



Camera Nazionale della Moda Italiana



# SUSTAINABLE FASHION

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*Guidelines on eco-toxicological requirements  
for articles of clothing, leather goods,  
footwear and accessories.*

in collaboration with



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# **1. PURPOSE**

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These guidelines on the eco-toxicological requirements for articles of clothing/leather goods/footwear/accessories (the “Guidelines”) mark out the way towards innovative and informed fashion by favouring the adoption of responsible management models along the entire chain of value as indicated in the Sustainability Manifesto for Italian fashion. (Camera Nazionale della Moda Italiana - <http://www.cameramoda.it/it/associazione/corporate-social-responsibility/923/>).

This initiative is the first step of the Sustainability roadmap to 2020 promoted by Camera Nazionale della Moda, that is already working on further guidelines for production processes.

The Guidelines promote the introduction and development of virtuous and sustainable practices through effective use and management of chemical substances in production processes. This is to guarantee that the aforementioned products have chemical safety standards superior to those required by current law, for the benefit of consumers and the community in general.

To this end, the Guidelines will be regularly reviewed and integrated to assimilate new legislations at international level, the results of studies of risks and toxicology, best available technologies and consultation with the various stakeholders.

Camera Nazionale della Moda commits to cooperate, train and inform the whole supply chain with the aim of achieving the outstanding goals that have been set.

# **2. FIELD OF APPLICATION**

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The Guidelines are applicable to articles, including the materials they’re made of, of clothing, footwear, leather goods and accessories and address the players engaged in various capacities in the design, production, distribution and marketing of such products.

Implementation of these Guidelines does not prejudice compliance with the provisions of law applicable in the countries of origin and/or sale, is voluntary and may be adapted to different business policies.

### 3. REFERENCES AND ASSUMPTIONS

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In drawing up these Guidelines, the requirements included in the following legislation and standards were taken into consideration:

A) the main international legislation applicable (eg. European REACH Regulation, the Consumer Product Safety Improvement ACT (CPSIA) in the USA, the China Revised National General Safety Standard for Textile Products (GB 18401), the Japanese JIS 112, etc.);

B) the main international technical standards (eg. technical report UNI/TR 11359 Management of safety of textiles, clothing, furnishing, footwear in leather and accessories, CEN/TR 16741 Textiles and Textile products – Guidance on health and environmental issues related to chemical content of textile products intended for clothing, interior textiles and upholstery, etc.);

C) the main industry specifications and protocols.

To standardize information and interpretation of data as far as possible and optimize synergy among the various parties involved, it was necessary to adopt test methods and related detection limits that are standard and/or shared and in line with the most advanced instrumentation available in major internationally accredited laboratories.

A table was then drawn up to list the reference parameters of the families of chemical substances in products (“Summary Table”) using the following approaches:

1) **”Proactive”**: considering the limits of the presence of residues of substances in articles, starting with the most restrictive legal requirements on an international level, to which voluntary parameters may be added and which may include or go beyond the legal ones;

2) **”Advanced”**: considers advanced requests of the market as targets to be achieved in a background of continuous improvement, research and implementation of the best available technologies. Such targets can be pursued through a continuous process of training and collaboration within the whole supply chain, and will be reviewed at least annually (unless mandatory legislative changes occur).

## 4. TERMS AND DEFINITIONS

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To facilitate consultation of the Guidelines, the main terms used and their definitions are given below.

### **Article**

Any product of clothing, footwear, leather goods or accessories, including the materials they are made of.

### **Infant**

Child under 36 months.

### **D.L.**

Detection Limit.

The lowest measurable concentration using the reference analytical method.

### **N.D.**

“Not Detectable”, ie. below the detection limit.

### **Family of substances**

A group of chemical substances sharing a chemical structure and/or having functional similarities.

### **Analytical method**

Laboratory test method involving actions and instruments for identifying the type (qualitative analysis) and/or quantity (quantitative analysis) of a substance in a substrate.

Analyses must be carried out in ISO 17025 accredited laboratories. It should be remembered that for certain families of substances internal methods based on the available standard ones are used. All methods must be accredited.

Methods and relative parameters will be regularly monitored and studied, also by means of inter-laboratory testing.

### **CAS**

The CAS number of a chemical substance is its univocal identification according to the American Chemical Abstracts Service.

### **Potentially hazardous substances**

In these guidelines they are substances potentially present in articles of clothing, footwear, leather goods and accessories which may, on the basis of current scientific knowledge, prove detrimental to the health of persons and/or the environment.

## 5. WAYS OF USING SUBSTANCES

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For a clear understanding of these Guidelines and their subject matter it's important to briefly look at some basics of how the production and manufacturing chains actually work, since the possibility of complying with the requisites depends on the ways in which chemical substances are used.

Regarding use of chemical substances, and potentially hazardous and/or restricted ones in particular, it's important to understand the distinction between the lists of substances restricted in the Article or RSL (Restricted Substances Lists) and the lists of substances restricted in the production process or MRSLS (Manufacturing Restricted Substances Lists).

Given that chemical reactions also happen in nature, in defining any limit in articles or processes, values lower than those already existent in nature should not be considered, and, while it is possible to guarantee that a substance is not used in the production process it, is not scientifically or technically possible to guarantee its total absence.

Where available, the use of alternative and sustainable chemical substances is always preferable. In replacing a substance, the environmental, economic and social impact of the possible alternatives should always be assessed.

Ways of using substances in the production, chemical and manufacturing chains may vary considerably in terms of quantities of chemical substances used, potential hazard, machines used and types of processing. In cases of extreme complexity it is necessary to follow **good manufacturing practices**, which are based on the best techniques/technologies available.

Within the production, chemical and manufacturing chains, information needed to enable correct evaluation of articles' compliance with the limits indicated in the "Summary Table" must always be provided, though without prejudice to intellectual property and industrial secrets.

In the production chains, single chemical substances are rarely used (except for commodity chemicals, such as acetic acid). In most cases mixtures of substances are used. This is why a **terminology common to all operators in the textile/clothing chain on one hand and the leather goods/footwear chain on the other hand is used**.

This common terminology (detailed hereunder) employs terms used in daily work to refer to the "functions" for which they are used, eg. wetting agent or levelling agent.

Chemical mixtures are used in production chains in countless phases, sometimes in highly complex combinations. The descriptions that follow take into account the peculiarities of the textile/clothing and leather goods/footwear chains.

# 6. TEXTILES SUPPLY CHAIN

## 6.1 CHEMICAL MIXTURES USED

The following table summarizes the terminology used for chemical mixtures. It is common to all operators in the textiles supply chain and provides sufficiently full coverage of the terms used in this production chain.

	<b>FUNCTION/TERM</b>	<b>MEANING/USE</b>
1.	Accelerator – diffusor	Facilitates dyeing of low penetration fibres
2.	Thickener	Thickens print pastes
3.	Softener	Softens the article
4.	Hydrophilic softener	Softener for keeping a textile hydrophilic
5.	Silicone softener	Silicone emulsion to soften the article
6.	Anti-algae	Prevents formation of algae in print pastes
7.	Anti crack agent	Prevents signs of metal supports on bolts and yarns
8.	Stain resistant agent	Makes article oil-repellent
9.	Anti-migrant	Prevents migration of colour in printing and with pigments
10.	Anti-oxidant	Prevents oxidation of colouring agents
11.	Anti-crease	Ensures dimensional stability
12.	Anti-pilling	Reduces the pilling effect on the article
13.	Anti-putrescent	Prevents putrefaction of print pastes
14.	Anti-reducing	Prevents undesired reduction of substances
15.	Anti-foaming	Prevents formation of foam
16.	Anti-static	Against electrical charging of fibres
17.	Anti-slipping	Prevents slipping of yarns between weft and warp
18.	Anti-moth	Prevents proliferation of moth in wool
19.	Oxygenated water activator	Aids the whitening action of oxygenated water
20.	Bacteriostatic	Prevents proliferation of bacteria on the article
21.	Blocking agent	Blocks a reaction in progress and/or reaction sites
22.	Bleaching agent	Whitener of fibres
23.	Optical whitener	Fibre whitener containing an optical brightener
24.	Weighting agent	Facilitates working of silk fibres
25.	Carrier	Adjuvant of colouring agent precipitation on fibres
26.	Catalyst	Catalyst of chemical reactions
27.	Cyclodextrins	Molecules that encapsulate and then release substances
28.	Cohesive for fibres	Keeps fibres together in spinning operations
29.	Detergent	Fibre washing agent
30.	Detergent for degumming	Eliminates sericin from silk
31.	Detergent – dispersant	Detergent containing an amount of dispersant
32.	Detergent – emulsifier	Detergent capable of maintaining an emulsion
33.	Detergent – solvent	Detergent containing an amount of solvent
34.	Deaerating agent	Reduces air bubbles in wet processes
35.	Dispersant	Disperses substances in wet processes
36.	Dispersant for oligomers	Eliminates polyester oligomers

FUNCTION/TERM		MEANING/USE
37.	Dispersant – levelling agent	Dispersant that favours uniform dyeing
38.	Acidity donor	Releases acidity in bath
39.	Alkalinity donor	Releases alkalinity in bath
40.	Emulsifier	For print paste or pigment dyes
41.	Amylase enzyme	Biological catalyst that accelerates chemical processes
42.	Catalase enzyme	Biological catalyst that accelerates chemical processes
43.	Cellulase enzyme	Biological catalyst that accelerates chemical processes
44.	Protease enzyme	Biological catalyst that accelerates chemical processes
45.	Fixative agent	Fixative for colouring agents, to increase solidity
46.	Fulling agent	Helps to felt wool
47.	Fungicide	Prevents proliferation of fungi on article
48.	Hydro-oleo repellent	Makes article water repellent and anti-stain
49.	Flame retardant	Makes material flame retardant
50.	Wetting agent	Helps make textile fibres wettable
51.	Wetting agent – deaerating agent	Helps make fibres wettable and eliminates air
52.	Waterproofing agent	Makes material waterproof
53.	Lubricant	Lubricates fibres, making them easier to work
54.	pH Neutralizer	Neutralizes pH
55.	Penetrant	Helps chemical products penetrate fibres
56.	Resin for non-shrink treatment	Makes wool shrink-resistant
57.	Reducing agent	Obtains reduction reactions
58.	Reserving agent	Prevents fibres from being stained with colour
59.	Retardant	Retards merging of the colouring agent with the fibre
60.	Discharge agent	Drains colouring agent from dyed material
61.	Foaming agent	Produces foam for specific processes
62.	Sequestrant	Removes metals in wet processes
63.	Sequestrant – dispersant	Removes and disperses substances
64.	Hydrogen peroxide stabilizer	Bleaches animal fibres
65.	Dimensional stabilizer	Obtains dimensional stability of fabrics
66.	Stabilizer for foam	Obtains stable foam in specific processes
67.	Buffering agent	Maintains a given pH
68.	Levelling agent	For homogeneous precipitation of dye on fibre
69.	UV absorber	Capable of absorbing UV light
70.	UV protectors	Capable of protecting against UV light

The following table details the classes of dyes used to individually dye textile fibres and their countless blends.

DYE CLASSES	
CLASS	USE
1. Cationic	Generally on acrylic fibres, exceptionally on others
2. Acid	Generally on protein-based fibres but also on modified polyamide and synthetic fibres
3. Pre-metallized	On protein-based fibres
4. Chrome	On protein-based fibres
5. Direct	On cellulose-based fibres and exceptionally on protein-based fibres
6. Reactive	On protein- and cellulose-based fibres
7. Vat	On cellulose-based fibres
8. Sulphur	On cellulose-based fibres
9. Dispersed	On polyester and exceptionally on other synthetic fibres
10. Pigments	For print pastes



The following are examples of substances normally used as commodity chemicals.

COMMODITY CHEMICALS	
<b>ACIDS</b>	<b>ELECTROLYTES</b>
Acetic acid	Sodium sulphate
Formic acid	Sodium chloride
Sulphuric acid	<b>ALKALINE SALTS</b>
<b>BASES</b>	Sodium diphosphate
Ammonia	Sodium triphosphate
Sodium hydroxide	Sodium carbonate
<b>OXIDIZING AGENTS</b>	Sodium bicarbonate
Oxygenated water	<b>ACID SALTS</b>
Sodium hypochlorite	Ammonium sulphate
Sodium chlorite	Ammonium acetate
Sodium perborate	Sodium acetate
<b>REDUCING AGENTS</b>	<b>STABILIZERS</b>
Sodium bisulphite	Sodium silicate
Sodium hydrosulphite	Sodium pyrophosphate
Sodium thiosulphite	<b>SOLUBILIZERS</b>
Sodium sulphydrate	Urea
Sodium sulphide	

## 6.2 PRODUCTION PROCESSES

Production processes may be divided into macro phases (eg. wool combing) in which there are various phases (eg. chemical spinning) in turn divided into processes (eg. desizing, scouring and bleaching) focusing on specific operations.

Detailed below are the macro-phases, phases and processes.

### 1. Wool combing

### 2. Spinning

- 2.1 Chemical spinning
- 2.2 Mechanical spinning
  - 2.2.1 wool worsted spinning
  - 2.2.2 wool woolen spinning
  - 2.2.3 cotton spinning
  - 2.2.4 open-end

### 3. Weaving

- 3.1 Orthogonal weaving
- 3.2 Knitting

### 4. Preparation for weaving

- 4.1 Sizing
- 4.2 Glueing
- 4.3 Waxing

## 5. Ennobling

### 5.1 Pre-treatments

- 5.1.1 anti-shrinking
- 5.1.2 desizing, scouring, bleaching
- 5.1.3 mercerization and alkalinisation
- 5.1.4 carbonization
- 5.1.5 silk weighting

### 5.2 Dyeing

- 5.2.1 protein-based fibres
- 5.2.2 cellulose-based fibres
- 5.2.3 synthetic fibres
- 5.2.4 fibre mixes

### 5.3 Printing

- 5.3.1 direct/by application
- 5.3.2 corrosion
- 5.3.3 ink-jet

### 5.4 Finishing

- 5.4.1 physical-mechanical
- 5.4.2 chemical
- 5.4.3 coating

### 5.5 Denim fabric

## 6. Post-treatments

- 6.1 Garment treatments
- 6.2 Dry cleaning

# 7. LEATHER SUPPLY CHAIN

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## 7.1 CHEMICAL MIXTURES USED

The following table summarizes the terminology used for chemical mixtures. It is common to all operators in the leather supply chain and provides sufficiently full coverage of the terms used in this production chain.

FUNCTION/TERM	MEANING/USE
1. Aniline	Colouring agent
2. Stain resistant agent	Makes the article oleo-repellent
3. Anti-wrinkle	Auxiliary for preventing wrinkles in the liming phase
4. Starch	Product that determines leather's feel, shine and appearance
5. Alkalinity donor	Releases alkalinity in wet processes
6. Alkalining fixing agent	Alkaline product for fixing mineral tanning
7. Bacteriostatic	Prevents proliferation of bacteria on article
8. Deliming agent	Product for lowering pH
9. De-tanning agent	Product that removes tanning products
10. Deacidifier	Product for removing acidity
11. Dispersant	Disperses substances wet processes

<b>FUNCTION/TERM</b>		<b>MEANING/USE</b>
12.	Skin detaching agent	Product that improves the detachment of the skin from other materials
13.	Emulsifier	Soaps and detergents that improve dispersion of greasy substances
14.	Lipase enzyme	Biological catalyst that accelerates chemical processes
15.	Fixative	Fixative for colouring agents, to increase solidity
16.	Fungicide	Prevents proliferation of fungi on article
17.	Waterproofing agent	Product that makes leather water resistant
18.	Flame retardant	Makes leather flame retardant
19.	Wetting agent	Makes leather wettable
20.	Impregnating agent	High penetration polymers for rigidity or fullness
21.	Fatliquoring	Lubricates and softens leather fibres
22.	Binding agent	Pigment binder
23.	Masking agent	Chelating adjuvant in penetration of mineral tanning
24.	Touch modifier	Product that changes the hand to silky, slippery, non-slip, etc.
25.	Neutralizer	Neutralizes pH
26.	Oleophobic agent	Product that prevents that the oily substances can wet the skin surface
27.	Penetrant	Aids penetration of colouring agents of chemical products in leather
28.	Pigment	Insoluble colouring product in dispersion
29.	Resin	Organic substance, natural or synthetic, high molecular weight, amorphous, used in various stages, both in wet and in dressing
30.	Filling agent	Product that selectively improves body in the parts of the leather with an emptier structure
31.	Soaking agent	Adjuvant for diffusion of water in leather
32.	Sequestrant	Removes metals in wet processes
33.	Degreasing agent	Detergent that removes grease
34.	Foam stabilizer	Obtains stable foam in specific processes
35.	Buffering agent	Maintains a given pH
36.	Tannin	Products that stabilize the structure of leather
37.	Levelling agent	For uniform precipitation of colouring on leather
38.	Patent leather varnish	Film that makes leather shiny

The following table details the classes of dyes agents used.

DYE CLASSES	
1.	Cationic
2.	Acid
3.	Pre-metallized
4.	Direct
5.	Reactive
6.	Sulphur
7.	Dispersed (only on certain "double face" effects)
8.	Pigment

The following are examples of substances normally used as commodity chemicals.

COMMODITY CHEMICALS	
ACIDS	DELIMING SALTS
Acetic acid	Ammonium chloride
Formic acid	Ammonium sulphate
Sulphuric acid	Sodium bisulphite
Hydrochloric acid	SALTS
Oxalic acid	Ammonium bicarbonate
BASES	Calcium formate
Ammonia	Sodium acetate
Sodium hydroxide	Sodium bicarbonate
Calcium hydroxide	Sodium chloride
UNHAIRING AGENTS	Sodium formate
Sodium sulphhydrate	SOLVENTS
Sodium sulphide	2-Butoxyethanol
VEGETABLE EXTRACTS	2-Butoxyethanol acetate
Chestnut extract	Ethyl acetate
Gambier extract	Isobutyl acetate
Mimosa extract	Methyl acetate
Quebracho extract	2-Ethylhexanol
Sumach extract	Isopropyl alcohol
Micronized tara	2-Butoxyethanol acetate
TANNING SALTS	Butylglycol
Basic chromium sulfare	Cyclohexanone
Aluminium salts	Dilsobutyl ketone
Zirconium salts	Dipropyleneglycol methyl ether
Titanium salts	Etil Diglicole Etere
Iron salts	Ethyldiglycol
ORGANIC TANNING AGENTS	Diethylene glycol
Glutaraldehyde	Propylene glycol
Oxazolidine	Methylisobutil ketone
Phosphonium salts	Xylene (Xylol;-o,-m,-p)

## 7.2 PRODUCTION PROCESSES

The raw materials used in tanning are raw or semi-processed hides coming almost exclusively from the food industry. Listed below are the main phases in tanning operations, which may vary with type of animal or process. Such types sometimes entail the exclusion or repetition of some of the processes listed.

### 1. Beamhouse operations

This phase rehydrates and washes the skins, removes superfluous parts and prepares them for further treatments.

- 1.1 Desalting
- 1.2 Soaking
- 1.3 Liming
- 1.4 Deliming
- 1.5 Bating

### 2. Tanning

This phase stabilizes the skins with various kinds of chemical substances (mineral and organic).

- 2.1 Pickling
- 2.2 Tanning
- 2.3 Mineral tanning
- 2.4 Vegetable tanning
- 2.5 Synthetic tanning

### 3. Re-tanning

This phase finishes the tanned leather to give it the desired colouring and softness.

- 3.1 Chrome re-tanning
- 3.2 Neutralization
- 3.3 Re-tanning
- 3.4 Dyeing
- 3.5 Fatliquoring

### 4. Dressing

This production phase includes the application of dyes, chemical substances, various kinds of materials and mechanical operations (eg. printing, brushing, etc.) to obtain the final effects.

- 4.1 Impregnation
- 4.2 Pre-base coat
- 4.3 Base coat
- 4.4 Top coat
- 4.5 Starch
- 4.6 Ink Jet

# 8. INFORMATION ON CERTAIN FAMILIES OF SUBSTANCES

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- 8.1 Phytosanitary products
- 8.2 Alkylphenol ethoxylates and Nonylphenol ethoxylates
- 8.3 Carcinogenic aromatic amines
- 8.4 Chlorinated benzenes and toluenes - chlorobenzenes
- 8.5 Chlorophenols –chlorinated phenols
- 8.6 Allergenic and carcinogenic colouring agents
- 8.7 Perfluorinated compounds
- 8.8 Organic tin compounds
- 8.9 Formaldehyde
- 8.10 Phthalates
- 8.11 Polycyclic aromatic hydrocarbons (PAH)
- 8.12 Isocyanates
- 8.13 Heavy metals
- 8.14 Nitrosamines
- 8.15 Short chain chlorinated paraffins
- 8.16 Flame retardants
- 8.17 Organic solvents
- 8.18 Chlorinated solvents

## 8.1 PHYTOSANITARY PRODUCTS

Phytosanitary products include all products, synthetic or natural, that are used to combat the main diseases in plants (infectious diseases, physiopathologies, parasites and phytophagous animals, weeds).

The possible presence of phytosanitary products on clothing, footwear, leather goods and accessories may be caused by their use in the cultivation of vegetable textile fibres (eg. herbicides and pesticides) or veterinary drugs used on livestock (eg. insecticides), or treatments of the article itself (eg. acaricides on fabrics and fungicides on leather).

Wet treatments at temperatures over 80° C during the finished product manufacturing phases usually eliminate such residues.

Pesticides, the term commonly used to indicate this family of substances, is not used in legislation or official documents.

## 8.2 ALKYLPHENOL ETHOXYLATES AND NONYLPHENOL ETHOXYLATES

APs, including Nonyl-phenol (NP), and APEOs, including Nonyl Phenol Ethoxylate (NPEO), are precursors of surfactant molecules and form a vast category of non-ionic surfactants characterized by excellent performance both as detergents and emulsifiers and dispersants.

In Europe they have been used as the main components in detergent agents for washing and bleaching textile products, as finishing auxiliaries (dispersants, fulling agents,...), in spinning lubricants and as degreasing agents for leather.

Given the structure of the supply chain, their presence in traces in the articles cannot be excluded, partly because of residual contamination in some of the chemical products (surfactants, wetting agents, emulsions, polymers) and/or in the raw materials (eg. wool, leather, cashmere, silk).

## 8.3 CARCINOGENIC AROMATIC AMINES

Aromatic amines are amines with an aromatic substituent, ie. aromatic hydrocarbons to which at least one amine group (NH<sub>2</sub>), an imine group (NH) or a nitrogen atom has been added. The structure of an aromatic amine therefore contains one or more benzene rings.

In almost all classes of dyes there are dyes with an azo structure (azo group –N=N– between two aromatic rings): some of them, due to the breaking of the chemical bonds (reductive splitting), can release one or more aromatic amines that are carcinogenic or potentially carcinogenic for humans; amines which can also be present as non-reacted impurities.

They can be present in all coloured materials and articles.

## 8.4 CHLORINATED BENZENES AND TOLUENES - CHLOROBENZENES

Chlorobenzenes are a group of substances in which the benzene ring has one or more hydrogen atom (H) substituted by a chlorine atom (Cl).

They are used mainly as intermediates in the production of other chemical substances and may be present as impurities in chemical formulations (eg. dyes and biocides).

Chlorinated benzenes and toluenes can be used as carriers for dyeing synthetic fibres, especially polyester, to increase absorption and diffusion of the dyes inside fibres in dyeing processes carried out at low temperatures and ambient pressure. In Europe their use in such processes has almost disappeared. Polyester is dyed without a carrier, under pressure at around 130° C. They may also be used to dye certain wool-polyester mixes.

They can be used as levelling agents in the dyeing, printing and coating of textile materials and leather in general. Lastly, they are used in deodorants, fumigants, degreasing agents and defoliant. Dichlorobenzenes are used as insecticides or solvents for rubber, waxes or disinfectants. Trichlorobenzenes are used as herbicides, insecticides or as solvents for dyes and other chemical formulations with high melting points.

## 8.5 CHLOROPHENOLS –CHLORINATED PHENOLS

Chlorophenols are a group of substances with chlorine atoms linked to phenols and include all the isomers of mono-, di-, tri-, tetra- and penta-chlorophenol.

Pentachlorophenol (PCP) and Tetrachlorophenol and its salts (TeCP) were widely used in the past as herbicides, fungicides, insecticides and anti-algae agents. In Europe they have not been used as preservatives for some years. They may also be used as impregnating agents in textiles and may be present, as contaminants, in certain types of dyes. PCP and TeCP can also be used as preservatives in pastes for printing.

## 8.6 ALLERGENIC AND CARCINOGENIC COLOURING AGENTS

Most dyes in which allergenic effects have been identified belong to the class of dispersed dyes. This class of dyes is formed by molecules without polar groups capable of making the dye soluble in water and in fact they disperse in it but do not dissolve. This characteristic makes these dyes similar to lipophilic structures like skin.

Some dispersed dyes are also carcinogenic even though they do not contain azo groups capable of releasing the carcinogenic aromatic amines in 8.2 above.

Dispersed dyes are used mainly in the dyeing of polyester and acetate but also polyamide.

## 8.7 PERFLUORINATED COMPOUNDS

Perfluorinated compounds (PFC) are formed by fluorine and carbon.

They can be used in finishes requiring water repellence, stain resistance and oil repellence (treatment commonly known as DWR - Durable Water Repellent) for work clothes, uniforms, medical fabrics, outdoor clothing, etc.

Since there are alternative products on the market (eg. non-fluorinated products for water repellence), the intentional use of certain perfluorocarbons now illegal (PFOS, PFOA) is excluded. Unfortunately, they were widely used in the past and given their environmental persistence they can be present as environmental pollutants and/or degradation products.

## 8.8 ORGANIC TIN COMPOUNDS

Organic tin compounds are those that contain at least one tin-carbon bond.

Di-organic tin compounds are used as thermal stabilizers in the production of PVC or as catalysts in the production of polymer materials (eg., polyurethane (PU), polyester or polymers of self-crosslinking silicone). They may also be used as biocides (they are mildly anti-bacterial) or preservatives in fabrics and leather. They may also be contained in silicone-based finishes (eg. for their elastomeric and hydro-repellent properties).

Tri-organic tin compounds are used as fungicides in the textile industry. Mono-organic tin compounds do not have biocidal properties.

## 8.9 FORMALDEHYDE

Formaldehyde is a highly reactive volatile organic compound and, as such, is ubiquitous and may be found anywhere. It is produced industrially but is also generated in a number of processes of degradation of natural organic molecules and is present in many foods (eg. fruit and vegetables, meat, fish, crustaceans and dried mushrooms, etc.), partly as an impurity in treatment and preservation processes but above all because it's present as a metabolic intermediate in various organisms. Formaldehyde has various properties: its capacity to inactivate microorganisms makes it a biocide (anti-mould, etc.) but its main use is in the production of polymers, especially Urea-Formaldehyde (UF), Melamine-Formaldehyde (MF) and Phenol-Formaldehyde (PF) resins.

Given its extreme versatility, formaldehyde is used industrially across a wide range of applications, including:

*in the textile sector* : anti-crease and anti-stain fixative, intermediate in the production of elastomeric fibres, a component in dye fixatives for fabrics and prints, and a component in levelling agents and dispersants;

*in the leather sector*: production of polyurethane polymers in aqueous dispersion and acrylic polymers in aqueous emulsion for dressing of leather, as an auxiliary in biocides, for crosslinking casein solutions, and in tannins as a re-tanning agent in the wet phases of leather treatment.

## 8.10 PHTHALATES

Phthalates (esters of phthalic acid) are compounds used above all as plasticizers in the plastics industry. They are used mainly in the production of "soft" plastic articles, for they make material very flexible and deformable. They can be found in both textile articles and footwear.

There is a risk of their being found in prints, coatings/linings, plastics, adhesives and sometimes in nitro paints (nitro lacquers), where they are used as plasticizers.

## 8.11 POLYCYCLIC AROMATIC HYDROCARBONS (PAH)

These are hydrocarbons with a complex structure consisting of two or more aromatic rings. They may be present as impurities in certain raw materials used in the production of chemical mixtures and dyes. PAHs are not easily soluble in water, do not evaporate and do not readily degrade.

They have been found not only in rubber but also in numerous plastics (ABS, PP,...). The main causes of PAH contamination include: plasticizing oils used in the production of rubber and plastics, ashes for the black pigment of rubber and plastics, contaminated lacquers.



## 8.12 ISOCYANATES

The isocyanates are a group of aromatic or aliphatic compounds of low molecular weight containing the radical isocyanate.

Isocyanates react with compounds contained in alcohol groups to produce the polyurethane polymers that make polyurethane foams, thermoplastic elastomers, elastan, polyurethane paints, etc..

They can also be used in the dressing of leather, in adhesives for footwear and in coatings for textiles.

## 8.13 HEAVY METALS

Heavy metals are natural substances that are found in numerous types of material. Detailed below are the metals in question here and their possible applications:

- **Antimony (Sb)**. Used as a catalyst in the production of polyester fibres.
- **Arsenic (As)**. Its compounds are used mainly in pesticides, herbicides and insecticides. They are not normally used in textile applications but they may be found in recycled materials and some colours/glass.
- **Cadmium (Cd)**. Widely used as a stabilizer of plastics (PVC); it can also be found in metallic accessories, glass and dyes/paints (usually red, orange, yellow, green).
- **Cobalt (Co)**. Used in the production of inks, paints and dyes.
- **Chromium (Cr)**. The most dangerous form of chromium is hexavalent Cr, which is rare in nature but can be found in textiles and leather articles. In textiles, hexavalent chromium can be found in articles dyed with post-chromate conversion dyes, when conditions have not been thoroughly controlled. In leather articles on the other hand, hexavalent chromium may be present because it's formed in the presence of oxidizing substances used in tanning. Cr and its compounds are also used in the production of metal complex dyes.
- **Mercury (Hg)**. Hg is deemed to be totally excluded from textile processes. It may sometimes be found as a contaminant in certain low quality catalytic processes.
- **Nickel (Ni)**. Ni is widely used in surface treatments for numerous metallic accessories in common use in the clothing and footwear sectors.
- **Lead (Pb)**. In the textiles and leather sectors lead may be associated with the use of paints and pigments; it is also found in certain alloys for metallic accessories and glass.
- **Copper (Cu)**. In the textiles and leather sectors copper may be present in certain metal complex dyes or used as a mordant to increase the light fastness of certain dyes. It can also be found in a number of metallic components/as a base for galvanizing treatments.

## 8.14 NITROSAMINES

Nitrosamines are organic compounds containing a nitroso group, -N=O, bonded to an amine.

Nitrosamines and their precursors may be deliberately added during the manufacturing of natural and synthetic rubbers. They are used as constituents of accelerators, anti-oxidants and reinforcing agents to give the end product strength and elasticity.

Nitrosamines may be generated from their precursors to provide secondary products in processes for rubber production and storage. They may therefore be found, for example, in rubbers used for the soles of footwear.

### **8.15 SHORT-CHAIN CHLORINATED PARAFFINS**

Short-chain chlorinated paraffins (SCCPs) are complex mixtures of polychlorinated hydrocarbons. Their main use is as lubricant additives in fluids for metal working processes. They are also used as flame retardants, plasticizers for rubbers, paints and adhesives.

Lesser uses include greasing and softening agents in the leather industry, impregnating agents in the textiles industry and additives for sealing compounds.

### **8.16 FLAME RETARDANTS**

There are two classes of products normally regulated: brominated or chlorinated flame retardants (eg. PBB, PBDEs, TCEP) and organophosphate flame retardants (eg. TRIS and TEPA).

Brominated flame retardants (organobromine compounds) or chlorinated retardants (chlorinated hydrocarbon-based) are mixtures of artificial chemical substances that may be added to a wide range of products, also for industrial use, to make them less inflammable, as they have high stability and a capacity to diminish propagation of flames.

The term organophosphate (sometime abbreviated to OP) refers generically to the esters of phosphoric acid. Some of their compounds based on production processes containing chlorine, such as tri (2-chloroethyle) phosphate (TCEP), tri (2-chlorine-1-methyl) phosphate (TCPP) and tris (1,3-dichloro-2-propyl) phosphate (TDCP), are used to reduce the inflammability of materials, as are the non-chlorinated POs such as tris (2-butoxyethyl) phosphate (TBEP), tri-iso-butyl phosphate (TiBP) and tri-n-butyl phosphate (TnBP).

### **8.17 ORGANIC SOLVENTS**

Organic solvents are widely used in industry and day-to-day life. They may be found in adhesives, colours, sprays and printing processes. They have low boiling points and evaporate easily at room temperature.

Benzene and toluene are solvents commonly found in adhesives, while dimethylformamide (DMF) is commonly found in polyurethanes. Dimethylformamide is also used as an organic solvent in the production of plastics, adhesives and coatings. Due to their nature and uses, they could be present in traces in many of the chemical substances obtained by synthesis processes.

### **8.18 Chlorinated solvents**

Chlorinated solvents are halogenated aliphatic solvents and are in widespread use. Some may be used in textile processing as washing solvents or carriers for functional finishes. They may also be used as swelling agents for urethane foam, chemical intermediates in dyes and pesticides and industrial detergents.

They may also be present in thermoplastic adhesives for printworks and be used for surface cleaning operations.

# 9. SUMMARY TABLE

## Reference parameters for the families of chemicals in articles

### Introduction

The implementation of this Guideline does not affect the compliance to the legal requirements of the Countries of origin and on sale.

### Approaches

**Proactive:** considering the limits of the presence of residues of substances in articles, starting with the most restrictive legal requirements on an international level, to which voluntary parameters may be added and which may include or go beyond the legal ones;

**Advanced:** considers advanced requests of the market as targets to be achieved in a background of continuous improvement, research and implementation of the best available technologies. Such targets can be pursued through a continuous process of training and collaboration within the whole supply chain, and will be reviewed at least annually (unless mandatory legislative changes occur).

For some families of chemicals, the limits in the articles have been distinguished between leather and textile, given the intrinsic diversity of the matrixes analyzed, as well as the different analytical methods used and the related detection limits.

### Analytical method

The analysis must be carried out in ISO 17025 accredited laboratories. It should also be taken into account that, for some families of substances, internal methods (based on the normed available ones) are used. All methods must be accredited.

The methods and related parameters will be periodically monitored and explored, even through inter-laboratory tests.

Families of chemicals	Limit in the Articles			Analytical method (always refer to the latest version)	DL detection limit	Notes
	Proactive		Advanced			
	Child (*)	Adult				
<b>Agrochemicals (plant protection products)</b>	≤ 0,2 mg/kg Sum: ≤ 1 mg/kg	≤ 0,2 mg/kg Sum: ≤ 1 mg/kg	N.D.	EPA 8081; EPA 8151; EPA 8141	0,2 mg/kg	(**)
<b>Alkylphenols Ethoxylated alkylphenols</b>	Sum: ≤ 100 mg/kg	Sum: ≤ 100 mg/kg	N.D.	NP, OP: ISO 18857-1 NPEO, OPEO: Textile ISO/FDIS 18254; Leather ISO DIS 18218-1	1 mg/kg	
<b>Carcinogenic aromatic amines</b>	≤ 20 mg/kg Textile ≤ 30 mg/kg Leather	≤ 20 mg/kg Textile ≤ 30 mg/kg Leather	≤ 5 mg/kg	Textile: ISO/DIS 14362-1 e -3 per 4-amminoazobenzene; GB/T 17592.1; GB/T 23344. Leather: ISO 17234-1 e 2; GB 20400; GB/T 19942.	5 mg/kg	The leather DL will be subject to specific studies and in- depth analysis.
<b>Biocides - Dimethylfumarate</b>	N.D.	N.D.	N.D.	ISO TS 16186	0,1 mg/kg	
<b>Biocides – others</b>	Only biocidal products authorized in the EU Reg. 528/2012 and subsequent amendments			Solvent Extraction GC- MS / LC-MS-MS		
<b>Benzenes and chlorinated toluenes - chlorobenzenes</b>	Sum: ≤ 1 mg/kg	Sum: ≤ 1 mg/kg	N.D.	DIN 54232	0,5 mg/kg	
<b>Chlorophenols - chlorinated phenols</b>	Textile ≤ 0,05 mg/kg Leather ≤ 0,5 mg/kg	Textile ≤ 0,05 mg/kg Leather ≤ 0,5 mg/kg	N.D.	Textile LFGB B 82.02.8 Leather EN-ISO 17070	0,05 mg/kg	The leather DL will be subject to specific studies and in- depth analysis.
<b>Vinyl chloride - monomer</b>	≤ 5 mg/kg	≤ 5 mg/kg	N.D.	GB/T 4615	5 mg/kg	
<b>Allergenic dyes</b>	≤ 50 mg/kg	≤ 50 mg/kg	N.D.	DIN 54231	5 mg/kg	
<b>Carcinogenic dyes</b>	N.D.	N.D.	N.D.			
<b>Dyes - other prohibited</b>	N.D.	N.D.	N.D.			
<b>Fluorinated compounds PFOS/PFOA</b>	N.D.	N.D.	N.D.	CEN/TS 15968	1 µg/m <sup>2</sup>	Legislative decisions with regard to the unit of measure for the leather will be monitored. (***)

Families of chemicals	Limit in the Articles			Analytical method (always refer to the latest version)	DL detection limit	Notes
	Proactive		Advanced			
	Child (* )	Adult				
<b>Fluorinated compounds - others</b>	1 µg/m <sup>2</sup> 10 µg/m <sup>2</sup> for FTOH	1 µg/m <sup>2</sup> 10 µg/m <sup>2</sup> for FTOH	N.D.	CEN/TS 15968	1 µg/m <sup>2</sup> ; 10 µg/m <sup>2</sup> for: 8:2 FTOH, 10:2 FTOH, 4:2 FTOH, 6:2 FTOH	Legislative decisions with regard to the unit of measure for the leather will be monitored.
<b>Organic tin compounds</b>	≤ 0,5 mg/kg	≤ 1 mg/kg	N.D.	ISO/TS 16179	0,1 mg/kg	
<b>Formaldehyde</b>	≤ 16 mg/kg	≤ 75 mg/kg ≤ 300 mg/kg no contact with the skin	≤ 16 mg/kg child ≤ 75 adult	Textile: ISO 14184-1; GB/T 2912.1 Leather: ISO 17226-1 e 2 - GB/T 19941 Wood: EN717-3	16 mg/kg	
<b>Phthalates - BBP, DEHP, DIBP, DBP, DINP</b>	Banned ≤ 50 mg/kg	Banned ≤ 50 mg/kg	N.D.	CPSC-CH-C1001-09.3	10 mg/kg for DIDP and DINP;	
<b>Phthalates – others</b>	Sum: ≤ 500 mg/kg	Sum: ≤ 500 mg/kg	N.D.		5 mg/kg for the others	
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>	Group 1: 0,5 mg/kg each; Naftalene <2 mg/kg; Sum: < 5 mg/kg	Group 1: 1 mg/kg each; Naftalene: <2 mg/kg; Sum: <10 mg/kg	Adult: Group 1: 0,5 mg/kg each; Naftalene: <2 mg/kg; Sum: <5 mg/kg Child: Group 1: 0,2 mg/kg each Naftalene <1 mg/kg; Sum: < 1 mg/kg	AfPS GS 2014:01 PAK	0,2 mg/kg	
<b>Isocyanates</b>	N.D.	N.D.	N.D.	EN 13130-8	1 mg/kg	
<b>MINEABLE METALS TEXTILE - LEATHER</b>						
<b>Antimony</b>	≤ 30 mg/kg	≤ 30 mg/kg	N.D.	Textile: EN 16711-2; Leather: ISO 17072-1	5 mg/kg	N.D. only for natural fibers, 30 mg/kg for the others
<b>Arsenic</b>	≤ 0,2 mg/kg	≤ 1 mg/kg	≤ 0,2 mg/kg		0,02 mg/kg	
<b>Cadmium</b>	≤ 0,1 mg/kg	≤ 0,1 mg/kg	≤ 0,1 mg/kg		0,02 mg/kg	
<b>Chrome</b>	≤ 1 mg/kg Textile	≤ 2 mg/kg Textile	≤ 1 mg/kg Textile		0,1 mg/kg	
<b>Chrome VI</b>	< 3 mg/kg Leather <0,5 mg/kg Textile	<3 mg/kg Leather <0,5 mg/kg Textile	< 3 mg/kg Leather < 0,5 mg/kg Textile	Leather: ISO 17075 - Voluntary: aging 24h / 80°C / 5% RH; Textile: Extraction with alkaline solution according to UV determination of ISO 105 E04	0,5 mg/kg Textile; 3 mg/kg Leather	
<b>Cobalt</b>	≤ 1 mg/kg	≤ 4 mg/kg	≤ 1 mg/kg	Textile: EN 16711-2; Leather: ISO 17072-1	0,1 mg/kg	
<b>Copper</b>	≤ 25 mg/kg	≤ 50 mg/kg	≤ 25 mg/kg		5 mg/kg	
<b>Lead</b>	≤ 0,8 mg/kg Leather ≤ 0,2 mg/kg Textile	0,8 mg/kg Leather ≤ 1 mg/kg Textile	0,8 mg/kg Leather ≤ 0,2 mg/kg Textile		0,1 mg/kg	
<b>Mercury</b>	≤ 0,05 mg/kg Leather ≤ 0,02 mg/kg Textile	≤ 0,05 mg/kg Leather ≤ 0,02 mg/kg Textile	N.D.		0,02 mg/kg	
<b>Nickel</b>	≤ 1 mg/kg	≤ 4 mg/kg	≤ 1 mg/kg		0,1 mg/kg	
<b>METALS SUM CONTENT</b>						
<b>Arsenic</b>	N.D. Wood	N.D. Wood	N.D. Wood	CPSC-CH-E1003-09.3 (surface coating) CPSC-CH-E1001-08.1 /CPSC-CH-E1002-08.1 (substrate)	1 mg/kg	
<b>Mercury</b>	N.D.	N.D.	N.D.		1 mg/kg	
<b>Cadmium</b>	≤ 40 mg/kg	≤ 75 mg/kg	≤ 10 mg/kg	EN 16711-1 (Textile) EN ISO 17072-2 (Leather)	10 mg/kg	
<b>Lead</b>	≤ 40 mg/kg	≤ 100 mg/kg for all the unpainted materials ≤ 90 mg/kg for all the painted materials	≤ 40 mg/kg (90 mg/kg for glass)		10 mg/kg	

Families of chemicals	Limit in the Articles			Analytical method (always refer to the latest version)	DL detection limit	Notes
	Proactive		Advanced			
	Child (*)	Adult				
<b>NICKEL RELEASE FROM METAL COMPONENTS</b>						
<b>Nickel</b>	Non-penetrating parts: 0,28 µg/cm <sup>2</sup> /sett. Penetrating parts: 0,11 µg/cm <sup>2</sup> /sett.	Non-penetrating parts: 0,28 µg/cm <sup>2</sup> /sett. Penetrating parts: 0,11 µg/cm <sup>2</sup> /sett.	0,1 µg/cm <sup>2</sup> /sett.	EN 12472 + EN 1811	0,1 µg/cm <sup>2</sup> /sett	
<b>Nitrosamines</b>	≤ 0,5 mg/kg	≤ 0,5 mg/kg	≤ 0,1 mg/kg	GB/T 24153	0,1 mg/kg	Relevant to rubber and similar
<b>Orthophenylphenol</b>	Textile ≤ 50	Textile ≤ 100 mg/kg	Textile ≤ 50 mg/kg	LFGB B 82.02.8	0,05 mg/kg	
<b>Short-chain chlorinated paraffins - flame retardants</b>	N.D.	N.D.	N.D.	Solvent Extraction GC-MS / LC-MS-MS	50 mg/kg	Substances used as flame retardants, but not only
<b>Flame retardants</b>	N.D.	N.D.	N.D.	GB/T 24279	5 mg/kg	Substances used as flame retardants, but not only
<b>SOLVENTS</b>						
<b>N- methylpyrrolidone (NMP)</b>	≤ 100 mg/kg	≤ 500 mg/kg	N.D.	Solvent Extraction // GC-MS; HS-GC ISO/TS 16189 per DMF	0,1 mg/kg	
<b>N,N- dimethylacetamide (DMAc)</b>	≤ 300 mg/kg	≤ 500 mg/kg	N.D.			
<b>N,N- dimethylformamide (DMF)</b>	≤ 50 mg/kg	≤ 200 mg/kg	N.D. child 50 mg/kg adult			
<b>Chlorinated solvents (see list)</b>	Sum: ≤ 500 mg/kg	Sum: ≤ 500 mg/kg	N.D.	Solvent Extraction // GC-MS; HS-GC	0,5 mg/kg	
<b>pH</b>	3,5 - 7,5 Leather; 4 - 7,5 Textile	3,5 - 7,5 Leather; 4 - 7,5 Textile	3,5 - 7,5 Leather; 4 - 7,5 Textile	Textile: ISO 3071; GB/T 7573 Leather: ISO 4045		

The different supply chains agree to monitor the performance of analytical methods and the related detection limits through periodical inter-laboratory tests on the matrixes of interest.

## NOTES

- (\*)  
Parameters voluntarily applicable also to children over 36 months.
- (\*\*)  
The name “Pesticides”, commonly used to refer to this family of substances, is not a term used in legislation or official documents.
- (\*\*\*)  
[http://ec.europa.eu/environment/chemicals/international\\_conventions/pdf/questions\\_answers.pdf](http://ec.europa.eu/environment/chemicals/international_conventions/pdf/questions_answers.pdf)  
<http://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=CELEX:32010R0757&from=IT>  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:164:0007:0031:en:PDF>

# 10. TABLE OF CHEMICAL SUBSTANCES

Categories	Substances	CAS	Notes
Agrochemicals (Phytosanitary products)	Aldrin	309-00-2	
	2-(2,4,5-Trichlorophenoxy)propionic acid, its salts and compounds	93-72-1	
	Azinphos-methyl	86-50-0	
	Azinphos-ethyl	2642-71-9	
	Bromophos-ethyl	4824-78-6	
	Captafol	2425-06-1	
	Carbaryl	63-25-2	
	Chlordane	57-74-9	
	Chlordecone	143-50-0	
	Chlordimeform	6164-98-3	
	Chlorfenvinphos	470-90-6	
	Coumafos	56-72-4	
	Cyfluthrin	68359-37-5	
	Cyhalothrin	91465-08-6	
	Cypermethrin	52315-07-8	
	DEF	78-48-8	
	Deltamethrin	52918-63-5	
	Diaryl halogenated alkanes	various	
	Dicrotophos	141-66-2	
	Diazinon	333-41-5	

Categories	Substances	CAS	Notes
Agrochemicals (Phytosanitary products)	Halogenated biphenyls, including Polychlorinated biphenyls (PCBs)	1336-36-3; 53469-21-9; Various	
	1-(o-Chlorophenyl)-1-(p-chlorophenyl)-2,2-dichloroethane (o,p'-DDD)	53-19-0	
	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane (p,p'-DDD)	72-54-8	
	2-(2-Chlorophenyl)-2-(4-chlorophenyl)-1,1-dichloroethene (o,p'-DDE)	3424-82-6	
	1,1-Bis(p-chlorophenyl)-2,2-dichloroethylene (p,p'-DDE)	72-55-9	
	2,4'-Dichlorodiphenyltrichloroethane (o,p'-DDT) and its isomers; preparations containing DDT and its isomers	789-02-6	
	p,p'-Dichlorodiphenyldichloroethane (p,p'-DDT) and its isomers; preparations containing DDT and its isomers	50-29-3	
	2,4-Dichlorophenoxyacetic acido, its salts and compounds	94-75-7	
	Dichlorprop	120-36-5	
	Dieldrin	60-57-1	
	Dimethoate	60-51-5	
	Dinoseb and its salts	88-85-7	
	Endosulfan	115-29-7	
	Endosulfan, alfa	959-98-8	
	Endosulfan, beta	33213-65-9	
	Endrin	72-20-8	
	Hexabromobiphenyl	36355-01-8	
	Hexachlorocyclohexane	608-73-1	
	Esfenvalerate	66230-04-4	
	Fenvalerate	51630-58-1	
	Heptachlor	76-44-8	
Heptachlorepoxyde	1024-57-3		
Isodrin	465-73-6		
Kelevan	4234-79-1		



Categories	Substances	CAS	Notes
Agrochemicals (Phytosanitary products)	Lindane (gamma-HCH)	58-89-9	
	Malathion	121-75-5	
	MCPA (4-Chloro-2-methylphenoxyacetic acid)	94-74-6	
	MCPB ( 4-(4-Chloro-o-tolyloxy)butyric acid	94-81-5	
	Mecoprop	93-65-2	
	Halogenated diphenyl methanes	various	
	Methamidophos	10265-92-6	
	Methoxychlor	72-43-5	
	Metilparathion	298-00-0	
	Mevinphos (Fosdrin)	7786-34-7	
	Monocrotophos	6923-22-4	
	Monomethyl-dibromo-diphenyl methane (DBBT)	99688-47-8	
	Monomethyl-dichloro-diphenyl methane	81161-70-8	
	Monomethyl-tetrachlorodiphenyl methane	76253-60-6	
	Halogenated naphthalenes	various	
	Parathion	56-38-2	
	Perthan	72-56-0	
	Profenofos	41198-08-7	
	Propetamphos	31218-83-4	
	Quinalphos	13593-03-8	
	Pentachloronitrobenzene (PCNB, Quintozene)	82-68-8	
	Strobane	8001-50-1	
Telodrin	297-78-9		
Alogenated phenols, including polychlorinated triphenyls (PCT)	various		



Categories	Substances	CAS	Notes
Agrochemicals (Phytosanitary products)	Toxaphene	8001-35-2	
	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), its salts and compounds	93-76-5	
	Trifluralin	1582-09-8	
	α- Hexachlorocyclohexane	319-84-6	
	β- Hexachlorocyclohexane	319-85-7	
	δ- Hexachlorocyclohexane	319-86-8	
Alkylphenols - Alkylphenol ethoxylates	<b>Alkylphenols</b>		
	Nonylphenol (NP), mixed isomers	25154-52-3; 104-40-5; 84852-15-3	
	Octylphenol	27193-28-8; 1806-26-4; 140-66-9	
	<b>Alkylphenoethoxylates (APEOs)</b>		
	Octylphenol ethoxylate (OPEO) <sub>[1-18]</sub>	9002-93-1 various	
	Nonylphenol ethoxylate (NPEO) <sub>[1-18]</sub>	9016-45-9 various	
Carcinogenic aromatic amines	p-Aminoazobenzene	60-09-3	
	o-Aminoazotoluene	97-56-3	
	4-Aminobiphenyl	92-67-1	
	2-Amino-4-nitrotoluene	99-55-8	
	2-Anisidine	90-04-0	alternative name, o-anisidina
	Benzidine	92-87-5	
	4-Chloroaniline	106-47-8	
	4-Chloro-2-toluidine	95-69-2	
	p-Cresidina	120-71-8	
	2,4-Diamminoanisolet	615-05-4	
	4,4'-Diaminodiphenylmethane	101-77-9	
	2,4-Toluenediamine	95-80-7	
3,3'-Dichlorobenzidine	91-94-1		

Categories	Substances	CAS	Notes
Carcinogenic aromatic amines	3,3'-Dimethoxybenzidine	119-90-4	
	3,3'-Dimethylbenzidine	119-93-7	
	3,3'-Dimethyl-4,4'-diamino-diphenylmethane	838-88-0	
	4,4'-Methylene-bis-(2-chloroaniline)	101-14-4	
	2-Naphthylamine	91-59-8	
	4,4'-Oxydianiline	101-80-4	
	4,4'-Thiodianiline	139-65-1	
	2-Toluidine	95-53-4	
	2,4,5-Trimethylaniline	137-17-7	
	2,4-Xylidine	95-68-1	
	2,6-Xylidine	87-62-7	
	Biocides- Dimethylfumarate	Dimethylfumarate (DMFu)	624-49-7
Biocides- others	All biocides NOT present in EU Regulation 528/2012 and subsequent amendments are forbidden		
Chlorinated benzenes and toluenes - chlorobenzenes	Monochlorobenzene	108-90-7	
	Dichlorobenzene, mixed isomers	25321-22-6	
	1,2-Dichlorobenzene	95-50-1	
	1,3-Dichlorobenzene	541-73-1	
	1,4-Dichlorobenzene	106-46-7	
	Trichlorobenzene, mixed isomers	12002-48-1	
	1,2,3-Trichlorobenzene	87-61-6	
	1,2,4-Trichlorobenzene	120-82-1	
	1,3,5-trichlorobenzene	108-70-3	
	<i>Tetrachlorobenzene, all isomers:</i>		
	1,2,3,4-Tetrachlorobenzene	634-66-2	

Categories	Substances	CAS	Notes
Chlorinated benzenes and toluenes - chlorobenzenes	1,2,3,5-Tetrachlorobenzene	634-90-2	
	1,2,4,5-Tetrachlorobenzene	95-94-3	
	Pentachlorobenzene	608-93-5	
	Hexachlorobenzene	118-74-1	
	Monochlorotoluene, mixed isomers	25168-05-2	
	2-Chlorotoluene	95-49-8	
	3-Chlorotoluene	108-41-8	
	4-Chlorotoluene	106-43-4	
	Dichlorotoluene, mixed isomers	29797-40-8	
	2,3-Dichlorotoluene	32768-54-0	
	2,4-Dichlorotoluene	95-73-8	
	2,5-Dichlorotoluene	19398-61-9	
	2,6-Dichlorotoluene	118-69-4	
	3,4-Dichlorotoluene	95-75-0	
	<i>Trichlorotoluenes:</i>		
	2,3,6-Trichlorotoluene	2077-46-5	
	a,a,a-trichlorotoluene	98-07-7	
	<i>Tetrachlorotolueni:</i>		
	a,a,a,2-Tetrachlorotoluene	2136-89-2	
	a,a-2,6-Tetrachlorotoluene	81-19-6	
	a,a,a,4-Tetrachlorotoluene	5216-25-1	
Pentachlorotoluene	877-11-2		

Categories	Substances	CAS	Notes
Chlorophenols - Chlorinated phenols	Trichlorophenol (TriCP), mixed isomers	25167-82-2	
	2,3,5-Trichlorophenol	933-78-8	
	2,3,6-Trichlorophenol	933-75-5	
	2,4,5-Trichlorofenol	95-95-4	
	2,4,6-Trichlorofenol	88-06-2	
	3,4,5-Trichlorofenol	609-19-8	
	Tetrachlorophenol (TeCP), mixed isomers	25167-83-3	
	2,3,4,5-Tetrachlorophenol	4901-51-3	
	2,3,4,6-Tetrachlorophenol	58-90-2	
	2,3,5,6-Tetrachlorophenol	935-95-5	
	Pentachlorophenol (PCP)	87-86-5	
Vinyl chloride monomer	Vinyl chloride	75-01-4	
Allergenic dyes	Pigment Red 104	12656-85-8	
	Disperse Blue 3	2475-46-9	
	Disperse Blue 7	3179-90-6	
	Disperse Blue 26	3860-63-7	
	Disperse Blue 35	12222-75-2	
	Disperse Blue 102	12222-97-8	
	Disperse Blue 106	12223-01-7	
	Disperse Blue 124	61951-51-7	
	Disperse Brown 1	23355-64-8	
	Disperse Orange 1	2581-69-3	
	Disperse Orange 3	730-40-5	
	Disperse Orange 37/59/76	12223-33-5	
	Disperse Red 1	2872-52-8	
	Disperse Red 11	2872-48-2	
	Disperse Red 17	3179-89-3	
	Disperse Yellow 1	119-15-3	
	Disperse Yellow 9	6373-73-5	
	Disperse Yellow 39	12236-29-2	
	Disperse Yellow 49	54824-37-2	
Disperse Orange 37/76	13301-61-6		

Categories	Substances	CAS	Notes
Carcinogenic dyes	Acid Red 26	3761-53-3	
	Basic Red 9	569-61-9	
	Basic Violet 14	632-99-5	
	Direct Black 38	1937-37-7	
	Direct Blue 6	2602-46-2	
	Direct Red 28	573-58-0	
	Disperse Blue 1	2475-45-8	
	Disperse Orange 11	82-28-0	
	Disperse Yellow 3	2832-40-8	
	Pigment Yellow 34	1344-37-2	
	Disperse Orange 149	85136-74-9	
Banned dyes (others)	Acid Violet 49	1624-09-3	
	Basic Blue 26	2580-56-5	
	Basic Violet 1	8004-87-3	
	Basic Violet 3	548-62-9	
	Navy blue	118685-33-9	
Fluorinated compounds PFOS/PFOA	Perfluorooctane sulfonate (PFOS)	1763-23-1	
	Perfluorooctanoic acid (PFOA)	335-67-1	
Fluorinated compounds (others)	<b>PFAS chemicals</b>		
	Perfluoro hexane sulfonate (PFHxS)	355-46-4 / 432-50-7	
	Perfluorohexanesulfonate Na-salt (L-PFHxS)	82382-12-15	
	Perfluoroheptanesulfonate Na-salt (L-PFHpS)	68555-66-8	
	Perfluorodecanesulfonate Na-salt (L-PFDS)	2806-15-7	

Categories	Substances	CAS	Notes
Fluorinated compounds (others)	Potassium heneicosulfonate (PFDS-K)	2806-16-8	
	1-Decanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heneicosulfonate-, ammonium salt (PFDS-NH4)	67906-42-7	
	Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	
	Perfluorodecane sulfonic acid (PFDS)	335-77-3	
	Perfluoro-3,7-dimethyloctanoic acid (PF-3,7-DMOA)	172155-07-6	
	1H,1H,2H,2H-Perfluorooctane sulfonic acid (1H,1H,2H,2H-PFOS)	27619-97-2	
	2H,2H,3H,3H-Perfluoroundecanoic acid (H4PFUnA)	34598-33-9	
	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	
	Perfluorooctane sulfonamide (PFOSA)	754-91-6	
	N-Methyl perfluorooctane sulfonamide (N-Me-FOSA)	31506-32-8	
	N-Ethyl perfluorooctane sulfonamide (N-Et-FOSA)	4151-50-2	
	N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	24448-09-7	
	N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	1691-99-2	
	Perfluorobutane sulfonic acid (PFBS)	375-73-5 59933-66-3 749861-23-2	
	Perfluorobutanesulfonate K-salt (PFHxS-K)	29420-49-3	
	<b>Fluorotelomer alcohols (FTOHs) F(CF<sub>2</sub>)<sub>n</sub>CH<sub>2</sub>CH<sub>2</sub>OH</b>		
	1H,1H,2H,2H-Perfluorohexane-1-ol (4:2 FTOH)	2043-47-2	
	1H,1H,2H,2H-Perfluoro-1-octanol (6:2 FTOH)	647-42-7	
	1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTOH)	678-39-7	
	1H,1H,2H,2H-Perfluorododecane-1-ol (10:2 FTOH)	865-86-1	
	<b>Olefins fluorotelomer(FTOs)</b>		
	1H,1H,2H,2H-Perfluorooctylacrylate (6:2 FTA)	17527-29-6	
	1H,1H,2H,2H-Perfluorodecylacrylate (8:2 FTA)	27905-45-9	
	1H,1H,2H,2H-Perfluorododecylacrylate (10:2 FTA)	17741-60-5	
	Perfluorooctanesulfonyl Fluoride (PFOSF)	307-35-7	
	<b>Perfluoroalkyl carboxylic acids and salts (PFCA)</b>		
	Perfluorobutanoic acid (PFBA)	375-22-4	
Perfluorohexanoic acid (PFHxA)	307-24-4		

Categories	Substances	CAS	Notes
Fluorinated compounds (others)	Perfluorononanoic acid (PFNA)	375-95-1	
	7H-Dodecafluoroheptanoic acid (HPFHpA)	1546-95-8	
	2H,2H-Perfluorodecanoic acid (H2PFDA)	27854-31-5	
	Perfluoropentanoic acid (PFPeA)	2706-90-3	
	Perfluoroheptanoic acid (PFHpA)	375-85-9	
	Perfluorodecanoic acid (PFDA)	335-76-2	
	Perfluoroundecanoic acid (PFUnA)	2058-94-8	
	Perfluorododecanoic acid (PFDoA)	307-55-1	
	Perfluorotridecanoic acid (PFTrA)	72629-94-8	
	Perfluorotetradecanoic acid (PFTeA)	376-06-7	
Organotin compounds	Monobutyltin compounds (MBT)	2273-43-0 various	
	Monooctyltin (MOT)	15231-57-9	
	Dibutyltin (DBT)	1002-53-5	
	Dibutyltin dichloride (DBTC)	683-18-1	
	Dibutyltin hydrogen borate (DBB)	75113-37-0	
	Dibutyltin compounds (DOT)	various	
	Dioctyltin (DOT)	15231-44-4	Various
	Tributyltin compounds (TBT)	various	
	Tributyltin (TBT)	56573-85-4	
	Bis(tributyltin) oxide (TBTO)	56-35-9	
	Triphenyltin Compounds (TPhT)	various	
	Triphenyltin (TPT)	668-34-8	
	Tetra butyl tin compounds (TeBT)	1461-25-2 various	
	Tetra octyltin compounds	various	
	Tricyclohexyltin (TCyHT)	various	
	Trioctyltin (TOT)	250252-89-2 various	
	Tripropyltin (TPT)	various	
	Tributyltin (TMT)	various	
Dimethyltin (DMT)	various		

Categories	Substances	CAS	Notes
For formaldehyde	Formaldehyde	50-00-0	
Phthalates - BBP, DEHP, DIBP, DBP, DINP	Benzylbutylphthalate (BBP)	85-68-7	
	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	
	Diisobutyl phthalate (DIBP)	84-69-5	
	Dibutylphthalate (DBP)	84-74-2	
	Diisononylphthalate (DINP)	28553-12-0 68515-48-0	
Phthalates (others)	<b>Esters of phthalic acid</b>		
	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	71888-89-6	
	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4	
	1,2-benzenedicarboxylic acid, dipentylester, branched and linear (DnPP)	84777-06-0	
	Bis(2-methoxyethyl) phthalate (DMEP)	117-82-8	
	Diisodecylphthalate (DIDP)	26761-40-0 68515-49-1	
	Dimethyl phthalate (DMP)	131-11-3	
	Diethyl phthalate (DEP)	84-66-2	
	Di-n-hexyl phthalate (DnHP)	84-75-3	
	Diocetylphthalate (DNOP)	117-84-0	
	Di-iso-pentylphthalate (DIPP)	605-50-5	
	Dipentyl phthalate (DnPP)	131-18-0	
	N-pentyl-isopentylphthalate (nPIPP)	776297-69-9	
	Diisooctyl phthalate (DIOP)	27554-26-3	
	Dinonyl phthalate (DNP)	84-76-4	
	Dipropyl phthalate (DprP)	131-16-8	
	Dicyclohexyl phthalate (DCHP)	84-61-7	
Di-N-hexyl phthalate (DHxP)	68515-50-4		
Polycyclic aromatic hydrocarbons (IPA)	<b>Polyaromatic hydrocarbons (PAHs)</b>		Group 1
	Benzo(a)pyrene (BaP)	50-32-8	
	Benzo(e)pyrene (BeP)	192-97-2	
	Benzo(a)anthracene (BaA)	56-55-3	
	Chrysene (CHR)	218-01-9	
	Benzo(b)fluoranthene (BbFA)	205-99-2	
	Benzo(j)fluoranthene (BjFA)	205-82-3	
	Benzo(k)fluoranthene (BkFA)	207-08-9	



Categories	Substances	CAS	Notes
Polycyclic aromatic hydrocarbons (IPA)	Dibenzo(a,h)anthracene (DBAhA)	53-70-3	Group 1
	Benzo(g,h,i)perylene	191-24-2	
	Indeno(1,2,3-cd)pyrene	193-39-5	
	Cyclopenta[c,d]pyrene	27208-37-3	
	Dibenzo[a,e]pyrene	192-65-4	
	Dibenzo[a,h]pyrene	189-64-0	
	Dibenzo[a,j]pyrene	189-55-9	
	Dibenzo[a,l]pyrene	191-30-0	
	1-Methylpyrene	2381-21-7	
	Acenaphthene	83-32-9	
	Acenaphthalene	208-96-8	
	Anthracene	120-12-7	
	Fluoranthene	206-44-0	
	Fluorene	86-73-7	
	Naphthalene	91-20-3	
	Phenanthrene	85-01-8	
	Pyrene	129-00-0	
Isocyanates	Diphenylmethane-4,4'-diisocyanate (MDI)	101-68-8	
	Diphenylmethane-2,2'-diisocyanate (2,2-MDI)	2536-05-2	
	Diphenylmethane-2,4-diisocyanate (2,4-MDI)	5873-54-1	
	MDI mixed isomers	26447-40-5	
	1,1'-Methylenebis(4-isocyanatobenzene)	9016-87-9	
	Hexamethylene diisocyanate (HMDI)	822-06-0	
	Methylene-bis(4-cyclohexylisocyanate) (4,4-MDI)	5124-30-1	
Extractable Metal Content (textiles / leather)	Antimony (Sb)	7440-36-0	
	Arsenic (As)	7440-38-2	
	Cadmium (Cd)	7440-43-9	
Extractable Metal Content (textiles / leather)	Chromium (Cr)	7440-47-3	
	Chromium, VI (CrVI)	18540-29-9	
	Cobalt (Co)	7440-48-4	
	Copper (Cu)	7440-50-8	
	Lead (Pb)	7439-92-1	
	Mercury (Hg)	7439-97-6	
	Nickel (Ni)	7440-02-0	

Categories	Substances	CAS	Notes
Total metal content	Arsenic	7440-38-2	
	Mercury (Hg)	7439-97-6	
	Cadmium (Cd)	7440-43-9	
	Lead (Pb)	7439-92-1	
Nickel releasable from metal	Nickel (Ni)	7440-02-0	
Nitrosamines	N-nitrosodibutylamine (NDBA)	924-16-3	
	N-nitrosodiethylamine (NDEA)	55-18-5	
	N-nitrosodimethylamine (NDMA)	62-75-9	
	N-nitrosodipropylamine (NDPA)	621-64-7	
	N-nitroso-N-ethylaniline (NEPhA)	614-64-6	
	N-nitroso-N-methylaniline	614-00-6	
	N-nitrosomorpholine (NMOR)	59-89-2	
	N-nitrosopiperidine (NPIP)	100-75-4	
	N-nitrosopyrrolidine	930-55-2	
Orthophenylphenol	o-Phenylphenol	90-43-7	
Short Chain Chlorinated Paraffins - Flame Retardants	2,2-Bis(bromomethyl)-1,3-propanediol	3296-90-0	
	Bis (2,3-dibromopropyl) phosphate	5412-25-9	
	Short Chain Chlorinated Paraffins C10 to C13 (SCCP)	85535-84-8	
Flame retardants	Hexabromocyclododecane HBCDD and all isomers	25637-99-4	
	<b>Polybrominated biphenyl ethers (PBDE)</b>		
	Tetra-bromodiphenyl ether (TetraBDE)	40088-47-9 ; 5436-43-1	
	Penta-bromodiphenyl ether (PentaBDE)	32534-81-9	
	Hexa-bromodiphenyl ether (HexaBDE)	36483-60-0	
	Hepta-bromodiphenyl ether (HeptaBDE)	68928-80-3	
	Octa-bromodiphenyl ether (OctaBDE)	32536-52-0	
	Deca-bromodiphenyl ether (DecaBDE)	1163-19-5	
	Tetrabromobisphenol A (TBBPA)	79-94-7	
	Tetrabromobisphenol A (TBBPA) bis(2,3-dibromopropyl ether)	21850-44-2	
	Tris(aziridinyl)phosphineoxide (TEPA)	545-55-1	
	2,2',3,3',4,4',5,5',6-Nonabromodiphenyl Ether (Nona BDE)	63936-56-1	
	Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)	13674-87-8	
	Tris(2-chloro-1-methylethyl) phosphate (TCPP)	13674-84-5	
	Tri-o-cresyl phosphate	78-30-8	

Categories	Substances	CAS	Notes
Flame retardants	Tris(2-chloroethyl) phosphate (TCEP)	115-96-8	
	Tris(2,3-dibromopropyl) phosphate (TRIS)	126-72-7	
	2-Ethylhexyl 2,3,4,5-Tetrabromobenzoate (TBB)	183658-27-7	
	bis(2-ethylhexyl) tetrabromophthalate (TBPH)	26040-51-7	
Solvents	1-Methyl-2-pyrrolidone (NMP)	872-50-4	
	N,N - Dimethylacetamide (DMAc)	127-19-5	
	N,N-Dimethylformamide (DMFo)	68-12-2	
Chlorinated solvents	<b>Chlorinated ethanes, all isomers</b>		
	1,1,1-Trichloroethane	71-55-6	
	1,1,2-Trichloroethane	79-00-5	
	1,1,1,2-Tetrachloroethane	630-20-6	
	1,1,2,2-Tetrachloroethane	79-34-5	
	Hexachloroethane	67-72-1	
	1,1-Dichloroethane	75-34-3	
	1,2-Dichloroethane	107-06-2	
	Dichloromethane	75-09-2	
	Trichloroethylene	79-01-6	
	Trichloromethane (chloroform)	67-66-3	
	Carbon tetrachloride	56-23-5	
	1,1-Dichloroethylene	75-35-4	
	Benzyl chloride	100-44-7	

# 11. BIBLIOGRAPHY

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## 10.1 European laws

- General product safety directive (GPSD), Directive 2001/95/EC;
- Regulation (EC) No 1907/2006 REACH on the Registration, Evaluation, Authorisation and restriction of Chemicals;

## 10.2 International laws

- Argentina – Resolution 7/2009;
- Argentina – Resolution 583/2008;
- Canada – Canada Consumer Product Safety Act (CCPSA);
- Canada – Canada Hazardous Products Act (Surface Coating Materials Regulations SOR/2010-224);
- Canada – Canadian Environmental Protection Act (CEPA) 1999;
- China - GB18401 - 2010 (Textile Product);
- China – GB20400 – 2006 (Leather and fur);
- China – GB25036-2010 (Children’s canvas rubber footwear);
- China – GB25038-2010 (Rubber Shoes);
- Egypt – Ministerial Decrees no. 961/2012;
- Indonesia – Ministry of Industry’s directive no. 72/M-IND/PER/7/2012;
- Indonesia – Partial Requirements of Indonesia National Standard (SNI) for Towels;
- Japan – Japanese Law 112;
- Korea - Safety Quality Mark Act (Annex 1 Textile Products for infant);
- Korea - Safety Quality Mark Act (Annex 3 Leather Products);
- Korea – Self Regulatory Safety Confirmation Act (Annex 4 Textile Products for Infants);
- Saudi Arabia – SASO GSO 1956;
- Taiwan – CNS 15290 Safety of Textiles (General requirements);

- Turkey – Official Gazette No 27893;
- Turkey – Official Gazette No 28431;
- USA - California Proposition 65;
- USA - Consumer Product Safety Improvement Act CPSIA (Public Law 110-314);
- USA - Customs and Border protection (CBP);
- USA - Federal Hazardous Substances Act (15 U.S.C. §§1261-1278);
- USA - National Waste Minimization Program;
- USA - Occupational Safety and Health Act of 1970;
- USA - Toxic Substances Control Act (TSCA);
- USA - Washington Children’s Safe Product Act (CSPA);
- Vietnam – Circular 32/2009/TT-BCT;

### **10.3 European Technical Standards**

- Regulation (EC) No 66/2010 Ecolabel;
- UNI/TR 11359 “Safety management of textiles, clothing, furniture, footwear, leather and accessories”;
- CEN/TR 16741 “Textiles and textile products – Guidance on health and environmental issues related to chemical content of textile products intended for clothing, interior textiles and upholstery”;

### **10.4 International Technical standards**

- Japan – Industrial voluntary scheme;
- USA – AafA American apparel & footwear association;

### **10.5 Main private standards**

**These Guidelines have been edited by a working group formed by:**

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