

G-STAR RAW

MANUFACTURING
RESTRICTED SUBSTANCES LIST

VERSION 1.0 - OCTOBER 2014

INTRODUCTION

This Manufacturing Restricted Substance List (MRS�) will assist in the control of hazardous substances used to process textile and trim materials. Natural leather and metal trim parts are excluded from the scope of this MRS�.

The document addresses hazardous substances potentially used and discharged into the environment during manufacturing and related processes, not just those which could be present in finished products. G-Star Raw C.V. anticipates that suppliers will work closely with their chemical and material suppliers to ensure substances mentioned in this MRS� are not present above the limits given in any of the chemical commercial products that are purchased from chemical suppliers. This MRS� is an important part of G-Star's Corporate Responsibility program and shall be shared with all suppliers, sub-contractors and others involved in the production of G-Star products. The following production are targeted by this document: Mill, Printing, CMT, Finishing and Trim suppliers (excl. metal trims).

Purpose of the list

G-Star cares about consumers and the environment. Our suppliers are critical partners in our commitments in the area of consumer safety and environmental protection. The MRS� contains a list of chemical substances by CAS# that are subject to a usage ban. The MRS� applies to chemicals used in the manufacturing of materials, components and finished products, which include solvents, cleaners, adhesives, paints, inks, detergents, dyes, colorants, auxiliaries, finishing agents used for wet processing, maintenance, waste water treatment, sanitation and pest control. There should be no intentional use of the MRS� listed substances in facilities.

Note: The MRS� does not replace applicable national environmental or workplace safety restrictions. Worker exposure to the listed and other hazardous substances must not exceed

occupational exposure limits and chemical formulations must comply with all applicable legal restriction, including any subsequent restrictions that establish stricter limits. The MRS� does not replace legal restrictions on hazardous substances in finished products (RSL requirements).

Definitions

Chemical Substance

means 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.

Commercial Chemical Product

is a proprietary blend of several chemical substances or a reaction product used to create a 'trade name' or 'functional' product that is available for purchase from a chemical supplier. Note this document will not list commercial chemical products.

CAS

Chemical Abstract Service index number

is a link to a wealth of information about a specific chemical substance, is a unique numeric identifier, designates only one substance, has no chemical significance. It includes up to 9 digits which are separated into 3 groups by hyphens. The first part of the number, starting from the left, has up to 6 digits; the second part has 2 digits and the final part consists of a single check digit.

Usage Ban

means a chemical product used for the manufacturing of articles (e.g.) must not intentionally contain these substances or substance groups.

MRS� Creation Process

The MRS� includes relevant substances from the original 11 priority chemical groups along with additional substances discussed with qualified experts from the Zero Discharge of Hazardous Chemicals Technical Advisory Committee (ZDHC TAC). Several of the listed substances are regulated in finished products and have been successfully restricted for years.

MRS� Instructions

Raw Material and Finished Product Supplier Guidance

Substances are banned from intentional use in facilities that process raw materials and manufacture finished products. Please refer to G-Star's Restricted Substance List (RSL) for individual requirements.

Chemical Supplier Formulation Limit

Substances are restricted to concentration limits in chemical formulations commercially available from chemical suppliers. These limits ban intentional use while allowing for reasonable expected manufacturing impurities that should be consistently achievable by responsible chemical manufacturers.

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MANUFACTURING RESTRICTED SUBSTANCES LIST

	SUBSTANCE	CAS Number	Raw Material and Finished Product Supplier Guidance	Chemical Supplier Commercial Formulation Limit	Guidelines	General Techniques for Analysing	Common Potential Use	Mill	Printer	CMT	Finish	Trims (excl. metal trims)
	PHTHALATES											
Zero Discharge	Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7	Usage Ban for every single substance	sum of all phthalates 250 ppm	Declaration needed from chemical supplier/raw material supplier	GC-MS	Esters of orth-phthalic acid or "phthalates" are a class of organic compounds commonly added to plastics to increase flexibility. They are sometimes used to facilitate molding of plastic by decreasing its melting temperature. Phthalates can be found in: Flexible Plastic components (e.g. PVC) Print pastes Adhesives Plastic buttons Plastic sleeveings Coatings	X	X	X	X	
	Dibutyl phthalate (DBP)	84-74-2										
	Butylbenzyl phthalate (BBP)	85-68-7										
	Di-"isononyl" phthalate (DINP)	28553-12-0 and 68515-48-0										
	Di-"isodecyl" phthalate (DIDP)	26761-40-0 and 68515-49-1										
	Di-n-octyl phthalate (DNOP)	117-84-0										
	Di-isobutyl phthalate (DIBP)	84-69-5										
	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4										
	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	71888-89-6										
	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0										
	Di-iso-pentyl phthalate (DIPP)	605-50-5										
	n-Pentyl-isopentyl phthalate	776297-69-9										
Di-n-pentyl phthalate (DnPP)	131-18-0											
Bis(2-methoxyethyl) phthalate (DMEP)	117-82-8											
Di-n-hexyl phthalate (DHP)	84-75-3											
Dimethyl phthalate (DMP)	131-11-3											
	FLAME RETARDENTS											
Zero Discharge	Tris-(2,3-dibromopropyl)- phosphate (TRIS)	126-72-7	Usage Ban	5ppm	Declaration needed from chemical supplier/raw material supplier	GC-MS	Flame retardant chemicals potentially used in clothing and tent fabric (PU clothings) to meet safety standards.	X	X	X	X	
	Tris - (aziridiny) - phosphineoxide (TEPA)	5455-55-1										
	Polybromobiphenyls (PBB)	59536-65-1										
	Hexabromocyclododecane (HBCDD)	25637-99-4										
	Octabromodiphenylether (OctaBDE)	32536-52-0										
	Tris-(2-chloroethyl)-phosphate (TCEP)	115-96-8										
	Pentabromodiphenyl ether (PentaBDE)	32534-81-9										
	Bis(2,3-dibromopropyl) phosphate (BBP)	5412-25-9										
	Bis(2,3-dibromopropylether) of tetrabromobisphenol (BDBPT)	21850-44-2										
	Decabromodiphenyl Ether (DecaBDE)	1163-19-5										

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AZO DYES WHICH BY REDUCTIVE CLEAVAGE MAY RELEASE ONE OR MORE ARYLAMINES												
Zero Discharge	Biphenyl-4-ylamin, 4-aminobiphenyl xenylamine	92-67-1	Usage Ban	Declaration needed from chemical supplier/raw material supplier	LC, GC	200ppm	Azo dyes and pigments are colorants that incorporate one or several azo groups (-N=N-) bound with aromatic compounds. Thousands of azo dyes exist, but only those which degrade to form listed amines are restricted. Azo dyes are used in dyed fabric or leather.	X	X	X	X	
	Benzidine	92-87-5				200ppm						
	4-chloro-o-toluidine	95-69-2				200ppm						
	2-naphthylamine	91-59-8				200ppm						
	o-aminoazotoluene, 4-amino-2',3-dimethylazobenzene 4-o-tolylazo-otoluidine	97-56-3				200ppm						
	5-nitro-o-toluidine	99-55-8				200ppm						
	4-chloroaniline	106-47-8				200ppm						
	4-methoxy-m-phenylenediamine	615-05-4				200ppm						
	4,4'-methylenedianiline 4,4'-diaminodiphenylmethane	101-77-9				200ppm						
	"3,3'-dichlorobenzidine 3,3'-dichlorobiphenyl-4,4'-ylenediamine	91-94-1				200ppm						
	3,3-dimethoxybenzidine o-dianisidine	119-90-4				200ppm						
	3,3-dimethylbenzidine, 4,4'-bi-o-toluidine	119-93-7				200ppm						
	4,4'-methylenedi-o-toluidine	838-88-0				200ppm						
	6-methoxy-m-toluidine p-cresidine	120-71-8				200ppm						
	4,4'-metylene-bis-(2-chloro-aniline) 2,2'-dichloro-4,4'-ethylenedianiline	101-14-4				200ppm						
	4,4'-oxydianiline	101-80-4				200ppm						
	4,4'-thiodianiline	139-65-1				200ppm						
	o-toluidine, 2-aminotoluene	95-53-4				200ppm						
4-methyl-m-phenylenediamine	95-80-7	200ppm										
2,4,5-trimethylaniline	137-17-7	200ppm										
o-anisidine (2-methoxyanilin)	90-04-0	200ppm										
4-amino azobenzene	60-09-3	200ppm										
2,4-xylydine	95-68-1	200ppm										
2,6-xylydine	87-62-7	200ppm										

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ORGANOTIN COMPOUNDS												
Zero Discharge	Diocetyl tin (DOT) + compounds	1002-53-5	Usage Ban	20ppm	Declaration needed from chemical supplier/raw material supplier	GC-MS, LRMS	Organotins are a class of chemicals combining tin and organics such as butyl and phenyl groups. Organotins are predominantly found in the environment as antifoulants in marine paints, but they can also be used as biocides (e.g., antibacterials), catalysts in plastic and glue productions, and heat stabilizers in plastics/rubber. In textiles and apparel, organotins may be associated with textiles plastics/rubber, inks, paints, metallic glitter, and heat transfer material.	X	X			
	Triphenyltin (TPHT) + compounds	56573-85-4		5ppm								
	Dibutyltin (DBT) + compounds	668-34-8		5ppm								
	Tributyltin (TBT) + compounds	15231-44-4		5ppm								
CHLOROBENZENES AND CHLOROTOLUENES												
Zero Discharge	Dichlorobenzenes *	95-50-1, 541-73-1, 106-47-7	Usage Ban	1000ppm	Declaration needed from chemical supplier/raw material supplier	GC-MS	Chlorobenzenes (Chlorinated aromatic hydrocarbons) are used as carriers in the dyeing process of polyester or wool/polyester fibers. They can also be used as solvents.	X	X	X	X	X
	Trichlorobenzenes *	87-61-6, 120-82-1, 108-70-3		10ppm								
	Tetrachlorobenzenes	17700-09-3		10ppm								
	Pentachlorobenzenes	608-93-5		10ppm								
	Hexachlorobenzene	118-74-1		10ppm								
	Chlorotoluenes	95-49-8		10ppm								
	Dichlorotoluenes *	95-73-8, 118-69-4, 95-75-0		10ppm								
	Trichlorotoluenes *	98-07-7, 2077-46-5, 6639-30-1		10ppm								
	Tetrachlorotoluenes *	5216-25-1, 81-19-6, 134-25-8		10ppm								
Pentachlorotoluenes *	877-11-2, 13014-24-9	10ppm										

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CHLORINATED SOLVENTS												
Zero Discharge	1,2,3-Trichloropropane	96-18-4	Usage Ban	5ppm	Declaration needed from chemical supplier/raw material supplier	GC-MS	In apparel and footwear, solvents are used as finishing/cleaning and printing agents, for dissolving and diluting fats, oils and adhesives (e.g., in degreasing or cleaning operations).	X	X	X	X	X
	1,2-Dichloroethane	107-06-2		5ppm								
	Pentachloroethane	76-01-7		5ppm								
	Chloroform	67-66-3		5ppm								
	Trichloroethane	79-00-5		5ppm								
	1,1,1-Tetrachloroethane	630-20-6		5ppm								
	1,1-Dichloroethylene	75-35-4		5ppm								
	1,1,1-Trichloroethane	71-55-6		5ppm								
	Carbon Tetra Chloride	56-23-5		5ppm								
	Tetrachloroethylene	127-18-4		5ppm								
Trichloroethylene	79-01-6	5ppm										
CHLOROPHENOLS												
Zero Discharge	Pentachlorophenol (PCP)	87-86-5	Usage Ban	Sum of all 20ppm	Declaration needed from chemical supplier/raw material supplier	GC-MS	Chlorophenols are polychlorinated compounds used as preservatives or pesticides. Pentachlorophenol (PCP) and Tetrachlorophenol (TeCP) are sometimes used to prevent mould and kill insects when growing cotton and when storing/transporting fabrics. PCP/TeCP can also be used as a preservative in print pastes.	X				X
	2,3,5,6 - Tetrachlorophenol (TeCP)	935-95-5										
	2,3,4,6 - Tetrachlorophenol (TeCP)	58-90-2										
	2,3,4,5 - Tetrachlorophenol (TeCP)	4901-59-3										
CHLORINATED PARAFFINS												
Zero Discharge	Short-chain chlorinated paraffins (SCCP)	85535-84-8	Usage Ban	50ppm	Declaration needed from chemical supplier/raw material supplier		SCCP's: used as flame retardants, in plasticizers, paints and adhesives and for fat liquoring of leather. SCCP's may cause long-term adverse effects in the aquatic environment.	X	X		X	X
	Medium-chain chlorinated paraffins (MCCP)	85535-85-9		50ppm								

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HEAVY METALS, EXTRACTABLE												
Zero Discharge	Arsenic (As)	7440-38-2	Usage Ban	50ppm	Declaration needed from chemical supplier/raw material supplier	ICP-OES, AAS	Arsenic and its compounds can be used in some preservatives, pesticides and defoliants for cotton. It is also associated with synthetic fibers, accessories for textiles and clothing, paints, inks, trims, plastics, and metal components.					
	Cadmium (Cd)	7440-43-9		20ppm/50ppm for pigments			Cadmium compounds are found in or used as: Pigments (particularly red, orange, yellow, and green), Stabilizer for PVC plastic, Fertilizers, Biocides, Alloys for plating of other.					
	Chromium (Cr VI)	7440-47-3		1ppm			Chromium is used in leather tanning and can be oxidised into Cr6+.					
	Lead (Pb)	7439-92-1		50ppm			In apparel and footwear, lead may be associated with plastics, paints, inks, pigments, surface coatings and metal components.	X	X		X	X
	Mercury (Hg)	7439-97-6		2ppm/25ppm for pigments			Mercury compounds can be present in pesticides and can be found as contamination in caustic soda (NaOH). Mercury compounds can be used in paints (e.g. surface paints on zippers and buttons).					
	Nickel (Ni)	7440-02-0		250ppm			Nickel metal is mainly used for plating of alloys, improving the corrosion resistance in alloys, improving the hardness of alloys and is a key element in the production of stainless steel. Certain dyestuffs contain complexbound Nickel. Both Nickel metal and Nickel compounds can occur as an impurities in pigments and alloys.					
ALKYLPHENOLS (AP) AND ALKYLPHENOL ETHOXYLATES (APEO)												
Zero Discharge	Nonylphenols (NP)	25154-52-3 104-40-5 11066-49-2 84852-15-3	Usage Ban	250ppm	Declaration needed from chemical supplier/raw material supplier	LC-MS GC-MS	APEOs can be used as or found in: Detergents, Scouring agents, Wetting agents, Softeners, Emulsifier/dispersing agents for dyes and prints, Impregnating agents, Degreasing agents for leather, Leather Finishing, Degumming for silk production, Dyes and pigment preparations, Polyester padding and Down/ feather fillings.					
	Octylphenols (OP)	27193-28-8 140-66-9 1806-26-4		250ppm								
	Nonylphenoethoxylates (NPEO)	9016-45-9 26027-38-3 37205-87-1 68412-54-4 127087-87-0		500ppm				X	X	X	X	X
	Octylphenolsethoxylates (OPEO)	9063-89-2 9036-19-5 38987-90-6 9002-93-1		500ppm								

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	PERFLUORINATED CHEMICALS												
Zero Discharge	Perfluorooctanesulfonates (PFOS)	1763-23-1	Usage Ban	1ppm	Declaration needed from chemical supplier/raw material supplier	LC-MS	PFOS is sometimes used as an ingredient in stain repellent finishes. PFOS is used as a binder in non-woven fabrics to enhance dyeing, wetting agents to improve coverage and penetration of substances, achieve finish on-yarn uniformity, and water resistance, oil resistant coatings on textiles, leather, and other materials. Perfluorooctanoic Acid is used in the production of fluoropolymers which are used as impregnating agents on textiles (e.g., water repellents on jackets).						
	Perfluorooctane acids (PFOA)	335-67-1		2ppm									
	1H,1H,2H,2H-Perfluorooctylacrylate (6:2 FTA)	17527-29-6		ND						X		X	X
	1H,1H,2H,2H-Perfluorodecylacrylate (8:2 FTA)	27905-45-9		ND									
	1H,1H,2H,2H-Perfluorododecylacrylate (10:2 FTA)	17741-60-05		ND									
	1H,1H,2H,2H-Perfluoro-1-hexanol (4:2 FTOH)	2043-47-2		ND									
	1H,1H,2H,2H-Perfluoro-1-otanol (6:2 FTOH)	647-42-7		ND									
	1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTOH)	678-39-7		ND									
1H,1H,2H,2H-Perfluoro-1-dodecanol (10:2 FTOH)	865-86-1	ND											
							Perfluorinated chemicals (PFC's) can be used as impregnation agents and cleaning products. PFC's are persistent, bioaccumulative and poisonous and possibly carcinogenic.						

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POLYCYCLIC AROMATIC HYDROCARBONS (PAH'S)												
Zero Discharge	Benzo(a)pyrene	50-32-8	Usage Ban	20ppm	Declaration needed from chemical supplier/raw material supplier	GC-MS	Polycyclic Aromatic Hydrocarbons (PAHs) are natural components of crude oil and they are a common residue from oil refining. PAHs have a characteristic smell similar to the smell of car tires or asphalt. Oil residues containing PAHs are added in rubber and plastics as a softener or extender. Therefore, PAHs are risky in rubber, plastics, lacquers and coatings. PAHs are often found in the outsoles of footwear and in printing pastes of screen prints. PAHs can be present as impurities in Carbon Black. Clean mineral oils should be used in the rubber to avoid PAHs.	X	X	X	X	X
	Benzo(e)pyrene	192-97-2		sum of all PAH = 200ppm								
	Benzo(a)anthracene	56-55-3										
	Chrysene	218-01-9										
	Benzo(b)fluoranthene	205-99-2										
	Benzo(j)fluoranthene	205-82-3										
	Benzo(k)fluoranthene	207-08-9										
	Dibenzo(a,h)anthracene	53-70-3										
	Acenaphthene	83-32-9										
	Acenaphthylene	208-96-8										
	Anthracene	120-12-7										
	Benzo(ghi)perylene	191-24-2										
	Fluoranthene	206-44-0										
	Fluorene	86-73-7										
	Indeno(1,2,3-cd)pyrene	193-39-5										
	Naphthalene	91-20-3										
Phenanthrene	85-01-8											
Pyrene	129-00-0											

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	ALLERGENIC DISPERSE DYES											
ADDITIONALLY	C.I. Disperse Blue 1	2475-45-8	Usage Ban	250ppm	Declaration needed from chemical supplier/raw material supplier	LC	Disperse dyes are a class of water-insoluble dyes that penetrate the fiber system of synthetic or manufactured fibers and are held in place by physical forces without performing chemical bonds. Disperse Dyes are used in synthetic fiber (e.g. polyester, acetate, polyamide). Restricted disperse dyes are suspected of causing allergic reactions and should no longer be used for dyeing of textiles.	X		X		X
	C.I. Disperse Yellow 3	2832-40-8		250ppm								
	C.I. Disperse Blue 106	12223-01-7		250ppm								
	C.I. Disperse Blue 124	61951-51-7		250ppm								
	C.I. Disperse Blue 35	12222-75-2		250ppm								
	C.I. Disperse Orange 3	730-40-5		250ppm								
	C.I. Disperse Orange 37/59/76	12223-33-5 / 13301-61-6		250ppm								
	C.I. Disperse Red 1	2872-52-8		250ppm								
	C.I. Disperse Blue 3	2475-46-9		250ppm								
	C.I. Disperse Blue 7	3179-90-6		250ppm								
	C.I. Disperse Blue 26	3860-63-7		250ppm								
	C.I. Disperse Blue 102	12222-97-8		250ppm								
	C.I. Disperse Brown 1	23355-64-8		250ppm								
	C.I. Disperse Orange 1	2581-69-3		250ppm								
	C.I. Disperse Red 11	2872-48-2		250ppm								
	C.I. Disperse Red 17	3179-89-3		250ppm								
	C.I. Disperse Yellow 1	119-15-3		250ppm								
	C.I. Disperse Yellow 9	6373-73-5		250ppm								
	C.I. Disperse Yellow 39	12236-29-2		250ppm								
	C.I. Disperse Yellow 49	54824-37-2		250ppm								
C.I. Disperse Orange 149	85136-74-9	250ppm										
C.I. Disperse Yellow 23	6250-23-3	250ppm										

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CARCINOGENIC DYES												
ADDITIONALLY	C.I. Acid Red 26	3761-53-3	Usage Ban	250ppm	Declaration needed from chemical supplier/raw material supplier	LC	Most of these substances are regulated and should no longer be used for dyeing of textiles	X	X			X
	C.I. Basic Red 9	569-61-9		250ppm								
	C.I. Direct Black 38	1937-37-7		250ppm								
	C.I. Direct Blue 6	2602-46-2		250ppm								
	C.I. Direct Red 28	573-58-0		250ppm								
	C.I. Disperse Blue 1	2475-45-8		250ppm								
	C.I. Disperse Yellow 3	2832-40-8		250ppm								
	C.I. Basic Violet 14	632-99-5		250ppm								
C.I. Disperse orange 11	82-28-0	250ppm										
OTHER SOLVENTS/VOLATILE ORGANIC COMPOUNDS (VOC)												
ADDITIONALLY	Xylene	1330-20-7	Usage Ban	500ppm	Declaration needed from chemical supplier/raw material supplier	GC-MS	These volatile organic compounds should not be used in textile auxiliary chemical preparations. They are associated with solvent-based processes like solvent-based PU coatings and glues/adhesives. They should not be used for any kind of facility cleaning or post-cleaning.	X	X	X	X	X
	o-Xylene	95-48-7		500ppm								
	p-Xylene	106-44-5		500ppm								
	m-Xylene	108-39-4		500ppm								
	Benzene	71-43-2		50ppm								
POLYVINYLCHLORIDE (PVC)												
ADDITIONALLY	Polyvinylchloride	9002-86-2	Usage Ban	ND	Declaration needed from chemical supplier/raw material supplier	ATR-FT IR	The use of PVC is voluntarily restricted because it is claimed that dioxins are produced as a byproduct of vinyl chloride manufacture and from burning of waste PVC.	X	X	X	X	X

LC - Liquid Chromatography

MS - Mass spectrometry

GC - Gas Chromatography

ICP-OES - Inductively coupled plasma - optical emission spectrometry

ATR-FT IR - Attenuated total reflection Infrared spectroscopy

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Information provided in this document is valid as of October 2014. Changes, modifications and/or actualizations will be notified from time to time, and will make part of this list as of such date.

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