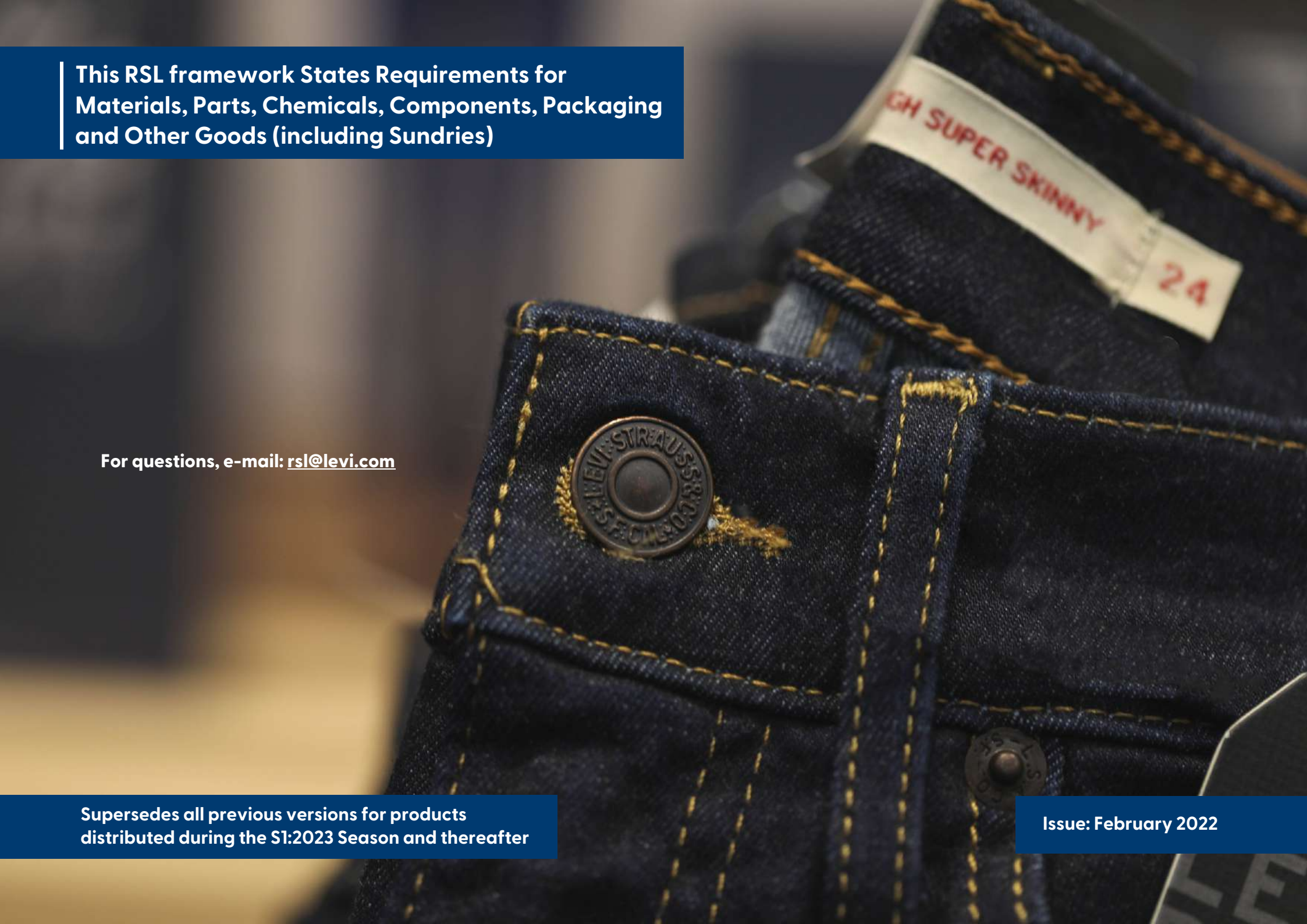
LEVI STRAUSS & CO.

Product Safety by Design Framework for Restricted Substances List("RSL")

February 2022

This RSL framework States Requirements for Materials, Parts, Chemicals, Components, Packaging and Other Goods (including Sundries)



For questions, e-mail: rsl@levi.com

Supersedes all previous versions for products distributed during the S1:2023 Season and thereafter

Issue: February 2022

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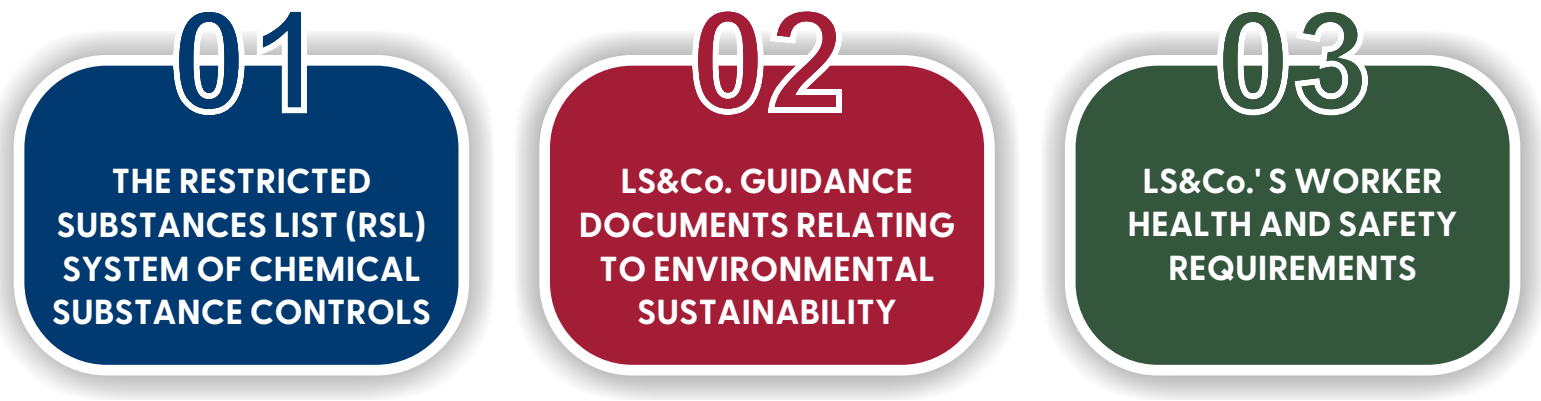
SECTION – 1

OVERVIEW OF LS&Co. RESTRICTED SUBSTANCES LIST (RSL) - WHAT'S NEW

OVERVIEW OF LS&Co. RESTRICTED SUBSTANCES LIST (RSL) - WHAT'S NEW

LS&Co. is committed to conducting its business in a sustainable manner designed to protect consumers, workers, the environment and the LS&Co. brands. We do so by building principally upon three pillars:



These pillars and all other LS&Co. Environmental, Health, and Safety requirements set out on LS&Co.' s website www.levistrauss.com apply to all Suppliers as well as Sources in LS&Co.' s global supply chain.

RESTRICTED SUBSTANCES LIST – OBJECTIVES

The objectives of LS&Co. RSL requirements (February 2022) are intended to:

- Ensure that Materials, Chemicals and Other Goods comply with the applicable chemical content and chemical exposure laws of every governmental jurisdiction in which those products are fabricated, manufactured, processed or distributed; and
- Protect the health and safety of consumers handling LS&Co. Labeled and/or distributed finished products

ADOPTION OF AFIRM RSL

In 2004, LS&Co. was one of the founding members of the AFIRM group (Apparel Footwear Industry RSL Management Group - https://afirm-group.com/ and has aligned with AFIRM Group RSL for many years. Effective January 2022 LS&Co. has adopted the AFIRM Group RSL and AFIRM Packaging RSL.This is to drive industry collaboration and provide the apparel and footwear supply chain with a single tool for effective management of Restricted Substances (as a 'Chemical Substances Control Program') to reduce the use and impact of harmful substances in factories where LS&Co. labeled, and/or distributed products are manufactured.The AFIRM RSL can be found in website (https://afirm-group.com/).

LS&Co. RSL REQUIREMENTS ABOVE AFIRM RSL

The LS&Co. specific requirements above AFIRM RSL are set out in this 'Product safety by design framework' guidance document in different sections as stated below:

- LS&Co. Priority chemicals and RSL Usage ban policy requirements (Refer to Section-2)
- LS&Co. Emerging issues policy for CMR, EDCs, Skin Sensitizers and PBT chemicals (Refer to Appendix-4)
- LS&Co. Code of Conduct requirements (refer to Section-6) include,

  A. Supplier and Sources commitment
  B. Suppliers and Sources Management System Requirements supporting RSL compliance at the factory
  C. Obligation to Comply with EU REACH and All Other Governmental Requirements
  D. Obligation to Comply with US States Chemicals of High Concern in Children Products and its Reporting Requirements
  E. LS&Co. Chemical Information Log (CIL)

Please note that the AFIRM RSL - and LS&Co. specific requirements above AFIRM RSL - apply to all materials, parts, chemicals, components, packaging and other goods (including sundries) that are sourced or supplied for direct or eventual use in products to be labeled, manufactured and/or distributed by LS&Co. This listing includes but is not limited to, finished products, including apparel, non-apparel, footwear, accessories, packaging and other products.

APPLICATION

LS&Co. requires that all Materials, Chemicals and Other Goods provided by Suppliers and Sources(as defined next column) comply with LS&Co.Priority chemicals RSL Usage ban policy requirements and the "Limit Value Finished Product" (LVFP) levels specified in AFIRM RSL. To ensure that the finished products meet the LVFP concentrations set out in AFIRM RSL, Suppliers and Sources must implement an appropriate program of testing and quality assurance.

In addition, Suppliers and Sources must ensure that the chemicals used or supplied in the manufacturing of LS&Co. labeled/or and distributed products are used in a manner consistent with any Safety Data Sheet (SDS), Technical Data Sheet (TDS) and any other specifications and warnings provided by any Supplier or Source.

Moreover, by agreeing to furnish any Materials, Chemicals, or Other Goods to LS&Co. or by agreeing to comply with LS&Co. RSL requirements as stated above, each Supplier and Source must ensure that each Material, Chemical and Other Goods supplied for use in the manufacturing and distribution of any LS&Co. labeled and LS&Co. distributed product does not contain any substance in any manner which would violate:

(a) LS&Co. Priority chemicals RSL usage ban policy requirements
(b) AFIRM RSL and
(c) The applicable law of any country and jurisdiction in which the Supplier, Source, or LS&Co. conducts business and in any jurisdiction in which it ships Materials, Chemicals, or Other Goods

In addition, each Supplier is similarly responsible and also liable to LS&Co. for ensuring that each of its Sources similarly complies with LS&Co. RSL requirements and the aforesaid applicable laws.

Any violation of the LS&Co. RSL requirements or the aforesaid applicable laws is a violation of all contracts to supply Materials, Chemicals and Other Goods to LS&Co.

Throughout this document, references are made to Supplier(s) and Source(s). LS&Co. defines them for the purposes of the RSL as follows:

SUPPLIER(S) are defined as factories and other businesses, including licensees, that contract with LS&Co. to produce finished products, apparel, footwear, accessories and other products for LS&Co. Suppliers may also contract with Sources for Materials, Chemicals, and Other Goods for direct or eventual use in fabricating, manufacturing, or other processing of LS&Co. labeled and/or distributed apparel, non-apparel, footwear, accessories and other products.

SOURCE(S) are defined as business partners of Suppliers that provide Materials, Chemicals, and Other Goods for direct or eventual use in fabricating, manufacturing or other processing of LS&Co. labeled and/or distributed apparel, footwear, accessories and other products. For a glossary of other terms/Definitions found in this document, please see Appendix 6 .

SECTION – 2

LS&Co.' S RSL USAGE BAN POLICY, PRIORITY CHEMICALS LIST AND OTHER RESTRICTIONS

LS&Co.' S RSL USAGE BAN POLICY, PRIORITY CHEMICALS LIST AND OTHER RESTRICTIONS

In addition to the chemical restrictions in the AFIRM RSL, LS&Co. has further restrictions on all anti microbials,all applied flame-retardant finishes, and all per-fluoroalkyl substances.

Antimicrobial Substances

- Anti-microbial substances are used to prevent damage to underlying substrates by bacteria and mold in use and are sometimes used to deliver microbe-killing performance for the end-user (for example to prevent odor)
- Many anti-microbial substances are legally restricted and other pieces of legislation require that specific chemical types can only be used after they are assessed and authorized for very specific end-use
- LS&Co. does not allow the use of any anti-microbial chemicals to protect substrates or to deliver customer benefits
- **Biocides used as preservatives for chemicals applied to garments:** Suppliers are required to declare these substances to LS&Co. along with test result data on residues remaining on the garment after their application.
- **Biocides used to preserve garments from deterioration:** This class of antimicrobials, including biocides, is used to preserve garments during transport, such as dimethyl fumarate is banned.
- **Biocides used to kill odor-causing bacteria from human skin:** The use of these antimicrobials is categorically banned.
- The use of preservatives to prevent raw material or chemical formulation spoilage is permitted but the specific chemicals must be approved by the relevant regulatory body.
- The use of alternative chemistries (such as odor-absorbing technology) must be approved by LS&Co. Product Safety Teams.

Flame Retardant Chemicals

- Flame retardant chemicals are used to inhibit the formation and spread of fire on substrates.
- Many flame-retardant chemicals are restricted by legislation.
- No Flame Retardants are allowed on LS&Co. products. Upon request, the absence of the flame retardants is to be tested for confirmation of RSL compliance.
- There are some end uses in some jurisdictions where flammability standards must be met to place products on the market.
- This must be achieved by substrate selection (e.g. fiber type) and construction (e.g. type of knit/weave and weight of fabric) rather than the application of flame-retardant chemicals.
- If suppliers believe there is a legal requirement to meet specific flammability legislation that can only be met using flame retardant chemicals, this must be discussed with LS&Co. Product Safety teams before orders are being confirmed.

Perfluoroalkyl / Polyfluoroalkyl Substances (PFASs)

- Per-fluoroalkyl substances are used to provide water and stain-repellent properties to the surfaces of substrates.
- Some PFASs are restricted by legislation and others are on the regulatory pathway with further restrictions anticipated.
- LS&Co. does not permit the use of any PFASs for any end-use.
- **LS&Co.'s PFASs (Perfluoroalkyl / Polyfluoroalkyl Substances) elimination policy:** LS&Co.'s goal is to phase out the use of any PFASs in the manufacturing and packaging of all of its labeled and distributed products. The new and more restrictive limits set in the 2022 RSL Update are intended as one of the steps directed towards that goal. Any fluorine-containing organic chemicals that are used in the process of manufacturing or packaging of LS&Co. – labeled or distributed products to impart properties such as water repellency or others to the final products are not allowed to be used without prior approval of LS&Co.

  The names and acronyms for the substances were used according to the article:

  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3214619/
- This restriction applies to all finishes, coating, and membranes that are used to deliver technical water repellent and stain management performances.
- Alternative chemistry must meet LS&Co. performance requirements with respect to

The table below provides a summary of the Priority chemicals restricted by the LS&Co. above AFIRM RSL

Table A – LS&Co. Priority Chemicals list

Sl No.	LS&Co. Priority chemicals list[1]	CAS No	Limit Value Final Product (mg/kg)	Test Method
1	Aromatic Amines from Azo Colorants and Arylamine Salts[2]	Various, refer AFIRM RSL for list of substances	Usage ban[3](TR[4]= 20)	**Products for all markets except China**: Textiles (natural & synthetic): EN ISO 14362-1 Natural leather: ISO 17234-1 p- Aminoazobenzene: All materials except Leather: EN ISO 14362-3 Leather: EN ISO 17234-2 **Products for China market:** China Standard: GB18401; Textiles: GB/T 17592 China Standard: GB 20400; Natural leather: GB/T19942
2	Disperse Dyes and other Forbidden dyes	Various, refer AFIRM RSL for list of substances	Usage ban (TR=30)	DIN 54231
3	Navy Blue Colorant	Various, refer AFIRM RSL for list of substances	Usage ban (TR=30)	DIN 54231
4	Chlorophenols[5]	Various, refer AFIRM RSL for list of substances	Usage ban (TR=0.5)	DIN 50009
5	Triclosan	3380-34-5	Usage ban (TR=1)	Solvent extraction / GC-MS
6	Dimethyl fumarate (DMFu)	624-49-7	Usage ban (TR=0.1)	All materials:ISO 16186

FOOTNOTES

1. LS&Co. is aiming to eliminate the list of priority chemicals from its manufacturing process, not allowed intentionally.
2. See Appendices 2 and 3 for a partial list of Azo dyes and pigments which, through reductive cleavage, may form restricted substances (amines).
3. **USAGE BAN** – A prohibition of any use of the substance during any stages of product manufacturing. However, the RSL identifies an Allowable Trace ("TR") amount of the substance to be detected if caused by unintentional or unavoidable contamination.
4. **ALLOWABLE TRACE (TR)** – The Allowable Trace is identified by the TR designation in the Limit Value column. The Allowable Trace [amount] represents the [permitted unavoidable trace presence] amount of a substance that has been added unintentionally or unavoidably to a Materials, Chemicals and Other Goods, but is nonetheless [is] allowed to be [found] detected in [on the garment] the Materials, Chemicals and Other Goods when otherwise the substance has been prohibited from use.
5. Any biocide used to impart properties to the final products is not allowed to be used

7	Chlorinated Benzenes and Toluenes 1,2-Dichlorobenzene	Various, refer AFIRM RSL for list of substances 95-50-1	Usage ban (TR=1) Usage Ban (TR=10)	DIN EN 17137
8	Phthalates (All esters of Ortho-phthalic acid. Including, but not limited to, the AFIRM RSL list)[6]	Various, refer AFIRM RSL for list of substances	Usage ban (TR=500 each,TR=1,000 total)	Sample preparation for all materials: CPSC-CH-C1001-09.4 Measurement: Textiles: GC-MS, EN ISO 14389 (7.1 Calculation based on the weight of print only; 7.2 Calculation based on the weight of print and textile if print cannot be removed). All materials except textiles: GC/MS
9	**Diisocyanates**[7] – Diphenylmethane diisocyanate (MDI)[8] – Hexamethylene diisocyanate (HDI) – Isophorone diisocyanate (IPDI) – Tetramethylxylene diisocyanate (TMXDI) – Toluene diisocyanate (TDI)[9] – Napthylene-1,5,di-isocyanate (1,5-NDI)	 Various 822-06-0 4098-71-9 2778-42-9 584-84-9 & 91-08-7 3173-72-6	 Free: 1; Blocked: 50 Free: 1; Blocked: 50 Free: 1; Blocked: 100 Free: 1; Blocked: 100 Free: 1; Blocked: 15 Free: 1; Blocked: 15	 Analysis of free isocyanates: Solvent extraction / HPLC Analysis of releasable (blocked) isocyanates: Solvent extraction/ GC-MS with injector block temperature at 300ºC, confirmation at 180ºC
10	Flame Retardants[10]	Various, refer AFIRM RSL for list of substances	Usage Ban (TR=10)	EN ISO 17881-1 for brominated flame retardants EN ISO 17881-2 for phosphorus flame retardants

FOOTNOTES

6. LS&Co. indicates that Usage Bans will be imposed upon all esters of ortho-phthalic acid; however, Materials, Chemicals, and Other Goods are to be tested for one or more of the listed phthalates upon LS&Co.'s request.
7. Use of blocked diisocyanates (oxime/pyrazole- or self-blocked) based on any other diisocyanates and pre-polymers (than listed) on the garment/fabric finishes and/or prints needs prior approval from LS&Co. Product Safety.
8. MDIs include monomers, isomers, oligomers, and polymers with various CAS Numbers.
9. TDI restriction applies to both 2,4-TDI (584-84-9) and 2,6-TDI (91-08-7), individually.
10. No Flame Retardants are allowed on LS&Co. products. Upon request, the absence of the flame retardants is to be tested for confirmation of RSL compliance.

Heavy Metals (Restrictions for Textiles (including Artificial Leather) and Leather (Natural & Coated)[11] Total Digestion[12,13] & Extractable Metal Content				
11	Cadmium (Cd) compounds	Various	Usage ban Extractable: (TR=0.1) Total: (TR= 40)	Extractable: All materials except Leather: DIN EN 16711-2 Leather: DIN EN ISO 17072-1 Total: All materials except Leather: DIN EN 16711-1 Leather: DIN EN ISO 17072-2
12	Lead (Pb) compounds	Various	Usage Ban Extractable: (TR=0.2) Total: (TR=50)	Extractable: All materials except Leather: DIN EN 16711-2 Leather: DIN EN ISO 17072-1 Total: Non-metal: CPSC-CH-E1002-08.3 Metal: CPSC-CH-E1001-08.3 Lead in paint and surface coatings: CPSC-CH-E1003-09.1 Leather: 17072-2 Textiles: EN16711-1
13	Arsenic (As) compounds	Various	Usage Ban Extractable: (TR=0.2) Total: (TR=10)	Extractable: All materials except Leather: DIN EN 16711-2 Leather: DIN EN ISO 17072-1 Total All materials except Leather: DIN EN 16711-1 Leather: DIN EN ISO 17072-2

FOOTNOTES

11. Metal restrictions are separated into 2 major categories: (1) Restrictions for textiles and leather (artificial, natural & coated leather), (2) Restrictions for Sundries and Jewelry (children & adults). The concentration is calculated at the element level. However, metals can be found in products both at the element level and in the ionized form(s) (including metal compounds) with various CAS numbers.
12. Total digestion metal content – the sample is digested by concentrated acid and the total metal content in the sample is measured.
13. Applicable for Leather (artificial, natural, and coated) only.

14	Mercury (Hg) compounds	Various	Usage Ban Total: (TR=0.5) Extractable: (TR=0.02)	Extractable: All materials except Leather: DIN EN 16711-2 Leather: DIN EN ISO 17072-1 Total All materials except Leather: DIN EN 16711-1 Leather: DIN EN ISO 17072-2
15	Chromium (Cr (VI)) -Hexavalent[14]	18540-29-9	Usage ban (TR = 1) for textile (TR = 3) for leather	Textiles: DIN EN 16711-2 with EN ISO 17075-1 if Cr is detected Leather: EN ISO 17075-1 and EN ISO 17075-2 for confirmation in case the extract causes interference. Alternatively, EN ISO 17075-2 may be used on its own. Aging test: ISO 10195 Method A2. For China market for leather and fur: GB/T 22807 - Spectrophotometric method GB/T 38402 - Chromatography method

FOOTNOTES

14. Chromium (Cr)-hexavalent restriction is applicable only for leather. Testing is to be performed after aging [aging condition: 24 hours with 80°C & 10% relative humidity (RH)].

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Heavy Metals (Restrictions for Sundries and Jewelry[15] (to be used by both Children[16] and Adults)				
16	Cadmium (Cd) compounds	Various	Usage ban Extractable: (TR=0.1) Total: (TR= 40)	Total: EN 1122 Extractable: ASTM F2923
17	Lead (Pb) compounds in Surface Coating and Substrates[17]	Various	Usage Ban Extractable: (TR=1) Total: (TR=90)	Total: Metals: CPSC-CH-E1001-08 Coating: CPSC-CH-E1003-09 Leather: ISO 17072-2 Others: CPSC-CH-E1002-08 Extractable: ASTM F2923
18	Arsenic (As) compounds	Various	Usage Ban Extractable: (TR=25)	ASTM F2923
19	Mercury (Hg) compounds	Various	Usage Ban Extractable: (TR=60)	ASTM F2923
20	Chromium (Cr (VI)) - Hexavalent	18540-29-9	Usage ban (TR = 1) for textile (TR = 3) for leather	Textile: DIN EN 16711-2 with EN ISO17075-1 if Cr is Detected Leather: Aging, ISO 10195 A2 Measurement: EN ISO 17075-1 and EN ISO 17075-2 for confirmation in case the extract causes interference. Alternatively, EN ISO 17075-2 may be used on its own.
Organotin compounds				
21	– Mono, Di-butyltin derivatives – Mono, Di & Tri-methyltin derivatives – Mono, Di-phenyltin derivatives – Mono, Di & Tri-octyltin derivatives – Tricyclohexyltin and Tripropyltin – Tributyltin and Triphenyltin derivatives	Various	Usage ban (TR=1 each) Usage ban (TR=0.5 each)	All materials: CEN ISO/TS 16179 or EN ISO 22744-1

FOOTNOTES

15. Jewelry includes stones and crystals. Man-made leaded crystals are prohibited from use on any children's products.
16. Children's products are defined as products designed or intended primarily for children age 12 and below.
17. US: New York labeling requirement - Effective from 1 January 2021, it is prohibited to sell or offer for sale of children's jewelry with lead content more than 40 ppm but less than federal standards (90 ppm for surface coating or 100 ppm for substrates) unless it bears a warning label. The warning statement can be either placed on the children's jewelry itself or the label on its immediate container and must at least contain the following language: "WARNING: CONTAINS LEAD. MAY BE HARMFUL IF EATEN OR CHEWED. COMPLIES WITH FEDERAL STANDARDS."

Solvents				
22	Tetrachloroethylene (Perchloroethylene)	127-18-4	Usage ban (TR = 1)	Solvent extraction / GC-MS or LC-MS
23	Trichloroethylene (TCE)	79-01-6	Usage ban (TR = 10)	Solvent extraction / GC-MS or LC-MS
24	N-Methylpyrrolidone (NMP)	872-50-4	Usage ban (TR=10)	Textiles: EN 17131 All other materials: DIN CEN ISO/TS 16189
25	Benzene	71-43-2	Usage Ban [TR=5]	Methanol extraction at 60C / GC-MS
26	Pentachloroethane	76-01-7	Usage ban (TR = 10)	Methanol extraction at 60C / GC-MS
27	1,1,1,2- Tetrachloroethane	630-20-6	Usage ban (TR = 10)	Methanol extraction at 60C / GC-MS
28	Dimethylformamide (DMFa)[18]	68-12-2	Usage ban (TR=500)	Textiles: EN 17131 All other materials: DIN CEN ISO/TS 16189
29	Chlorinated Paraffins[19]	Various	Usage Ban [TR=30]	Leather: ISO 18219-1:2021 (SCCP) ISO 18219-2:2021 (MCCP) Textiles: ISO 22818:2021 (SCCP + MCCP)
30	Phenol	108-95-2	Usage Ban (TR=60)	Solvent extraction / GC-MS or LC-MS

FOOTNOTES

18. This restriction is applicable for artificial leather and footwear accessories only, e.g – Shoes, Bags, belts, wallets, etc

19. Including short-chained chlorinated paraffin from C_{10} to C_{13} and medium-chained chlorinated paraffin from C_{14} to C_{17} where chlorine content is 20% to 70%. The possible application can be fatliquoring (leather), plasticizer, and flame retardant (plastics).

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31	**Alkylphenols (APs), Alkylphenol Ethoxylates (APEOs), including all isomers**			
	Nonylphenol (NP), mixed isomers Octylphenol (OP), mixed isomers	Various including 104-40-5 & 140-66-9	Usage Ban (TR= 5 sum of all)	AP: Textiles and Leather: EN ISO 21084 Polymers and all other materials: 1 g sample/20 mL THF, sonication for 60 minutes at 70 degrees C, analysis according to EN ISO 21084
	Nonylphenol ethoxylates (NPEOs) Octylphenol ethoxylates (OPEOs)	Various	Usage Ban (TR=50 sum of all)	APEO: All materials except Leather: EN ISO 18254-1 with the determination of APEO using LC/MS or LC/MS/MS Leather: Sample prep and analysis using EN ISO 18218-1 with quantification according to EN ISO 18254-1
32	N-Nitrosamines[20]	Various, refer AFIRM RSL for list of substances	Usage Ban (TR=0.5)	GB/T 24153-2009 Determination using GC/MS, with LC/MS/MS verification if positive. Alternatively, LC/MS/MS may be performed on its own. EN ISO 19577
33	PVC	9002-86-2	Usage Ban	Beilstein Test for screening, FTIR for confirmation
34	PFASs (Perfluoroalkyl / Polyfluoroalkyl Substances)	Refer Appendix -1 for PFASs (Perfluoroalkyl / Polyfluoroalkyl Substances) list	Usage Ban	All materials Extraction with an organic solvent, GC-MS and LC-MS. Based on EN ISO 23702-1

FOOTNOTES

20. The test method has been quoted under GB25038-2010 " Rubber shoes healthy and safety specification and GB25036-2010 " Children's Canvas Rubber Footwear"

35	Formaldehyde[21,22]	50-00-0	Textile & Leather Children: Not Detected (TR=16) Adults: (TR=65)	All materials except Leather: JIS L 1041 Method A (Japan Law 112) or EN ISO 14184-1 Products for China market: GB/T 2912.1 Natural Leather: ISO 17226-2 with EN ISO 17226-1 confirmation method in case of interferences. Alternatively, EN ISO 17226-1 can be used on its own. Products for China market: GB/T 19941 part 1 HPLC method

FOOTNOTES

21. EXCEPTION: For baby products (age 0 – 24 months) intended for the Japanese market, the formaldehyde concentration must be below an absorbency (A-A) limit of 0.05 using JIS L1041 Method A.
22. Melamine-based resins are a) prohibited for use at coating; b) require LS&Co.'s prior approval for use as cross-linker.

Table B – RoHS[23] Electrical and Electronic Equipment

Chemical Substance [24,25]	CAS Number	Limit Value Final Product (mg/kg)	Test Method
Cadmium (Cd)	Various	100	RoHS Directive 2011/65/EU IEC 62321 Part 1 to 7-2
Chromium (Cr^{6+}) – hexavalent	18540-29-9	1,000 For each	
Lead (Pb)	Various		
Mercury (Hg)	Various		
Polybrominated biphenyls (PBB)	Various		
Polybrominated diphenyl ethers (PBDE)	Various		
Phthalates (For Phthalates list, Please refer to AFIRM RSL)	Various	500 for each 1000 for total	All materials: GC/MS

Table C - Batteries[26]

Chemical Substance	CAS Number	Limit Value Final Product (mg/kg)	Test Method
Cadmium (Cd)	Various	20	EU Battery Directive 2006/66/EC, Total digestion, ICP
Lead (Pb)	Various	40	
Mercury (Hg)	Various	5	

FOOTNOTES

23. RoHS refers to the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment. RoHS applies to electrical and electronic products. NOTE: The limits listed are by weight of homogeneous material (i.e., single material that is separated mechanically).
24. For metals, concentration is calculated at the element level. However, metals can be found both at the element level and in the ionized form(s) (including metal compounds) with various CAS numbers.
25. For phthalates requirement, this should refer to AFIRM RSL.
26. Regarding batteries, for metals, concentration is calculated at the element level. However, metals can be found both at the element level and in the ionized form(s) (including metal compounds) with various CAS numbers.

Table D – M: Restriction on Packaging[27]

Chemical Substance[28]	CAS Number	Limit Value Final Product (mg/kg)	Test Method
Cadmium (Cd)	Various	Usage Ban [TR= 100 total]	Total heavy metals (Cd, Cr, Pb & Hg): EN ISO 16711-1 If the total of four heavy metals exceeds 100 ppm and Cr is detected, test for CrVI
Lead (Pb)	Various		
Mercury (Hg)	Various		
Chromium (Cr6+) – hexavalent	18540-29-9		All materials: EN ISO 17075-1 if Total Cr is detected and EN ISO 17075-2 for confirmation in case the extract causes interference. Alternatively, EN ISO 17075-2 may be used on its own.
PVC	9002-86-2	Usage Ban	Beilstein Test for screening, FTIR for confirmation
Dimethyl fumarate (DMFu)	624-49-7	Usage Ban [TR=0.1]	All materials: ISO 16186

FOOTNOTES

27. Packaging means transportation packaging as well as product packaging, i.e., any material used for the containment, protection, handling, delivery, and presentation of finished goods (article).
28. For metals, concentration is calculated at the element level. However, metals can be found both at the element level and in the ionized form(s) (including metal compounds) with various CAS

Phthalates (For Phthalates list, Please refer to AFIRM RSL)	Various	Usage ban [TR=100]	Sample preparation for all materials: CPSC-CH-C1001-09.4 Measurement: Textiles: GC-MS, EN ISO 14389 (7.1 Calculation based on weight of print only; 7.2 Calculation based on the weight of print and textile if a print cannot be removed). Plastics: EN 14372 Other Materials: GC-MS
PFASs (Perfluoroalkyl / Polyfluoroalkyl Substances) (refer Appendix-1)	Various	Usage ban [TR=1]	EN ISO 23702-1

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SECTION – 3

LS&Co. RSL EXPECTATIONS AND BEST PRACTICE FOR CHEMICAL COMPLIANCE

LS&Co. RSL EXPECTATIONS AND BEST PRACTICE FOR CHEMICAL COMPLIANCE

LS&Co. requires that all "Products, Materials, Chemicals and Other Goods" from Suppliers and Sources comply with:

1. The AFIRM RSL requirements.
2. Additionally, LS&Co. Priority chemicals List and RSL Usage ban policy (Section-2)
3. Emerging chemical issues policy (Appendix -4).
4. Any applicable law of any country and jurisdiction in which the Supplier or Source conducts business and in any jurisdiction in which it ships Materials, Chemicals or Other Goods. In addition, each Supplier is similarly responsible and also liable to LS&Co. for ensuring that each of its Sources similarly complies with this RSL and the aforesaid applicable laws.

Managing chemical compliance for LS&Co. is not just a case of testing products before they go on sale. There is a requirement to put systems in place for managing chemical inputs and manufacturing processes such that there is an expectation that product chemical compliance will be achieved

LS&Co. considers that to ensure chemical compliance the three key areas to manage are:

- Chemical formulations
- Components / Materials (textiles, leather, trims, and so on)
- Production facilities

Certain independent certification schemes can also be used to confirm compliance with one or more of these three key areas and details are provided in Table A & C below.

LS&Co. does not operate a single design, specification, and sourcing model, but there are fundamental steps that must be undertaken to bring any product to market and key pieces of good practice that must be implemented to ensure RSL

For any product to be manufactured and put on sale the following steps have to be carried out – depending on the specific model being employed, these steps may be individual or combined and they may be carried out by LS&Co. teams, Suppliers, or Sources.

- Innovation - to develop new materials, new processes, or new product looks or aesthetics
- Product Design and Development with technical Specification - of materials and products
- Sourcing - of chemical formulations, materials, and finished products
- Component Manufacture
- Product Assembly

Advice for ensuring chemical compliance at all stages of the design and buying process is provided in Table B below.

Table A – GUIDE FOR SELECTION OF CHEMICALS, COMPONENTS AND FACILITIES FOR RSL COMPLIANCE

The information in the table below should be used as a guide when selecting or evaluating chemicals, components, and facilities to avoid chemical non-compliance.

Specific business processes, standards, and expectations are likely to change over time and readers should always familiarize themselves with current LS&Co. business requirements.

	Not Permitted	Minimum Expectations	Preferred
Chemicals and Formulations Example:- • Dyes • Pigments • Auxiliaries • Finishing chemicals • Printing inks • Adhesives • Commodity chemicals	• Formulations that contain LS&Co. priority chemicals RSL Usage ban list including Antimicrobials, PFAs, Flame retardants, Endocrine disruptors, Skin Sensitizers, CMRs, PBTs • Formulations that are non-conformant to ZDHC MRSL • Intentional use of Chemicals that are restricted on the AFIRM RSL or ZDHC MRSL ***Higher Risk – Care Advised** • Formulations and processes that are not verified for RSL • Formulations that are not screened or confirmed as MRSL compliant • Formulations from suppliers who cannot provide SDS, TDS, and Compliance Declarations	• LS&Co. Chemical Information Log declaration (CIL) • Material safety data sheets • Technical data sheets • Screened Chemistry certificate, including Commodity Chemicals screening • Comply with LS&Co.Priority chemical policies of RSL usage ban, Emerging issues, Antimicrobials, PFAs, Flame retardants, etc	• Formulations that are known to be RSL compliant and have existing screening information • MRSL conformance certifications • ECO PASSPORT by OEKO-TEX®
Components / Materials Example:- • Textile materials • Leather materials • Metal, non-metal components	**Prohibited materials, processes** • Market materials (from unknown manufacturers or local sources) • PVC • DMFu coated desiccants • Wax coating • PFAS based Durable water repellent (DWR) finishes ***Higher Risk – Care Advised** • Components or materials that are not verified for RSL • PU leather • Leather (coated / uncoated) • Textiles with a performance finish • Coated textiles • Pigment printed textiles • Trims (metal, plastic, textile) • Man-made leaded crystals	• Do not use any materials that are banned by LS&Co. • Follow LS&Co. RSL test protocols during development and productions per season	**Certifications** • STANDARD 100 by OEKO-TEX® • LEATHER STANDARD by OEKO-TEX® • GOTS for organic • GRS for recycled • Any other industry certifications, consult with LS&Co. Product safety team before use **Materials and Processes** • Components or Materials that are verified for RSL and have valid test reports and CIL declarations • Water-based coatings • Water-based binders • Water-based PU leather • Canopy viscose with Green shirt ranking • Canopy Lyocell • PFAS-free water repellents • Dope dye

Material where there is a point of sale claim of specific sustainability attributes e.g. • Organic Materials • Leather materials • Recycled materials	Any material or product without appropriate 3rd party certification	• Follow LS&Co. RSL test protocols during development and productions per season • OCS - Organic Content Standard • GRS Global Recycling Standard or RCS Recycled Claim Standard Note: Certificates are required to verify all sustainability product claims, consult with LS&Co. PD&S and Sustainability contacts for more details	• MADE IN GREEN by OEKO-TEX® certification • Leather working Group (LWG) certification with a Gold rating
Facilities Example:- • Cut and Sew units • Dyeing mills • Laundries • Printing units • Tanneries	• Do not meet LS&Co. Sustainability standards criteria https://www.levistrauss.com/wp-content/uploads/2021/09/LSCO_Sustainability_Guidebook.pdf ***Higher Risk – Care Advised** • Facilities that cannot demonstrate competence in chemical management • No 3rd party certifications to demonstrate competence in chemical management • Facilities with historical RSL failures	• Execute annual LS&Co. RSL agreements • Complete online RSL self-assessments • File and provide necessary information downstream as appropriate (full recipe details, SDS, TDS, CIL declarations, appropriate certifications, and test reports	• STeP by OEKO-TEX® • GOTS certified • GRS certified • Verified Higg FEM • LWG Gold rating • Working toward Clean Chain and InCheck inventory reporting with ZDHC MRSL compliant chemistry

Table B – Summary of Requirements with Best Practice to the Buying Process

<table>
<tr><th>Innovation</th><th>Design</th><th>Product Development - Technical Specification</th><th>Sourcing</th><th>Component Manufacture</th><th>Product Assembly (and industrial laundry and printing)</th></tr>
<tr><td colspan="6">

Execute applicable RSL agreements before business engagement with Suppliers and Sources
Communicate RSL standards to all Suppliers and Sources and chemical suppliers involved in component and product manufacture
Use only chemicals, formulations, components, and facilities that have previously been used and proven to meet RSL standards
Never specify chemicals, formulations, components, or facilities that are not permitted or do not meet minimum RSL requirements
If new formulations, components, or facilities are used, try to use those covered by appropriate 3rd party certifications
If non-certified formulations, components, or facilities are proposed, ensure that appropriate assessments are conducted before use to verify conformance with minimum RSL requirements
Ensure all information on facilities, materials, chemical recipes, processes, formulations, certifications, and test reports is recorded and kept on file
Ensure that any products whose attributes are to be promoted as at the point of sale have the appropriate certifications to verify marketing claims

</td></tr>
<tr><td>Ensure all materials and chemical inputs meet LS&Co. RSL requirements before trials commence.</td><td>Specify known, RSL compliant components, processes, and formulations as much as possible
Highlight the need for chemical compliance on all designs/tech packs
Test materials as per RSL testing guide
Consult with LS&Co. product safety team as needed</td><td>Use previously used RSL compliant facilities where possible
Communicate detailed requirements for new, proposed facilities and ensure they're understood on RSL obligations before proceeding
Consult with LS&Co. Product safety team for factory training needs and RSL downloads</td><td>Ensure the availability of full recipe details, SDS, TDS, CIL declarations, appropriate certifications, and test reports at every stage of product development and manufacture</td><td>Ensure all components are RSL tested and in compliance before assembly
Ensure all components and formulations used in assembly are RSL compliant
Ensure all formulations used in laundry and printing processes are RSL compliant</td><td></td></tr>
</table>

DECISION TREE FOR THE SELECTION OF COMPONENTS AND FACILITIES FOR RSL COMPLIANCE

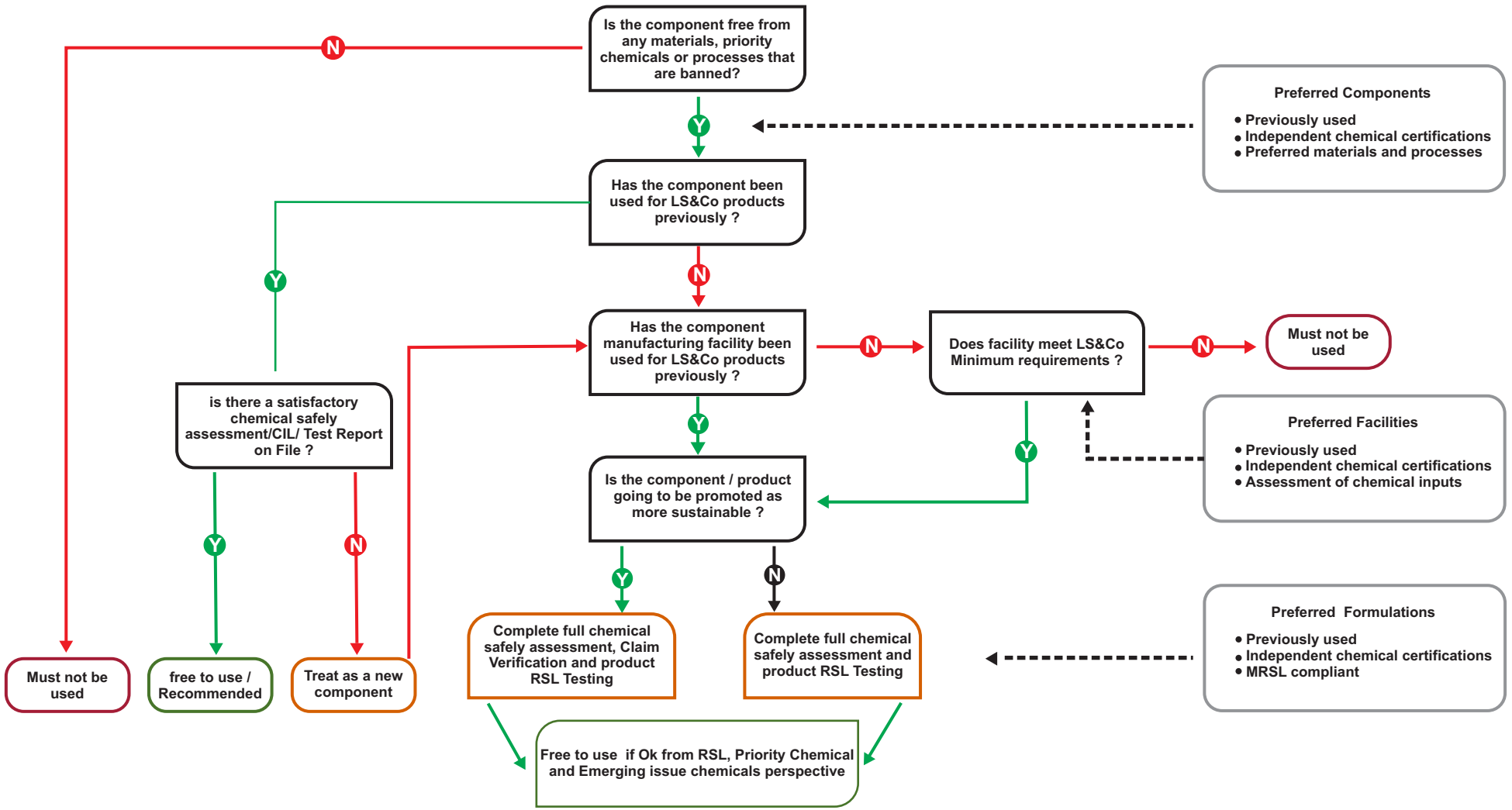

Table C – Schemes/Certifications

Scheme/ Certification	Main Focus	LS&Co. Risk Mitigation	Comments
Screened Chemistry	Hazard Assessment methodology for full formulation review	Chemical hazard assessment performed by authorized 3rd party toxicology organization. Contact LS&Co. Sustainability team for more details	Requires Screened Chemistry certificate and is an approved ZDHC MRSL conformance program.
ZDHC MRSL	Chemical Inputs / Formulations	MRSL conformance certifications	Multiple levels 1 -3 with 1 being a verification test, 2 being a test and review of a chemical manufacturer's operating practices, and 3 requiring an on-site visit
ZDHC InCheck report	Facility Inventory	-	100% of chemical inventory to be MRSL compliant
ECO PASSPORT by OEKO-TEX®	Inputs / Chemical Formulations	Certified formulations lower risk of RSL failure for textiles/leather/components	ECO PASSPORT by OEKO-TEX® limits are protective of STANDARD 100 limits on textiles/leather/components and align with ZDHC
STeP by OEKO-TEX®	Facility assessment including chemical management (including inventories), environmental management/performance (including effluent), health and safety, social responsibility, and quality management	STeP by OEKO-TEX® facilities are lower risk	MRSL and effluent requirements for STeP by OEKO-TEX® are closely aligned with ZDHC

Higg FEM	Includes a chemical evaluation module for which there is a score	Independently verified FEM chemical module scores indicate low risk in terms of RSL failure	Self-reported scores have limited value
GRS (Global Recycling Standard)	Product RSL	GRS certified products are very low risk	GRS is primarily a materials management/chain of custody certification but requires compliance with an RSL
GOTS (Global Organic Textile Standards)	Product RSL	GOTS certified products are very low risk	GOTS also has requirements for chemical inputs and other expectations of the facilities – such as effluent treatment STANDARD 100 by OEKO-TEX®
STANDARD 100 by OEKO-TEX®	Product and component RSL compliance and certification	Very low risk of STANDARD 100 by OEKO-TEX® certified products/textiles/components having an RSL failure	STANDARD 100 by OEKO-TEX® certificates are traceable, require testing, auditing of inventories and managements systems
LEATHER STANDARD by OEKO-TEX®	Product and leather RSL compliance and certification	Very low risk of LEATHER STANDARD by OEKO-TEX® certified products/leather having an RSL failure	LEATHER STANDARD by OEKO-TEX® certificates are traceable, require testing, auditing of inventories and managements systems
MADE IN GREEN by OEKO-TEX®	Product and component certification that combines STANDARD 100 by OEKO-TEX® and STeP by OEKO-TEX®	Strongly encouraged by LS&Co.	MADE IN GREEN by OEKO-TEX® provides traceable messaging to consumers that the product has been tested for harmful substances, made in environmentally friendly facilities, and produced in safer and socially responsible workplaces
ZDHC ClearStream report	Effluent Output for a facility		An indication that no restricted substances are present in waste streams
LWG (Leather Working Group)	Facility assessment for tanneries and leather finishing that includes chemical management	Recommended that 'Gold rated' tanneries are used as these indicate low risk in terms of RSL failure	LWG operates gold, silver, and bronze rating for the better tanneries

SECTION – 4

MATERIALS AND PROCESSES – SPECIFIC RISKS AND MITIGATION

MATERIALS AND PROCESSES – SPECIFIC RISKS AND MITIGATION

This section considers common material types, common processes types, and the chemical risks associated with them. It also considers what can be done to mitigate risks and alternative materials, and processes that can be specified to reduce RSL risks further.

The aim is to provide information that enables a greater understanding of higher and lower risk materials and processes and information to those using chemicals on how to avoid RSL failure.

The following 3 tables give a general overview of components used in the production of LS&Co. products. More details on specific materials, processes, and specific risks and mitigation are provided later in this section. Any single component can cause a product failure. All failures have to be treated with equal importance.

Table A – General overview of components used in the production of LS&Co. products

Clothing	e.g. Shirts, Trousers, Underwear, Coats, Denim, Knits and Sweaters, Leather garments
Main Materials	e.g. Textiles (dyed, printed, finished, coated), Leather (dyed, printed, coated), Mock Leather, Recycled Textiles and Leather
'Main' Materials used as Trims	e.g. Threads, Pocketing, Woven Lining, Knit Lining, Labels, Badges and Patches, Care Labels, Tapes, Stretch Inserts, Adjustable Waistbands, Laces, Drawstrings, Interlinings, Elastics, Embroidery
Non-Metal/Plastic Trims	e.g. Buttons, Buckles, Decorative Studs, D-Rings, Eyelets/Grommets, Toggles, Tipping / Aglets
Metal Trims	e.g. Buttons, Snaps, Rivets, Buckles, Hook and Bar, Studs, Eyelets/Grommets, Toggles, Aglets, D-Rings, Tipping
Other / Multiple Materials	e.g. Zippers, Sew-on Crystals, Rhinestones, Sequins, Beads, Stickers, Heat Transfer Embellishments, Foams, Tapes, Visible Trims such as Stretch Inserts, Maternity Panels, Hook & Loop Fasteners, PolyFills used in Jackets

Footwear	e.g. Shoes, Sneakers, Boots, Sandals
Upper Materials	e.g. Natural/Synthetic Leather (dyed, coated, printed), Textiles (dyed, printed, coated, finished), Plastics, PU leather, and Recycled leather
Lining / Sock Materials	e.g. Leather, Textiles
Soles	e.g. TPU, PU, EVA, Rubber, ABS, Leather
'Main' Materials used as Trims	e.g. Threads, Woven Lining, Knit Lining, Labels, Badges and Patches, Care Labels, Tapes, Laces, Interlinings, Elastics, Embroidery, Zippers
Metal Trims	e.g. Eyelets, Aglets
Plastic Trims	e.g Eyelets, Aglets, Motifs
Other	e.g Foams, Glue, Adhesives and Desiccants

Accessories	e.g. Belts, Suspenders, Backpacks, Wallets, Caps, Eye Wear Products, Tote, Duffle and Handbags, Bandanas, Gloves, Scarf, Mugs, Watches, (Electrical: Batteries, Portable Chargers, Power Banks, Bluetooth devices)
Main Materials	e.g. Leather (dyed, coated, printed), Textiles (dyed, printed, coated, finished), Plastics, PU leather, Ceramics
'Main' Materials used as Trims	e.g. Threads, Woven Lining, Knit Lining, Labels, Badges and Patches, Care Labels, Tapes, Laces, Drawstrings, Interlinings
Plastic Trims	e.g. Buttons, Buckles, Decorative Studs, D-rings, Eyelets/Grommets, Toggles, Tipping / Aglets
Metal Trims	e.g. Buttons, Snaps, Rivets, Buckles, Hook and Bar, Studs, Eyelets/Grommets, Toggles, Aglets
Other	Foams
Electrical/ Electronics	Batteries, portable chargers, power banks, Bluetooth devices

Additionally, packaging has to be considered including the following items:

Packaging	E.g. Hang Tags, Flashers, UVM Stickers, Boxes/Cartons, Labels, Adhesives, Tapes, Poly Bags

Table B – Chemical Risks Associated with Specific Material Types

The table below lists materials that are commonly used in LS&Co. Products and the most common chemical risks.

The list is not exhaustive and does not include chemicals that are very unlikely to be used (deliberately or inadvertently) or detected.

When considering a component, it is impossible to fully disassociate materials and processes (e.g., PU mock leather can be considered as a material in its own right or as a textile with a thick coating applied). Base materials have very limited chemical risks. It is generally the chemicals that are placed on them or within them that are of concern.

The materials listed in the table below are 'standard' materials without any special finishes, processes or techniques applied. To assess the risks of blends it is necessary to consider multiple rows.

This table should be read in conjunction with the process risk table (later in this section) which provides details of the chemical risks associated with processes.

The AFIRM RSL also provides details on specific risks and testing requirements.

Material	Specific Type	Most Common Failures
Dyed Textiles Dyed with standard dyes, no performance finishes applied	Applies to all fiber types	• APEOs from process chemicals such as detergents, wetting agents, etc. • AZO AMINES from dyestuffs (darker colors higher risk – whites no risk)
	+Viscose	• FORMALDEHYDE (from undeclared Anti-pill or shrink-proof finish)
	+Polyester	• ALLERGENIC DISPERSE DYES (dark colors are higher risk – whites no risk)
	+Nylon / Silk	• EXTRACTABLE HEAVY METALS (from Metal-complex dyestuff)
	+Wool	• CHROME VI in rare instances where old generation 'after chrome' dyes are used • EXTRACTABLE HEAVY METALS (from Metal-complex dyestuff)
	Recovered Fibers mechanically recovered from pre-or post-consumer waste e.g. Cotton / Wool	• Same risks as virgin fibers
	Recycled Fibers fiber recovered via depolymerization / re-polymerization, melting, or dissolution before fiber extrusion e.g. Polyester / Nylon / Lyocell	• Same risks as virgin fibers

Denim Dyed with indigo dye and bleached/ washed	Cotton / Lyocell / Hemp	• APEOs from Process chemicals such as detergents, wetting agents, etc • RESIDUAL CHLORINE / OZONE creating odor
Metal Yarns		• NICKEL from metals/alloys • LEAD from metals/alloys • CADMIUM from metals/alloys
Metallised Yarns (e.g. Lurex)		• PVC from films • PHTHALATES from films
Leather	Dyed,**Uncoated**	• CHROME VI formed from chrome salts used in tanning • APEOs from process chemicals such as detergents, degreasing agents,etc • AZO AMINES from dyestuffs (darker colors higher risk) • CHLORINATED PARAFFINS from processing • OPP used as a preservative • ISOTHIAZOLINONE as a preservative
	Coated	• Same risks as dyed leather • Plus risks associated with coatings - See process table below
	Recycled from process waste, composite of shredded discarded leather	• Same risks as dyed leather • APEOs

PU Mock Leather		• APEOs from process chemicals such as detergents, wetting agents, dispersing agents, etc • AZO AMINES from dyestuffs (dark fabric colors are higher risk) • ALLERGENIC DISPERSE DYES for the polyester base (dark colors are higher risk)Coating: • APEOs from chemicals coating formulation • AZO AMINES from pigments • PVC (it is banned by LS&Co. but could be used or present as a contaminant) • PHTHALATES if PVC /PU is used or present as a contaminant • DMFa from solvent-based PU coating • LEAD and CADMIUM in pigments or polymer stabilizers • ISOCYANATES in PU
Plastics / Polymers e.g. Used as plastics, coatings, films	All polymer types	• LEAD and CADMIUM in pigments
	PU / TPU	• ISOCYANATES • Phthalates • Organotins • DMFa from Solvent-based PU coating
	ABS	• Organotins • STYRENE MONOMER
	EVA	• The odor from Formamide, Acetophenone, and 2-Phenyl-2-Propanol • Phthalates • Organotins
	Polycarbonate	• Organotins • BISPHENOL A
Rubber		• LEAD and CADMIUM in pigments • Phthalates • Organotins • Poly Aromatic Hydrocarbons (PAHs) • Chlorinated paraffins (SCCP & MCCP)
Metal		• LEAD • CADMIUM • NICKEL (release)

Elastics		• Same risks as Nylon / Elastane fabrics • APEOs from process chemicals such as detergents, wetting agents etc • AZO AMINES from dyestuffs (darker colors higher risk – whites no risk) • EXTRACTABLE HEAVY METALS (from metal-complex dyestuff)
Foams		• The risk depends on polymer type – see Plastics / Polymers
Polyfills		• APEOs • Dye related risks – if dyed
Packaging		• See AFIRM Packaging RSL

Table C – Chemical Risks Associated with Specific Processes

The table below contains details of processes that are commonly applied to components and products to create LS&Co. designs and their possible chemical failures. Detailed information on avoidance of failure is provided after this table.

Dyeing			
Process / Dye Type	**Fiber Type**	**Substrate Type**	**Possible Chemical Failures / Issues**
Reactive	Cotton Linen Viscose Hemp	Fibers Yarns Fabrics Garments	▪ AZO AMINES – from old generation azo dyes ▪ APEOs from process chemicals such as detergents, wetting agents, etc.
Vat/ Sulphur	Cotton Linen Viscose Hemp	Fibers Yarns Fabrics Garments	▪ APEOs from process chemicals such as detergents, wetting agents, etc.

Disperse	Polyester	Fibers Yarns Fabrics	▪ AZO AMINES – from old generation azo dyes ▪ APEOs from process chemicals such as detergents, wetting agents, dispersing agents, etc. ▪ ALLERGENIC DISPERSE DYES – from old generation dyes ▪ CHLORO ORGANIC CARRIERS – where polyester is dyed at low temperatures in open vessels (e.g. laces, trims)
Acid	Nylon Silk	Fibers Yarns Fabrics	▪ AZO AMINES – from old generation azo dyes ▪ APEOs from process chemicals such as detergents, wetting agents, etc. ▪ Tiny risk of 'other harmful dyes' from use of old generation dyes
Acid	Wool	Fibers Yarns Fabrics Garments	▪ AZO AMINES – from old generation azo dyes ▪ APEOs from process chemicals such as detergents, wetting agents, etc. ▪ Tiny risk of 'other harmful dyes' from use of old generation dyes
Basic	Acrylic	Fibers Yarns Garments	▪ AZO AMINES – from old generation azo dyes ▪ APEOs from process chemicals such as detergents, wetting agents, etc.
Direct	Cotton Linen Viscose Hemp	Garment	▪ AZO AMINES – from old generation azo dyes ▪ APEOs from process chemicals such as detergents, wetting agents, etc. ▪ Tiny risk of 'other harmful dyes' from use of old generation dyes
Pigment	Any fiber type	Garment	▪ AZO AMINES – from pigments ▪ APEOs – from process chemicals and binder formulations ▪ LEAD AND CADMIUM from pigments ▪ ISOCYANATES from PU binders
Denim (Raw unwashed)	Cotton Lyocell Hemp	Yarns	▪ APEO – from process chemicals such as detergents and wetting agents
Spray Dye	Any fiber using dyes or pigments	Garments	▪ Risks are related to the dye type or pigments used (see previous entries) ▪ Worker exposure to spray must be managed

Tie-Dye	Any fiber, usually: Cotton Nylon	Garments	• Risks related to the dye type (see previous entries)
Dyeing with natural dyes and pigments	Cotton	Fibers Yarns Fabrics Garments	• Risk of Heavy metals from Mordants (dye fixatives) • APEOs from process chemicals such as detergents, wetting agents, etc.

Finishing

Process	Fiber Type	Substrate Type	Possible Chemical Failures / Issues
Softeners (general)	Any fiber type	Fabrics Garments	• APEOs – from finish formulations
Softeners (silicone)	Any fiber type	Mainly fabrics	• APEOs – used as emulsifying agents and wetting agents in finish formulations • CYCLIC SILICONES can be present (C4, C5, C6)
Durable Water Repellent	Any fiber type	Mainly fabrics	• **PFAS – Any fluorine-containing organic chemicals that are used in the process of manufacturing to impart properties such as water repellency or others to the final products are not allowed to be used in LS&Co. (refer LS&Co. PFAS policy)** • APEOs – used as emulsifying agents and wetting agents in finish formulations
Soil and Stain Repellent	Any fiber type	Mainly fabrics	
Resin (wrinkle-free/easy care)	Typically:CottonLinen	Fabrics Garments	• FORMALDEHYDE – from resins • Plus softener risks and APEOs if resins combined with softeners
Resin (anti-pill)	Viscose	Fabric	• FORMALDEHYDE – from resins • Plus softener risks and APEOs if resins combined with softeners

Resin (handle modification)	Any fiber type	Fabrics Garments	• FORMALDEHYDE – from resins • Plus softener risks and APEO's if resins combined with softeners
Anti-microbial	Any fiber type	Mainly fabrics	• **Any biocide used to impart properties to the final products is not allowed to be used in LS&Co. In case of requested biocide finishing by LS&Co. used biocides have to be approved acc. to EC 528/2012 and approval of LS&Co. product safety is required**
Temperature control	Any fiber type	Fabrics	• APEOs in binder formulations • ISOCYANATES in PU binder formulations
Flame Retardants	Any fiber type	Fabrics	• **No Flame Retardants are allowed on LS&Co. products.**
Moisture Wicking	Any fiber type	Fabrics	• APEOs in binder formulations • ISOCYANATES in PU binder formulations
Textile Coating	Any fiber type	Fabrics	• AZO AMINES – from pigments. • APEOs – from coating formulations • LEAD AND CADMIUM from pigments • ISOCYANATES from PU coating • ORGANOTINS from PU coating • PVC and PHTHALATES from PVC coating • SOLVENTS (various chemicals depending on coating type) • **Melamine based resins are a) prohibited for use at coating, and b) require LS&Co. Product safety approval before use as cross-linker**
Leather Coating (general)	Leather		• AZO AMINES – from pigments. • APEOs – from coating formulations • LEAD AND CADMIUM from pigments • PVC and PHTHALATES from PVC binders • SOLVENTS

Leather Coating (PU)	Leather		• General risks plus: • ISOCYANATES from PU binders. Use of blocked diisocyanates (oxime/pyrazole- or self-blocked) based on any other diisocyanates and pre-polymers (then listed) on the garment/fabric finishes and/or prints needs prior approval from LS&Co. Product safety • ORGANOTINS from PU coating • N, N Dimethylformamide from PU binders
Leather Coating (Wax)	Leather		• General leather risks plus: • APEOs • Chlorinated paraffin • Glycols • Phthalates
Leather Coating (Acrylic Top)	Leather		• General leather risks plus: • Glycols • Phthalates
Leather Coating (PU)	Leather		• General leather risks plus: • Organotins • Diisocyanates • Phthalates
Leather Coating (Nitrocellulose)	Leather		• General leather risks plus: • APEOs • Glycols • Phthalates

Laundry and Denim Finishing

Process	Substrate type	Possible Chemical Failures / Issues
Denim Wash / Bleach	Denim Garments	• RESIDUAL ODOUR from chlorine bleach • APEOs from process chemicals such as detergents, wetting agents, and softeners
Softener wash	Dyed Garments – Any fiber type	• APEOs from process chemicals such as detergents, wetting agents, and softeners

PP Spray	Denim Garments	• Worker exposure to spray must be managed via PPE and water curtains
Sandblasting	Denim Garments	• NOT PERMITTED
3D Resin	Denim Garments	• FORMALDEHYDE from resins
Hand scraping	Denim Garments	• Worker exposure to dust must be managed
Laser Etching	Denim Garments	• Worker exposure to fumes must be managed • Safety interlocks must be operational to prevent laser burns
Dipping and Sponging localized bleaching	Denim Garments	• Risks depend on chemicals used (PP or chlorine)
Ozone Treatment	Denim Garments	• Residual OZONE odor • APEOs from process chemicals such as detergents, wetting agents, and softeners

Printing

Process	Fiber Type	Substrate Type	Possible Chemical Failures / Issues
Reactive (Screen and digital)	Cotton Linen Viscose Hemp	Fabric AOP	• AZO AMINES – from old generation dyes • APEOs from process chemicals such as detergents, wetting agents, etc • Antimicrobials (various) from print pastes

Disperse (Screen and Sublimation)	Polyester	Fabric AOP	• AZO AMINES – from old generation dyes • APEOs from process chemicals such as detergents, wetting agents, etc. • ALLERGENIC DISPERSE DYES – from old generation dyes • Tiny risk of 'other harmful dyes' from use of old generation dyes • Antimicrobials (various) from print pastes
Acid (Screen and digital)	Nylon Wool	Fabric AOP Garment	• AZO AMINES – from old generation dyes • APEOs from process chemicals such as detergents, wetting agents, etc. • Tiny risk of 'other harmful dyes' from use of old generation dyes • Antimicrobials (various) from print pastes
Pigment (Screen and digital)	Any fiber type	Fabric AOP Panel Garment	• AZO AMINES – from pigments • APEOs – from print formulations • LEAD AND CADMIUM from pigments • ISOCYANATES from PU binders • PVC and PHTHALATES from PVC binders • SOLVENTS • FORMALDEHYDE from binders • ORGANOTINS from PVC and PU binders • N, N Dimethylformamide from PU binders
Plastisol (Screen)	Any fiber type	Panel Garment Footwear Accessories	• Plastisol inks are prohibited in LS&Co. Products. All non-PVC inks must be phthalates and PVC-free • AZO AMINES – from pigments • APEOs – from print formulations • LEAD AND CADMIUM from pigments • ISOCYANATES from PU binders • PVC and PHTHALATES from PVC binders • SOLVENTS • Organotin from PVC and PU binders

Glitter (Screen – 'glitter-in-ink' or glitter sprinkled onto printed adhesive)	Any fiber type	Fabric AOP Panel Garment	• ISOCYANATES from PU binders • APEOs – from print formulations • PVC and PHTHALATES from PVC binders • SOLVENTS for binders • SOLVENTS from adhesives • Organotin from PVC and PU binders
Puff (Screen)	Any fiber type	Panel Garment Footwear Accessories	• AZO AMINES – from pigments • APEO – from print formulations • LEAD AND CADMIUM from pigments • ISOCYANATES from PU binders • PVC and PHTHALATES from PVC binders • SOLVENTS • ORGANOTINS from PVC and PU binders
Foil (Screen – foil applied to the printed adhesive)	Any fiber type	Fabric AOP Panel Garment Footwear Accessories	• PVC and PHTHALATES from foil 'films' • SOLVENTS from adhesives • ISOCYANATES in PU adhesives • FORMALDEHYDE in adhesives • ORGANOTINS from PVC and PU binders
Flock (Screen – 'flock-in-ink' or more commonly sprinkled onto printed adhesive)	Any fiber type	Fabric AOP Panel Garment Footwear Accessories	• AZO amines in flock fiber • APEOs on flock fibers (from upstream dyeing) • SOLVENTS from adhesives • ISOCYANATES in PU adhesives • FORMALDEHYDE in adhesives
Heat transfer pre-printed films	Any fiber type	Panel Garment Footwear Accessories	• PVC and PHTHALATES • LEAD and CADMIUM from pigments • AZO AMINES from pigments • Organotin from PVC

Pigment discharge (screen)	Cotton Viscose	Fabric AOP Panel	• AZO AMINES – from pigments • APEOs – from printing formulations • LEAD AND CADMIUM from pigments • ISOCYANATES from PU binders • PVC and PHTHALATES from PVC binders • SOLVENTS • FORMALDEHYDE from binders or reducing agents
Sublimation (digitally printed papers)	Polyester	Fabric AOP Panel	• AZO AMINES from old generation dyes (low risk if transfer papers are inkjet printed)
Reflective (Screen)	Any fiber type	Panel Garment Footwear Accessories	• AZO AMINES – from pigments • APEOs – from printing formulations • LEAD AND CADMIUM from pigments • ISOCYANATES from PU binders • PVC and PHTHALATES from PVC binders • SOLVENTS • FORMALDEHYDE from binders
Beads (Screen – beads applied to adhesive print)	Any fiber type	Panel Garment Footwear Accessories	• AZO AMINES – from pigments • APEOs – from process chemicals • LEAD AND CADMIUM from pigments • ISOCYANATES from PU binders • PVC and PHTHALATES from PVC binders • SOLVENTS • FORMALDEHYDE from binders
Printing – Photo printing (CMYK) (Screen)	Any fiber type (mainly cotton)	Panel Garment	• AZO AMINES – from pigments • APEOs – from print formulations • LEAD AND CADMIUM from pigments • ISOCYANATES from PU binders • PVC and PHTHALATES from PVC binders • SOLVENTS • FORMALDEHYDE from binders

Glow in the dark	Any fiber type (mainly cotton)	Panel Garment Footwear Accessories	▪ AZO AMINES – from pigments ▪ APEOs – from binder formulations ▪ LEAD AND CADMIUM from pigments ▪ ISOCYANATES from PU binders ▪ PVC and PHTHALATES from PVC binders ▪ SOLVENTS ▪ FORMALDEHYDE from binders
Gel	Any fiber type		▪ AZO AMINES – from pigments ▪ APEOs – from print formulations ▪ LEAD AND CADMIUM from pigments
Silicone Ink	Any fiber type	Panel Garment Footwear Accessories	▪ AZO AMINES – from pigments ▪ APEOs – from binder formulations ▪ LEAD AND CADMIUM from pigments

Leather Processing

Process	Possible Chemical Failures/Issues
Chrome Tanning	▪ CHROME VI formed via oxidation of Chrome III salts used in tanning ▪ AZO amines from old generation dyes ▪ SCCPs used as softeners ▪ OPP as a preservative (permitted but restricted) ▪ APEOs from process chemicals such as degreasing agents,detergents, etc
Veg Tanning	▪ AZO amines from old generation dyes ▪ SCCPs used as softeners ▪ OPP as a preservative (permitted but restricted) ▪ APEOs from process chemicals such as degreasing agents,detergents, etc.

Leather Coating (general)	▪ AZO AMINES – from pigments ▪ APEOs – from coating formulations ▪ LEAD AND CADMIUM from pigments ▪ PVC and PHTHALATES from PVC binders ▪ SOLVENTS
Leather Coating (PU)	▪ General risks plus: ▪ ISOCYANATES from PU binders. Use of blocked diisocyanates (oxime/pyrazole- or self-blocked) based on any other diisocyanates and pre-polymers (than listed) on the garment/fabric finishes and/or prints needs prior approval from LS&Co. ▪ ORGANOTINS from PU coating ▪ N, N Dimethylformamide from PU binders
Leather Finishing (waxes, creams, polish)	▪ Chlorinated paraffin from wax finish Aniline leather (dyed followed by thin protective coating PU/Silicone), Coated leather [coating thickness more than 0.15 mm-PU Coating], Metallic Coated leather [metal emulsion applied onto the leather for shiny appearance], Nubuck leather (surface is abraded to give soft, velvet-like feel], Oil leather [leather surface treated with oil/wax emulsion], Patent leather [high gloss surface finish imparted generally using linseed oil], Pigmented leather [leather surface contain coating for pigment], Suede leather [surface is sanded to give leather velvet-like feel]

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Avoiding Failures – Generic

Some steps can be taken by a designer and product developers in terms of creating products with lower risk materials and processes and the designer and product developers should try to ensure that higher-risk components are sourced from lower risk component manufacturers

However, the key to avoiding RSL failures is good chemical management practice in the component manufacturing facility, including:

- A full written chemical inventory
- Chemicals sourced from reputable chemical suppliers
- The use of ZDHC MRSL compliant chemicals
- LS&Co. Screened Chemistry program compliant formulations
- SDS for all chemicals and formulations, providing an indication of all hazardous chemicals above certain limits
- Technical data sheets for all chemicals and formulations, providing details of how they should be used – minimizing chances of inadvertent formation of unwanted chemicals and/or incomplete reactions
- CIL Declarations of conformance from chemical suppliers
- Details of MRSL compliance and/or independent certifications where appropriate
- Full written recipes with details of all formulations and commodity chemicals
- Standard Operating Procedures for all processes
- RSL Failure analysis protocols
- Independent certifications to demonstrate competence in chemical management
- Spot checks on incoming formulations for RSL/MRSL compliance
- Spot checks on incoming raw materials for RSL compliance
- RSL checks on finished products
- CIL created for all formulations used in the manufacture of a component

Table D – Avoiding Failure/Corrective Action – Chemical Specific

The table below gives details of where commonly detected restricted substances may be found and how they can be avoided.

This table is predominantly of use for failure analysis and corrective actions plans

Chemical	Where the chemical/s can be found	How it can be avoided?
Allergenic Disperse Dyes	A small number of disperse dyes for dyeing polyester are categorized as allergenic/skin sensitizing	• Working with reputable dye suppliers • Working with formulations that are ZDHC MRSL Compliant • Review CIL and TDS of dyestuff and check with skin sensitizer database
Anti-microbials	These are deliberately applied to give consumer benefits such as anti-odor (e.g. silver compounds, quaternized silicones). They can be used as preservatives for greige to protect it from mold during storage and transportation (e.g. Penta or tetra-chlorophenol). They can be legitimately used to preserve formulations (various approved chemical types)	• Any biocide used to impart properties to the final products is not allowed to be used without prior approval of LS&Co. • In case of requested biocide finishing by LS&Co. used biocides have to be approved acc. to EC 528/2012 and approval of LS&Co. Product safety team. • Do not use them intentionally! Check incoming greige for traces of preservatives
APEOs	APEOs are chemicals that are used as detergents, wetting agents, and emulsifying agents. They can be used in 100% form as detergents or at lower levels in multiple types of formulation such as dispersing agents, softeners, coatings, dyebath lubricants, and degreasing agents. APEOs can remain on a substrate after processing or partial processing	• Working with reputable dye suppliers • Working with formulations that are ZDHC MRSL Compliant • Check incoming greige and partially treated substrates (e.g. P4P fabrics)
Azo Amines	Many azo dyes can split to form carcinogenic amines. These tend to be older generation dyes but cover reactive, direct, acid, and disperse dye types so all fiber types can be affected. Denim is not affected unless overdyed with direct dyes. 3,3'– dichlorobenzene has been reported to be found when printing using a combination of Pigment Black 7 with either Pigment Orange 13 or Pigment Orange 34. This combination of pigments shall be subjected to the listed usage bans.	• Working with reputable dye suppliers • Working with formulations that are ZDHC MRSL Compliant

Chloro organic Carriers	Chemicals used to dye polyester at room temperature. Normally polyester is dyed at 130°C but it is sometimes dyed in open vessels at lower temperatures using these carriers.	• Only use suppliers with high temperature, pressurized machinery
Chrome VI	Chrome III salts are used for leather tanning but if conditions are wrong they can convert to Chrome VI for which is toxic, sensitizing, and carcinogenic. Chrome VI is very rarely used to fix dyeing on wool in a process called after-fixing.	• Chrome-free tanning can be employed • Managing total extractable chromium is advised as this can convert to Chrome VI – not the chromium involved in cross-linking the leather • Ensuring the pH is managed within recommended limits can help
Cyclic Silicones	Present in some silicone softeners and coatings	• Working with reputable chemical suppliers who can give credible declarations • Not yet on ZDHC MRSL but likely to be on the next revision
Flame Retardants	Flame retardants are deliberately added as a finish to reduce flammability.	• Do not specify them! They are expensive and will rarely be applied to provide something for free
Formaldehyde	Formaldehyde can be present in shrink-proof, easy-care, or anti-pill resins that are applied to cotton, linen, or viscose fabrics. It can be present in old-generation pigment print binders and coating formulations. It can be present in adhesives and impregnated fusings/interlinings.	• Use formaldehyde-free alternatives where possible – where adequate performance can be consistently achieved • Where formaldehyde containing formulations have to be used to give adequate performance ensure curing conditions are correct (pH, time, temperature) • Consider washing products to remove formaldehyde – it is readily soluble
Heavy metals (various)	See separate listings for Lead, Cadmium, and Nickel. Heavy metals can be an integral part of some dyestuffs to provide colorfastness performance – but extractable amounts are low since the metals are bound in. Heavy metals can be used as mordants/fixatives for natural dyes.	

Isocyanates	Isocyanates (or more correctly diisocyanates) are one of the building blocks of polyurethane and, if they are not fully reacted, can be present in PU binders, adhesives, and coatings.	• Use pre-polymerized PU where possible and avoid 2-pack products that have high levels of isocyanate present • Where 2-pack products are used ensure curing conditions are closely controlled (isocyanate:diol ratio, pH, catalyst level, time, temperature)
Lead	Lead can be found in metals components. Lead-based pigments can be used in any end-use that involves pigmentation (printing, coating, plastics, rubber). Lead compounds can be used as a stabilizer for some polymers.	• Working with reputable pigment suppliers • Working with formulations that are ZDHC MRSL Compliant • Checking metal components with ZRF / RSL testing • Use of STANDARD 100 by OEKO-TEX® approved metal and plastic trims
Cadmium	Cadmium can be found in metals components Cadmium based pigments can be used in any end-use that involves pigmentation (printing, coating, plastics, rubber)	• Working with reputable pigment suppliers • Working with formulations that are ZDHC MRSL Compliant • Checking metal components with ZRF / RSL testing • Use of STANDARD 100 by OEKO-TEX® approved metal and plastic trims
Nickel (releasable)	Nickel can be found in metal components Nickel is an integral part of some dye chromophores.	• Working with reputable dye suppliers • Working with formulations that are ZDHC MRSL Compliant Use of STANDARD 100 by OEKO-TEX® approved metal trims
Ortho-phenylphenol (OPP)	OPP is used as a preservative for leather.	• Monitor levels in finished leather • Use LWG medal rated tanneries • Working with reputable leather chemical suppliers • Working with formulations that are ZDHC MRSL Compliant
Organotins	Organotins are occasionally used as an antimicrobial for the preservation of greige. They may also occasionally be used to preserve formulations. Organotins are also used for in-situ catalysis of PU coatings (e.g. rubberized coating of buttons and toggles).	• Working with reputable chemical suppliers • Working with formulations that are ZDHC MRSL Compliant • Avoid the use of 2-pack in-situ polymerization of PU • Conduct RSL checks on incoming greige

PFAS	Used in durable water and stain repellent finishes	• LS&Co.'s PFASs (Perfluoroalkyl / Polyfluoroalkyl Substances) elimination policy: LS&Co.'s goal is to phase out the use of any PFASs in the manufacture and packaging of all of its labeled and distributed products. The new and more restrictive limits set in the RSL are intended as one of the steps directed towards that goal. Any fluorine-containing organic chemicals that are used in the process of manufacturing or packaging of LS&Co. labeled or distributed products to impart properties such as water repellency or others to the final products are not allowed to be used without prior approval of LS&Co. • Do not specify PFAS chemistries! • Working with reputable chemical suppliers for PFAS free formulations such as PU, Silicone, Dendrimer-based repellent chemistries • Working with formulations that are ZDHC MRSL Compliant with a further declaration regarding the absence of ALL PFAS
Phthalates	Phthalates are used to soften PVC plastics, films, and binders. They are mobile (not chemically attached) and used at up to 30% by weight so there is a chance of contamination in facilities that manufacture PVC and non-PVC products – and purportedly Phthalate-free and Phthalate containing products.	• Working with reputable chemical suppliers • Working with formulations that are ZDHC MRSL Compliant • Specify PVC-free and phthalate-free and try to work with facilities that use neither PVC nor phthalates to minimize the chance of contamination
Poly Vinyl Chloride (PVC)	PVC is a polymer used in plastics, films, binders, and coatings. The main concerns are with phthalates rather than PVC itself.	• PVCs and their Vinyl chloride monomers use are banned in LS&Co. products • Working with reputable chemical suppliers for PVC free alternatives • Working with formulations that are ZDHC MRSL Compliant • Specify PVC-free and Phthalate-free and try to work with facilities that use neither PVC nor phthalates to minimize the chance of contamination
Chlorinated Paraffins Short and Medium chain Chlorinated paraffins (SCCP's & MCCP's)	SCCPs and MCCPs are alternatives to phthalates and can be used in PVC to promote 'phthalate-free even though SSCPs are illegal! SCCPs and MCCPs are also used as softeners, flame retardants or as fat-liquoring agents in leather processing.	• Working with reputable chemical suppliers • Working with formulations that are ZDHC MRSL Compliant

N,N-Dimethylformamide (DMFa)	Used as the solvent for PU leather. It is washed out during processing but residues remain.	• Specify water-based PU leather where possible
Solvents (various)	Solvents are used in many different processes and formulations (printing inks, coatings, binders, cleaning products). Nowadays water-based alternatives are available for many processes but introduction can be challenging because of different drying characteristics (too quick or too slow depending on the solvent they are replacing). Some solvents have very poor hazard profiles (e.g. CMR) and others are problematic because their volatility creates high levels in working areas that can exceed maximum exposure limits or create fire/explosion risks. VOCs can create environmental issues if not contained. Solvents are not commonly a product safety issue because they often evaporate or are forcibly evaporated during a drying/curing process but they have to be managed for worker safety and environmental protection.	• Working with reputable chemical supplier • Obtain declarations of solvent content (Solvents are not yet fully included on MRSL) • Specify water-based alternatives where possible

SECTION – 5

ROOT CAUSE ANALYSIS (RCA) AND CORRECTIVE ACTION PLANS (CAP)

ROOT CAUSE ANALYSIS (RCA) AND CORRECTIVE ACTION PLANS (CAP)

LS&Co. aims to achieve 100% product compliance against RSL standards and use safer chemistries in productions. It is very important that factories learn from failures rather than simply remediating or replacing items and moving on. There will always be a reason for the failure and analysis enables future failures to be avoided.

The fundamental cause of an RSL failure is highly likely to be:

- Deliberate use of a restricted substance in a chemical formulation
- Presence as a contaminant in a formulation or commodity chemical
- Cross-contamination in a factory or laboratory
- Formation of a restricted substance during a chemical reaction as part of the manufacturing process
- Chemicals sourced from deceptive sources (off the shelves from the local suppliers)
- The factory is compromising chemical quality in the name of cost savings

Ensuring 'contributing factors' are managed well vastly reduces the chances of failure.

The following sequence of questions should be followed to establish causes of failure, contributing factors, and what can be done to ensure future production of components and final products are RSL compliant.

	Notes	RCA / CAP
Is the test report valid?	• Is the lab LS&Co. accredited? • Has the correct test method been employed? • Is the reporting limit and limit of detection/quantification correct? • Have the pass/fail limits been applied correctly?	• Re-test using correct methods in an accredited lab
Do two or more different material types in the same product have the same failure?	• This could indicate the offending chemical has been applied after the product has been assembled e.g. a laundry wash or polish applied to footwear	• Ensure all components comply with LS&Co. standards • Check all SDS, technical information / CIL declarations to look for obvious sources • Speak to chemical suppliers to ask if failing chemical could be present in their formulation • Test formulations for the failing chemical • Replace the failing formulation with a compliant one

Is the failure on a metal component?	• No remedial action is possible by the assembly factory	• Replace the component with a compliant one • Manufacturers need to reformulate alloys / modify the purity of components
Is the failure on a plastic component? e.g. Phthalates in PVC, Styrene monomer in polystyrene, BPA in polycarbonate, lead or cadmium pigments/stabilizers	• No remedial action is possible by the assembly factory • Failure can be due to pigments, plastic additives, monomers	• Replace the component with a compliant one • The plastic manufacturer needs to reformulate/check levels of residual monomer etc • Alternative plastic-type may need to be selected in some instances e.g. BPA will always be present in polycarbonate
Is the failure on a pigment print, coating, or other embellishments?	• A failure may be due to the base material or pigment prints/embellishments such as flock, glitter	• Test the base material and the print / coating / embellishment separately to establish which part is failing • Replace failing items such as flock, glitter with a compliant alternative • Check all SDS, technical information / CIL declarations to look for obvious sources • Speak for chemical suppliers to ask if failing chemical could be present in their formulation • Test formulations for the failing chemical • Replace the failing formulation with a compliant one
Is the failure dye or pigment-related? **e.g. azo amines, allergenic disperse dyes**	• Some failures can only be a result of using colorants that don't meet the standards • Some failures, such as heavy metals may be due to dyes or pigments • Solving dye related failures is easy but care must be taken with pigment prints on top of dyed grounds and multicolor prints	• Check recipes to see if known failing colorants have been used • Check all SDS, technical information / CIL declarations to look for obvious sources • Speak for chemical suppliers to ask if failing chemical could be present in their formulation • Test formulations for the failing chemical • Replace the failing formulation with a compliant one

Is the failure clearly due to the use of a restricted finish? e.g. PFAS water repellent, antimicrobial, or Flame retardant chemicals	• The use of some types of finish is not permitted e.g. Flame retardant and antimicrobial finishes • The use of other types of finish is permitted e.g. water repellent but some specific chemical types are banned	• Check recipes to see if known failing chemicals have been used • Check all SDS, technical information / CIL declarations to look for obvious sources • Speak for chemical suppliers to ask if failing chemical could be present • Test formulations for the failing chemical • Replace permitted finish types e.g. water repellent, with a compliant formulation
Is the failure finish process-related? **e.g. Formaldehyde on resinated viscose, Isocyanates on PU coated materials, Solvents**	• Some chemical failures are almost always related to specific finishes but are due to incorrect processing conditions rather than just the presence of certain chemicals in formulations	• Can the chemical type be changed to something that is a lower risk? E.g. formaldehyde-free, water-based • Check recipes to see if things like pH, catalyst concentration, and so on are correct according to TDS • Check fixation/curing conditions, temperatures are correct
Is the failure related to chemicals that are known to be used or present in specific processes? **e.g. Chromium in leather tanning, Quinoline in disperse dye formulations**	• Some chemicals are known to be only present in specific formulations or processes • They may be due to a control issue (e.g. Cr Vi) or the presence of a chemical in formulations (e.g.quinoline) • If a failure occurs it is possible to narrow down the problem to a specific process in the manufacturing	• Check recipes to see if known failing colorants have been used • Check all SDS, technical information / CIL declarations to look for obvious sources • Speak for chemical suppliers to ask if failing chemical could be present in their formulation • Test formulations for the failing chemical • If appropriate, replace the failing formulation with a compliant one • If appropriate, check recipes and process control to stop the formation of the failing chemical
Is the failure related to chemicals that are not intentionally used but can be present in multiple formulations and processes? e.g. APEOs	• Sometimes it is very difficult to narrow down the initial search for the process that has caused the issue and it can be a laborious exercise to find where the chemical is introduced or created	• Testing of unprocessed substrates and partially processed substrates (e.g. bleached but not dyed, dyed but not finished) for the failing chemical can be quicker and cheaper than testing every formulation

Is there no conceivable way that the failing chemical could have been used in the manufacturing process?	• If all information checks and formulation tests show no sign of the failing chemical the cause is likely either contamination or the mistaken use of a non-compliant formulation that does not appear on a recipe	• Establish if there are formulations on site that are non-compliant with the LS&Co. chemical requirements • Establish if there are components or finished products on-site that are non-compliant with the LS&Co. chemical requirements • Instigate a strict review of process controls • Instigate strict segregation measures
Is the failure related to chemicals used in product assembly? e.g. Solvents in adhesives, Formaldehyde in bonded interlining	• Normally chemical failures are due to components that fail but sometimes adhesives, interlinings, etc. can fail. • Adhesives and other formulations used in product assembly should be managed just like any other formulation used in component manufacture – there should be SDS, TDS, supplier declarations, certifications and should be included on a CIL	• Confirm all components meet the LS&Co. chemical requirements • Check all SDS, technical information / CILs to look for obvious sources in formulations used in the assembly • Speak for chemical suppliers to ask if failing chemical could be present in their formulation • Test formulations for the failing chemical • Replace the failing formulation with a compliant one
Have the LS&Co. requirements been provided to all facilities involved in the manufacture of components and product assembly?	• Some failures are a result of facilities not knowing the standards	• Ensure all standards, chemicals safety assessment expectations, and documentation requirements are provided to every facility that uses the chemical in the manufacturing of a material, component, or product for LS&Co.

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RSL FAILURE RESOLUTION FORM (FRF)

Product Type:			
Laboratory Name:			
Test Report Ref:		Date	
Vendor/Supplier Information			
Name:		Vendor ID:	
Sample Information			
Material/Product Name:		Material Type:	
Product code (PC9 or FA or S Code):		Production Date:	
Colour Name:		Colour Code:	
Brand tested for:		Season	

Status (check as appropriate)	Pre-production		Details of the Failure: • List chemical name • List chemical CAS No • List failure amount vs limit (ppm)
	Bulk Production		
	Finished Product		
	Development		
Available Documentation	Material safety data sheet (SDS)		Please attach all relevant documentation available to substantiate the information on this form
	Technical data sheet (TDS)		
	Chemical Information Log (CIL)		
	Process recipes		
	Test reports, including retest reports		

Follow Up Actions
List quantity of material/product affected by the failure • List status of failed material/product (is it held at shipping, contained in factory etc) • List shipment destinations • Describe next steps (hold material, pause production, reject material etc) • List corrective actions, preventative measures to be implemented

Name:		Signed:		Date:	

SECTION – 6

CODE OF CONDUCT FOR RSL

CODE OF CONDUCT FOR RSL

LS&Co. is committed to continuous improvement in relation to chemical management to ensure that products meet and exceed current standards, regulations and expectations.

It is a requirement that all Products, Materials, Chemicals and Other Goods used in the manufacturing of finished products meet LS&Co. Restricted Substances standards and there is an expectation that efforts will be made to go beyond those standards wherever possible.

LS&Co. will encourage the use of safer chemistry by promoting Sustainable materials and processes that go beyond compliance on products at point of sale.

In addition to managing chemicals to ensure product safety, the use of safer chemistry will also provide a safer working environment for those handling chemical formulations and a lower risk of environmental damage.

LS&Co. will:

- Execute necessary RSL agreements prior to engaging in business for all our productions globally
- Ensure chemical compliance and the use of safer chemistry is always included in discussions with vendors at the earliest possible stage of product development
- Ensure that when prices are negotiated, chemical compliance requirements are clearly stated and openly discussed
- Ensure chemical compliance requirements are clearly stated on any sketches, designs or design packs that are passed onto vendors
- Ensure all relevant LS&Co. standards are made available to all actors in a supply chain
- Ensure in-house innovations and developments are thoroughly evaluated for chemical safety before passing onto a supply chain
- Ensure teams are available to discuss queries at any stage of the design, development and production process
- Provide necessary trainings to empower supply chain partners to gain adequate knowledge and to eliminate RSL risks at early stages of product design and developments

Vendors will:

- Ensure timely execution of LS&Co. Supplier compliance agreements as requested and ensure similar agreements kept in place with all Suppliers and Sources in a supply chain
- Comply with the most up to date RSL, any failure to comply with the RSL and the ZDHC MRSL are a material breach of any agreement with LS&Co. and with a LS&Co. Source notwithstanding any other term of that agreement
- Appoint RSL point person to demonstrate relevant data and metrics that the restricted substances are legally managed in LS&Co. products, and to ensure that Materials, Chemicals and Other Goods comply with RSL requirements
- Ensure no RSL listed chemicals, those prohibited or restricted by (a) LS&Co. Priority chemicals RSL usage ban and other policy requirements (Page no 7) (b)AFIRM RSL or (c) the applicable law of any country and jurisdiction in which the Supplier, Source or LS&Co. conducts business and in any jurisdiction are not used
- Ensure full transparency of supply route to component manufacturer level
- Ensure full details of all components and component manufacturers are provided at the time of product developments
- Ensure all relevant LS&Co. standards are provided to all Suppliers and Sources in a supply chain, including chemical suppliers, agents and component manufacturers
- Ensure all chemicals, materials and components are tested/certified for RSL before use in LS&Co. productions
- Ensure there is a CIL declarations (refer LS&Co. CIL declaration format in page no. 64) gathered from each chemical suppliers and component manufacturers that meets (a) LS&Co. Priority chemicals RSL usage ban and other policy requirements (refer Section-2 in page no.7) (b) AFIRM RSL or (c) the applicable law of any country and jurisdiction in which the Supplier, Source or LS&Co. conducts business and in any jurisdiction in which it ships Materials, Chemicals or Other Goods
- Follow LS&Co. Performance standards and conduct all RSL testing according to the LS&Co. RSL requirements at the appropriate time in the buying process
- Ensure all test data and certifications required to verify promotable claims
- Ensure all packaging and assembly materials meet the RSL standards

- Provide any information related to materials, chemicals and process to LS&Co. on demand, which include but not limited to SDS, TDS, Chemical recipes, RSL test reports, shipment quantity and shipment destinations etc.
- Immediately notify LS&Co. of any issues or problems in achieving compliance with the standards
- Declare that each current and future chemical, compound and substance and other goods, that are used, supplied or otherwise delivered to LS&Co.comply with and do not violate the legal restrictions globally, including but not limited to, EU REACH, California Proposition 65, All US State specific Children product regulatory requirements and Toxics in packaging, etc.

Component Manufacturers (including dyers, printers, laundries and tanneries) will:

- Ensure there is a full written inventory
- Source chemicals from reputable chemical suppliers
- Ensure no RSL listed chemicals, those prohibited or restricted by (a) LS&Co. Priority chemicals RSL usage ban and other policy requirements (refer Section-2 in page no 7) (b) AFIRM RSL or (c) the applicable law of any country and jurisdiction in which the Supplier, Source or LS&Co. conducts business and in any jurisdiction are not used (details in section 3)
- Source chemicals that are certified with Screened Chemistry and the formulations are ZDHC MRSL Compliant
- Ensure there is a SDS for all chemicals and formulations
- Ensure there are technical data sheets for all chemicals and formulations
- Ensure there are CIL declarations of conformance from chemical suppliers
- Ensure there are full written recipes with details of all formulations and commodity chemicals
- Ensure standard operating procedures for all processes – including process check to ensure product consistency
- Make independent certifications to demonstrate competence in chemical management available
- Conduct spot checks on incoming formulations for RSL and MRSL compliance
- Conduct spot checks on incoming raw materials for RSL and MRSL compliance
- Conduct RSL tests on finished products as per LS&Co. standards
- Immediately notify vendors and / or LS&Co. of any issues or problems in achieving compliance with the standards

Chemical Suppliers will:

- Provide an SDS for every chemical and formulation
- Provide a technical data sheet for every chemical and formulation
- Ensure no RSL listed chemicals, those prohibited or restricted by (a) LS&Co. Priority chemicals RSL usage ban and other policy requirements (Page no 7) (b) AFIRM RSL or (c) the applicable law of any country and jurisdiction in which the Supplier, Source or LS&Co. conducts business and in any jurisdiction are not used (details in section 3)
- Provide CIL declarations (refer section-6, F for LS&Co. CIL declaration format) of conformity to RSL,MRSL conformance certificates and Screened Chemistry - Full Material Disclosure certificate (or other equivalent certifications)
- Provide declarations of absence of any hazardous substances on request
- Provide detailed formulation compositions on request for promotable claims (under NDA if necessary)
- Provide information to LS&Co. and component manufacturers if standards change and formulations cease to be compliant

A. Suppliers' and Sources' Commitment

Each Supplier or Source of Materials, Chemicals and Other Goods (a) to LS&Co., and (b) to any LS&Co. Supplier or Source when the Materials, Chemicals and Other Goods will be used during the fabrication, manufacture or other processing of a LS&Co. labeled and/or distributed product represents and warrants that each of its Materials, Chemicals and Other Goods complies with all provisions of the RSL (including, but not limited to, the RSL's prohibitions, restrictions, other requirements and all applicable national and other legal requirements). Supplier will defend, indemnify and hold LS&Co. harmless against any allegation, claim, loss, damage, or other detriment resulting from any such Supplier's or Source's non-compliance.

As a Supplier or Source of LS&Co. products or raw materials for LS&Co. products, you are required to understand the RSL product requirements and deliver only compliant products. You are also responsible for seeking guidance from LS&Co. in any situation where you may have doubts or uncertainties about your product's compliance with LS&Co.'s RSL. Compliance with LS&Co.'s RSL is a mandatory condition necessary for satisfying each and every order placed by LS&Co.

B. LS&Co. SUPPLIERS' AND SOURCES' MANAGEMENT SYSTEM REQUIREMENTS SUPPORTING LS&Co. RSL COMPLIANCE AT THE FACTORY

PLAN

- Appoint a RSL liaison (designated as a Technical Representative (TR) in the Suppliers and Sources. (TR roles and responsibilities are defined in Appendix -5)
- Contact LS&Co.'s RSL team with any questions or to request training
- Communicate with and educate all personnel concerning the RSL whose acts or omissions could affect compliance with the RSL
- Communicate copies of all appropriate information concerning the applicable RSL to all of your Suppliers and Sources whose acts or omissions could affect compliance with the LS&Co.RSL.
- Ensure that you and your Suppliers and Sources comply with all applicable legal requirements of the countries and other jurisdictions in which you/they do business, as well as all countries to which they ship any Materials, Chemicals and Other Goods which may be used with respect to LS&Co. . labeled and/or distributed products.

DO

- Execute LS&Co. Supplier RSL compliance agreement annually
- Purchase only Materials, Chemicals and Other Goods which comply with LS&Co.'s RSL requirements
- Use LS&Co. Screened Chemistry program certified and ZDHC MRSL compliant formulations
- Gather SDS, TDS, other certificates if any and verify for RSL compliance for every chemical used by or purchased from any Source
- Understand all the chemical inputs to your production by requesting fully completed Chemical Information Logs (see page no 64) from your chemical Sources
- Comply with all applicable LS&Co. Chemical policies for Chemicals use and DO NOT USE any LS&Co. . RSL Usage ban substances in productions
- Be sure that employees are familiar with the precautions set out in the SDSs or TDSs
- Contact all your Materials, Chemicals and Other Goods Suppliers and Sources to ensure their understanding of LS&Co.'s RSL and their commitment to supplying only RSL compliant chemicals and materials
- Conduct internal staff training
- Document and retain all dyeing, coating, finishing and printing formulations
- Follow the parameters as listed on the latest TDSs and document all chemicals use and process control variables (e.g. pH, curing temperatures, durations, liquor quantities and ratios) as actually used in production with retention of the documentation
- Assess the chemical product safety risk that may encounter and Implement the processes as defined in the chemical recipes or their equivalents

CHECK

- Ensure that only materials and chemicals meeting the RSL requirements are used in the production of LS&Co.-labeled and LS&Co.-distributed products
- Check the validity of all test reports and certificates at every juncture of product season
- Conduct inspections, audits and other control practices to ensure compliance with your obligations under the applicable RSL
- Regularly check process control variables (e.g. pH, curing temperatures, duration, liquor quantities and ratios as per recipes) to validate proper chemical application
- Follow LS&Co. Performance standard guidelines and perform analytical testing at LS&Co.- approved laboratories during product development and production stages
- Perform yearly random RSL compliance verifications as per LS&Co. RSL performance standards

ACT

- Replace Materials, Chemicals and Other Goods of unknown chemical constituents with Materials, Chemicals and Other Goods that meet LS&Co.'s RSL
- Do not ship Materials, Chemicals and Other Goods if you are in doubt about compliance
- Verify RSL compliance through laboratory testing and other appropriate quality control/quality assurance procedures and consult LS&Co. RSL team at the same time
- Investigate the root causes of any actual or potential RSL non-compliance situation and act timely, effectively, and efficiently to both notify LS&Co. and restore full compliance

C. OUTLINE OF LS&Co. RSL PROHIBITIONS, LIMITATIONS AND REQUIREMENTS

The prohibitions, restrictions and other requirements in the RSL are based, in part, on global laws concerning chemicals usage in the manufacturing and/or distribution of the types of products distributed by LS&Co.

The European Union has developed the "Regulation Concerning the Registration, Evaluation, Authorization and Restriction of Chemicals" or REACh, which is aimed at ensuring the protection of human health and the environment from risks that might be posed by certain exposures to certain doses of specific chemicals. Other countries have developed or are developing similar laws such as, but not limited to, the United States, China, Canada, Mexico, Indonesia, Serbia, Vietnam and South Korea. Moreover, in the United States, many states, including, but not limited to, California, Illinois, Maine, Vermont, Oregon, New York and Washington, have adopted laws concerning chemicals in consumer products, including Chemicals of High Concern (CHCC) in children's products and their reporting requirements, as well as The Model Toxics in Packaging Legislation requirements for US and Europe packaging requirements (94/62/EC). These and other legal requirements were considered in preparing this edition of the RSL.

Laws and regulations concerning substances are periodically changing as more scientific and other technical information becomes generally accepted, leading to an enhanced understanding of chemicals and any potential effects they might have at certain doses by certain routes of exposure on human health and the environment. Accordingly, LS&Co. will endeavor to publish an updated RSL on a regular basis.

Moreover, by agreeing to furnish any Material, Chemical or Other Good to LS&Co. or by agreeing to comply with this RSL, each Supplier and Source must ensure that each Material, Chemical and Other Good, supplied for use in the manufacturing and distribution of any LS&Co.-labelled and LS&Co.-distributed product does not contain any substance to the extent that the substance is banned or limited (a) under this RSL or (b) under the applicable law of any country and jurisdiction in which the Supplier or Source conducts business and in any jurisdiction in which it ships Materials, Chemicals or Other Goods. In addition, each Supplier is similarly responsible and also liable to LS&Co. for ensuring that each of its Sources similarly complies with this RSL and the aforesaid applicable laws.

Any violation of the RSL or of the aforesaid applicable laws is a violation of all contracts to supply Materials, Chemicals and Other Goods to LS&Co. .

D. OBLIGATION TO COMPLY WITH REACH AND ALL OTHER GOVERNMENTAL REQUIREMENTS

While for convenience, this section of the RSL discusses some of the requirements of REACh, the obligation remains with Suppliers and Sources to identify and comply with all applicable requirements as set out in REACh and in the applicable laws of each country and other jurisdictions in which each Supplier and Sources conducts business as well as each country into which each Supplier and Source ships any Materials, Chemicals and Other Goods.

EU REACH: The European Union's Regulation Concerning the Registration, Evaluation, Authorization and Restriction of Chemicals

APPLICATION

This section applies to all Suppliers and Sources manufacturing or supplying Materials, Chemicals and Other Goods for use in LS&Co. labelled and/or distributed products, including, but not limited to, apparel, non-apparel, footwear, accessories, packaging and other products which are intended for distribution or sale in any country within the European Economic Area.

PURPOSE

The information provided below is intended to assist our Suppliers and Sources to comply with REACh [Regulation (EC) Number 1907/2006 of the European Parliament and of the Council] Every LS&Co. Supplier and Source agree to inform LS&Co. of any substances listed for requirements (see below) in European Chemicals Agency (ECHA website: www.echa.europa.eu) present in any and all Materials, Chemicals and Other Goods intended for use in any LS&Co. labeled and/or distributed apparel, non-apparel, footwear, accessories, and other products. In supplying this information, LS&Co. does not intend to assume all or any part of our Suppliers' and/or Sources' duty to comply with the regulation.

WHAT SUPPLIERS AND SOURCES SHOLD DO

All LS&Co. Suppliers and Sources shall visit the European Chemicals Agency (ECHA) website https://www.echa.europa.eu/ regularly and comply with the published obligations and guidance regarding chemicals and consumer articles.

To help ensure that all products supplied to LS&Co. comply with REACh, each Supplier and Source is obligated to track not only the lists of chemicals with valid requirements but also the registries of intentions until outcomes*.

Suppliers and Sources shall map each step in their supply chains, including the sourcing and processing of Materials, Chemicals and Other Goods ingredients, and immediately inform LS&Co. according to the Information Duty (Article 33) of all cases where a substance listed in the “Candidate List of Substances of Very High Concerns for Authorization" is present in the product or other Materials, Chemicals and Other Goods provided for use in any LS&Co. labeled or distributed product. Additionally, authorization requirements (as per Annex XIV) and restriction requirements (as per Annex XVII) in REACh regulation shall be followed by any Suppliers or Sources situated in Europe.

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*Substances of Very High Concerns (SVHC) are defined as CMR 1,CMR 2,PBT,vPvB or similar substances as given in the legal text of REACh, Annex XVII for CMR, and on the European Chemicals Agency website, www.echa.europa.eu/

The listing is inclusive of candidate substances of Substances of Very High Concerns (SVHC) for Authorization and Registry of intentions list, as defined below:

Candidate substances can be found at http://echa.europa.eu/candidate-list-table

Registry of SVHC intentions until outcome are found at https://echa.europa.eu/registry-of-svhc-intentions

Authorization list of Substances: https://echa.europa.eu/authorisation-list

Restriction list of Substances: https://echa.europa.eu/substances-restricted-under-reach Registry of restriction intentions until outcome: https://echa.europa.eu/registry-of-restriction-intentions

E. OBLIGATION TO COMPLY WITH US STATES CHEMICALS OF HIGH CONCERN IN CHILDREN PRODUCTS AND ITS REPORTING REQUIREMENTS

All LS&Co. Suppliers and Sources shall visit US state regulatory websites (refer below) regularly and comply with the published obligations and guidance regarding chemicals and children's products. To help ensure that all children's products supplied to LS&Co. comply with these state laws, each Supplier and Source is obligated to track and monitor Materials, Chemicals and Other Goods, used or supplied for the fabrication, manufacturing or processing of LS&Co. labelled and/or distributed children's products.

- ✔ The Oregon Health Authority website for the current High Priority Chemicals of Concern for Children's Health (HPCCCHs) as listed: https://www.oregon.gov/oha/ph/healthyenvironments/healthyneighborhoods/toxicsubstances/pages/toxic-free-kids.aspx
- ✔ The Maine Department of Environmental Protection website for the current Priority Chemicals as listed: https://www.maine.gov/dep/safechem/childrens-products/index.html
- ✔ The Minnesota Department of Health website for the published obligations and guidance regarding chemicals and children's products: https://www.health.state.mn.us/communities/environment/childenvhealth/tfka/index.html
- ✔ The Vermont Department of Health website for the published obligations and guidance regarding current chemicals of high concern to children's products (CHCC): https://www.healthvermont.gov/environment/children/chemicals-childrens-products
- ✔ The Washington Department of Ecology website with the published obligations and guidance regarding chemicals and children's products: https://ecology.wa.gov/Waste-Toxics/Reducing-toxic-chemicals/Childrens-Safe-Products-Act

Suppliers and Sources shall map each step in their supply chains, including the sourcing and processing of Materials, Chemicals and Other Goods ingredients, and immediately inform LS&Co. of all cases where a priority chemical, HPCCCH, or CHCC is present in the product or other Materials, Chemicals and Other Goods provided for use in any LS&Co. labeled or distributed product.

OTHERS

Other countries or states have developed or are developing similar laws and regulations, such as, but not limited to, US, China, Canada, Mexico, Indonesia, Serbia, Vietnam and South Korea. These and other regulatory requirements are incorporated into the RSL.

Lists of restricted substances are constantly changing as more information from scientists and health professionals becomes available, leading to an enhanced understanding of chemicals and their effect on human health and the environment. Accordingly, LS&Co. will endeavor to publish an updated list on a regular basis. That said, it remains the responsibility of each Supplier and Source to identify and comply with all applicable requirements as set out under these regulations / requirements by each country and other jurisdictions in which each Supplier and Source conducts business and into which it ships any Materials, Chemicals and Other Goods.

F. Chemical Information Log (CIL)

APPLICATION

LS&Co. Suppliers and Sources must communicate with their chemical and material Sources about the content and requirements of the LS&Co. RSL. Suppliers and Sources must request a comprehensive Chemical Information Log (“CIL”) from each and every chemical and material Source. Chemical and Material Sources must review LS&Co.'s RSL requirements to determine which substance(s) in their preparations (chemical mixtures), if any, has the potential to violate any provision of the applicable LS&Co. RSL.

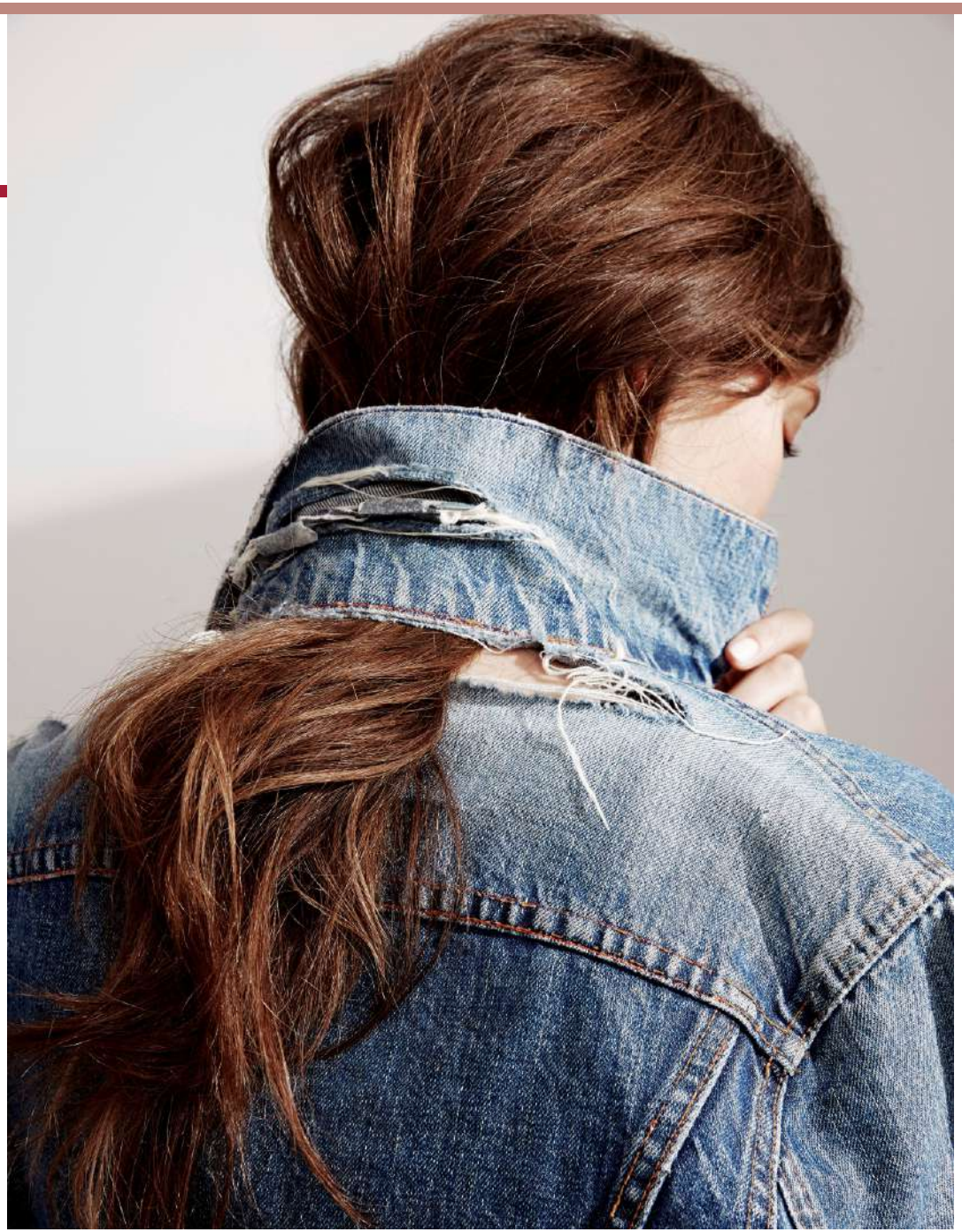
The CIL must be completed for each substance used in the manufacturing of any LS&Co. product. The CIL includes 4 Sections. The first section must be completed with the chemical/material trade name, as indicated on product packaging documents, SDS and label. For each preparation, the chemical and material supplier shall indicate whether such chemical or material:

(1) contains an RSL substance, or
(2) may form an RSL substance during normal processing conditions

When a substance constitutes, contains, or may form, a resulting substance containing a RSL component in a concentration that could exceed a corresponding RSL restriction, the chemical supplier must identify the RSL component of the resulting substance and concentration on the CIL. The concentration set forth on the CIL must be the concentration of the RSL substance in the resulting substance.

PURPOSE

LS&Co. acknowledges that superior knowledge of specific chemical data and characteristics is likely to reside with the chemical Source. It is, therefore, imperative that each chemical Source properly communicate to each of its customers (each Supplier) the existence of any RSL listed substances in any Materials, Chemicals and Other Goods it furnishes to the Supplier.



LS&Co. CHEMICAL INFORMATION LOG

SECTION-1: SUPPLIER INFORMATION

Supplier Company Name & Address:	**Chemical/Product Trade Name(s):**
Manufacturer Name & Address : **(If different from the above)**	**Regulatory or EHS Contact (Email & Phone no):**
Date of Log:	**LS&Co.RSL version reference):** **(Example : 2022 version)**

Please provide a current copy of:

- ☐ SDS (required)
- ☐ Product Specifications (if available)
- ☐ Screened Chemistry certificate (required)
- ☐ Any other 3rd party certificates (e.g OEKO-TEX®, GOTS, LWG etc)
- ☐ Technical Data Sheet included (if available)
- ☐ Certificate of Analysis (if available)
- ☐ ZDHC/Regulatory declarations (self) (if available)

Location of Chemical / material production (Country) : _____

Mention Chemical use category: _____
(Example: Dyes, Pigments, Auxiliary, Cleaning, Maintenance and process related)

Instructions: If any Materials, Chemicals and Other Goods which you furnish to the LS&Co. Supplier, Source or to LS&Co. constitute, contain, or form any substance whose nature or concentration might exceed or cause the concentration on the final product to exceed any prohibition, limitation, other requirement in the most recent LS&Co. RSL or other applicable legal requirement, please provide the following information:

SECTION 2: LS&CO. RSL DECLARATION

The product supplied to LS&Co.supply chain is a ☐ Chemical ☐ Article

Article Definition: An "article" means a manufactured item, other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g. minute or trace amounts, of a hazardous chemical and does not pose a physical hazard or health risk. OSHA Hazard Communication Standard, 29 CFR 1910.1200 (c) (Example: Trims, accessories, and packaging materials)

Trade Name	Contains RSL Substance [YES/NO]	Forms RSL Substance [YES/NO]	Name of Restricted Substance	CAS No.	Concentration in preparation (ppm or %)	Intentional Use (or) Impurity

SECTION 3: CHEMICALS OF INTEREST INFORMATION

Please indicate if your material or any of its components appear on any of the following country specific regulations or restricted substance lists indicated in Column below.

If yes, please specify the chemical and the amount present

	Regulation/ Restricted Substance List		Details (CAS # and amount)
☐	LS&Co. Priority chemicals list and RSL Usage Ban policy	☐ Yes ☐ No	
☐	US Consumer Product Safety Improvement Act (US CPSIA)	☐ Yes ☐ No	
☐	Canada Consumer Product Safety Act (CCPSA)	☐ Yes ☐ No	
☐	California Prop 65	☐ Yes ☐ No	
☐	Obligations to comply with US states Chemicals of High concern list in Children Products	☐ Yes ☐ No	
☐	US Toxic Substance Control Act (TSCA)	☐ Yes ☐ No	
☐	EU –REACH Substance of Very High Concern list	☐ Yes ☐ No	

SECTION 4: CERTIFICATION AND PREPARER INFORMATION

I certify that the information above is true and correct and that the Chemicals of Interest declaration provided by me on this form are either not in the chemical/material supplied to LS&Co. or are disclosed on this form. If the above product information provided on this form changes,I agree to update and inform LS&Co., 30 days prior to the change.

Name:	Date:
Title:	Email:
Address: City/State/Zip:	Phone:
Country:	Fax:
Signature: I certify that the foregoing is accurate and that I am authorized to sign on behalf of the company. Name: Date:	

Signature Company Stamp

Appendix 1 - PFASs (Perfluoroalkyl / Polyfluoroalkyl Substances),All PFASs, but not limited to, the following:

Chemical Substance	CAS Number	Limit Value Final Product (mg/kg)	Test Method
Perfluorooctanesulfonic acid (PFOS) / and related substances			
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	Usage Ban [TR=1 µg/m2]	All materials Extraction with an organic solvent, GC-MS and LC-MS. Based on EN ISO 23702-1
Perfluorooctanesulfonic acid, potassium salt (PFOS-K)	2795-39-3		
Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5		
Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH4)	29081-56-9		
Perfluorooctane sulfonate diethanolamine salt (PFOS-NH(OH)2)	70225-14-8		
Perfluorooctanesulfonic acid, tetraethylammonium salt (PFOS-N(C2H5)4)	56773-42-3		
N-Ethylperfluoro-1-octanesulfonamide (N-Et-FOSA)	4151-50-2		
N-Methylperfluoro-1-octanesulfonamide (N-Me-FOSA)	31506-32-8		
2-(N-Ethylperfluoro-1-octanesulfonamido)-ethanol (N-Et-FOSE)	1691-99-2		
2-(N-Methylperfluoro-1-octanesulfonamido)-ethanol (N-Me-FOSE)	24448-09-7		
Perfluoro-1-octanesulfonyl fluoride (POSF)	307-35-7		
Perfluorooctane sulfonamide (PFOSA)	754-91-6		

Perfluorooctanoic acid (PFOA), its salts, polymers related substances	Various	Usage Ban [TR=25ppb – Total]	All materials Extraction with an organic solvent, GC-MS and LC-MS. Based on EN ISO 23702-1
PFOA and Its Salts			
Perfluorooctanoic acid (PFOA)	335-67-1		
Sodium perfluorooctanoate (PFOA-Na)	335-95-5		
Potassium perfluorooctanoate (PFOA-K)	2395-00-8		
Silver perfluorooctanoate (PFOA-Ag)	335-93-3		
Perfluorooctanoyl fluoride (PFOA-F)	335-66-0		
Ammonium pentadecafluorooctanoate (APFO)	3825-26-1		

Perfluorooctanoic acid (PFOA) related substances		Usage ban (TR=1 - Total)	All materials Extraction with an organic solvent, GC-MS and LC-MS. Based on EN ISO 23702-1
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	39108-34-4		
Methyl perfluorooctanoate (Me-PFOA)	376-27-2		
Ethyl perfluorooctanoate (Et-PFOA)	3108-24-5		
2-Perfluorooctylethanol (8:2 FTOH)	678-39-7		
1H,1H,2H,2H-Perfluorodecyl acrylate (8:2 FTAC	27905-45-9		
1H,1H,2H,2H-Perfluorodecyl methacrylate (8:2 FTMA)	1996-88-9		

Other PFAS			
Perfluorohexanoic acid (PFHxA), its salts, and related substances	Various	Usage ban [TR = 25 ppb]	Extraction with an organic solvent, GC-MS and LC-MS. Based on EN ISO 23702-1
Perfluorobutanesulfonic acid (PFBS) and related substances	Various	Usage Ban [TR = 1 each]	
Perfluorohexanesulfonic acid (PFHxS) and related substances	Various		
Perfluoroheptanesulfonic acid (PFHpS) and related substances	Various		
Perfluorodecanesulfonic acid (PFDS) and related substances	Various		
Perfluorobutyric Acid (PFBA) and related substances	Various		
Perfluoropentanoic Acid (PFPA) and related substances	Various		
Perfluoroheptanoic acid (PFHpA) and related substances	Various		
Perfluoro-3,7-dimethyloctanoic acid (PF-3,7-DMOA)	172155-07-6		
7H-Perfluoroheptanoic acid (HPFHpA)	1546-95-8		
2H,2H-Perfluorodecanoic acid (8:2 Fluorotelomer carboxylic cid, 8:2 FTCA, H2PFDA)	27854-31-5		
2H,2H,3H,3H-Perfluoroundecanoic acid (8:3 Fluorotelomer carboxylic acid, 8:3 FTCA, H4PFUnA)	34598-33-9		
1H, 1H, 2H, 2H-Perfluorooctanesulfonic Acid (H4-PFOS, 6:2 FTS)	27619-97-2		
C9-C14 Perfluorocarboxylic acids (PFCAs) and their salts	Various	Usage ban (TR-25 ppb)	Extraction with an organic solvent, GC-MS and LC-MS. Based on EN ISO 23702-1
C9-C14 Perfluorocarboxylic acids (PFCAs) -related substances	Various	Usage ban (TR-260 ppb)	

Appendix 2: Azo Dyes which, through reductive cleavage, may form restricted substances (amines)

Dye Name Color Index #	CAS Number (if available)	Dye Name Color Index #	CAS Number (if available)	Dye Name Color Index #	CAS Number (if available)
Acid Black 29	12217-14-0	Direct Blue 8	2429-71-2	Direct Orange 6	6637-88-3
Acid Black 94	6358-80-1	Direct Blue 9	No CAS number	Direct Orange 7	2868-76-0
Acid Black 131	12219-01-1	Direct Blue 10	4198-19-0	Direct Orange 8	64083-59-6
Acid Black 132	12219-02-2	Direct Blue 14	72-57-1	Direct Orange 10	6405-94-3
Acid Black 209	No CAS number	Direct Blue 15	2429-74-5	Direct Orange 108	No CAS number
Acid Brown 415	No CAS number	Direct Blue 22	2586-57-4	Direct Red 1	25188-24-3
Acid Orange 24	1320-07-6	Direct Blue 25	25180-27-2	Direct Red 2	992-59-6
Acid Orange 45	2429-80-3	Direct Blue 35	No CAS number	Direct Red 7	No CAS number
Acid Red 4	5858-39-9	Direct Blue 53	314-13-6	Direct Red 10	25188-29-8
Acid Red 5	No CAS number	Direct Blue 76	16143-79-6	Direct Red 13	25188-30-1
Acid Red 24	No CAS number	Direct Blue 151	110735-25-6	Direct Red 17	No CAS number
Acid Red 73	5413-75-2	Direct Blue 160	No CAS number	Direct Red 21	6406-01-5
Acid Red 85	3567-65-5	Direct Blue 173	No CAS number	Direct Red 22	No CAS number
Acid Red 114	6459-94-5	Direct Blue 192	159202-76-3	Direct Red 24	No CAS number
Acid Red 115	No CAS number	Direct Blue 201	60800-55-7	Direct Red 26	No CAS number
Acid Red 116	No CAS number	Direct Blue 215	6771-80-8	Direct Red 28	573-58-0
Acid Red 128	6548-30-7	Direct Blue 295	6420-22-0	Direct Red 37	3530-19-6

Acid Red 148	No CAS number	Direct Brown 1	3811-71-0	Direct Red 39	6358-29-8
Acid Red 150	No CAS number	Direct Brown 1:2	2586-58-5	Direct Red 44	6548-29-4
Acid Red 158	8004-55-5	Direct Brown 2	25255-06-5	Direct Red 46	2302-97-8
Acid Red 167	No CAS number	Direct Brown 6	25180-39-6	Direct Red 62	No CAS number
Acid Red 264	No CAS number	Direct Brown 25	33363-87-0	Direct Red 67	No CAS number
Acid Red 265	6358-43-6	Direct Brown 27	No CAS number	Direct Red 72	8005-64-9
Acid Red 420	No CAS number	Direct Brown 31	25180-41-0	Direct Violet 1	25188-44-7
Acid Violet 12	6625-46-3	Direct Brown 33	No CAS number	Direct Violet 12	2429-75-6
Basic Brown 4	5421-66-9	Direct Brown 51	No CAS number	Direct Violet 21	No CAS number
		Direct Brown 59	6247-51-4	Direct Violet 22	25329-82-2
Basic Red 42	No CAS number	Direct Brown 79	6483-77-8	Direct Yellow 1	No CAS number
Basic Red 111	113741-92-7	Direct Brown 95	16071-86-6	Direct Yellow 24	6486-29-9
Direct Black 4	25156-49-4	Direct Brown 101	No CAS number	Direct Yellow 48	No CAS number
Direct Black 29	No CAS number	Direct Brown 154	6360-54-9	Disperse Orange 149	85136-74-9
Direct Black 38	1937-37-7	Direct Brown 222	No CAS number	Disperse Red 151	No CAS number
Direct Black 91	6739-62-4	Direct Green 1	3626-28-6	Disperse Yellow 7	6300-37-4
Direct Black 154	54804-85-2	Direct Green 6	4335-09-5	Disperse Yellow 23	6250-22-3
Direct Blue 1	3814-14-3	Direct Green 8	25180-47-6	Disperse Yellow 56	54077-16-6
Direct Blue 2	2429-73-4	Direct Green 8:1	No CAS number	Solvent Orange 7	3118-98-6
Direct Blue 3	No CAS number	Direct Green 85	72390-60-4	Solvent Red 19	6368-72-5
Direct Blue 6	2602-46-2	Direct Orange 1	54579-28-1	Solvent Red 23	85-86-9

Appendix 3: Pigments which, through reductive cleavage, may form restricted substances (amines)

Pigment Name	CAS Number (if available)	C.I. Number	Pigment Name	CAS Number (if available)	C.I. Number
Permanent Brown B	No CAS number	12800	Pigment Red 42	6358-90-3	21210
Pigment Blue 25	10127-03-4	21180	Pigment Red 114	6358-47-0	12351
Pigment Blue 26	5437-88-7	21185	Pigment Red 162	No CAS number	12431
Pigment Chrome Yellow L Paste	No CAS number	12720	Pigment Yellow 12	6358-85-6	21090
Pigment Green 10	51931-46-5	12775	Pigment Yellow 13	5102-83-0	21100
Pigment Orange 3	No CAS number	12105	Pigment Yellow 14	5468-75-7	21095
Pigment Orange 13	3520-72-7	21110	Pigment Yellow 17	4531-49-1	21105
Pigment Orange 14	No CAS number	21165	Pigment Yellow 49	15110-84-6	11765
Pigment Orange 15	6358-88-9	21130	Pigment Yellow 55	6358-37-8	21096
Pigment Orange 16	6505-28-8	21160	Pigment Yellow 63	14569-54-1	21091
Pigment Orange 34	15793-73-4	21115	Pigment Yellow 83	5567-15-7	21108
Pigment Orange 44	17457-73-5	21162	Pigment Yellow 87	No CAS number	21107:1
Pigment Orange 50	No CAS number	21070	Pigment Yellow 114	71872-66-7	21092
Pigment Orange 63	No CAS number	21164	Pigment Yellow 124	67828-22-2	21107
Pigment Red 7	6471-51-8	12420	Pigment Yellow 126	90268-23-8	21101
Pigment Red 8	6410-30-6	12335	Pigment Yellow 127	68610-86-6	21102
Pigment Red 17	6655-84-1	12390	Pigment Yellow 152	20139-66-6	21111
Pigment Red 22	6448-95-9	12315	Pigment Yellow 170	31775-16-3	21104
Pigment Red 37	6883-91-6	21205	Pigment Yellow 171	53815-04-6	21106
Pigment Red 38	6358-87-8	21120	Pigment Yellow 172	No CAS number	21109
Pigment Red 39	No CAS number	21080	Pigment Yellow 174	78952-72-4	21098
Pigment Red 41	No CAS number	21200	Pigment Yellow 176	90268-24-9	21103
			Pigment Yellow 188	23792-68-9	21094

APPENDIX -4 LS&Co. EMERGING ISSUES POLICY

In addition to the restrictions on specific chemicals listed on the AFIRM RSL and priority chemicals banned by LS&Co. there are several emerging chemical issues that must be considered when manufacturing components or products for LS&Co.

- CMRs (Carcinogens, Mutagens, Reproductive Toxins)
  - To be categorised as CMR, one or more of the hazard parameters must be met
- Endocrine Disruptors
- PBT's (Persistent, Bioaccumulative, Toxic)
  - To be categorised as PBT, all three hazard parameters must be met
- Skin Sensitisers

Purpose:

1. Ensure product safety by avoiding the deliberate use of CMRs,Endocrine Disruptors, PBTs, and Skin Sensitizers as chemical inputs
2. Ensure product safety by avoiding the use of formulations containing high levels of contamination by CMRs, Endocrine Disruptors, PBTs, and Skin Sensitizers
3. Ensure worker safety by removing formulations containing CMRs, Endocrine Disruptors, PBTs, and Skin Sensitizers from inventories
4. Ensure protection of aquatic species via avoiding inputs containing CMRs, Endocrine Disruptors, PBTs, and Skin Sensitizers
5. Promote a better understanding of the contents of formulations to promote substitution of CMRs, Endocrine Disruptors, PBTs, and Skin sensitizers with safer alternatives

Policy:

- The use of ZDHC MRSL compliant, LS&Co. Screened Chemistry program compliant formulations is expected.
- The deliberate use of chemicals categorised as, presumed or suspected CMRs, Endocrine Disruptors, PBTs, and Skin Sensitisers additional to those on the AFIRM RSL and ZDHC MRSL is not permitted.
- Formulations containing chemicals categorised as, presumed or suspected CMRs, Endocrine Disruptors, PBTs, and Skin Sensitisers additional to those on the AFIRM RSL and ZDHC MRSL should be avoided.

  All products must meet the LS&Co. restricted substances standards.

Recommendations:

- Use LS&Co. Screened Chemistry program certified and ZDHC MRSL compliant formulations
- Obtain SDS from all chemical suppliers
  - Identify hazardous substances, including CMRs, Endocrine Disruptors, PBTs, and Skin Sensitisers via named chemicals and/or H-phrases
- Obtain CIL declarations from chemical suppliers and sources confirming the absence of:
  - Deliberately included chemicals categorised as presumed or suspected CMRs, Endocrine Disruptors, PBTs, and Skin Sensitisers
- High-level chemical contaminants categorised as presumed or suspected CMRs, Endocrine Disruptors, PBTs, and Skin Sensitisers

How are hazardous substances identified in formulations?

There are clear requirements that chemical suppliers must follow for labeling of formulations including the listing of any hazardous substances.

There is a recognised system for problematic chemicals with the worst / most harmful being given the label Category 1A and the next level down in terms of harmfulness being given the term Category 1B and Category 2.

There is a requirement for chemical suppliers to provide a Safety Data Sheet (referred to as MSDS or SDS) to a facility for every individual formulation and a requirement for all hazardous substances to be highlighted* with appropriate details of the specific hazards they present.

The following table sourced from http://www.chemsafetypro.com/Topics/GHS/GHS_cut_off_value_GHS_concentration_limit.html details the labelling cut-off for different hazards

Generic GHS Cut-off Values for SDSs

GHS has also set generic cut-off values for SDSs. An SDS should be prepared and provided for a substance or mixture meeting classification or for mixture containing a hazarddous ingredient with a concentration exceeding the cut-off limits given in the table below.

Hazard Class	Cut-off value/concentration limit
Acute toxicity	≥ 1.0%
Skin corrosion/Irritation	≥ 1.0%
Serious eye damage/eye irritation	≥ 1.0%
Respiratory/Skin Sensitization	≥ 0.1%
Germ cell mutagenicity (Category 1)	≥ 0.1%
Germ cell mutagenicity (Category 2)	≥ 1.0%
Carcinogenicity	≥ 0.1%
Reproductive toxicity	≥ 0.1%
Specific target organ toxicity (single exposure)	≥ 1.0%
Specific target organ toxicity (repeated exposure)	≥ 1.0%
Aspiration hazard (Category 1)	≥ 10% of Category 1 ingredients(s) and kinematic viscosity ≤ 20.5 mm^2/s at 40^0C
Aspiration hazard (Category 2)	≥ 10% of Category 2 ingredients(s) and kinematic viscosity ≤ 14 mm^2/s at 40^0C
Hazardous to the aquatic environment	≥ 1.0%

The prime purpose of an SDS is to allow for safe handing in a factory but they do provide some information in terms of content and H-phrases.

However many MRSLs, manufacturing restricted substances lists, such as the ZDHC MRSL, supported by LS&Co, have maximum allowable limits well below 1000 ppm (0.1%) and so it is necessary to seek declarations of conformity from chemical suppliers.

MRSLs typically list specific chemicals, and not H-phrases and descriptors such as 'carcinogen', 'mutagen' and 'reproductive toxin' so it is advisable to ask chemical suppliers to confirm conformance with an MRSL and declare the presence of any chemicals with CMR, Endocrine Disrupting, PBT or Skin Sensitising properties.

*Note: The GHS Hazard Statements on an SDS and hazard properties detailed on resources such as the ECHA website https://www.echa.europa.eu/information-on-chemicals are based on the chemical itself in 100% form. They are present in formulations in lower concentrations and, if judged in the diluted form at lower concentrations, some H-phrases for some chemicals may be judged differently.

Is there any legitimate upstream use that can lead to contamination in formulations?

In any chemical reaction, there is a good chance that some of the starting chemicals will remain unreacted and these can be present in small amounts in final formulations. It is also possible for catalysts to remain in formulations and there can be solvent residues.

In general, there is better exposure control in upstream chemical manufacture than in downstream chemical use so there can be a legitimate use of hazardous chemicals in the production of safe chemicals and formulations

CMRs: What are they?

CMR is not a single parameter - it refers to chemicals that have one or more of the following properties: Carcinogen - a chemical that causes cancer.

Mutagen - a chemical that causes changes to DNA (mutations). Some mutations cause cancer and such mutagens are carcinogens.

Reproductive toxin - a chemical that adversely affects reproduction or causes birth defects

NOTE: some CMRs have other negative properties, such as being persistent or endocrine disruptors. It is always important to look at all the properties of a chemical and not just consider one in isolation.

How are they categorised?

Terms

CMR substances can be classified into 3 categories depending on the severity of hazards.

- **Category 1A**: Known human carcinogen (H340), known mutagen (H350), or known reproductive toxicant (H360) based on HUMAN evidence
- **Category 1B**: Presumed human carcinogen (H340), presumed mutagen (H350), or presumed reproductive toxicant (H360) based on ANIMAL studies;
- **Category 2**: Suspected carcinogen (H341), suspected mutagen (H351), or suspected reproductive toxicant (H361) based on limited evidence from animal studies or/and humans.

Information on all hazard classes and categorisation is available here https://www.chemsafetypro.com/Topics/GHS/GHS_Classification_Criteria.html

GHS Hazard Statements

The GHS Hazard Statements of concern are those listed in the terms and definitions above.

H340: May cause genetic defects
H341: Suspected of causing genetic defects
H350: May cause cancer
H351: Suspected of causing cancer
H360: May damage fertility or the unborn child
H361: Suspected of damaging fertility or the unborn child

What are the legal restrictions?

There are legal restrictions on specific chemicals that fall into the CMR category such as benzene or asbestos fibers.

There is also general legislation restricting the use of CMR substances but that depends on the categorisation.

For example in the EU, only CMR category 1A/1B substances (listed in table 3.1 of annex VI to CLP regulation) are restricted by REACH. Category 2 CMRs are not legally restricted. If any substance has been assigned with hazard statement code H340, H350, or H360, it will be restricted by REACH.

There is specific legislation in the EU for CMRs in Textiles Regulation EU 2018/1513, entry 72 in Annex XVII of REACH https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1513&from=EN

What are typical examples of chemicals classified as CMRs?

Chrome VI, Benzene, Formaldehyde, and Cadmium
Examples of CMR's in textiles can be found at https://eurlex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:32018R1513&from=EN

Product Safety:

There are quite a lot of CMRs used in upstream manufacturing processes and residues may be present in formulations.

Formulations containing CMRs are sometimes used in the early stages of wet processing and are less likely to remain on the finished product - and they can be used in finishing/coating/printing formulations where they will remain on the finished product.

In order to avoid harm to workers, it is not permissible to use any formulations containing CMRs in wet processing or upstream textile processes, even if they will not appear on finished products

There is a possibility that some CMR chemicals may be formed during processing (an example would be formaldehyde) and process control is extremely important but the key to product safety is managing chemical inputs.

Endocrine disruptors: What are they?

An endocrine disruptor is a substance or mixture that alters the function of the endocrine (hormonal) system and consequently causes adverse health effects.

These adverse health effects can include infertility, feminizing of males, masculinizing of females, developmental disorders (physical and cognitive).

The adverse health effects can occur in humans and other species so it is important that, in addition to formulation safety for workers and product safety for consumers, attention is paid to discharges from manufacturing facilities and potential losses from clothing in the domestic laundry.

The effects of endocrine disruptors are generally cumulative, with long-term repeated exposure being the main concern.

NOTE: some endocrine disruptors have other negative properties, such as being persistent. It is always important to look at all the properties of a chemical and not just consider one in isolation.

How are they categorised?

Terms

The term 'Endocrine Disruptor' is used by authorities to denote that a chemical has been deemed to be an endocrine disruptor according to their assessment criteria. However, there is not yet alignment on how chemicals are assessed and categorised - The EU set up a program to manage endocrine-disrupting chemicals in 2021.

The following (copied) text outlines the proposal.

For the purpose of classification, the committee proposes to separate out human health endocrine disrupters from environmental endocrine disruptors as there is the potential for them to have different implications in the downstream legislation. Both hazard classes will then be further split into two hazard categories with Category 1 for known or presumed endocrine disruptors and Category 2 for suspected endocrine disruptors. Although currently there is no intention to separate Category 1 into subcategories for known or presumed endocrine disruptors as in almost all EU downstream legislation, Categories 1A and 1B are regulated the same way.

Regarding potential double classification (i.e., where the same experimental results could be used for classification for CMR (carcinogenic, mutagenic, or toxic for reproduction substances) as well as for an endocrine disruptor effect), further discussion is to take place. This will focus in particular on rules regarding the wording of hazard statements and labeling requirements in order to avoid duplication of information for the same adverse effect. Expected concentration limits to be introduced would be in line with current CMRs with the table below applying to both human health and environmental endocrine disruptors:

Ingredient classified as:	Generic concentration limits triggering classification of a mixture as:	
	Category 1	Category 2
Category 1	≥ 0.1 %	
Category 2		≥ 1 %

A series of potential label elements have been outlined within the proposal, alongside the standard information on how to classify mixtures using the usual methods such as bridging principles.
The proposal is currently in the review stage - with some contributors suggesting that the negative effects of endocrine disruptors are already covered by existing, agreed categories.
Info link.....https://www.ul.com/news/eu-proposes-add-two-new-hazard-classes-eu-clp-regulation-cover-endocrine-disruptors

GHS Hazard Statements

Several GHS Hazard Statements may relate to endocrine-disrupting properties. These may also apply to other properties such as a reproductive toxin.

H340: May cause genetic defects
H341: Suspected of causing genetic defects
H360: May damage fertility or the unborn child
H361d: Suspected of damaging the unborn child
H361e: May damage the unborn child
H361f: Suspected of damaging fertility
H361g: may damage fertility
H362: May cause harm to breastfed children

What are the legal restrictions?

Some specific, named, endocrine-disrupting are specifically restricted by legislation.

The prime reason for the restriction may be the endocrine-disrupting properties (such as Phenol, 4-nonyl-, branched) or they may be restricted because of multiple negative properties (such as some phthalates that are both endocrine disruptors and reproductive toxins).

General legislation may emerge as a result of the EU consultation process.

Some endocrine disruptors are classified as Substances of Very High Concern (SVHC) under Reach legislation. SVHC classification is normally applied to Carcinogens, Mutagens, or Reproductive Toxins (CMRs), or Chemicals that are Persistent Bioaccumulative and Toxic (PBTs) but there is also a clause stating 'chemicals of equivalent concern' which allows endocrine disruptors to be included.

What are typical examples of chemicals classified as endocrine disruptors?

Bisphenol A (used in e.g. epoxy resins and manufacture of polycarbonate)

Polybrominated Diphenyl Ethers (Flame retardant chemicals)

APEO's (used as detergents and wetting agents)

Phthalates (used as plasticisers for PVC plastic and binders)

PFOA (a by-product of the manufacture of 'C8' fluorotelomers)

Product Safety:

Formulations containing chemicals with endocrine-disrupting properties have historically been used in wet processing (e.g. APEO's) or finishing/coating/printing formulations.

Bisphenol-A is known to be produced in small quantities from polycarbonates by slow hydrolyses in water or aqueous solutions

It is not permissible to use any formulations containing endocrine disruptors in wet processing or upstream textile processes even if they will not appear on finished products.

Note:
Obtain declarations from chemical suppliers and sources confirming the absence of any chemicals on https://edlists.org list, added intentionally
Reference: Further detailed information
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2726844/

PBTs: What are they?

To be categorised as a CMR, one of the three criteria of Carcinogen, Mutagen, or Reproductive Toxin has to be met.

To be categorised as a PBT all three of the criteria of Persistence, Bioaccumulative and Toxic have to be met.

Persistent chemicals are chemicals that do not readily biodegrade in the environment and are sometimes referred to a 'forever chemicals' as, one in the environment, they will be around for a long, long time.

Bioaccumulative chemicals are chemicals that are not broken down by animals or other organisms and will accumulate in the tissues of an organism. There may be a half-life for retention/excretion and some chemical concentrations may reduce overtime in the absence of further exposure, but there is an inherent propensity for the chemicals to accumulate with repeated exposure.

Ordinarily, 'toxic' chemicals can poison a person, animal, or other organism and have a range of negative consequences. In the context of the PBT assessment, a chemical is determined to be 'Toxic' if it has one of several harmful properties, including carcinogenicity, mutagenicity, specific target organ toxicity, or aquatic toxicity.

The combination of a chemical being persistent (not breaking down and therefore possibly capable of moving around the earth), bioaccumulative (residing in organisms), and Toxic (causing damage to organisms) makes the substances particularly harmful.

Because PBT chemicals are persistent and concentrations may build up in tissues from repeated low-level exposure there is an argument to say there are no safe levels of these chemicals.

NOTE: some PBTs have other negative properties and it is always important to look at all the properties of a chemical and not just consider one in isolation.

How are they categorised?

Terms

There are two terms in common usage:

PBT - as described above and vPvB (very persistent very bioaccumulative)

Chemicals are tested in laboratory conditions and attributed P, B, and T if they fail to meet certain criteria.

Persistence - not meeting criteria for biodegradation

Bioaccumulation - this is a laboratory check for hydrophobicity and is viewed alongside data such as elimination half-lives.

Toxicity - a substance meets the criteria for 'Toxic' in the context of PBT characterisation if it meets any of the following classifications:

- carcinogenic (category 1A or 1B),
- germ cell mutagenic (category 1A or 1B)
- toxic for reproduction (category 1A, 1B or 2)
- specific target organ toxicity after repeated exposure (STOT RE category 1 or 2)
- acute aquatic toxicity data E(L)C50 < 0.01 mg/L

If any EC50 or LC50 from acute (short-term) aquatic toxicity studies < 0.1 mg/L, then the substance is a potential T candidate.

Chronic (long-term) aquatic toxicity studies need to be carried out if the substance has been confirmed to be P or B. If the 'No observable adverse effect concentration' (NOEC) or EC10 from chronic aquatic toxicity studies (daphnia, fish, algae) < 0.01 mg/L, the substance will be confirmed as a T substance.

Studies are conducted on both aquatic and mammalian toxicity

There is also a related category vPvB, which is attributed to chemicals with the very lowest levels of biodegradation and the very highest levels of bioaccumulation.

There are slightly different criteria for vPvB in different jurisdictions but the concept is the same.

GHS Hazard Statements

Because of the complexity of the 'toxic' categorisation there are numerous GHS Hazard Statements that may be applied to PBT substances.

What are the legal restrictions?

There are some legal restrictions on specific chemicals that fall into the PBT category e.g. PFOA, PCBs

Legislation such as POP legislation (persistent organic pollutants) also covers some PBTs.

Many individual chemicals will be restricted because of the properties that render them 'toxic' in the PBT definition.

PBT is a relatively new categorisation and some chemicals are definitely in this category and others are being assessed.

What are typical examples of chemicals classified as PBTs?

PFOA, PCBs, Mercury, Some restricted pesticides.

Product Safety:

Formulations containing PBTs are sometimes used in wet processing and are less likely to remain on the finished product - and they can be used in finishing/coating / printing formulations where they will remain on the finished product.

In order to avoid harm to workers or environmental damage, it is not permissible to use any formulations containing PBTs in wet processing or upstream textile processes, even if they will not appear on finished products

Skin sensitizers: What are they?

A skin sensitizer is a chemical that will lead to an allergic response following skin contact. In contrast to skin irritation, skin sensitization is an immunological response to previous exposure to a substance that results in an inflammatory skin reaction.
In order for skin sensitization to occur there has to be previous exposure to the chemical.

A person may become sensitized after a single exposure or it may occur over a prolonged period of time.

Once sensitized to a chemical an individual may suffer a sudden and severe reaction after exposure to a relatively low dose of that chemical.

The effects range from reddening of the skin to severe swelling, soreness, and itching.

It should be noted that avoidance of chemicals that have historically been used in textiles, footwear, and accessories and are known to be skin sensitizers is relatively straightforward.

The avoidance of all allergies, where a very small number of individuals may be allergic to tiny traces of obscure chemicals, is almost impossible.

The risk of skin sensitization is much higher for textile workers who handle chemicals and assembly workers who handle components - but there is a possibility that finished products could pose a risk to consumers.

A particular concern is that consumers who have become pre-sensitized can subsequently have a significant reaction to tiny traces of skin sensitizer in LS&Co. products - so the aim has to be to rigorously manage skin sensitizers in final products to avoid this scenario.

NOTE: some skin sensitizers have other negative properties, such as being persistent or endocrine disruptors. It is always important to look at all the properties of a chemical and not just consider one in isolation.

How are they categorised?

Terms

There are three main terms used to indicate the negative effects of chemicals on the skin:

Irritant

- A chemical that causes irritation on exposure. The irritation is dependent on the chemical, the individual, and the dose and the irritation is likely to follow the same path on each exposure to healthy skin

Skin Sensitiser

- As described above. Apparently safe, symptomless exposure can be followed by a severe reaction on subsequent exposure

Corrosive

- A chemical that causes burns and destruction of skin on exposure

Some chemicals fall into more than one of the above groups depending on concentration.

Skin sensitizers are categorised by noting the propensity of chemicals to cause sensitization in empirical tests in humans or animals. The reaction may be affected by concentrations used in the experiments so there is always some debate in the industry over some classifications.

The severity of the reaction may also be considered.

For skin sensitizers, there are two categories:

Category 1 and 1A - Substances showing a high frequency of occurrence in humans and/or a high potency in animals can be presumed to have the potential to produce significant sensitization in humans

Category 1B - Substances showing a low to moderate frequency of occurrence in humans and/or a low to moderate potency in animals can be presumed to have the potential to produce sensitization in humans. Information on all hazard classes and categorisation is available here

https://www.chemsafetypro.com/Topics/GHS/GHS_Classification_Criteria.html

GHS Hazard Statement

The GHS Hazard Statement of concern is:

H317: May cause an allergic skin reaction

What are typical examples of chemicals classified as Skin sensitizers?

Certain disperse dyes (listed on the RSL) and certain di-isocyanates.

A list of skin sensitizers that may be restricted in the future on textiles by EU legislation can be found here - https://echa.europa.eu/documents/10162/82d6f20a-af6c-9a42-3cc5-77649900f348

Product Safety:

There are some skin sensitizers used in upstream manufacturing processes and residues may be present in formulations.

Formulations containing skin sensitizers are sometimes used in wet processing and are less likely to remain on the finished product - and they can be used in finishing/coating / printing formulations where they will remain on the finished product.

It is not permissible to use any formulations containing skin sensitizers in wet processing or upstream textile processes even if they will not appear on finished products to avoid harm to workers.

APPENDIX 5 TECHNICAL REPRESENTATIVE (TR) ROLES AND RESPONSIBILITIES

PURPOSE

The Technical Representative's (TR) core deliverable is to demonstrate relevant data and metrics that the restricted substances are legally managed in LS&Co. products, and ensure that Materials, Chemicals, and Other Goods comply with the applicable chemical content and chemical exposure laws of every governmental jurisdiction in which those products are fabricated, manufactured, processed or distributed; and protect the health and safety of consumers handling LS&Co. labeled and/or distributed finished products. And also, the TR is responsible and authorized for implementing the LS&Co.RSL – Manufacturing Control Program for the factory locations.

SCOPE OF RESPONSIBILITIES

- Technical Representative shall be able to demonstrate that brand-specific RSL requirements, including necessary RSL agreements, have been executed before engagement with LS&Co. product developments and productions.
- Technical Representative shall be able to demonstrate that all chemicals being brought on-site are accompanied by relevant documentation such as Chemical Information Log (CIL), Safety Data Sheet (SDS), Technical Data Sheet (TDS), etc., and these documents are validated for LS&Co. RSL requirements before purchase.
- The Technical Representative shall manage all aspects of chemical usage in the factory, including, but not limited to, the following:
  - Collection and analysis of chemicals, materials, and product data
  - Purchase only Materials, Chemicals, and Other Goods which comply with LS&Co.'s RSL requirements
  - Product testing and Chemical risk management as per LS&Co.RSL requirements
  - Be sure that employees are familiar with the precautions set out in the SDSs or TDSs
  - Understand all the chemical inputs to your production by requesting fully completed Chemical Information Logs (see Section 6, F) from your chemical Sources
  - Contact all your Materials, Chemicals, and Other Goods Suppliers and Sources to ensure their understanding of LS&Co.'s RSL and their commitment to supplying only RSL compliant chemicals and materials
  - Conduct internal staff training for RSL
  - Document and retain all dyeing, coating, finishing, printing formulations
  - Follow the parameters as listed on the latest TDSs and document all chemicals use and process control variables (e.g., pH, curing temperatures, durations, liquor quantities, and ratios) as used in production with retention of the documentation.
  - Assess the chemical product safety risk that may encounter
  - Implement the processes as defined in the chemical recipes or their equivalents
  - Record-keeping

- Ensure that you and your Suppliers and Sources comply with all applicable legal requirements of the countries and other jurisdictions in which you/they do business, as well as all countries to which they ship any Materials, Chemicals and Other Goods which may be used with respect to LS&Co. labeled and/or distributed products.

- Management of chemical/LS&Co. product-specific feedback and/or complaints from customers and markets.

- Prepare and submit necessary RSL performance scorecards/summary report from time to time as requested by LS&Co. Product safety.

SPECIFIC REQUIREMENTS

- Ensure that all substance-related activities are centralized through the Technical Representative

- Establish an approved chemical supplier list and an approved chemicals list and ensure that all chemical purchases are made only from these lists

- Communication of LS&Co.'s Restricted Substances List (RSL) with all raw material and chemical/auxiliary suppliers

- Collect and maintain all other necessary chemical-related documents such as Chemical inventory, Safety data sheets (SDS), Technical Data Sheets (TDS), Recipes, Chemical Information Log sheets (CIL), Compliance Agreements, Analysis Certificates, and Product test reports from relevant personnel, and establish an efficient archiving system for documents

- Analyze SDS/MSDS of all facility chemicals, focusing on occupational health and safety and environmental protection and taking necessary actions (e.g. create Workplace Hazardous Chemicals Map for the factory; establish Personal Protective Equipment protocol (PPE), etc.) based on information from SDS/MSDS

- Approve the purchase of any new chemical or raw material before implementation in bulk (e.g. samples)

- Provide training for all stakeholders regarding the chemical management system, e.g., purchasing department, maintenance department, production, warehousing, waste personnel, etc.

- Train workers regarding risks from hazardous chemicals and safe usage techniques. Approve the use of chemicals used by contractors in conducting temporary work on-site. Provide support to purchasing personnel regarding the acquisition of chemicals and raw materials.

- Demonstrate that the LS&Co. RSL Usage ban and priority chemical policy requirements met during any and all stages of product manufacturing.

- Establish factory sampling programs for testing releases into all media - such as raw materials, chemicals, fabrics, garments, and sundry components as per LS&Co. standards.

APPENDIX 6 : DEFINITIONS

ACCESSORIES - Products other than typical pants and shirts. Accessories can include both apparel and non-apparel products such as belts, caps, shoes, handbags, gloves, socks, scarves, eyewear, watches, home textile products and wallets. The examples covered here are neither exhaustive nor all inclusive; they simply provide examples of products defined as accessories. All accessories are covered by LS&Co.'s RSL.

ALLOWABLE TRACE (TR) - The Allowable Trace is identified by the TR designation in the Limit Value column. The Allowable Trace [amount] represents the [permitted unavoidable trace presence] amount of a substance that has been added unintentionally or unavoidably to a Materials, Chemicals and Other Goods, but is nonetheless [is] allowed to be [found] detected in [on the garment] the Materials, Chemicals and Other Goods when otherwise the substance has been prohibited from use.

CHEMICAL ABSTRACT SERVICE (CAS) NUMBER - A unique number that identifies a particular chemical structure. While there may be various synonyms for a substance using different naming conventions, there is only one CAS number. Mixtures do not have CAS numbers; only individual chemical components have CAS numbers. When there is doubt about the chemical name used in the RSL, always check the CAS number.

CHILDREN'S PRODUCTS - An article which is designed for or intended primarily for use by children aged 12 years and under. All Girls size 0-16 and Boys size 0-20 are presumptively included within this definition of children's products.

CONCENTRATION LIMIT - The concentration limit is set for each substance as measured in each of the Materials, Chemicals and Other Goods supplied to LS&Co. and in the final product. It represents the maximum allowable amount of the respective substance which can be found in a RSL compliant product. The concentration limit is shown in the Limit Value column. The limit is specified as the amount of the substance on the amount of substrate, by weight (e.g., milligrams substance per kilogram of product [mg/kg]).

Concentration limits are applicable to any single part of a garment or accessory, not an average over the whole product. If the limit is given for a group of substances with various CAS numbers, the concentration should be calculated on basic substance of the group generally given with its name in the name column. For example, with regard to methylene diphenyl diisocyanates (with isomers, homologs, oligomers and polymers), all MDI type is ocyanates must be measured and calculated to the monomer 4,4'-methylenediphenyl diisocyanate). Another example is the metals present in the apparels in the form of several salts which are measured together and must be calculated as the elemental metal content. On the other hand, the analytical method sometimes measures a substance containing many chemicals.

DETECTION LIMIT - Specifies the test method detection sensitivity that a laboratory must be able to achieve when measuring the substance in the product.

LS&Co. PRODUCT(S) - LS&Co. final products covered by the RSL include all LS&Co. branded products, including Levi's®, Dockers®, DENIZEN® and Signature by Levi Strauss & CO.™ products as well as LS&Co. distributed products. LS&Co.Products include those sourced directly by LS&Co., products sourced by an agent, and those designed and sourced by our licensee partners.

NON-APPAREL PRODUCTS - Products made from materials other than fabric or leather. Some products included in non-apparel products are mobile phones, home furnishings, ties, hats, watches, jewelry, eyewear and electronics. All other non-apparel products are covered by LS&Co.'s RSL.

POLYVINYL CHLORIDE (PVC) - Polyvinyl chloride, or PVC for short, is a hard plastic that may be found in packaging materials, flashers and screen printing. PVC is prohibited for use in packaging for all LS&Co. products. Alternatives to PVC packaging include polyurethane (PU), polyethylene (PE) and polyethylene terephthalate (PET). In addition, PVC screen printing, which utilizes phthalates, is prohibited for products.

PREPARATION - A mixture or solution composed of two or more substances.

APPENDIX 6 :

REPORTING LIMIT (RL) – The lowest concentration the laboratory is allowed to report. Results below reporting limits are affected by higher measurement uncertain ies and reported as Not Detected.

SOURCE(S) - Business partners of Suppliers that provide Materials, Chemicals and Other Goods or other goods for direct or eventual use in fabricating, manufacturing or other processing of LS&Co. labeled and/or distributed apparel, non-apparel, footwear, accessories and other products.

SUBSTANCE- A chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

SUNDRIES - Items that are permanently attached to the garment or footwear and may include zippers, rivets, buttons, care labels, name labels and tags.

SUPPLIER(S) - Include factories and other businesses, including licensees, that contract with LS&Co. to produce finished products, apparel, non-apparel, footwear, accessories and other products for LS&Co. Suppliers may also contract with Sources for Materials, Chemicals and Other Goods for direct or eventual use in fabricating, manufacturing or other processing of LS&Co. labeled and/or distributed apparel, non-apparel, footwear, accessories, and other products.

TECHNICAL REPRESENTATIVE (TR) - A factory nominated/appointed RSL point person to handle RSL activities as per LS&Co. RSL requirements (refer Appendix -5 for TR roles and responsibilities)

USAGE BAN - A prohibition of any use of the substance during any and all stages of product manufacturing. However, the RSL identifies an Allowable Trace ("TR") amount of the substance to be detected if caused by unintentional or unavoidable contamination.

APPENDIX 7 : LS&Co. PRODUCT SAFETY CONTACT INFORMATION

Global, Americas, India and Sri Lanka

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Leather footwear and accessories (LFA)

Zheng Billy

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CHINA

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E-mail : bzheng@levi.com

APPENDIX 8 : APPROVED LABORATORIES

Modern Testing Services	Scope of RSL Test	
	Full	Partial
Asia		
China- Hong Kong	X	
China- Shanghai	X	
China- Dongguan	X	
Taiwan		X
India - Tirupur		X
India - Bangalore		X
Bangladesh		X
Pakistan		X
Cambodia		X
Vietnam		X
Europe		
Germany	X	
UK		X
Americas		
US– Norwood, MA		X

Global Contact for Modern Testing Services

Laboratory Name: MTS (Global) Ltd. – Hong Kong
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Bureau Veritas	Scope of RSL Test	
	Full	Partial
Asia		
China- Hong Kong	X	
China- Shanghai	X	
China- Panyu	X	
Taiwan		X
Korea		X
India - Banaglore		X
India - Noida		X
India - Tirurpur		X
Bangladesh-Dhaka		X
Bangladesh-Chittagong		X
Sri Lanka		X
Pakistan		X
Vietnam - HCM		X
Vietnam - Hanoi		X
Europe		
Germany		X
Turkey		X
Americas		
Mexico		X
Guatemala		X

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Intertek	Scope of RSL Test	
	Full	Partial
Asia		
India– Bangalore		X
India– Gurgaon		X
India– Tirupur		X
Sri Lanka		X
Bangladesh– Dhaka		X
Bangladesh– Chittagong		X
Pakistan		X
Mauritius		X
China – Shanghai	X	
China– Guangzhou		X
China - Xiamen		X
Hong Kong	X	
Cambodia		X
Vietnam - HCM		X
Vietnam - Hanoi		X
Europe		
Turkey		X
Egypt		X
Americas		
US – Arlington Heights		X
Guatemala		X

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