



Fast Retailing Manufacturing Restricted Substances List (MRSL)

-Version 2021-

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

Change log for the version 2021

All the changes are according to ZDHC MRSL v.2.0.

Parameter	CAS Number	Modification	page
3,5-dichlorotoluene	25186-47-4	Changed substance limit according to the latest ZDHC MRSL	20
Trichlorotoluene	various	Changed substance limit according to the latest ZDHC MRSL	20
2,3,6-Trichlorotoluene	2077-46-5	Changed substance limit according to the latest ZDHC MRSL	20
2,4,5-Trichlorotoluene	6639-30-1	Changed substance limit according to the latest ZDHC MRSL	20
2,3,4-trichlorotoluene	7359-72-0	Changed substance limit according to the latest ZDHC MRSL	20
2,4,6-trichlorotoluene	23749-65-7	Changed substance limit according to the latest ZDHC MRSL	20
3,4,5-trichlorotoluene	21472-86-6	Changed substance limit according to the latest ZDHC MRSL	21
Tetrachlorotoluene	various	Changed substance limit according to the latest ZDHC MRSL	21
2,3,4,5-tetrachlorotoluene	76057-12-0	Changed substance limit according to the latest ZDHC MRSL	21
2,3,5,6-tetrachlorotoluene	1006-31-1	Changed substance limit according to the latest ZDHC MRSL	21

2,3,4,6-tetrachlorotoluene	875-40-1	Changed substance limit according to the latest ZDHC MRSL	21
Pentachlorotoluene	877-11-2	Changed substance limit according to the latest ZDHC MRSL	21
Benzylchloride	100-44-7	Changed substance limit according to the latest ZDHC MRSL	22

Contents

Introduction	5
Methodology	5
Definitions	6
General Requirements	8
Chapter 1: MRSL	9
Chapter 2: MRSL Candidate List	30
Chapter 3: Archived Substances	36
Additional Requirements	37
Appendix 1. Potential Uses	39

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 v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
1. AP / APEO				
Octylphenol	Various including 27193-28-8 140-66-9 1806-26-4 85771-77-3	No intentional use	250 mg/kg	yes
Nonylphenol	Various including 25154-52-3 104-40-5 84852-15-3 11066-49-2	No intentional use	250 mg/kg	yes
Octylphenoethoxylates	Various, including 68987-90-6 9036-19-5 9002-93-1	No intentional use	500 mg/kg	yes
Nonylphenoethoxylates	Various including 9016-45-9 26027-38-3 37205-87-1 68412-54-4 127087-87-0	No intentional use	500 mg/kg	yes
2. Phthalates (ortho-phthalates)				
Butyl benzyl Phthalate (BBP) ¹	85-68-7	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-n-butyl Phthalate (DBP) ¹	84-74-2	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Bis(2-ethylhexyl) Phthalate (DEHP) ¹	117-81-7	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-n-octyl Phthalate (DnOP) ¹	117-84-0	No intentional use	Sum of substances ¹ : 250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Di-iso-nonyl Phthalate (DINP) ¹	28553-12-0 68515-48-0	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-iso-decyl Phthalate (DIDP) ¹	26761-40-0, 68515-49-1	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Dimethyl phthalate (DMP)	131-11-3	No intentional use	1000 mg/kg*	
Diethyl Phthalate (DEP) ¹	84-66-2	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-n-propyl Phthalate (DPrP) ¹	131-16-8	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-iso-butyl Phthalate (DIBP) ¹	84-69-5	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-cyclohexyl Phthalate (DCHP) ¹	84-61-7	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-n-hexyl phthalate (DnHP / DHEXP) ¹	84-75-3	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
D-inonyl Phthalate (DNP) ¹	84-76-4	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-iso-octyl Phthalate (DIOP) ¹	27554-26-3	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Bis(methylglycol) phthalate (DMEP) ¹	117-82-8	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP) ¹	68515-42-4	No intentional use	Sum of substances ¹ : 250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Di-iso-heptyl Phthalate (1,2-benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (DIHpP) ¹	71888-89-6	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-penty Phthalate (n-, iso-, or mixed) (DPP / DPENP) ¹	131-18-0, 605-50-5, 776297-69-9, 84777-06-0	No intentional use	Sum of substances ¹ : 250 mg/kg	yes
Di-hexyl Phthalate, branched and linear, DHxP (DHP)	68515-50-4	No intentional use	1000 mg/kg*	
Di-iso-hexyl Phthalate	71850-09-4	No intentional use	1000 mg/kg*	
1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with \geq 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
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

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
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)	-	No intentional use	250 mg/kg	yes
Dibromo diphenyl ethers (DiBDE)	-	No intentional use	1000 mg/kg*	
Tribromo diphenyl ethers (TriBDE)	-	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)	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
3b. Chlorinated Flame retardants				

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
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
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
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, 1303-43-4, 12179-04-3, 215-540-4	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
Dibromopropylether	21850-44-2	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

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
3,3'-Dimethylbenzidine	119-93-7	No intentional use	150 mg/kg	yes
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
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-diaminoanisol 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
4c. Navy Blue				
Navy Blue	1. CAS # 118685-33-9; 2. Not Allocated	No intentional use	250 mg/kg	yes
4d. Disperse & Carcinogenic Dyes				
Acid Red 26	3761-53-3	No intentional use	250 mg/kg	yes
Basic Red 9	569-61-9	No intentional use	250 mg/kg	yes
Basic Violet 14	632-99-5	No intentional use	250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Direct Blue 6	2602-46-2	No intentional use	250 mg/kg	yes
Direct Red 28	573-58-0	No intentional use	250 mg/kg	yes
Direct Black 38	1937-37-7	No intentional use	250 mg/kg	yes
Disperse Yellow 3	2832-40-8	No intentional use	Textile: 250 mg/kg	yes
Disperse Orange 11	82-28-0	No intentional use	250 mg/kg	yes
Disperse Yellow 23	6250-23-3	No intentional use	1000 mg/kg*	
Disperse Orange 149	85136-74-9	No intentional use	1000 mg/kg*	
Basic Blue 26	2580-56-5	No intentional use	250 mg/kg	yes
Basic Green 4 (malachite green chloride)	569-64-2	No intentional use	250 mg/kg	yes
Basic Green 4 (malachite green oxalate)	2437-29-8	No intentional use	250 mg/kg	yes
Basic Green 4 (malachite green)	10309-95-2	No intentional use	250 mg/kg	yes
Disperse Blue 1	2475-45-8	No intentional use	250 mg/kg	yes
Disperse Blue 3	2475-46-9	No intentional use	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	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 37/59/76	13301-61-6	No intentional use	Textile: 250 mg/kg	yes
Disperse Red 1	2872-52-8	No intentional use	Textile: 250 mg/kg	yes
Disperse Red 11	2872-48-2	No intentional use	Textile: 250 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Disperse Red 17	3179-89-3	No intentional use	Textile: 250 mg/kg	yes
Disperse Yellow 1	119-15-3	No intentional use	Textile: 250 mg/kg	yes
Disperse Yellow 9	6373-73-5	No intentional use	Textile: 250 mg/kg	yes
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
Pigment Red 104	12656-85-8	No intentional use	1000 mg/kg*	
Pigment Yellow 34	1344-37-2	No intentional use	1000 mg/kg*	
Basic Violet 3	548-62-9	No intentional use	250 mg/kg	yes
Direct Brown 95	16071-86-6	No intentional use	1000 mg/kg*	
Direct Blue 15	2429-74-5	No intentional use	1000 mg/kg*	
Acid Red 114	6459-94-5	No intentional use	1000 mg/kg*	
Disperse Yellow 56	54077-16-6	No intentional use	1000 mg/kg*	
Disperse Red 151	61968-47-6	No intentional use	1000 mg/kg*	
Acid Violet 49	1694-09-3	No intentional use	250 mg/kg	yes
5. Organotin Compounds				
Monobutyltin, MBT	H based: 78763-54-9, Cl based: 1118-46-3	No intentional use	5 mg/kg	yes
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
Dioctyltin, DOT	H based: 94410-05-6, Cl based: 3542-36-7	No intentional use	5 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

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Triphenyltin, TPhT	H based: 892-20-6, Cl based: 639-58-7 ion: 668-34-8	No intentional use	5 mg/kg	yes
Tricyclohexyltin, TCyT	H based: 6056-50-4 Cl based: 3091-32-5	No intentional use	1 mg/kg	yes
Trioctyltin, TOT	-	No intentional use	5 mg/kg	yes
Tripropyltin, TPT	H based: 688-73-3 Cl based: 2279-76-7	No intentional use	1 mg/kg	yes
Monooctyltin, MOT	H based: 15231-44-4, Cl based: 3091-25-6	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
Monophenyltin, MPT	Cl based: 1124-19-2	No intentional use	5 mg/kg	yes
Methyltin trichloride, MMT	Cl based: 993-16-8	No intentional use	5 mg/kg	yes
Dimethyltin, DMT	Cl based: 753-73-1	No intentional use	5 mg/kg	yes
Trimethyltin, TMT	Cl based: 1066-45-1	No intentional use	5 mg/kg	yes
Tetrabutyltin, TeBT	1461-25-2	No intentional use	1 mg/kg	yes
Dipropyltin, DPT	Various	No intentional use	5 mg/kg	yes
Monomethyltin, MT	Various	No intentional use	5 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

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
6. PFCs				
Perfluorooctanoic acid (PFOA) (acid & ammonium salt)	335-67-1, 3825-26-1	No intentional use	0.025 mg/kg	yes
Perfluorooctane sulfonate (PFOS)	1763-23-1, 2795-39-3	No intentional use	2 mg/kg	yes
7. COC (Chlorobenzenes/Chlorotoluenes)				
Chlorobenzene ²	108-90-7	No intentional use	Sum of substances ² : 200 mg/kg	yes
Dichlorobenzene ²	various	No intentional use	Sum of substances ² : 200 mg/kg	yes
1,2-Dichlorobenzene	95-50-1	No intentional use	500mg/kg	yes
1,3-Dichlorobenzene ²	541-73-1	No intentional use	Sum of substances ² : 200 mg/kg	yes
1,4-Dichlorobenzene ²	106-46-7	No intentional use	Sum of substances ² : 200 mg/kg	yes
Trichlorobenzene ²	various	No intentional use	Sum of substances ² : 200 mg/kg	yes
1,2,3-Trichlorobenzene ²	87-61-6	No intentional use	Sum of substances ² : 200 mg/kg	yes
1,2,4-Trichlorobenzene ²	120-82-1	No intentional use	Sum of substances ² : 200 mg/kg	yes
1,3,5-Trichlorobenzene ²	108-70-3	No intentional use	Sum of substances ² : 200 mg/kg	yes
Tetrachlorobenzene ²	various	No intentional use	Sum of substances ² : 200 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
1,2,3,4-Tetrachlorobenzene ²	634-66-2	No intentional use	Sum of substances ² : 200 mg/kg	yes
1,2,3,5-Tetrachlorobenzene ²	634-90-2	No intentional use	Sum of substances ² : 200 mg/kg	yes
1,2,4,5-Tetrachlorobenzene ²	95-94-3	No intentional use	Sum of substances ² : 200 mg/kg	yes
Pentachlorobenzene ²	608-93-5	No intentional use	Sum of substances ² : 200 mg/kg	yes
Hexachlorobenzene ²	118-74-1	No intentional use	Sum of substances ² : 200 mg/kg	yes
Chlorotoluene ²	various	No intentional use	Sum of substances ² : 200 mg/kg	yes
2-Chlorotoluene ²	95-49-8	No intentional use	Sum of substances ² : 200 mg/kg	yes
3-Chlorotoluene ²	108-41-8	No intentional use	Sum of substances ² : 200 mg/kg	yes
4-Chlorotoluene ²	106-43-4	No intentional use	Sum of substances ² : 200 mg/kg	yes
Dichlorotoluene ²	various	No intentional use	Sum of substances ² : 200 mg/kg	yes
2,3-Dichlorotoluene ²	32768-54-0	No intentional use	Sum of substances ² : 200 mg/kg	yes
2,4-Dichlorotoluene ²	95-73-8	No intentional use	Sum of substances ² : 200 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
2,5-Dichlorotoluene ²	19398-61-9	No intentional use	Sum of substances ² : 200 mg/kg	yes
2,6-Dichlorotoluene ²	118-69-4	No intentional use	Sum of substances ² : 200 mg/kg	yes
3,4-Dichlorotoluene ²	95-75-0	No intentional use	Sum of substances ² : 200 mg/kg	yes
3,5-dichlorotoluene	25186-47-4	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
Trichlorotoluene ²	various	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
2,3,6-Trichlorotoluene ²	2077-46-5	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
2,4,5-Trichlorotoluene ²	6639-30-1	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
2,3,4-trichlorotoluene ²	7359-72-0	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
2,4,6-trichlorotoluene ²	23749-65-7	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
3,4,5-trichlorotoluene	21472-86-6	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
Tetrachlorotoluene ²	various	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
2,3,4,5-tetrachlorotoluene ²	76057-12-0	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
2,3,5,6-tetrachlorotoluene ²	1006-31-1	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
2,3,4,6-tetrachlorotoluene ²	875-40-1	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 mg/kg	yes
Pentachlorotoluene ²	877-11-2	No intentional use	Sum of substances ² : 200 mg/kg Each: 10 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
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*	

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
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	yes
8b. Other Solvents				
Benzene	71-43-2	No intentional use	50 mg/kg	yes
Xylene	1330-20-7 (all isomers) 95-47-6, 106-42-3, 108-38-3	No intentional use	Textile: 500 mg/kg	yes
Styrene	100-42-5	No intentional use	1000 mg/kg*	
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*	
Cyclohexanone	108-94-1	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*	
9. Chlorinated Phenols / OPP				
Pentachlorophenol (PCP), its salts and compounds	87-86-5	No intentional use	Sum of PCP & TeCP: 20 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Tetrachlorophenol (TeCP)	25167-83-3	No intentional use	Sum of PCP & TeCP: 20 mg/kg Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,4,5-Tetrachlorophenol	4901-51-3	No intentional use	Sum of PCP & TeCP: 20 mg/kg Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,4,6-Tetrachlorophenol	58-90-2	No intentional use	Sum of PCP & TeCP: 20 mg/kg Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,5,6-Tetrachlorophenol	935-95-5	No intentional use	Sum of PCP & TeCP: 20 mg/kg Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
Trichlorophenol (TriCP)	various	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,4-Trichlorophenol	15950-66-0	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,5-Trichlorophenol	933-78-8	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3,6-Trichlorophenol	933-75-5	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,4,5-Trichlorophenol	95-95-4	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
2,4,6-Trichlorophenol	88-06-2	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
3,4,5-Trichlorophenol	609-19-8	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
DiChlorophenol (DiCP)	various	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,3-Dichlorophenol	576-24-9	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,4-Dichlorophenol	120-83-2	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,5-Dichlorophenol	583-78-8	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2,6-Dichlorophenol	87-65-0	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
3,4-Dichlorophenol	95-77-2	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
3,5-Dichlorophenol	591-35-5	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
Mono Chlorophenol	various	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
2-Chlorophenol	95-57-8	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
3-Chlorophenol	108-43-0	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes
4-Chlorophenol	106-48-9	No intentional use	Sum of TeCP, TriCP, DCP, MonoCP: 50 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
o-Phenylphenol (OPP)	90-43-7	No intentional use	Textile: 5000 mg/kg Leather: Use is permitted	yes
10. Chlorinated Paraffins (SCCP / MCCP)				
Short Chain Chlorinated Paraffins (SCCP) with C10 –C13	85535-84-8	No intentional use	Textile: 50 mg/kg Leather: 250 mg/kg	yes
Medium Chain Chlorinated Paraffins (MCCP) with C14 – C17	85535-85-9	No intentional use	500 mg/kg	yes
11a. Heavy Metals				
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
Chromium, hexavalent, Cr(VI)	18540-29-9	No intentional use	10 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

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Total Tin	7440-31-5	No intentional use	250 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
Ethylene glycol dimethyl ether;	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: 1000 mg/kg	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 ³	91-20-3	No intentional use	Textile: Sum of substances ³ : 200 mg/kg Leather: 300 mg/kg	yes
Acenaphthylene ³	208-96-8	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Acenaphthene ³	83-32-9	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Fluorene ³	86-73-7	No intentional use	Sum of substances ³ : 200 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Phenanthrene ³	85-01-8	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Anthracene ³	120-12-7	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Fluoranthene ³	206-44-0	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Pyrene ³	129-00-0	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Benzo-[a]-anthracene(BaA) ³	56-55-3	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Chrysene(CHR) ³	218-01-9	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Benzo-[a]-pyrene (BaP)	50-32-8	No intentional use	20 mg/kg	yes
Indeno[1,2,3-cd]pyrene ³	193-39-5	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Dibenzo-[a,h]-anthracene (DBAhA) ³	53-70-3	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Benzo[ghi]perylene ³	191-24-2	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Benzo-[b]-fluoranthene(BbFA) ³	205-99-2	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Benzo-[k]-fluoranthene(BkFA) ³	207-08-9	No intentional use	Sum of substances ³ : 200 mg/kg	yes
Benzo-[e]-pyrene(BeP) ³	192-97-2	No intentional use	Sum of substances ³ : 200 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Benzo-[j]-fluoranthene(BjFA) ³	205-82-3	No intentional use	Sum of substances ³ : 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				
Permethrin	52645-53-1	No intentional use	250 mg/kg	yes
Tris (2-Chloroethyl) Phosphate (TCEP)	115-96-8	No intentional use	250 mg/kg	yes
Triclosan	3380-34-5	No intentional use	250 mg/kg	yes
Borate, zinc salt	12767-90-7	No intentional use	250 mg/kg	yes
Thiourea	62-56-6	No intentional use	1000 mg/kg	yes
Silica (particles of respirable size)	14464-46-1	No intentional use	No use of Sand Blasting	yes
AEEA [2-(2-aminoethylamino)ethanol]	111-41-1	No intentional use	100 mg/kg	yes
17. Others				
Bisphenol-A	80-05-7	No intentional use	100 mg/kg	yes

Parameter	CAS Number	FR MRSL v2021		ZDHC MRSL v2.0
		Requirements		
		in Manufacturing	in Chemical formulations	
Quinoline	91-22-5	No intentional use	1000 mg/kg	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

* 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 v2021	ZDHC MRSL v2.0
		Intent	
3a. Brominated Flame retardants			
Trimethyl phosphate	512-56-1	Certain phosphate flame retardants will be assessed for restrictions for the next ZDHC MRSL Update.	Yes (Candidate)
3b. Chlorinated Flame retardants			
Trixylyl phosphate (TXP)	25155-23-1	Certain phosphate flame retardants will be assessed for restrictions for the next ZDHC MRSL Update.	Yes (Candidate)
3c. Other Flame retardants			
Tri-o-cresyl phosphate (TOCP)	78-30-8	Certain phosphate flame retardants will be assessed for restrictions for the next ZDHC MRSL Update.	Yes (Candidate)
4a. Azo dYes			
Aniline	62-53-3	High levels of free aniline can be encountered in some indigo dye formulations. In Version 3 of the ZDHC MRSL, it is intended to place restrictions on the maximum permitted levels of free aniline in indigo dye formulations. Studies on levels of free aniline in currently available liquid and powder formulations and determination of safe levels of aniline for workers are required to determine appropriate levels.	Yes (Candidate)
4d. Disperse & Carcinogenic DYes			
Basic Green 4	129-73-7	Research needs to be conducted on alternative green dYes or green recipe formulations to establish if this can be restricted without affecting product/colour choices. Application using techniques such as gel-dyeing are unlikely to be restricted.	Yes (Candidate)

Parameter	CAS Number	FR MRSL v2021	ZDHC MRSL v2.0
		Intent	
6. PFCs			
Perfluorobutane sulfonate (PFBS)	375-73-5 or 59933-66-3	C8 PFCs are currently restricted in Version 1.1 of the ZDHC MRSL. In Version 3 of the ZDHC MRSL, it is intended to ban the deliberate use of all functional finishes based on PFCs except for anticipated derogations under EU law, such as protective articles where the highest levels of repellency are required to safeguard the user. In signaling this forthcoming restriction it is expected that wet processors plan to take no new deliveries of PFC-containing formulations after the publication of ZDHC MRSL Version 3.	Yes (Candidate)
Perfluorohexane sulfonate (PFHxS)	355-46-4		Yes (Candidate)
Perfluorohexanoic acid (PFHxA)	307-24-4		Yes (Candidate)
Perfluorobutanoic acid (PFBA)	375-22-4		Yes (Candidate)
Perfluoroheptanoic acid (PFHpA)	375-85-9		Yes (Candidate)
Perfluorononanoic acid (PFNA)	375-95-1		Yes (Candidate)
Perfluorododecanoic acid (PFDA)	335-76-2		Yes (Candidate)
8:2 FTOH	678-39-7		Yes (Candidate)
8:2 FTA	27905-45-9		Yes (Candidate)
Perfluorooctane sulfonamide (PFOSA)	754-91-6		Yes (Candidate)
Perfluorooctane sulfonfluoride (PFOSF)	307-35-7		Yes (Candidate)
N-Me-FOSA	31506-32-8		Yes (Candidate)
N -Et-FOSA	4151-50-2	Yes (Candidate)	

Parameter	CAS Number	FR MRSL v2021	ZDHC MRSL v2.0
		Intent	
N-Me-FOSE alcohol	24448-09-7		Yes (Candidate)
N-Et-FOSE alcohol	1691-99-2		Yes (Candidate)
Henicosafuoroundecanoic acid PFUnA	2058-94-8		Yes (Candidate)
Tricosafuorododecanoic acid PFDoA	307-55-1		Yes (Candidate)
Pentacosafuorotridecanoic acid PFTrA	72629-94-8		Yes (Candidate)
Heptacosafuorotetradecanoic acid PFTeA	376-06-7		Yes (Candidate)
Perfluoroheptane Sulfonate (PFHpS)	375-92-8		Yes (Candidate)
Perfluorodecane Sulfonate (PFDS)	335-77-3		Yes (Candidate)
Perfluorooctanesulphonic acid 1H,1H,2H,2H (H4PFOS; 6:2)	27619-97-2		Yes (Candidate)
Perfluoropentane Acid (PFPA)	2706-90-3		Yes (Candidate)
Perfluoro-3,7-dimethyloctanoic Acid (PF-3,7-DMOA)	172155-07-6		Yes (Candidate)
7H-Dodecanefluoroheptane Acid (HPFHpA)	1546-95-8		Yes (Candidate)
2H,2H-Perfluorodecane Acid (H2PFDA)	882489-14-7		Yes (Candidate)
2H,2H,3H,3H-Perfluoroundecanoic Acid (H4PFUnA)	34598-33-9		Yes (Candidate)

Parameter	CAS Number	FR MRSL v2021	ZDHC MRSL v2.0
		Intent	
1H,1H,2H,2H-Perfluorooctylacrylate (6:2 FTA)	17527-29-6		Yes (Candidate)
1H,1H,2H,2H-Perfluorododecylacrylate (10:2 FTA)	17741-60-5		Yes (Candidate)
1H,1H,2H,2H-Perfluoro-1-hexanol (4:2 FTOH)	2043-47-2		Yes (Candidate)
1H,1H,2H,2H-Perfluoro-1-octanol (6:2 FTOH)	647-42-7		Yes (Candidate)
1H,1H,2H,2H-Perfluoro -1-dodecanol (10:2 FTOH)	865-86-1		Yes (Candidate)
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)
8b. Other Solvents			
N,N-dimethylformamide (N,N-DMF)	68-12-2	With the exception of textile and leather coating processes, where no viable alternative solvent is	Yes (Candidate)

Parameter	CAS Number	FR MRSL v2021	ZDHC MRSL v2.0
		Intent	
N,N-dimethylacetamide (N,N-DMAC)	127-19-5	currently available, the deliberate use of NMP, DMAC and DMFa should be avoided and their presence in all formulations should be also carefully monitored to ensure compliance with product RSLs and the EU regulation for CMR chemicals, 2018/1513. It is intended to publish limits for maximum allowable limits in Version 3 of the ZDHC MRSL.	Yes (Candidate)
1-methyl-2-pyrrolidone (NMP)	872-50-4		Yes (Candidate)
Toluene	108-88-3	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)
Ethylbenzene	100-41-4		Yes (Candidate)
2-methoxypropanol	1589-47-5		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)

Parameter	CAS Number	FR MRSL v2021	ZDHC MRSL v2.0
		Intent	
17. Others			
Diazene-1,2-dicarboxamide [C,C'-azodi(formamide), ADCA]	123-77-3	It is intended to restrict ADCA in Version 3 of the ZDHC MRSL. Additionally, a wider appraisal of foaming/blowing agents and vulcanisation accelerators will be conducted and further chemicals may be included at that time.	Yes (Candidate)
Dimethyl Fumarate (DMFu)	624-49-7	DMFu must not be deliberately used in any formulations. It is intended to publish details of a universally agreed, robust test method and maximum allowable limit in version 3 of the MRSL. It should be noted that DMFu remains illegal in articles placed on the EU market above 0.1 ppm, so testing for DMFu in formulations using methods currently recommended by laboratories is strongly advised, with any detections resulting in an investigation into deliberate use at all stages in the supply chain.	Yes (Candidate)
Phenol	108-95-2	ZDHC is looking for safe limits for phenol as a contaminant in textile chemical formulations.	Yes (Candidate)
23. Siloxanes			
Octamethylcyclotetrasiloxane (D4)	556-67-2	These silicones are known contaminants in silicone formulation, the industry is currently reviewing the impact on silicone polymers. ZDHC will assess restrictions for the next update.	Yes (Candidate)
Decamethylcyclopentasiloxane (D5)	541-02-6		Yes (Candidate)
Dodecamethylcyclohexasiloxane (D6)	540-97-6		Yes (Candidate)

Chapter 3: Archived Substances

Parameter	CAS Number	ZDHC MRSL v2.0
4d. Disperse & Carcinogenic Dyes		
4-Dimethylaminoazobenzene (Solvent Yellow 2)	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:</p> <p>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.</p> <p>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>

Chemical Group	Potential Uses in Apparel and Footwear Textile Processing
4a. Azo Dyes	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.
4b. Navy Blue	Navy Blue colourants are regulated and should no longer be used for dyeing of textiles.
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>
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-

Chemical Group	Potential Uses in Apparel and Footwear Textile Processing
	<p>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).</p> <p>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).</p> <p>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).</p>
7. COC (Chlorobenzenes/Chlorotoluenes)	<p>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.</p>
8a. Halogenated Solvents / VOCs	<p>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).</p>
8b. Other Solvents	<p>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.</p>
9. Chlorinated Phenols / OPP	<p>Chlorophenols are poly chlorinated compounds used as preservatives or pesticides.</p> <p>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.</p>

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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.
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	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).
13. PAHs	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

Chemical Group	Potential Uses in Apparel and Footwear Textile Processing
	present as impurities in Carbon Black. They also may be formed from thermal decomposition of recycled materials during reprocessing.