



Fast Retailing Manufacturing Restricted Substances List (MRSL)

-Version 2024-

Revision history

Version	Revision description	Effective Date
2013	Initial release	01/04/2013
2014	Annual update	01/01/2014
2015	Annual update	05/15/2015
2015	Additional update	16/11/2015
2016	Annual update	25/04/2016
2017	Annual update	26/04/2017
2018	Annual update	25/07/2018
2019	Major revision to integrate ZDHC MRSL	10/05/2019
2020	Revision to integrate ZDHC MRSL v2.0	29/05/2020
2021	Annual update	31/05/2021
2023	Revision to integrate ZDHC MRSL v3.1	31/05/2023
2024	Revision to integrate ZDHC MRSL v3.1	31/05/2024

Change log for the version 2024

All the changes are according to ZDHC MRSL v.3.1.

Updated Item	Newly added	Limit updated	Current limit	Updated contents
3c. Other Flame retardants	●			Newly added according to ZDHC V3.1 Zinc borate salts
13. PAHs		●	leather: 200 mg/kg Textile & Plastics: Sum: 200 mg/kg	Added "except BaP" for Sum limit according to ZDHC V3.1 Naphthalene
		●	Sum: 200 mg/kg	Changed requirement to "Leather: Sum except BaP&Naphthalene: 200 mg/kg , Textile & Polymers: Sum except BaP: 200 mg/kg" according to ZDHC V3.1 Acenaphthylene Acenaphthene Fluorene Phenanthrene Anthracene Fluoranthene

				Pyrene Indeno[1,2,3-cd]pyrene Benzo[ghi]perylene Benzo-[a]-anthracene(BaA) Chrysene(CHR) Dibenzo-[a,h]-anthracene (DBAhA) Benzo-[b]-fluoranthene(BbFA) Benzo-[k]-fluoranthene(BkFA) Benzo-[e]-pyrene(BeP) Benzo-[j]-fluoranthene(BjFA)
		●	Sum: 200 mg/kg	Changed "Sum:200mg/kg" to "20mg/kg" according to ZDHC V3.1 Benzo-[a]-pyrene (BaP)
14. Pesticides		●	250 mg/kg	Changed requirement to "1000 mg/kg" according to ZDHC V3.1 Borate, zinc salt

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Introduction

Fast Retailing (FR) has committed to detox the apparel and footwear supply chains starting from 2013. To comply with this commitment, FR would eliminate the release of hazardous chemicals to protect consumers, worker, sourcing communities, and the natural environment using an approach based on Prevention principle¹ and Precautionary Principle².

We recognize it is very important to address hazardous substances potentially used and discharged into the environment during manufacturing and related processes deep within our supply chain, not just for substances that could be present in finished products. Following this approach, FR has developed a Manufacturing Restricted Substances List (MRSL), which defines thresholds and restrictions for substances identified as hazardous and potentially used in production and discharged into the environment during processing.

Methodology

The intent of FR MRSL is to provide suppliers with a harmonized approach to managing chemicals during the processing of raw materials within the apparel and footwear supply chain. The FR MRSL is a clear list of priority chemicals banned from intentional use in production site and specifying the maximum concentration limit of each substance within commercial chemical formulations.

As FR has joined ZDHC Group in 2019, to better align with the industry standard, Fast Retailing has set up this MRSL fully adopting all ZDHC MRSL requirements, which includes original 11 priority chemical groups referring to FR's Detox commitment. Furthermore, FR MRSL also includes additional substances aligned with other regulations, such as Oeko-Tex 100 and AFIRM, and identified by industry expert's evaluation.

1 This means solutions are focused on elimination of use at source, not on end-of-pipe or risk management. This requires either substitution with non-hazardous chemicals or where necessary finding non-chemical alternative solutions, such as re-evaluating product design or the functional need for chemicals.

2 This means taking preventive action before waiting for conclusive scientific proof regarding cause and effect between the substance (or activity) and the damage. It is based on the assumption that some hazardous substances cannot be rendered harmless by the receiving environment (i.e. there are no "environmentally acceptable"/"safe" use or discharge levels) and that prevention of potentially serious or irreversible damage is required, even in the absence of full scientific certainty.

The FR MRSL should be communicated to raw material suppliers, including sub-contractors and factories assembling or manufacturing garments and footwear. We also expect that material suppliers and factories will communicate with their chemical suppliers to ensure that listed substances are not present in chemical formulations above established limits.

Scope

Manufacturing in facilities processing textile materials, leather, rubber, foam, adhesives and trim parts in textiles, apparel, and footwear.

Definitions

Chemical Substance:

A chemical substance is a chemical element and its compounds in the natural state or obtained by any manufacturing process

Chemical Formulation:

A chemical formulation is usually a proprietary blend of several chemical substances that is available for purchase from chemical suppliers under their own trade name.

Hazardous chemicals:

Hazardous chemicals mean those show intrinsically hazardous properties: persistent, bioaccumulative and toxic (PBT); very persistent and very bioaccumulative (vPvB); carcinogenic, mutagenic and toxic for reproduction (CMR); endocrine disruptors (ED); or other properties of equivalent concern, not just those that have been regulated or restricted in other regions.

No Intentional Use:

A no intentional use indicates that the MRSL-listed chemical substance or group of substances may not be used to achieve a desired function or effect during production of the

raw material or product (that is, usage ban). Due to the existence of manufacturing impurities in chemical formulations, a minor or trace amount of the restricted substance is permitted. Chemical formulations containing restricted substances that exceed limits are not compliant with FR MRSL.

CAS Number:

Chemical Abstracts Service number, single and unique numerical identifiers to every chemical substance. FR MRSL focuses on chemical substances listed by CAS number, but it also includes groups of substances for which listing individual substances is not practical.

Trim parts:

Except for the packaging materials, all the trims and accessories that sewed in the garment (sewing thread, button, interlining, lining, zips, labels, care label, etc.).

General Requirements

Chapter 1: MRSL

- Group of “in Manufacturing”
This group substances are banned from intentional use in facilities that process raw materials and manufacture finished products.
- Group of “in Chemical Formulations”
This group substances are restricted to concentration limits in chemical formulations commercially available from chemical suppliers. These limits ban intentional use while allowing for reasonable expected manufacturing impurities that should be consistently achievable by responsible chemical manufacturers.

The substances marked with “Yes” in ZDHC MRSL column, are associated with the same requirements of ZDHC MRSL, whatever is “in Manufacturing” or “in Chemical Formulations”.

More information and guidance on each substance are available on [the ZDHC MRSL](#), including, where it may be found, why it is restricted and what are safer alternatives.

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Chapter 2: MRSL Candidate List

Proposed MRSL additions can meet listing criteria, yet lack safer alternatives at scale. Including such substances on the Candidate List encourages the innovation of alternatives.

Chapter 3: Archived Substances

Archived substances, or those without strong evidence of current use in Industry, but with clear evidence of historical use.

Chapter 1: MRSL

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
1. AP / APEO				
Octylphenol (OP)	Various including 27193-28-8 140-66-9 1806-26-4 85771-77-3	No intentional use	100 mg/kg	yes
Nonylphenol (NP)	Various including 25154-52-3 104-40-5 84852-15-3 11066-49-2	No intentional use	100 mg/kg	yes
Octylphenoethoxylates, n=2 to n= 16	Various, including 68987-90-6 9036-19-5 9002-93-1	No intentional use	250 mg/kg	yes
Nonylphenoethoxylates, n=2 to n=16	Various including 9016-45-9 26027-38-3 37205-87-1 68412-54-4 127087-87-0	No intentional use	250 mg/kg	yes
2. Phthalates (ortho-phthalates)				
Butyl benzyl Phthalate (BBP)	85-68-7	No intentional use	Sum: 250 mg/kg	yes
Di-n-butyl Phthalate (DBP)	84-74-2	No intentional use	Sum: 250 mg/kg	yes
Bis(2-ethylhexyl) Phthalate (DEHP)	117-81-7	No intentional use	Sum: 250 mg/kg	yes
Di-n-octyl Phthalate (DnOP)	117-84-0	No intentional use	Sum: 250 mg/kg	yes
Di-iso-nonyl Phthalate (DINP)	28553-12-0	No intentional use	Sum: 250 mg/kg	yes
Di-iso-decyl Phthalate (DIDP)	26761-40-0	No intentional use	Sum: 250 mg/kg	yes
Dimethyl phthalate (DMP)	131-11-3	No intentional use	1000 mg/kg*	
Diethyl Phthalate (DEP)	84-66-2	No intentional use	Sum: 250 mg/kg	yes
Di-n-propyl Phthalate (DPrP)	131-16-8	No intentional use	Sum: 250 mg/kg	yes
Di-iso-butyl Phthalate (DIBP)	84-69-5	No intentional use	Sum: 250 mg/kg	yes
Di-cyclohexyl Phthalate (DCHP)	84-61-7	No intentional use	Sum: 250 mg/kg	yes
Di-n-hexyl phthalate (DnHP / DHEXP)	84-75-3	No intentional use	Sum: 250 mg/kg	yes
D-inonyl Phthalate (DNP)	84-76-4	No intentional use	Sum: 250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024 Requirements		ZDHC MRSL v3.1
		in Manufacturing	in Chemical formulations	
Di-iso-octyl Phthalate (DIOP)	27554-26-3	No intentional use	Sum: 250 mg/kg	yes
Bis(methylglycol) phthalate (DMEP)	117-82-8	No intentional use	Sum: 250 mg/kg	yes
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4	No intentional use	Sum: 250 mg/kg	yes
Di-iso-heptyl Phthalate (1,2-benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (DIHpP)	71888-89-6	No intentional use	Sum: 250 mg/kg	yes
Di-n-pentylphthalate (DnPP/DPENP)	131-18-0	No intentional use	Sum: 250 mg/kg	yes
Diisopentylphthalate (DiPP)	605-50-5	No intentional use	Sum: 250 mg/kg	yes
N-pentyl-isopentyl phthalate (nPiPP)	776297-69-9	No intentional use	Sum: 250 mg/kg	yes
1,2-Benzenedicarboxylic acid, dipentyl ester, branched and linear standard	84777-06-0	No intentional use	Sum: 250 mg/kg	yes
Di-hexyl Phthalate, branched and linear (DHxP)	68515-50-4	No intentional use	Sum: 250 mg/kg	yes
Di-iso-hexyl Phthalate (DIHxP)	71850-09-4	No intentional use	Sum: 250 mg/kg	yes
1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate	68515-51-5 / 68648-93-1	No intentional use	1000 mg/kg*	
3a. Brominated Flame retardants				
Polybrominated biphenyls (PBBs)	59536-65-1 various	No intentional use	250 mg/kg	yes
Monobromo biphenyls (MonoBB)	26264-10-8, 2052-07-5, 2113-57-7, 92-66-0 various	No intentional use	250 mg/kg	yes
Dibromo biphenyls (DiBB)	13029-09-9, 92-86-4, 59080-32-9, various	No intentional use	250 mg/kg	yes
Tribromo biphenyls (TriBB)	51202-79-0, various	No intentional use	250 mg/kg	yes
Tetrabromo biphenyls (TetraBB)	60044-24-8, 60044-25-9, various	No intentional use	250 mg/kg	yes
Pentabromo biphenyls (PentaBB)	67888-96-4, 59080-39-6, various	No intentional use	250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Hexabromo biphenyls (HexaBB)	59080-40-9, 36355-01-8, various	No intentional use	250 mg/kg	yes
Heptabromo biphenyls (HeptaBB)	-	No intentional use	250 mg/kg	yes
Octabromo biphenyls (OctaBB)	27858-07-7, 61288-13-9, various	No intentional use	250 mg/kg	yes
Nonabromo biphenyls (NonaBB)	27753-52-2, 69278-62-2 119264-62-9, 119264-63-0, various	No intentional use	250 mg/kg	yes
Decabromo biphenyls (DecaBB)	13654-09-6	No intentional use	250 mg/kg	yes
Tris(2,3-Dibromopropyl)-Phosphate (TRIS)	126-72-7	No intentional use	250 mg/kg	yes
Polybrominated diphenyl ethers (PBDEs)	various	No intentional use	1000 mg/kg*	
Monobromo diphenyl ethers (MonoBDE)	various	No intentional use	250 mg/kg	yes
Dibromo diphenyl ethers (DiBDE)	various	No intentional use	1000 mg/kg*	
Tribromo diphenyl ethers (TriBDE)	various	No intentional use	250 mg/kg	yes
Tetrabromo diphenyl ethers (TetraBDE)	40088-47-9	No intentional use	250 mg/kg	yes
Pentabromo diphenyl ethers (PentaBDE)	32534-81-9	No intentional use	250 mg/kg	yes
Hexabromo diphenyl ethers (HexaBDE)	36483-60-0	No intentional use	250 mg/kg	yes
Heptabromo diphenyl ethers (HeptaBDE)	68928-80-3	No intentional use	250 mg/kg	yes
Octabromo diphenyl ethers (OctaBDE)	32536-52-0	No intentional use	250 mg/kg	yes
Nonabromo diphenyl ethers (NonaBDE)	63936-56-1	No intentional use	250 mg/kg	yes
Decabromo diphenyl ethers (DecaBDE)	1163-19-5	No intentional use	250 mg/kg	yes
Tetrabromo-bisphenol A (TBBPA)	79-94-7	No intentional use	250 mg/kg	yes
Bis(2,3-dibromopropyl)phosphate (BIS / BDBPP)	5412-25-9	No intentional use	250 mg/kg	yes
Hexabromocyclododecane (HBCDD)	134237-50-6, 134237-51-7, 134237-52-8, 25637-99-4, 3194-55-6	No intentional use	250 mg/kg	yes
2,2-bis(bromomethyl)-1,3-propanediol (BBMP)	3296-90-0	No intentional use	250 mg/kg	yes
Tetrabromobisphenol A bis(dibromopropyl ether)	21850-44-2	No intentional use	250 mg/kg	yes
3b. –Phosphorus Flame retardants				
Tris (2-Chloroethyl) Phosphate (TCEP)	115-96-8	No intentional use	250 mg/kg	yes
Tris(1,3-dichloro-2-propyl) phosphate (TDCPP)	13674-87-8	No intentional use	250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Tris(1-aziridinyl)phosphine oxide (TEPA)	545-55-1	No intentional use	250 mg/kg	yes
Tris(1-chloro-2-propyl) phosphate (TCPP)	13674-84-5	No intentional use	250 mg/kg	yes
Trixylyl phosphate (TXP)	25155-23-1	No intentional use	Sum: 250 mg/kg	yes
Trimethyl phosphate	512-56-1	No intentional use	Sum: 250 mg/kg	yes
Tri-o-cresyl phosphate (TOCP)	78-30-8	No intentional use	Sum: 250 mg/kg	yes
3c. Other Flame retardants				
Diboron trioxide	1303-86-2	No intentional use	250 mg/kg	yes
Boric acid	10043-35-3, 11113-50-1	No intentional use	250 mg/kg	yes
Disodium Tetraborate, anhydrous	1303-96-4, 1330-43-4, 12179-04-3, 215-540-4 (EINECS No., not CAS No.)	No intentional use	250 mg/kg	yes
Tetraboron disodium heptaoxide, hydrate	12267-73-1	No intentional use	250 mg/kg	yes
Disodium octaborate	12008-41-2	No intentional use	250 mg/kg	yes
Zinc borate salts	1332-07-6	No intentional use	250 mg/kg	yes
4a. Azo dyes				
4-Aminobiphenyl	92-67-1	No intentional use	150 mg/kg	yes
Benzidine	92-87-5	No intentional use	150 mg/kg	yes
4-Chloro-o-toluidine	95-69-2	No intentional use	150 mg/kg	yes
2-Naphtylamine	91-59-8	No intentional use	150 mg/kg	yes
o-Aminoazotoluene	97-56-3	No intentional use	150 mg/kg	yes
5-Nitro-o-toluidine	99-55-8	No intentional use	150 mg/kg	yes
4-Chloroaniline	106-47-8	No intentional use	150 mg/kg	yes
2,4-Diaminoanisole	615-05-4	No intentional use	150 mg/kg	yes
4,4'-Diaminodiphenylmethane	101-77-9	No intentional use	150 mg/kg	yes
3,3'-Dichlorobenzidine	91-94-1	No intentional use	150 mg/kg	yes
3,3'-Dimethoxybenzidine	119-90-4	No intentional use	150 mg/kg	yes
3,3'-Dimethylbenzidine	119-93-7	No intentional use	150 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
3,3'-Dimethyl-4,4'-diaminodiphenylmethane	838-88-0	No intentional use	150 mg/kg	yes
p-Cresidine	120-71-8	No intentional use	150 mg/kg	yes
4,4'-Methylene-bis-(2-chloroaniline)	101-14-4	No intentional use	150 mg/kg	yes
4,4'-Oxydianiline	101-80-4	No intentional use	150 mg/kg	yes
4,4'-Thiodianiline	139-65-1	No intentional use	150 mg/kg	yes
o-Toluidine	95-53-4	No intentional use	150 mg/kg	yes
2,4-Toluenediamine	95-80-7	No intentional use	150 mg/kg	yes
2,4,5-Trimethylaniline	137-17-7	No intentional use	150 mg/kg	yes
o-Anisidine	90-04-0	No intentional use	150 mg/kg	yes
Aminoazobenzene	60-09-3	No intentional use	150 mg/kg	yes
2,4-Xylidine	95-68-1	No intentional use	150 mg/kg	yes
2,6-Xylidine	87-62-7	No intentional use	150 mg/kg	yes
Aniline	62-53-3	No intentional use	Indigo 2000 mg/kg Other dyes 500 mg/kg Not Applicable for polymer	yes
4-chloro-o-toluidinium chloride	3165-93-3	No intentional use	150 mg/kg	yes
2-Naphthylammoniumacetate	553-00-4	No intentional use	150 mg/kg	yes
4-methoxy-m-phenylene diammonium sulphate; 2,4-diaminoanisoole sulphate	39156-41-7	No intentional use	150 mg/kg	yes
2,4,5-trimethylaniline hydrochloride	21436-97-5	No intentional use	150 mg/kg	yes
4d. Disperse & Carcinogenic Dyes				
Acid Red 26	3761-53-3	No intentional use	Textile&leather: 250 mg/kg	yes
Acid Red 114	6459-94-5	No intentional use	1000 mg/kg*	
Acid Violet 49	1694-09-3	No intentional use	Textile&Leather: 250 mg/kg	yes
Basic Blue 26	2580-56-5	No intentional use	Textile: 250 mg/kg	yes
Basic Green 4 (malachite green chloride)	569-64-2	No intentional use	Textile: 250 mg/kg	yes
Basic Green 4 (malachite green oxalate)	2437-29-8	No intentional use	Textile: 250 mg/kg	yes
Basic Green 4 (malachite green)	10309-95-2	No intentional use	Textile: 250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Basic Green 4 leuco base (Leucomalachite green, N,N,N',N'-tetramethyl-4,4'-benzylidenedianiline)	129-73-7	No intentional use	Textile: 250 mg/kg	yes
Basic Red 9	569-61-9	No intentional use	Textile: 250 mg/kg	yes
Basic Violet 3	548-62-9	No intentional use	Textile: 250 mg/kg	yes
Basic Violet 14	632-99-5	No intentional use	Textile: 250 mg/kg	yes
Direct Black 38	1937-37-7	No intentional use	Textile&leather: 250 mg/kg	yes
Direct Blue 6	2602-46-2	No intentional use	Textile&leather: 250 mg/kg	yes
Direct Blue 15	2429-74-5	No intentional use	1000 mg/kg*	
Direct Brown 95	16071-86-6	No intentional use	1000 mg/kg*	
Direct Red 28	573-58-0	No intentional use	Textile&leather: 250 mg/kg	yes
Disperse Blue 1	2475-45-8	No intentional use	Textile: 250 mg/kg	yes
Disperse Blue 3	2475-46-9	No intentional use	Textile: 250 mg/kg	yes
Disperse Blue 7	3179-90-6	No intentional use	Textile: 250 mg/kg	yes
Disperse Blue 26	3860-63-7	No intentional use	Textile: 250 mg/kg	yes
Disperse Blue 35	12222-75-2, 56524-77-7, 56524-76-6	No intentional use	Textile: 250 mg/kg	yes
Disperse Blue 102	12222-97-8	No intentional use	Textile: 250 mg/kg	yes
Disperse Blue 106	12223-01-7	No intentional use	Textile: 250 mg/kg	yes
Disperse Blue 124	61951-51-7	No intentional use	Textile: 250 mg/kg	yes
Disperse Brown 1	23355-64-8	No intentional use	Textile: 250 mg/kg	yes
Disperse Orange 1	2581-69-3	No intentional use	Textile: 250 mg/kg	yes
Disperse Orange 3	730-40-5	No intentional use	Textile: 250 mg/kg	yes
Disperse Orange 11	82-28-0	No intentional use	Textile: 250 mg/kg	yes
Disperse Orange 37/59/76	13301-61-6, 12223-33-5, 51811-42-8	No intentional use	Textile: 250 mg/kg	yes
Disperse Orange 149	85136-74-9	No intentional use	1000 mg/kg*	
Disperse Red 1	2872-52-8	No intentional use	Textile: 250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024 Requirements		ZDHC MRSL v3.1
		in Manufacturing	in Chemical formulations	
Disperse Red 11	2872-48-2	No intentional use	Textile: 250 mg/kg	yes
Disperse Red 17	3179-89-3	No intentional use	Textile: 250 mg/kg	yes
Disperse Red 151	61968-47-6	No intentional use	1000 mg/kg*	
Disperse Yellow 1	119-15-3	No intentional use	Textile: 250 mg/kg	yes
Disperse Yellow 3	2832-40-8	No intentional use	Textile: 250 mg/kg	yes
Disperse Yellow 9	6373-73-5	No intentional use	Textile: 250 mg/kg	yes
Disperse Yellow 23	6250-23-3	No intentional use	1000 mg/kg*	
Disperse Yellow 39	12236-29-2	No intentional use	Textile: 250 mg/kg	yes
Disperse Yellow 49	54824-37-2	No intentional use	Textile: 250 mg/kg	yes
Disperse Yellow 56	54077-16-6	No intentional use	1000 mg/kg*	
Pigment Red 104 (Lead chromate molybdate sulphate red)	12656-85-8	No intentional use	1000 mg/kg*	
Pigment Yellow 34 (Lead sulfochromate yellow)	1344-37-2	No intentional use	1000 mg/kg*	
5. Organotin Compounds				
Dibutyltin, DBT	H based: 1002-53-5, Cl based: 683-18-1	No intentional use	20 mg/kg 100 mg/kg for PU based thickeners	yes
Dimethyltin, DMT	Cl based: 753-73-1	No intentional use	5 mg/kg	yes
Diocetyl tin, DOT	H based: 94410-05-6, Cl based: 3542-36-7	No intentional use	5 mg/kg	yes
Diphenyltin, DPHT	H based: 1011-95-6, 6381-06-2 Cl based: 1135-99-5	No intentional use	5 mg/kg	yes
Dipropyltin, DPT	Various	No intentional use	5 mg/kg	yes
Monobutyltin, MBT	H based: 78763-54-9, Cl based: 1118-46-3	No intentional use	5 mg/kg	yes
Monomethyltin, MMT	Various, including 993-16-8	No intentional use	5 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Monooctyltin, MOT	H based: 15231-57-9, Cl based: 3091-25-6	No intentional use	5 mg/kg	yes
Monophenyltin, MPhT	Cl based: 1124-19-2	No intentional use	5 mg/kg	yes
Tetrabutyltin, TeBT	1461-25-2	No intentional use	1 mg/kg	yes
Tetraethyltin, TeET	597-64-8	No intentional use	1 mg/kg	yes
Tetraoctyltin, TeOT	Various	No intentional use	1 mg/kg	yes
Tributyltin, TBT	H based 36643-28-4, Cl complex: 56573-85-4, Cl based: 1461-22-9	No intentional use	5 mg/kg	yes
Tricyclohexyltin, TCyHT	H based: 6056-50-4 Cl based: 3091-32-5	No intentional use	1 mg/kg	yes
Trimethyltin, TMT	Cl based: 1066-45-1	No intentional use	5 mg/kg	yes
Trioctyltin, TOT	-	No intentional use	5 mg/kg	yes
Triphenyltin, TPhT	H based: 892-20-6, Cl based: 639-58-7 ion: 668-34-8	No intentional use	5 mg/kg	yes
Tripropyltin, TPT	H based: 761-44-4 Cl based: 2279-76-7	No intentional use	1 mg/kg	yes
6a. PFCs				
Perfluorooctanoic acid (PFOA) and its salts	335-67-1	No intentional use	PFOA = 0.025 mg/kg PFOA-related substances = 1 mg/kg	yes
PFOA-related substances	various	No intentional use	1 mg/kg	yes
2-Perfluorooctylethanol (8:2 FTOH)	678-39-7	No intentional use	1 mg/kg	yes
1H,1H,2H,2H-Perfluorodecyl acrylate (8:2 FTA)	27905-45-9	No intentional use	1000 mg/kg*	—
Perfluorooctane sulfonate (PFOS)	1763-23-1	No intentional use	2 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Perfluorooctane sulfonamide (PFOSA)	754-91-6	No intentional use	1000 mg/kg*	—
Perfluorooctane sulfonfluoride (PFOSF)	307-35-7	No intentional use	1000 mg/kg*	—
N-Methylperfluoro-1-octanesulfonamide (N-Me-FOSA)	31506-32-8	No intentional use	1000 mg/kg*	—
N-Ethylperfluoro-1-octanesulfonamide (N-Et-FOSA)	4151-50-2	No intentional use	1000 mg/kg*	—
2-(N-Methylperfluoro-1-octanesulfonamido)-ethanol (N-Me-FOSE)	24448-09-7	No intentional use	1000 mg/kg*	—
2-(N-Ethylperfluoro-1-octanesulfonamido)-ethanol (N-Et-FOSE)	1691-99-2	No intentional use	1000 mg/kg*	—
Perfluorononanoic acid (PFNA)	375-95-1	No intentional use	1000 mg/kg*	—
Perfluorododecanoic acid (PFDA)	335-76-2	No intentional use	1 mg/kg	yes
Henicosafuoroundecanoic acid (PFUdA / PFUnA)	2058-94-8	No intentional use	1000 mg/kg*	—
Tricosafuorododecanoic acid PFDoDA	307-55-1	No intentional use	1000 mg/kg*	—
Pentacosafuorotridecanoic acid (PFTTrDA)	72629-94-8	No intentional use	1000 mg/kg*	—
Heptacosafuorotetradecanoic acid (PFTeDA)	376-06-7	No intentional use	1000 mg/kg*	—
Perfluor+B268:K290+B277:D290o-3,7-dimethyloctanoic Acid (PF-3,7-DMOA)	172155-07-6	No intentional use	1000 mg/kg*	—
Perfluorodecane sulfonic acid (PFDS)	335-77-3	No intentional use	1 mg/kg	yes
1H,1H,2H,2H-Perfluorododecylacrylate (10:2 FTA)	17741-60-5	No intentional use	1000 mg/kg*	—
1H,1H,2H,2H-Perfluoro -1-dodecanol (10:2 FTOH)	865-86-1	No intentional use	1 mg/kg	yes
2H,2H,3H,3H-Perfluoroundecanoic Acid (H4PFUnA)	34598-33-9	No intentional use	1000 mg/kg*	—
Perfluorohexane sulfonate (PFHxS)	355-46-4	No intentional use	1 mg/kg	yes
Perfluorobutanoic acid (PFBA)	375-22-4+C384	No intentional use	1 mg/kg	yes
Perfluorobutane sulfonate (PFBS)	375-73-5	No intentional use	1 mg/kg	yes
Perfluoropentane Acid (PFPeA)	2706-90-3	No intentional use	1000 mg/kg*	yes

Parameter	CAS Number	FR MRSL v2024 Requirements		ZDHC MRSL v3.1
		in Manufacturing	in Chemical formulations	
Perfluorohexanoic acid (PFHxA)	307-24-4	No intentional use	PFHxA = 0.025 mg/kg PFHxA-related substances = 1 mg/kg	yes
Perfluoroheptanoic acid (PFHpA)	375-85-9	No intentional use	1000 mg/kg*	—
Perfluoroheptanoic acid, sodium salt (PFHpA-Na)	20109-59-5	No intentional use	1 mg/kg	
Perfluoroheptane Sulfonate (PFHpS)	375-92-8	No intentional use	1000 mg/kg*	—
7H-Dodecanefluoroheptane Acid (7HPFHpA)	1546-95-8	No intentional use	1000 mg/kg*	—
Perfluorooctanesulphonic acid 1H,1H,2H,2H (H4PFOS; 6:2)	27619-97-2	No intentional use	1000 mg/kg*	—
1H,1H,2H,2H-Perfluorooctylacrylate (6:2 FTA)	17527-29-6	No intentional use	1000 mg/kg*	—
1H,1H,2H,2H-Perfluoro-1-hexanol (4:2 FTOH)	2043-47-2	No intentional use	1 mg/kg	yes
1H,1H,2H,2H-Perfluoro-1-octanol (6:2 FTOH)	647-42-7	No intentional use	1 mg/kg	yes
6b. PFAS				
Total Organic Fluorine - As PFAS indicator	7782-41-4	No intentional use	Quantification limit: 50 mg/kg	yes
7. COC (Chlorobenzenes/Chlorotoluenes)				
Chlorobenzene	108-90-7	No intentional use	Sum: 200 mg/kg	yes
Dichlorobenzenes	Various include 25321-22-6	No intentional use	Sum: 200 mg/kg	yes
1,2-Dichlorobenzene	95-50-1	No intentional use	500mg/kg	yes
1,3-Dichlorobenzene	541-73-1	No intentional use	Sum: 200 mg/kg	yes
1,4-Dichlorobenzene	106-46-7	No intentional use	Sum: 200 mg/kg	yes
Trichlorobenzenes	Various include 12002-48-1	No intentional use	Sum of substances2 : 200 mg/kg	yes
1,2,3-Trichlorobenzene,	87-61-6	No intentional use	Sum of substances2 : 200 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
1,2,4-Trichlorobenzene	120-82-1	No intentional use	Sum of substances2 : 200 mg/kg	yes
1,3,5-Trichlorobenzene,	108-70-3	No intentional use	Sum of substances2 : 200 mg/kg	yes
Tetrachlorobenzenes	Various include 12408-10-5	No intentional use	Sum of substances2 : 200 mg/kg	yes
1,2,3,4-Tetrachlorobenzene	634-66-2	No intentional use	Sum of substances2 : 200 mg/kg	yes
1,2,3,5-Tetrachlorobenzene	634-90-2	No intentional use	Sum of substances2 : 200 mg/kg	yes
1,2,4,5-Tetrachlorobenzene	95-94-3	No intentional use	Sum of substances2 : 200 mg/kg	yes
Pentachlorobenzene	608-93-5	No intentional use	Sum: 200 mg/kg	yes
Hexachlorobenzene	118-74-1	No intentional use	Sum: 200 mg/kg	yes
Chlorotoluene	Various include 25168-05-2	No intentional use	Sum: 200 mg/kg	yes
2-Chlorotoluene	95-49-8	No intentional use	Sum: 200 mg/kg	yes
3-Chlorotoluene	108-41-8	No intentional use	Sum: 200 mg/kg	yes
4-Chlorotoluene	106-43-4	No intentional use	Sum: 200 mg/kg	yes
Dichlorotoluene	Various include "29797-40-8	No intentional use	Sum: 200 mg/kg	yes
2,3-Dichlorotoluene	32768-54-0	No intentional use	Sum: 200 mg/kg	yes
2,4-Dichlorotoluene	95-73-8	No intentional use	Sum: 200 mg/kg	yes
2,5-Dichlorotoluene	19398-61-9	No intentional use	Sum: 200 mg/kg	yes
2,6-Dichlorotoluene	118-69-4	No intentional use	Sum: 200 mg/kg	yes
3,4-Dichlorotoluene	95-75-0	No intentional use	Sum: 200 mg/kg	yes
3,5-dichlorotoluene	25186-47-4	No intentional use	Sum of substances2 : 200 mg/kg Each: 10 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Trichlorotoluene	various	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
2,3,6-Trichlorotoluene	2077-46-5	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
2,4,5-Trichlorotoluene	6639-30-1	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
2,3,4-trichlorotoluene	7359-72-0	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
2,4,6-trichlorotoluene	23749-65-7	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
3,4,5-trichlorotoluene	21472-86-6	No intentional use	Sum of substances2 : 200 mg/kg Each: 10 mg/kg	yes
Tetrachlorotoluene	various	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
2,3,4,5-tetrachlorotoluene	76057-12-0	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
2,3,5,6-tetrachlorotoluene	1006-31-1	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
2,3,4,6-tetrachlorotoluene	875-40-1	No intentional use	Sum: 200 mg/kg Each: 10 mg/kg	yes
Pentachlorotoluene	877-11-2	No intentional use	Sum: 200 mg/kg	yes
8a. Halogenated solvents / VOCs				
1,2-Dichloroethane	107-06-2	No intentional use	5 mg/kg	yes
1,1-Dichloroethene	75-35-4	No intentional use	1000 mg/kg*	
Methylene chloride	75-09-2	No intentional use	5 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Trichloromethane (Chloroform)	67-66-3	No intentional use	1000 mg/kg*	
1,1,1-Trichloroethane	71-55-6	No intentional use	1000 mg/kg*	
Carbon tetrachloride	56-23-5	No intentional use	1000 mg/kg*	
Trichloroethene (Trichloroethylene)	79-01-6	No intentional use	40 mg/kg	yes
1,1,2-Trichloroethane	79-00-5	No intentional use	1000 mg/kg*	
1,1,1,2-Tetrachloroethane	630-20-6	No intentional use	1000 mg/kg*	
Tetrachloroethene (PERC)	127-18-4	No intentional use	5 mg/kg	yes
1,1,2,2-Tetrachloroethane	79-34-5	No intentional use	1000 mg/kg*	
Pentachloroethane	76-01-7	No intentional use	1000 mg/kg*	
1,2,3-trichloropropane	96-18-4	No intentional use	1000 mg/kg*	
Benzylchloride	100-44-7	No intentional use	50 mg/kg and 100 mg/kg for dyes	yes
2-(2-methoxyethoxy)-ethanol	111-77-3	No intentional use	1000 mg/kg*	yes (Candidate)
8b. Other Solvents				
Benzene	71-43-2	No intentional use	50 mg/kg	yes
N,N-dimethylformamide (N,N-DMF) / DMFa	68-12-2	No intentional use	1000 mg/kg	yes
N,N-dimethylacetamide (N,N-DMAC)	127-19-5	No intentional use	1000 mg/kg	yes
1-methyl-2-pyrrolidone (NMP)	872-50-4	No intentional use	1000 mg/kg	yes
Toluene	108-88-3	No intentional use	500 mg/kg	yes
Ethylbenzene	100-41-4	No intentional use	1000 mg/kg*	—
Xylene	1330-20-7 (all isomers) 95-47-6, 106-42-3, 108-38-3	No intentional use	500 mg/kg	yes
Styrene	100-42-5	No intentional use	1000 mg/kg*	
Cresol (all isomers)	1319-77-3	No intentional use	500 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
o-cresol	95-48-7	No intentional use	500 mg/kg	yes
m-cresol	108-39-4	No intentional use	500 mg/kg	yes
p-cresol	106-44-5	No intentional use	500 mg/kg	yes
Formamide	75-12-7	No intentional use	1000 mg/kg*	
Carbon disulphide	75-15-0	No intentional use	1000 mg/kg*	
Acetophenone	98-86-2	No intentional use	1000 mg/kg*	
2-Phenyl-2-Propanol	617-94-7	No intentional use	1000 mg/kg*	
N-Ethyl-2-pyrrolidone; 1-Ethyl-2-pyrrolidinone (NEP)	2687-91-4	No intentional use	1000 mg/kg	yes
9. Chlorinated Phenols				
Pentachlorophenol (PCP), its salts and compounds	87-86-5	No intentional use	5 mg/kg	yes
Tetrachlorophenol (TeCP)	25167-83-3	No intentional use	Sum of TeCP: 15 mg/kg	yes
2,3,4,5-Tetrachlorophenol	4901-51-3	No intentional use	Sum of TeCP: 15 mg/kg	yes
2,3,4,6-Tetrachlorophenol	58-90-2	No intentional use	Sum of TeCP: 15 mg/kg	yes
2,3,5,6-Tetrachlorophenol	935-95-5	No intentional use	Sum of TeCP: 15 mg/kg	yes
Trichlorophenol (TriCP)	various	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,4-Trichlorophenol	15950-66-0	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,5-Trichlorophenol	933-78-8	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,6-Trichlorophenol	933-75-5	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,4,5-Trichlorophenol	95-95-4	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,4,6-Trichlorophenol	88-06-2	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
3,4,5-Trichlorophenol	609-19-8	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
DiChlorophenol (DiCP)	various	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3-Dichlorophenol	576-24-9	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,4-Dichlorophenol	120-83-2	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,5-Dichlorophenol	583-78-8	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2,6-Dichlorophenol	87-65-0	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
3,4-Dichlorophenol	95-77-2	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
3,5-Dichlorophenol	591-35-5	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
Mono Chlorophenol	various	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
2-Chlorophenol	95-57-8	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
3-Chlorophenol	108-43-0	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
4-Chlorophenol	106-48-9	No intentional use	Sum of TriCP, DCP, MonoCP: 50 mg/kg	yes
10. Chlorinated Paraffins (SCCP / MCCP)				
Short Chain Chlorinated Paraffins (SCCP) with C10 –C13	85535-84-8	No intentional use	250 mg/kg	yes
Medium Chain Chlorinated Paraffins (MCCP) with C14 –C17	85535-85-9	No intentional use	250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024 Requirements		ZDHC MRSL v3.1
		in Manufacturing	in Chemical formulations	
11a. Heavy Metals				
Total Heavy metal - (Non-Jewelry)				
Total Cadmium, Cd	7440-43-9	No intentional use	Others: 20 mg/kg Pigment: 50 mg/kg	yes
Total Lead, Pb	7439-92-1	No intentional use	100 mg/kg	yes
Total Mercury, Hg	7439-97-6	No intentional use	Others: 4 mg/kg Pigment: 25 mg/kg	yes
Total Cobalt, Co	7440-48-4	No intentional use	500 mg/kg	yes
Total Nickel, Ni	7440-02-0	No intentional use	250 mg/kg	yes
Total Antimony, Sb	7440-36-0	No intentional use	Dye: 50 mg/kg Pigment: 250 mg/kg	yes
Total Arsenic, As	7440-38-2	No intentional use	50 mg/kg	yes
Total Copper, Cu	7440-50-8	No intentional use	250 mg/kg	yes
Total Chromium, Cr	7440-47-3	No intentional use	100 mg/kg	yes
Total Silver (Ag)	7440-22-4	No intentional use	100 mg/kg	yes
Total Barium	7440-39-3	No intentional use	100 mg/kg	yes
Total Selenium	7782-49-2	No intentional use	Dye: 20 mg/kg Pigment: 100 mg/kg	yes
Total Tin	7440-31-5	No intentional use	250 mg/kg	yes
Extractable HM (Non-Jewelry)				
Extractable Chromium (VI), CrVI	18540-29-9	No intentional use	10 mg/kg	yes
12. Glycols				
Bis(2-methoxyethyl)-ether;	111-96-6	No intentional use	50 mg/kg	yes
2-methoxyethanol;	109-86-4	No intentional use	50 mg/kg	yes
2-methoxyethylacetate;	110-49-6	No intentional use	50 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Ethylene glycol dimethyl ether / 1,2-dimethoxyethane	110-71-4	No intentional use	50 mg/kg	yes
2-ethoxyethanol;	110-80-5	No intentional use	50 mg/kg	yes
2-ethoxyethyl acetate;	111-15-9	No intentional use	50 mg/kg	yes
2-methoxypropylacetate;	70657-70-4	No intentional use	Textile: 50 mg/kg Leather: 50 mg/kg, 1000 mg/kg (finishing formulations) Not Applicable for polymer	yes
2-methoxypropanol	1589-47-5	Textile&polymers: No intentional use Leather: candidate	Textile & polymers: ~50 mg/kg Leather: candidate	yes
1,2-bis(2-methoxyethoxy)ethane Triethylene glycol dimethyl ether (TEGDME)	112-49-2	No intentional use	50 mg/kg	yes
13. PAHs				
Naphthalene	91-20-3	No intentional use	leather: 200 mg/kg Textile & Plastics: Sum except BaP: 200 mg/kg	yes
Acenaphthylene	208-96-8	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Acenaphthene	83-32-9	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Fluorene	86-73-7	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Phenanthrene	1985/1/8	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Anthracene	120-12-7	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Fluoranthene	206-44-0	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Pyrene	129-00-0	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Indeno[1,2,3-cd]pyrene	193-39-5	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Benzo[ghi]perylene	191-24-2	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Benzo-[a]-anthracene(BaA)	56-55-3	No intentional use	20 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Chrysene(CHR)	218-01-9	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
Benzo-[a]-pyrene (BaP)	50-32-8	No intentional use	Sum: 200 mg/kg 20 mg/kg	yes
Dibenzo-[a,h]-anthracene (DBAhA)	53-70-3	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Benzo-[b]-fluoranthene(BbFA)	205-99-2	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Benzo-[k]-fluoranthene(BkFA)	207-08-9	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Benzo-[e]-pyrene(BeP)	192-97-2	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Benzo-[j]-fluoranthene(BjFA)	205-82-3	No intentional use	Sum: 200 mg/kg Leather: Sum except BaP&Naphthalene: 200 mg/kg Textile & Polymers: Sum except BaP: 200 mg/kg	yes
Cyclopenta[c,d]pyrene	27208-37-3	No intentional use	1000 mg/kg*	
Dibenzo-[a,e]pyrene	192-65-4	No intentional use	1000 mg/kg*	
Dibenzo-[a,h]pyrene	189-64-0	No intentional use	1000 mg/kg*	
Dibenzo-[a,i]pyrene	189-55-9	No intentional use	1000 mg/kg*	
Dibenzo-[a,l]pyrene	191-30-0	No intentional use	1000 mg/kg*	
1-Methylpyrene	2381-21-7	No intentional use	1000 mg/kg*	
14. Pesticides				

Parameter	CAS Number	FR MRSL v2024 Requirements		ZDHC MRSL v3.1
		in Manufacturing	in Chemical formulations	
AEEA [2-(2-aminoethylamino)ethanol]	111-41-1	No intentional use	100 mg/kg	yes
Borate, zinc salt	12767-90-7	No intentional use	250 mg/kg 1000 mg/kg	yes for CAS No.: 1332-07-6
Permethrin	52645-53-1	No intentional use	250 mg/kg (Exemption for mentioned processes)	yes
Silica (particles of respirable size)	14464-46-1	No intentional use	No use of Sand Blasting	yes
Thiourea	62-56-6	No intentional use	1000 mg/kg	yes
Triclosan	3380-34-5	No intentional use	250 mg/kg	yes
17. Others				
Diazene-1,2-dicarboxamide [C,C'-azodi(formamide), ADCA]	123-77-3	No intentional use	1000 mg/kg	yes
Dimethyl Fumarate (DMFU)	624-49-7	No intentional use	10 mg/kg	yes
o-Phenylphenol (OPP)	90-43-7	Textile: No intentional use Leather: Use is permitted for chemical preservation for transportation and storage of raw hides as well as tanned semi-finished products (wet-white, wet- blue). Chemical preservation of coated or uncoated finished leather shall not be permitted.	Textile: 5000 mg/kg	yes
Bisphenol-A	80-05-7	No intentional use	100 mg/kg No restriction on polymer	yes
Quinoline	91-22-5	No intentional use	1000 mg/kg	yes
Perboric acid, sodium salt	Multiple, including 11138-47-9,	No intentional use	1000 mg/kg	yes

Parameter	CAS Number	FR MRSL v2024		ZDHC MRSL v3.1
		Requirements		
		in Manufacturing	in Chemical formulations	
	15120-21-5, 7632-04-04, 16940-66-2, 13517-20-9, 125022-34-6, 90568-23-3			
Titanium dioxide particles have aerodynamic diameter $\leq 10 \mu\text{m}$.	13463-67-7	No intentional use	1% (w/w) of TiO ₂ particles have aerodynamic diameter $\leq 10 \mu\text{m}$. (Liquid mixtures or emulsions or pastes containing TiO ₂ , having proper GHS/CLP classification, are allowed for use.)	yes
20. UV stabilizers				
2-(2-hydroxy-3,5-di-tert-butylphenyl)-benzotriazole (UV 320)	3846-71-7	No intentional use	1000 mg/kg	yes
2-(2-hydroxy-3,5-di-t-butylphenyl)-5-chlorobenzotriazol (UV 327)	3864-99-1	No intentional use	1000 mg/kg	yes
2-(2-hydroxy-3-sec-butyl-5-tert-butylphenyl)benzotriazole (UV 350)	36437-37-3	No intentional use	1000 mg/kg	yes
2-(2-hydroxy-3,5-di-tert-pentylphenyl)benzotriazole (UV 328)	25973-55-1	No intentional use	1000 mg/kg	yes
23. Siloxanes				
Octamethylcyclotetrasiloxane (D4)	556-67-2	No intentional use	1000 mg/kg	yes
Decamethylcyclopentasiloxane (D5)	541-02-6	No intentional use	1000 mg/kg	yes
Dodecamethylcyclohexasiloxane (D6)	540-97-6	No intentional use	1000 mg/kg	yes

* This is a provisional value for chemicals which meet the criteria to be listed, but still need further information to set the fixed value.

Chapter 2: MRSL Candidate List

Parameter	CAS Number	FR MRSL v2023	ZDHC MRSL v3.1
		Intent	
8a. Halogenated solvents / VOCs			
2-(2-methoxyethoxy)-ethanol	111-77-3	In Version 3 of the ZDHC MRSL, it is intended to place restrictions on certain solvents with certain specific hazardous properties (e.g. CMRs). The restrictions are likely to apply to the inclusion of such solvents in formulations for use by wet processors and product assembly factories - and deliberate use of neat solvents in those facilities. Studies on usage patterns, exposure controls, safer alternatives and the potential effects of restrictions are necessary before restrictions can be proposed. Any potential ZDHC MRSL limits will need to be established collaboratively with groups who are working in parallel to study solvents in relation to workplace safety, air emissions, RSL compliance and downstream concerns.	Yes (Candidate)
Methanol	67-56-1		Yes (Candidate)
15. Formaldehyde			
Formaldehyde	50-00-0	The deliberate use of formaldehyde or inclusion of formaldehyde in formulations is not permitted. In Version 3 of the ZDHC MRSL, it is intended to place restrictions on the maximum permitted levels of formaldehyde in formulations. The use, presence, and generation of formaldehyde is a complex subject and studies are required to determine appropriate levels.	Yes (Candidate)
17. Others			
Phenol	108-95-2	ZDHC is looking for safe limits for phenol as a contaminant in textile chemical formulations.	Yes (Candidate)

Chapter 3: Archived Substances

Parameter	CAS Number	ZDHC MRSL v3.1
4c. Navy Blue		
Navy Blue	1. CAS # 118685-33-9; 2. Not Allocated	Yes (Archived)
4d. Disperse & Carcinogenic Dyes		
Basic Yellow 2/ Solvent yellow 34 (hydrochloride and free base)	60-11-7	Yes (Archived)
Basic Yellow 2	2465-27-2 492-80-8	Yes (Archived)
D&C Red No. 19	81-88-9	Yes (Archived)
8a. Halogenated solvents / VOCs		
Bis(chloromethyl)ether	542-88-1	Yes (Archived)

Additional Requirements

Besides specific hazardous substances required in above table, there are some additional parameters that FR requires during the production. These include restrictions and requirements on Asbestos and PVC materials, which are explained in more details in the following sections.

1. Asbestos materials

The use of Asbestos materials is prohibited by domestic legislation in many countries or regions as carcinogens. Asbestos materials are used for slates, insulation and heat-retention materials, and it has been found that Asbestos materials might be the root cause of lung fibrosis, malignant mesothelioma and lung cancer when the asbestos particles have been inhaled by human body.

If Asbestos materials are used in the facility, there is the possibility of causing serious health effects to employees and the surrounding environment. As Asbestos materials are highly dangerous, they must be investigated and treated by qualified experts. When it is confirmed that materials containing asbestos are found, the following countermeasures must be taken:

- The location of the asbestos used must be recorded and marked appropriately and visibly, and countermeasures must be taken to prevent any subsequent damage;
- Visual inspection must be conducted regularly to check any potential damage until disposal is completed;
- Employees must be trained to increase awareness of asbestos and to learn the countermeasures in case asbestos damage is found;
- Disposal must be conducted in accordance with the relevant laws; and
- The asbestos materials damaged must be repaired by a qualified contractor.

2. PVC materials

FR has banned the use of PVC materials in any FR products (including components). PVC is a widely used thermoplastic polymer, and it can be softer and more flexible by the addition of plasticizers and the most widely-used plasticizers are phthalates. In Apparel Industry, PVC material is commonly used in coats, jackets, aprons and bags. FR decides to ban PVC materials due to the following reasons:

- Many phthalates are known to be reprotoxic and might cause birth defects or changes in hormone level. Phthalates are also one chemical group of 11 priority hazardous chemical to eliminate according to FR's commitment from 2013; and
- It is claimed that dioxin is produced as a byproduct of vinyl chloride manufacture and from incineration of waste PVC in domestic garbage.

Appendix 1. Potential Uses

Chemical Group	Potential Uses in Apparel and Footwear Textile Processing
1. APs / APEOs	<p>APEOs can be found in: Detergents, scouring agents, spinning oils, wetting agents, softeners, emulsifier/dispersing agents for dyes and prints, impregnating agents, degumming for silk production, dyes and pigment preparations, polyester padding and down/feather fillings.</p>
2. Phthalates (ortho-Phthalates)	<p>Esters of ortho-phthalic acid (phthalates) are a class of organic compounds commonly added to plastics to increase flexibility. They sometimes are used to facilitate moulding of plastic by decreasing its melting temperature. Phthalates can be found in:</p> <ul style="list-style-type: none"> • Flexible plastic components (e.g., PVC) • Print pastes • Adhesives • Plastic buttons • Plastic sleeveings • Polymeric coatings
3a. Brominated Flame Retardants 3b. Chlorinated Flame Retardants	<p>Flame retardant chemicals are rarely used to meet flammability requirements in children's clothing and adult products. They should no longer be used in apparel and footwear.</p>
4a. Azo Dyes	<p>Azo dyes and pigments are colourants that incorporate one or several azo groups (-N=N-) bound with aromatic compounds. Thousands of azo dyes exist, but only those that degrade to form the listed cleavable amines are restricted. Azo dyes that release these amines are regulated and should no longer be used for dyeing of textiles.</p>
4b. Navy Blue	<p>Navy Blue colourants are regulated and should no longer be used for dyeing of textiles.</p>
4c. Disperse & Carcinogenic Dyes	<p>Most of Carcinogenic dyes are regulated and should no longer be used for dyeing of textiles.</p> <p>Disperse dyes are a class of water-insoluble dyes that penetrate the fibre system of synthetic or manufactured fibres and are held in place by physical forces without forming chemical bonds. Disperse dyes are used in synthetic fibre (e.g., polyester, acetate, polyamide). Restricted disperse dyes are suspected of causing allergic reactions and should no longer be used for dyeing of textiles.</p>

Chemical Group	Potential Uses in Apparel and Footwear Textile Processing
5. Organotin Compounds	Organotins are a class of chemicals combining tin and organics such as butyl and phenyl groups. Organotins are predominantly found in the environment as antifoulants in marine paints, but they can also be used as biocides (e.g., antibacterials), catalysts in plastic and glue production and heat stabilisers in plastics/rubber. In textiles and apparel, organotins are associated with plastics/rubber, inks, paints, metallic glitter, polyurethane products and heat transfer material.
6. PFCs	Durable water, oil and stain repellent finishes and soil release finishes (fluorinated polymers) based on long-chain technology are banned from intentional use. Long-chain compounds according to the Organisation for Economic Co-operation and Development (OECD) definition (https://www.oecd.org/ehs/pfc/) are based on long-chain perfluorocarboxylic acids (C8 and higher) and on long-chain perfluoroalkyl sulfonates (C6 and higher). The main contaminants of this technology include: Perfluoroalkyl sulfonates (PFSAs) with carbon chain lengths C6 and higher (e.g., PFOS, perfluorooctane sulfonate) and Perfluorocarboxylic acids with carbon chain lengths C8 and higher (e.g., PFOA, perfluorooctanoic acid). PFOA and PFOS may be present as unintended by-products in long-chain commercial water, oil and stain repellent agents. PFOA also may be in use for polymers like polytetrafluoroethylene (PTFE).
7. COC (Chlorobenzenes/Chlorotoluenes)	Chlorobenzenes and chlorotoluenes (chlorinated aromatic hydrocarbons) can be found as carriers in the dyeing process of polyester or wool/polyester fibres. They can also be used as solvents.
8a. Halogenated Solvents / VOCs	In apparel and footwear, solvents are used as finishing/cleaning and printing agents, for dissolving and diluting fats, oils and adhesives (e.g., in degreasing or cleaning operations).
8b. Other Solvents	These volatile organic compounds should not be used in textile auxiliary chemical preparations. They are associated with solvent-based processes like solvent-based polyurethane coatings and glues/adhesives. They should not be used for any kind of facility cleaning or spot cleaning.
9. Chlorinated Phenols / OPP	Chlorophenols are poly chlorinated compounds used as preservatives or pesticides. Pentachlorophenol (PCP) and tetrachlorophenol (TeCP) have been used in the past to prevent mould when storing / transporting, raw hides and leather. They are now regulated and should not be used.
10. Chlorinated Paraffins (SCCP / MCCP)	Short-chain chlorinated paraffins can be found as contaminants within long-chain chlorinated paraffins and sulfo-chlorinated paraffins, used as fat liquoring agents.

Chemical Group	Potential Uses in Apparel and Footwear Textile Processing
11. Heavy Metals	<ul style="list-style-type: none"> • Arsenic and its compounds can be found in some preservatives, pesticides and defoliants for cotton. It is also associated with synthetic fibres, paints, inks, trims and plastics. • Cadmium compounds are found in or used as: pigments (particularly red, orange, yellow and green), a stabilizer for PVC plastic and in fertilisers, biocides and paints (e.g., surface paints on zippers and buttons). • Mercury compounds can be present in pesticides and can be found as contamination in caustic soda (NaOH). Mercury compounds may be used in paints (e.g., surface paints on zippers and buttons). • In apparel and footwear, lead may be associated with plastics, paints, inks, pigments and surface coatings. • Although typically associated with leather tanning, chromium VI also may be used in the dyeing of wool (after the chroming process).
12. Glycols	<p>In apparel and footwear, glycols have a wide range of uses including as solvents for finishing/cleaning, printing agents, and dissolving and diluting fats, oils and adhesives (e.g., in degreasing or cleaning operations).</p>
13. PAHs	<p>Polycyclic aromatic hydrocarbons (PAHs) are natural components of crude oil and are a common residue from oil refining. PAHs have a characteristic smell similar to the smell of car tires or asphalt. Oil residues containing PAHs are added to rubber and plastics as a softener or extender and may be found in rubber, plastics, lacquers and coatings. PAHs are often found in the outsoles of footwear and in printing pastes of screen prints. PAHs can be present as impurities in Carbon Black. They also may be formed from thermal decomposition of recycled materials during reprocessing.</p>