during use is satisfactory washing.</p> <p>If use of biocidal agents is vital, folpet, chlorocresol, propiconazol, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).</p>
<b>Legal background:</b>	Triclosan is banned within PT9 (product type 9) that includes textiles, polymers and leather, according to the Biocidal Product Regulation 528/2012.
<b>Test method:</b>	<p>No standardised test method available.</p> <p>Test equipment: GC-MS, LC-MS.</p> <p>Detection limit: 0.01 mg/kg for both leather and textiles.</p>

## Zincpyrithion

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<b>Limit value:</b>	Should not be present in products.
<b>CAS RN:</b>	13463-41-7
<b>Properties:</b>	Antibacterial and fungicide agent.
<b>Use:</b>	Fungicide agent in articles. Commonly used in schampoo and previously in antifouling paint. May be used in plastic articles
<b>Comments:</b>	<p>The alternative to antibacterial agents during use is satisfactory washing.</p> <p>If use of biocidal agents is vital, folpet, chlorocresol, propiconazol, azoxystrobin and fludioxonil are approved for PT9 according to the Biocidal Product Regulation (EU 528/2012).</p>
<b>Legal background:</b>	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 Products Directive (98/8/EC).
<b>Test method:</b>	<p>No standardised test method available.</p> <p>Test equipment: GC-MS, LC-MS. Detection limit: 0.01 mg/kg.</p>

# MISCELLANEOUS

## pH

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<b>Limit value textiles:</b> _____	4.0 – 8.5
<b>Limit value leather:</b> _____	3.5 – 7.0
<b>Properties:</b> _____	A pH higher than 10 or lower than 3 can cause skin irritation.
<b>Comments textiles:</b> _____	The pH value can easily be corrected by washing.
<b>Legal background:</b> _____	None
<b>Test method textiles:</b> _____	ISO 3071
<b>Test equipment:</b> _____	pH meter. Accuracy: 0.2 pH units.
<b>Test method leather:</b> _____	EN ISO 4045
<b>Test equipment:</b> _____	pH meter. Accuracy: 0.2 pH units.

# APPENDICES

## **Appendix 1**

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Allergenic dye stuffs and Navy Blue (banned mordant dye)

## **Appendix 2**

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Banned arylamines

## **Appendix 3**

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Carcinogenic dye stuffs

## **Appendix 4**

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DBTs

## **Appendix 5**

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Chromium (VI) SVHC compounds

## **Appendix 6**

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SVHC lead compounds

## **Appendix 7**

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Regulations and limit values of formaldehyde

## Appendix 1 - Allergenic dye stuffs 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, 100357-99-1, 13324-23-7
C.I. Disperse Yellow 49	54824-37-2, 12239-15-5
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

Name	CAS RN
4,4-Methylene-bis[2-chloro-aniline]	101-14-4
4,4-Methylenedianiline	101-77-9
4,4'-oxydianiline	101-80-4*
4-chloroaniline	106-47-8
o-Dianisidine	119-90-4
4,4'-bi-o-toluidine	119-93-7
p-Cresidine	120-71-8*
2,4,5-trimethylaniline	137-17-7
4,4'-thiodianiline	139-65-1
4-Aminoazobenzene	60-09-3*
4-methoxy-m-phenylenediamine	615-05-4
4,4-Methylenedi-o-toluidine	838-88-0*
2,6-xylydine	87-62-7
o-Anisidine	90-04-0*
2-Naphthylamine	91-59-8
3,3-Dichlorobenzidine	91-94-1
Biphenyl-4-ylamine	92-67-1*
Benzidine	92-87-5
o-Toluidine	95-53-4*
2,4-xylydine	95-68-1
4-Chloro-o-toluidine	95-69-2
4-methyl-m-phenylenediamine	95-80-7*
o-Aminoazotoluene	97-56-3*
5-Nitro-o-toluidine	99-55-8
4-chloro-o-toluidinium chloride	3165-93-3**
2-Naphthylammoniumacetate	553-00-4**
4-methoxy-m-phenylene diammonium sulphate; 2,4-diaminoanisole sulphate	39156-41-7**
2,4,5-trimethylaniline hydrochloride	21436-97-5**

\* SVHC substances

\*\* CMR fast track substances

## 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 - 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-ethylhexanoate	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

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 hydroxyoctaoxidizincatedichromate	11103-86-9*
Pentazinc chromate octahydroxide	49663-84-5*

\* also listed in Annex XIV in addition to the candidate list

## Appendix 6 - SVHC lead compounds

Name	CAS RN
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 (H <sub>2</sub> Si <sub>2</sub> O <sub>5</sub> ), 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 cyanamidate	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
<u>Germany</u>	Bedarfsgegenständeverordnung (German Commodities Regulation), Annex III, No 9. 26.10.1993	Textiles that normally come into contact with the skin and release more than 1500ppm formaldehyde must bear the label "Contains formaldehyde> Washing this garment is recommended prior to first time use in order to avoid irritation of the skin."
<u>France</u>	Official Gazette of the French Republic, Notification 97/0141/F	For products intended to come in contact with human skin – Textiles for babies: 20ppm Textiles in direct skin contact: 100ppm Textiles not in direct skin contact: 400ppm
<u>Netherlands</u>	The Dutch (Commodities Act) Regulation on Formaldehyde in Textiles (July 2000)	Textiles in direct skin contact must be labelled "Wash before first use" if they contain more than 120ppm formaldehyde and the product must not contain more than 120ppm after wash.
<u>Austria</u>	Formaldehydverordnung, BGBL Nr. 194/1990	Textiles that contains 1500 mg/kg or above must be labelled.
<u>Finland</u>	Decree on Maximum Amounts of Formaldehyde in Certain Textiles products (Decree 210/1988)	Textiles for babies under 2 years: 30ppm Textiles in direct skin contact: 100ppm Textiles not in direct skin contact: 300ppm
<u>Norway</u>	Regulations Governing the Use of a Number of Chemicals in Textiles (April 1999)	Textiles for babies under 2 years: 30ppm Textiles in direct skin contact: 100ppm Textiles not in direct skin contact: 300ppm
<u>China</u>	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
<u>Japan</u>	Japanese Law 112	Textiles for infants: not detectable Textiles in direct skin contact: 75ppm



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